

Folding aggregates

Oil lubrication

Use and maintenance manual



Publication information

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Analytical index

Introduction

Field of application and limits of the manual

This manual has been prepared specifically for the user of the aggregate, and provides basic information that the user must be aware of prior to using it. In addition, the manual also contains information on maintaining the aggregate to ensure it remains efficient and safe over time.

Documents supplied with the aggregate

- **Use and maintenance manual:** contains all the information necessary for proper use of the aggregate.
- **Technical data sheet:** indicating the dimensions, characteristic data and performance figures of the aggregate.
- **Duty cycle** (if present): this data sheet shows the necessary stop times according to the operating cycles.

Aim of the document

The principal aim of the document is to ensure that personnel interacting with the component during its working life, do so in compliance with the instructions reported in this manual, thus safeguarding the health and safety of the personnel concerned.

The manual has been written, in particular, for the machine operator (general personnel) and user of the aggregate during the production phases, and the maintenance engineer (qualified personnel) during setting up and ordinary maintenance of the machine.

Symbols used in the manual



Paragraphs marked with this symbol indicate an imminent danger, and the contents must therefore be taken into careful account in order to prevent a serious accident.



Paragraphs marked with this symbol indicate procedures to be used and actions to be taken to avoid any damage to goods and property



This symbol is used to indicate points of particular importance that must not be overlooked.

Warnings

Before using the aggregate read the information about safety in appendix to this manual.

Ordering and requesting information

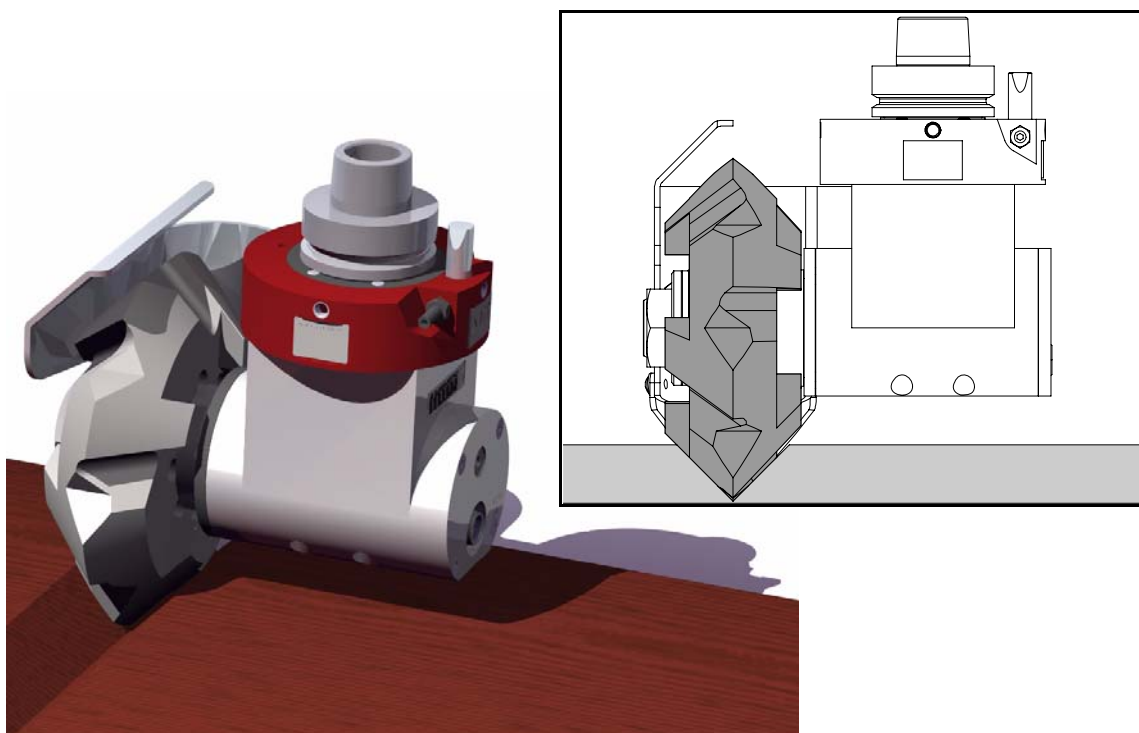
Requests for additional copies of the documentation supplied with the aggregate, or for any other information relating to the documentation, services, assistance or spare parts, specify:

- model of aggregate;
- name of dealer;
- specific information on any problems;
- clear information on the machining operations to be carried out;
- periods of use.

Description

1 Main parts

1.1 Designed use



The folding aggregates are created to execute the grooves on the panel.

Depending on the version of aggregate in your possession, the designed use may vary according to the type of machining provided for (see table).

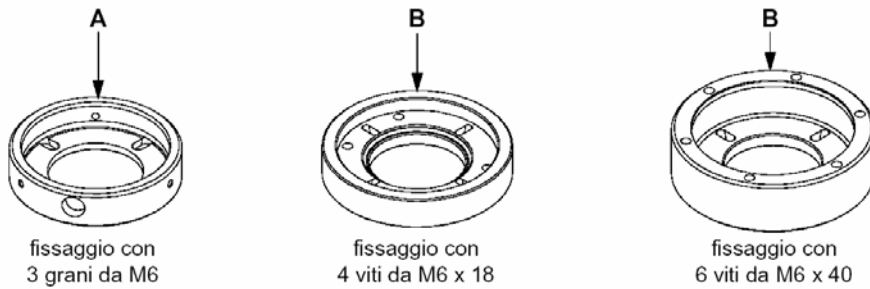
fitting	designed use
shaft + 2 keys	heavy folding
shaft + anti-rotation pin	soft folding

In all cases, these aggregates are used on machine tools for removing chips from the materials specified in the table below.

plastics	wood (solid, chipboard,...)
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1.2 Aggregate-electrospindle interface

1.2.1 Flange types

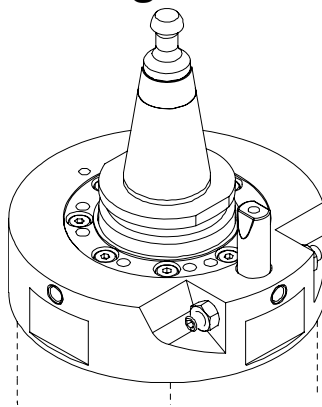


Flanges allow aggregates to be mounted on the electrospindles.

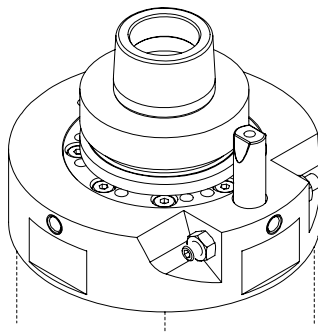
Type A flanges are fixed using grub screws on the sides.

Type B flanges are fixed using screws on the bottom part.

1.2.2 Types of mounting



Type ISO 30 mounting with anti-rotation pin.

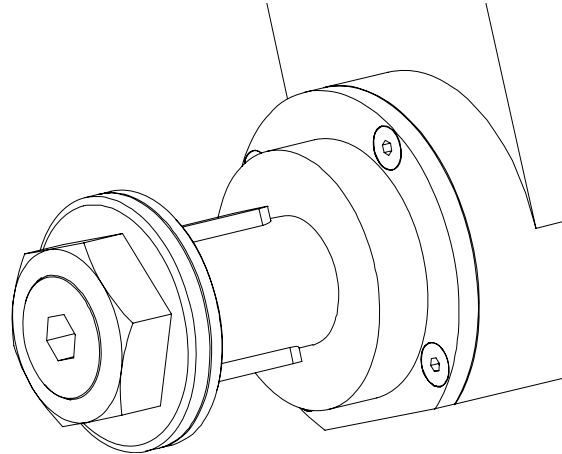


Type HSK F63 mounting with anti-rotation pin.

i It is possible to have more than one anti-rotation pin fitted according to need.

1.3 Aggregate-tool interface

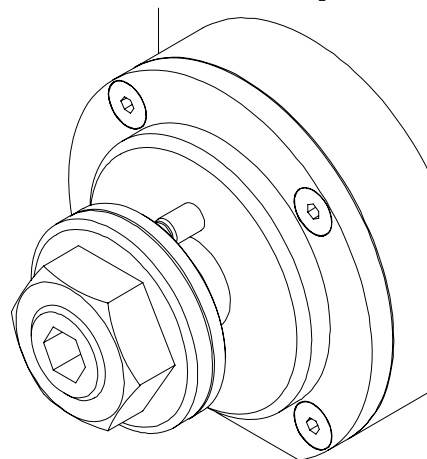
1.3.1 Shaft with 2 keys and flange



With this type of tool coupling it's possible to install heavy duty tools (high thickness, high diameter and high working depth), the power transmission is achieved by means of 2 keys and the lock of the blade it's with a flange.

 **Tools without keyway must not be used.**

1.3.2 Shaft with anti-rotation pin and flange

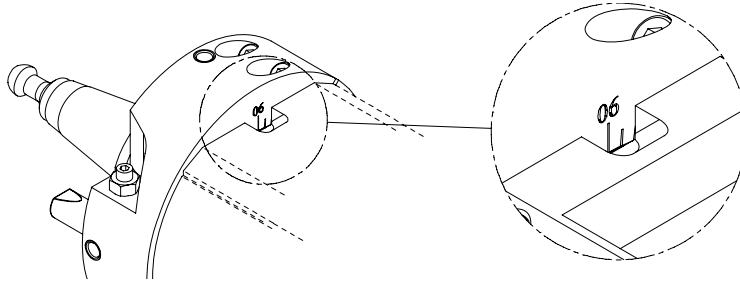


With this type of tool coupling it's possible to install tools for soft works (low thickness, low diameter and low working depth), the power transmission is achieved by means of 1 anti-rotation pin and the lock of the blade it's with a flange.

 **Tools without a hole for the anti-rotation pin must not be used.**

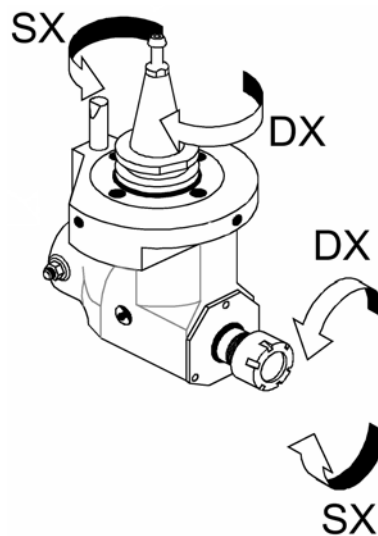
1.4 Aggregate orientation

1.4.1 Axial orientation



Allows the aggregate to be orientated according to the axis of the electrospindle.

1.5 Conventions



The direction of rotation is defined according to whether the motion is transmitted or received.

The axis is defined as entering if the motion is received, leaving if the motion is transmitted.

The electrospindle-aggregate interface has its axis of rotation entering and direction of rotation LH (SX) or RH (DX).

The aggregate-tool interface has its axis of rotation leaving and direction of rotation LH (SX) or RH (DX).



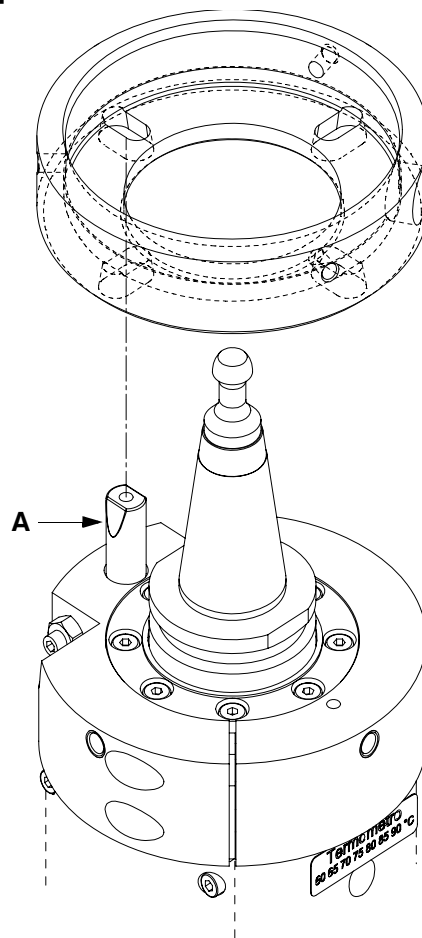
Always check the direction of rotation of the aggregate in order that the correct tool can be mounted.



Except other specifications in the technical-data sheet, the folding aggregate have the rotation direction RH for the electrospindle coupling and LH for the folding tool.

2 Preparation

2.1 Fitting the aggregate on the electrospindle

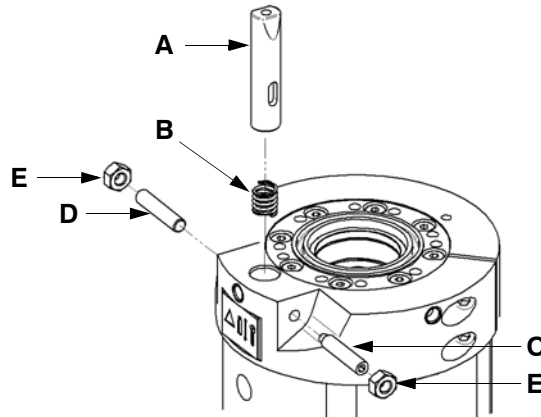


It is only possible to fit an aggregate to electrospindles equipped with a flange with one or more housings for lockpin (Ref. **A**), or with an automatic aggregate orientation device (C axis).

The aggregate must be fitted with pin orientated to correspond with the housing required.

When the aggregate is fitted to an electrospindle for the first time it will be necessary to adjust lockpin (see below), so as to ensure it couples perfectly with the housings.

2.1.1 Adjusting the lockpin



- A lockpin
- B spring
- C guide screw
- D lockscrew
- E nut

Unscrew the locknut (Ref. E) and slacken the locking screw (Ref. D) without completely unscrewing it, the pin will be pushed upwards by the spring (Ref. B).



Do not completely unscrew screws (Ref. C) and (Ref. D) in order to prevent the pin from jumping out and to ensure it just moves inside its housing.

Push down the lockpin (Ref. A) until it stops then turn the lockscrew (Ref. D) to lock lockpin (Ref. A) in lowest position.

Fit the aggregate on the electro-spindle aligning the lockpin with its housing on electro-spindle flange.

Loosen again the lockscrew (Ref. D) in order to let lockpin enter into its housing on electro-spindle flange.

Lock the lockpin again by tightening the lockscrew after checking lockpin is completely entered in its housing.

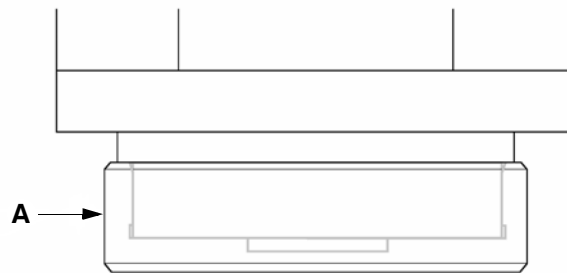


Not adjusting the lockpin can cause rapid deterioration in the aggregate mounting, with the consequent risk of separation from the electrospindle.

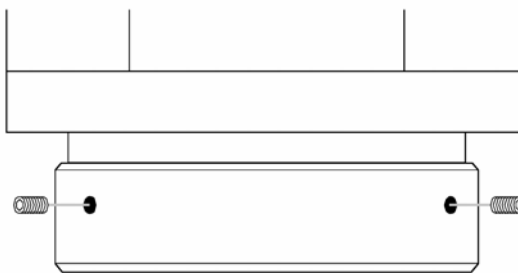
2.2 Assembling of the flange on the electric spindle

2.2.1 Assembling of the flange with lateral fixing

1. Clean the lower side of the electric-spindle and the internal side of the flange carefully.

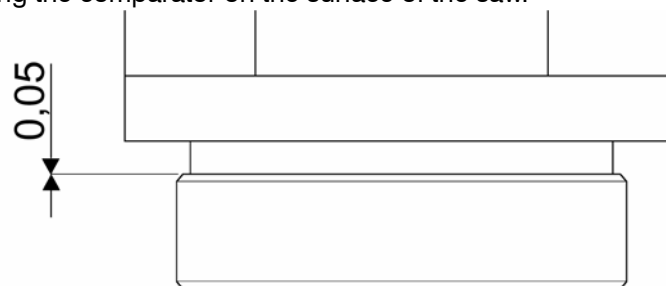


2. Insert the flange (Ref. A) on the electric-spindle.



3. Screw 2 dowels with flat edge in two of the three holes positioned on the lateral surface of the flange, in order to sustain it.
4. Install an aggregate on the electric-spindle and make the square of the flange.

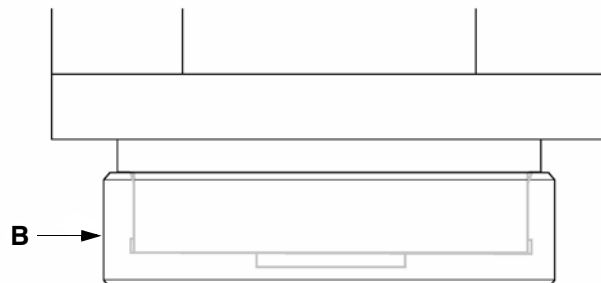
i To perform this operation we would advise you to use an aggregate with a circular saw tool, by positioning the comparator on the surface of the saw.



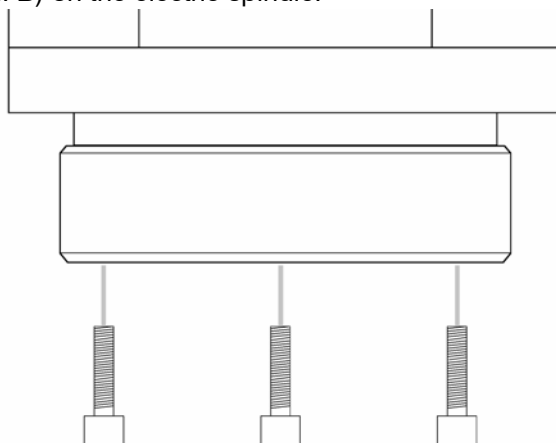
5. Through a 0.05 thickness gauge check that the flange is perfectly in stroke with the spindle.
6. Equip a drill machine with a \varnothing 3mm drill. Insert the drill of the drill machine in the third hole positioned on the lateral surface of the flange, make a cut on the spindle.
7. Screw one dowel in order to block the flange firmly.

2.2.2 Assembling of flange with lower fixing

1. Clean the lower side of the electric spindle and the internal side of the flange carefully.



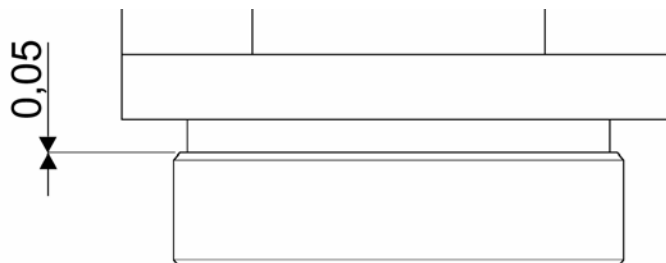
2. Insert the flange (Ref. **B**) on the electric-spindle.



3. Screw the bolts in the holes positioned on the lower surface of the flange, without fixing them completely
4. Install an aggregate on the electric-spindle and make the square up of the flange.

i To perform this operation we would advise you to use an aggregate with a circular saw tool, by positioning the comparator on the surface of the saw.

5. Fix the screws.



6. Through a 0.05 thickness gauge check that the flange is perfectly in stroke with the spindle.

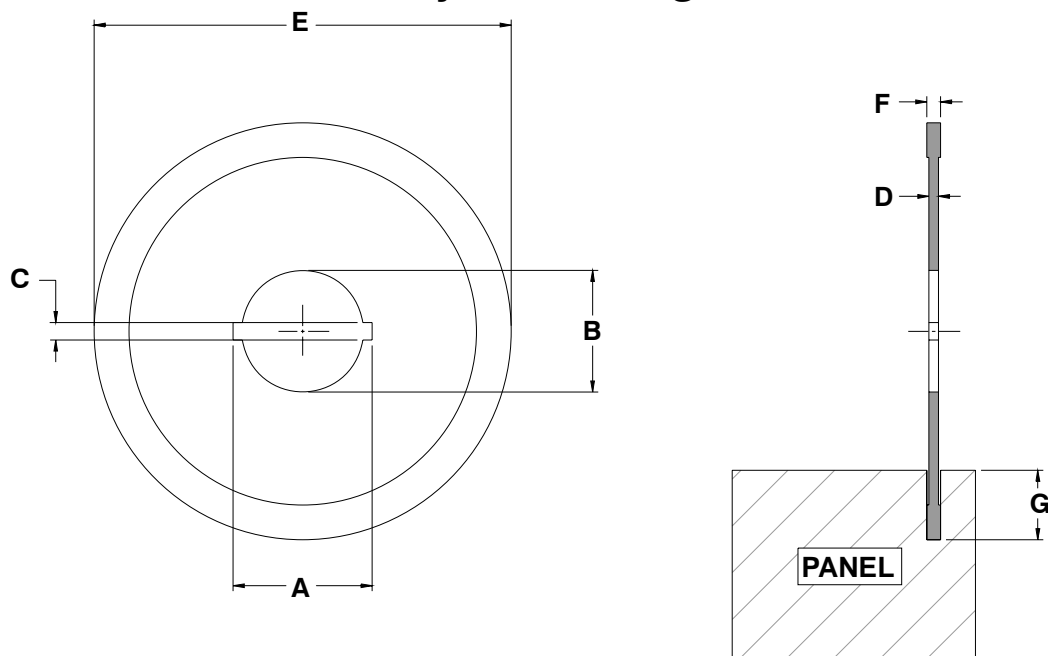
i The check with the thickness gauge is not allowed for electric-spindle with long nose. For this type of motor, before the installation, check that the contact surface between flange and electric-spindle is perfectly clean.

Uses

3 Tool characteristics

3.1 Folding tool

3.1.1 Shaft with keys and flange



This tool for heavy duty folding is installed on the shaft and it's locked with a flange, the dragging of the tool is achieved by means of 2 keys.



Check the compatibility of the tool with the aggregate in your possession.

The data to check on the technical data sheet is as follows:

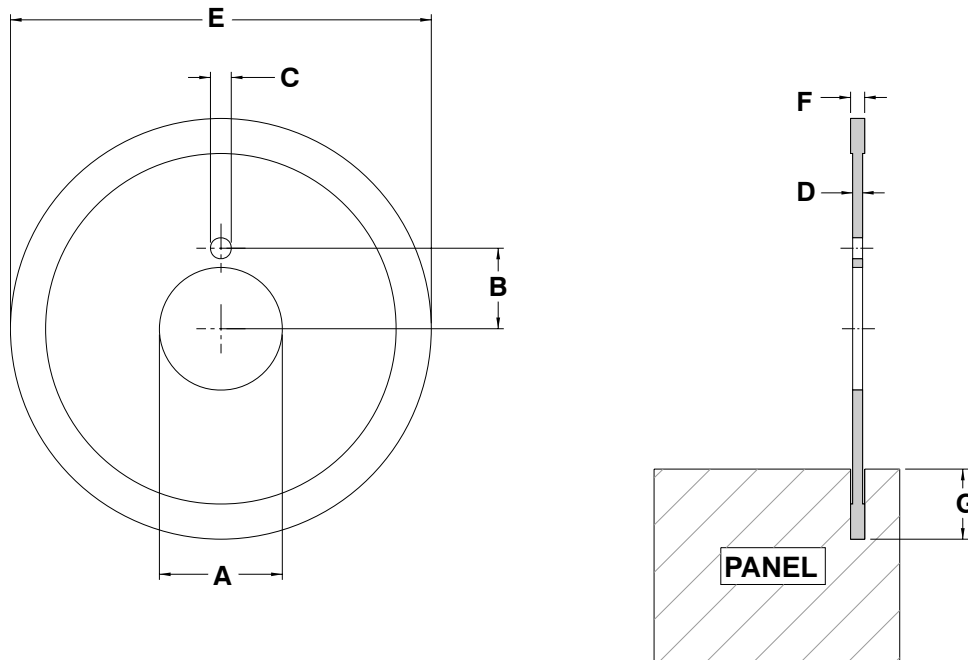
- A Height of keyway
- B Shaft diameter
- C Width of keyway
- D Thickness of tool body
- E Tool diameter
- F Tool thickness

3 Tool characteristics

G Working depth

Also check the compatibility of the direction of rotation of the tool with that of the aggregate.

3.1.2 Flange and anti-rotation pin



This tool for soft working is installed on the shaft and it's locked with a flange, the dragging of the tool is achieved by means of anti-rotation pin.



Check the compatibility of the tool with the tool with the aggregate in your possession.

The data to check on the technical data sheet is as follows:

- A Shaft diameter
- B Centreline distance of the anti-rotation pin
- C Diameter of the anti-rotation pin
- D Thickness of tool body
- E Tool diameter
- F Tool thickness
- G Working depth

Also check the compatibility of the direction of rotation of the tool with that of the aggregate.



Never use tools that do not have hole for the anti-rotation pin.

3.2 Safety in the choice of tools



When choosing tools to mount on the aggregate, comply with the following recommendations:

- **Never use deformed or cracked tools.**
- **Make sure that rotating tools are perfectly balanced, sharp and suitable for the work to carry out.**
- **Never use tools beyond their speed limits stamped on them or that indicated by the manufacturer.**
- **Before fitting a tool in its housing, make sure that the guide and centring surfaces are clean and unmarked.**
- **Tighten the screws, bolts, nuts or ring nuts of each tool to the torque specified.**
- **Always check that the direction of rotation of the tool is the same as that of the spindle on which it is to be mounted**
- **Never exceed the rotation speed limits indicated or reported in this manual or any other that may be supplied.**

4 Fitting tools



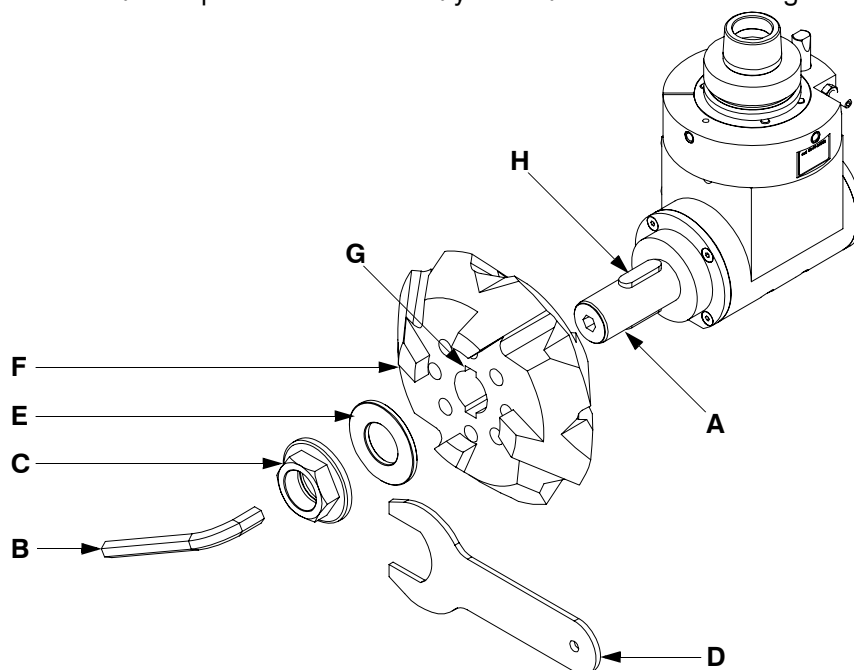
Risk of burns.

Do not carry out any operations of any nature on tools that have just stopped working. Wait for the tool to cool down before handling it.

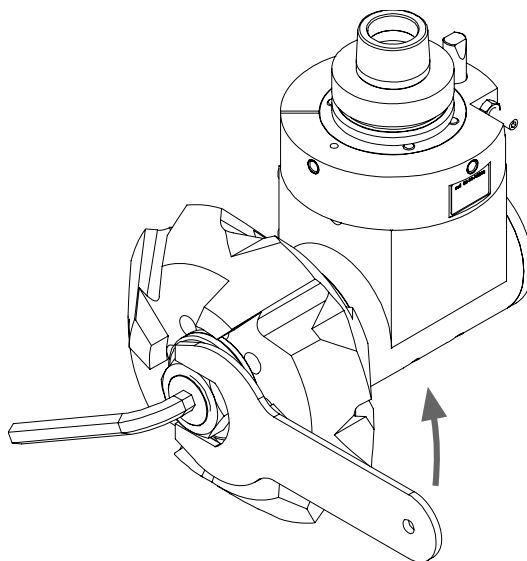
4.1 Folding tools

4.1.1 Folding heavy duty

If the protection carter is present it is necessary to disassemble unscrewing the support screws.



1. Block the shaft (Ref. **A**) using the appropriate spanner (Ref. **B**).
2. Unscrew the flange (Ref. **C**) using the appropriate spanner (Ref. **D**) and remove the spacer.
3. Install the tool (Ref. **F**) on the shaft making sure the keyways (Ref. **G**) corresponds with the keys on the shaft (Ref. **H**).



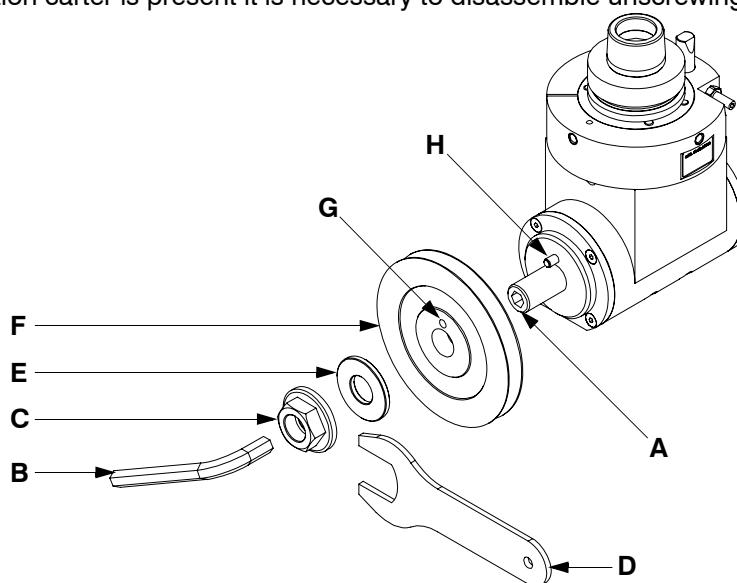
4. Screw up the flange to a torque of 40Nm.

i Except other indication in the technical-data sheet the direction screwing of the flange is LH.

! Always use the keys to dragging the tool.
Do not use the tools that does not have the keyway.

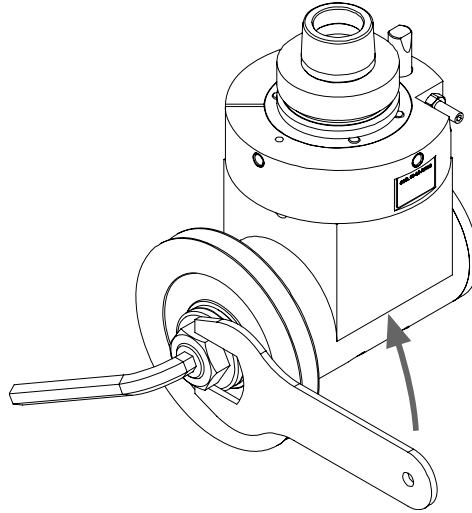
4.1.2 Soft folding processing

If the protection carter is present it is necessary to disassemble unscrewing the support screws.



1. Block the shaft (Ref. A) using the appropriate spanner (Ref. B).

2. Unscrew the flange (Ref. **C**) using the appropriate spanner (Ref. **D**) and remove the spacer (Ref. **E**).
3. Fit the tool (Ref. **F**) onto the spindle making sure that hole (Ref. **G**) corresponds with the anti-rotation pin.



4. Screw up the flange to a torque of 30Nm.

i Except other indication in the technical-data sheet the direction screwing of the flange is LH.

! **Always use the anti-rotation pin to dragging the tool.**
Do not use a tool that does not have a hole for the anti-rotation pin.

5 Adjustments



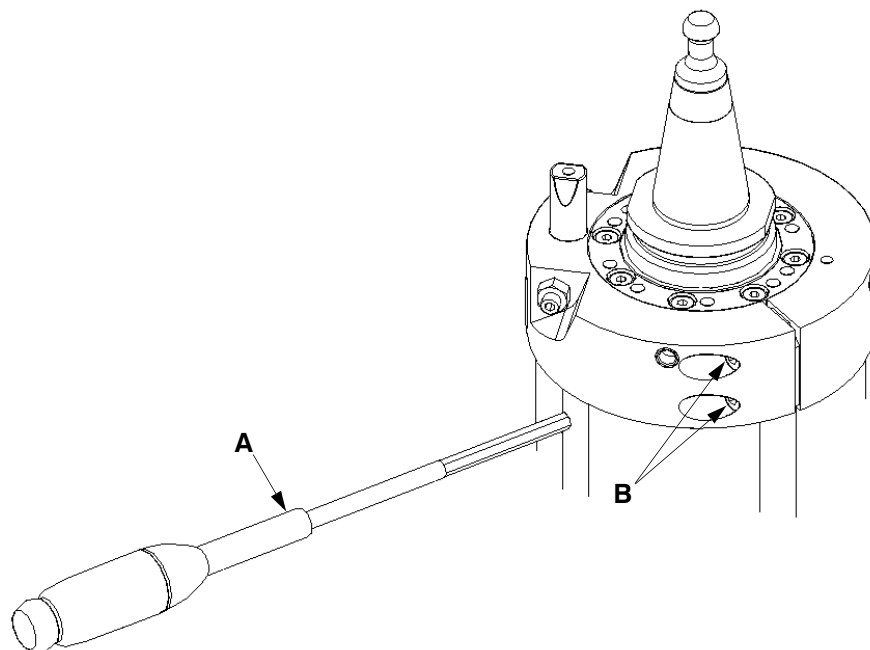
All the operations described in this chapter must be carried out by suitably qualified personnel.



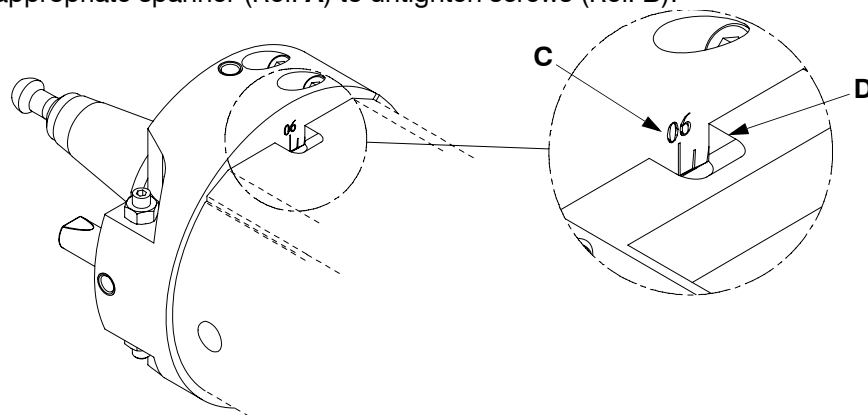
Risk of burns.

Do not carry out any operations of any nature on tools that have just stopped working. Wait for the tool to cool down before handling it.

5.1 Orientation according to axis C



1. Use the appropriate spanner (Ref. A) to untighten screws (Ref. B).

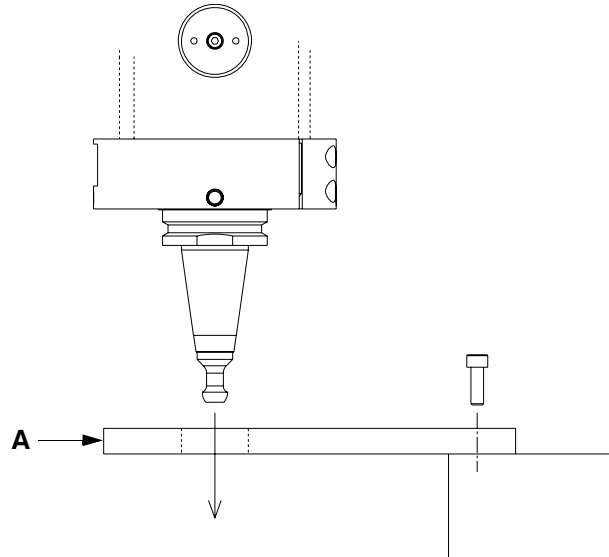


2. Orientate the aggregate using the graduated scale (Ref. C) at the bottom of the flange and the indicator on the body (Ref. D).
3. Re-tighten the screws using the appropriate spanner to a torque of 6Nm.



When carrying out the adjustments, use the optional equipment described below.

5.2 Optional equipment



The optional equipment (Ref. **A**) allows the aggregate to be anchored to a workbench, allowing any operations on it to be carried out in safety.

Operations

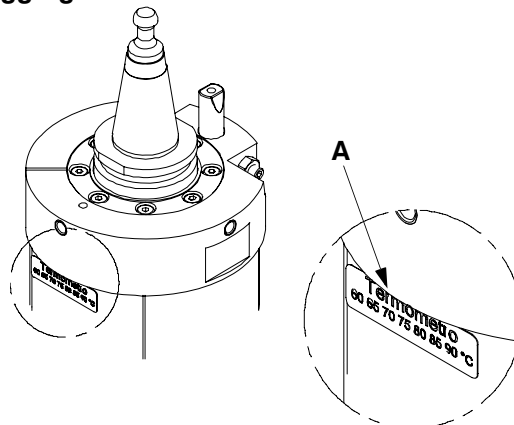
6 Maintenance

 **Do not eat, drink or smoke when handling lubricants.**
Always comply with current safety regulations when handling minerals oils and greases.

6.1 Machining suspension times

The aggregate can work continuously, providing the data reported on the *Technical Data Sheet* and on the *Duty cycle* (if present) regarding working speed, temperature and working cycles are complied with.

The temperature of the aggregate must never exceed the 80°C.



A heat sensitive plate on the aggregate monitors the temperature (Ref. A).

If the *Duty cycle* is complied with, the temperature should not reach the 80°C. However, should this happen, increase its stoppage times and check that the aggregate has been properly maintained.

 **The temperature of the aggregate should be monitored continuously to prevent malfunctions or breakages.**

6.2 Lubrication times and lubricant to be used

To obtain maximum performance from the aggregate, maintain its efficiency and prolong its working life, it must be regularly and correctly maintained.

Correct maintenance means respecting lubrication times, using the correct lubricants and keeping the working conditions of the aggregate under control in order to prevent any stress conditions from arising.

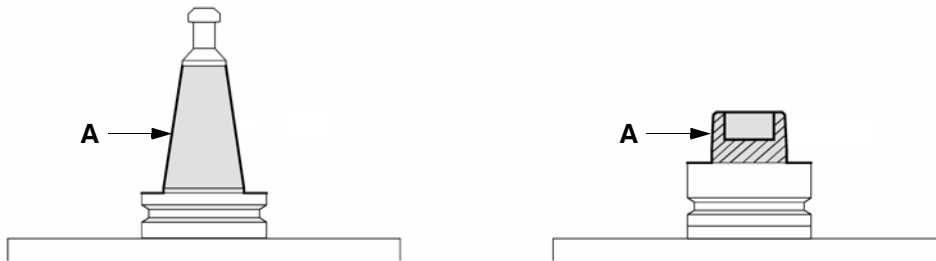
The following table shows the lubrication times and the types of lubricant to use.

Type	Lubrication times	Lubricant to be used
heavy duty folding	20cc. every 500h of operation	ISO VG - 32
soft folding process	20cc. every 500h of operation	ISO VG - 32

i The first oil change should be carried out after 200 hours of operation.

6.3 Cleaning

1. Rest the aggregate on the work-bench.



2. Clean surface (Ref. A) of the coupling using a soft clean cloth soaked with denatured alcohol or trichloroethylene.

i After cleaning, to prevent the coupling from locking in the electro-spindle avoid any risk of breaking the tool change device, spray some Klüber LUSIN PROTECT G31 on surface (Ref. A).

6.4 Lubrication

i Use the indicator to check the oil level in the aggregate regularly (Ref. A).



⚠ Never allow the oil level to fall below minimum. Consequently, oil must always be visible in the indicator.

⚠ When topping-up, do not exceed the maximum limit defined by the centreline of the indicator.



MAXIMUM LEVEL



OIL TOP UP NECESSARY

6.4.1 Oil level check

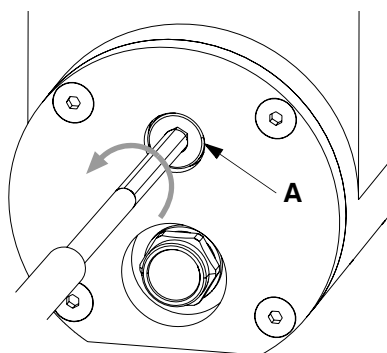
Wait for the aggregate to cool down.

Remove the aggregate and place it in a vertical position on a horizontal surface. Wait a few minutes for the oil to flow to its rest position.

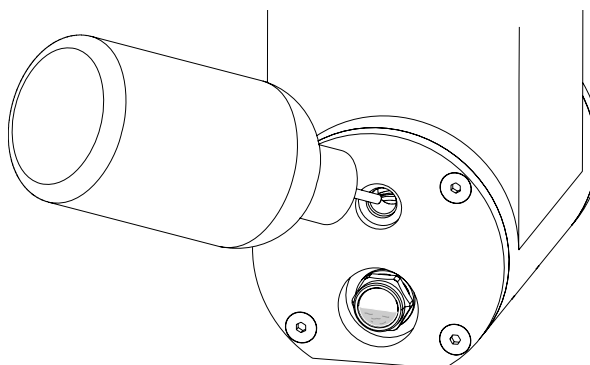
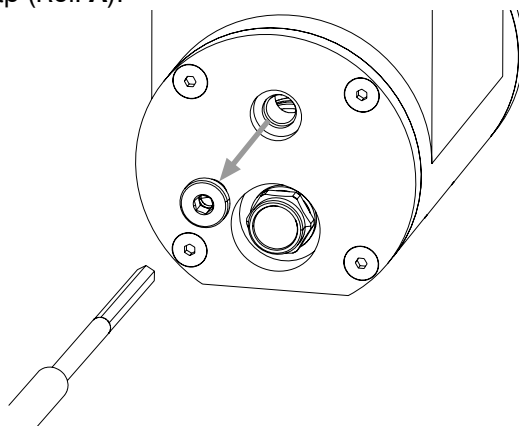
Check the level.

If the oil has reached minimum, top it up.

6.4.2 Oil top up



Unscrew the upper filler cap (Ref. A).



Use the special tube to add the oil necessary to reach the maximum level.

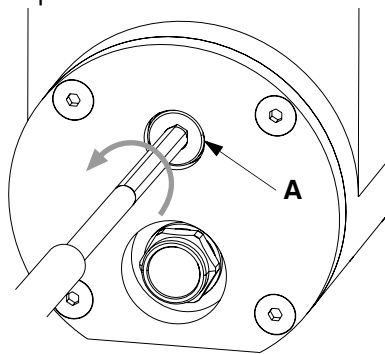
6.4.3 Oil change

After every 500 hours of operation (or once a year if the 500 hours limit is not reached) carry out a full oil change of the oil in the aggregate.

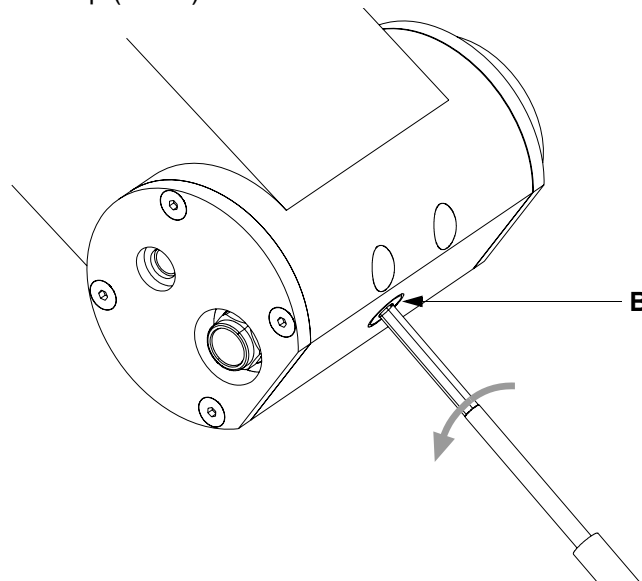
 **The first oil change should be carried out after 200 hours of operation.**

Wait for the aggregate to cool down.

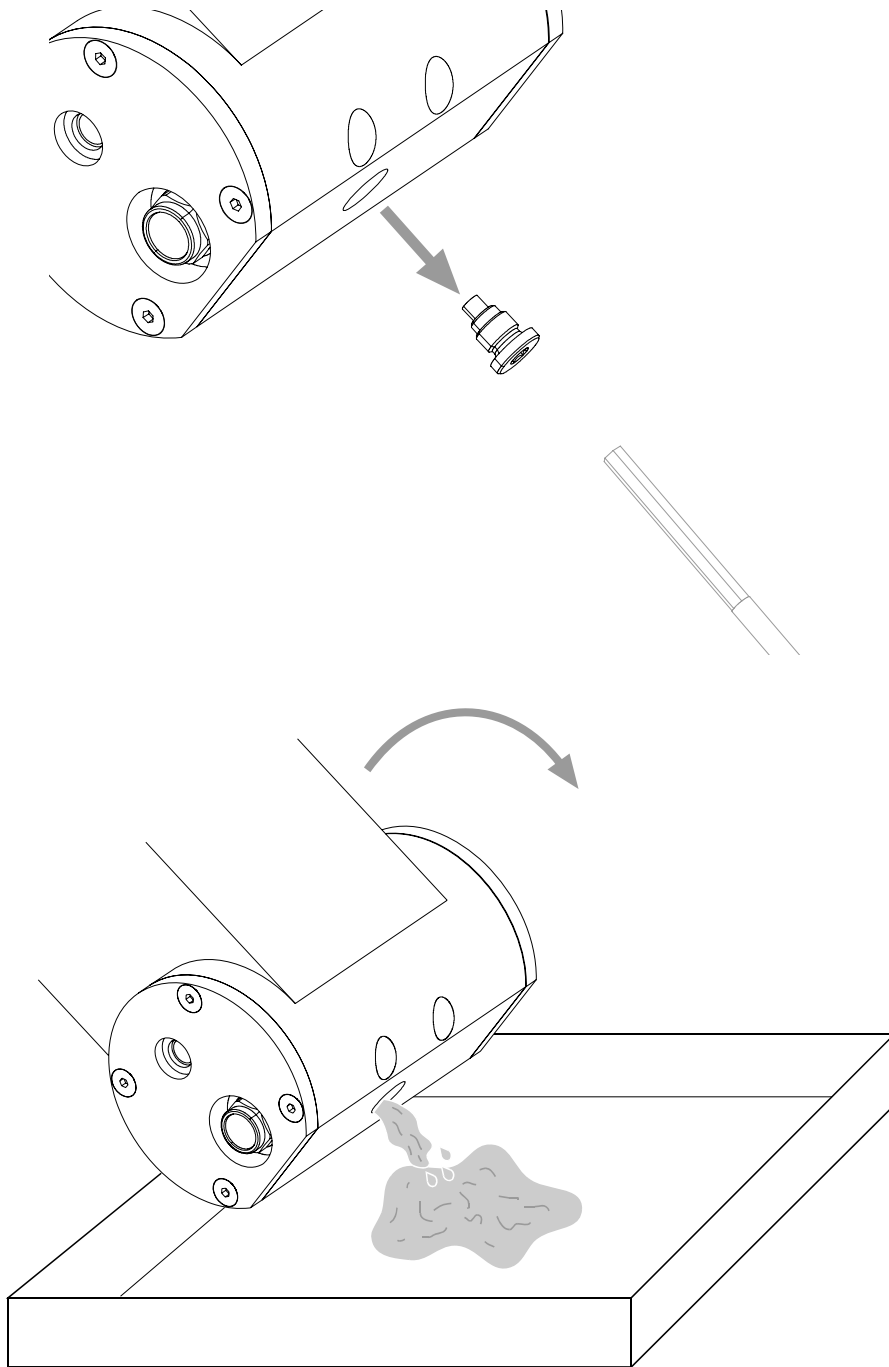
Remove the aggregate and place it in a vertical position on a horizontal surface. Wait a few minutes for the oil to flow to its rest position.



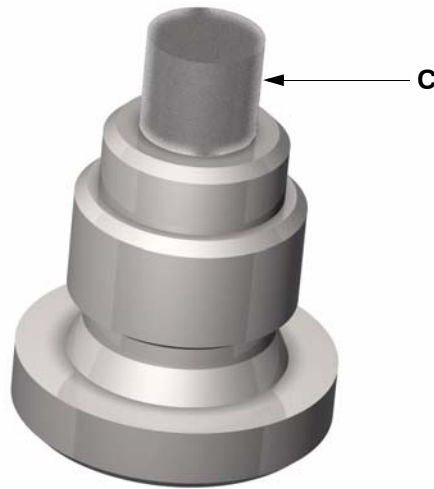
Unscrew the upper filler cap (Ref. **A**).



Place the aggregate over a waste oil collection tray and unscrew the lower drain plug (Ref. **B**).



Allow the oil to drain out from the aggregate by tilting it as necessary. Collect the oil in the tray.
When the aggregate is empty, clean off any residues.



The drain plug is fitted with a magnet to collect any metal filings (Ref. **C**). Clean the magnet and replace the drain plug under the aggregate.

Add oil to the aggregate through the upper filler hole up to the maximum level. Approximate quantity required 20 cc.

Replace the upper filler cap.

6.5 Characteristics of lubricants

Always use the lubricants indicated in the table. Only use the equivalent alternatives if the lubricant indicated is difficult or impossible to obtain. When replacing the original lubricant with one of an equivalent kind, clean the parts carefully to remove any residual product, in order to avoid any chemical reaction that might damage the machine.

Lubricant	
Name	Chemical and physical characteristics
ISO VG - 32	Category: OIL Viscosity: ISO VG32, conformig to DIN 51519 Specifications: CLP Lubricant conformig to DIN 51517, part 3
KLÜBER LUSIN PROTECT G31	Category: PROTECTIVE LUBRICANT

 **As used lubricants are highly polluting substances, they should be handed over to an authorised refuse disposal company/authority.**

Appendices

A Safety informations

A.1 Safety requirements

- Read the Use and maintenance manual carefully before starting or using the machine, and before carrying out maintenance or any other type of operation.
- Always follow all the warning, danger and caution notices in the manual and the safety signs affixed directly on the machine.
- The operator must be in possession of all the requirements necessary to use this type of machine.
- The guards protecting the operator must be installed and operational at all times.
- Always use the personal protection devices foreseen by current regulations on safety at work
- Do not wear bracelets, rings, chains, etc., as these may cause serious accidents; before starting work, remove all articles that are liable to cause this type of risk.
- Before starting work, examine the working area carefully for possible dangers; check that no foreign bodies have been left on or in the machine.
- Always start up the working cycle following the sequence of operations indicated.
- Do not access the machine's working area during the operating cycle.
- Do not put your hands or other elements near or into moving or live parts of the machine, or into the electrical cabinet.
- Do not alter the program parameters in order to obtain higher levels of performance than those originally foreseen and planned for when the machine was designed and tested.
- Do not work in the dark: use all the lighting available and ensure that it is efficient.
- Due concentration and care is required before using the machine in any way.
- Never leave the machine unattended when it is in operation.
- Always keep a clear view of the whole working or maneuvering area.
- Notify the maintenance staff should any items or systems be found to operate badly.

A.2 Tool mounting safety warnings

- Never use deformed or cracked rotating tools.
- Make sure that the rotating tools are perfectly balanced, sharp and suitable for the job.
- Never use tools beyond the speed limits stamped on them or those indicated by the manufacturer.
- Before fitting a tool in its housing, make sure that the guide and centring surfaces are perfectly clean and free of surface marks.
- Tighten the screws, bolts, nuts and ring nuts of each tool to the specified torque.
- Always check that the direction of rotation of the tool is compatible with that of the spindle on which it will be fitted.
- Never exceed the limits reported in this manual or any others specifications.

A.3 Safety precautions during maintenance

- Before carrying out any maintenance work on the aggregate and/or cleaning, remove it from the machine on which it is fitted.
- Maintenance must always be carried out by qualified technicians.
- Before carrying out any type of maintenance or lubrication, stop the machine using the procedures listed in the manual and wait for the aggregate to cool down.
- Every time that units have to be removed or installed, make sure that they are supported by lifting devices with a capacity suited to the load they are to support.
- Transfer the load immediately onto adequate supports or tressles.
- Never use petrol, solvents or inflammable liquids to clean elements, but use approved non-inflammable, non-toxic detergents of a type normally available on the market.
- Carry out all maintenance and repairs with due care and attention, following the indications provided in this manual.
- Always use personal protection devices.
- Use electrical tools that comply with current safety regulations.
- Before starting the machine, make sure nobody is in the process of carrying out maintenance operations.
- Do not work under or in the vicinity of a kinematic chain, unless it is adequately supported and locked.
- Before carrying out cleaning operations, repairs or other operations on the machine, always turn the start switch to the locked position.
- Wear protective goggles with cheekpieces.
- Before removing any guard, stop the machine completely and disconnect it from the power supply, making sure that none of the parts are still moving.
- The machine must only be used for the purposes foreseen.
- The machine must always be used in conformity with current safety requirements for the country in which it is installed.

A.4 Danger signs

>

DANGER ! Keep well away from gears and all other moving parts.

E

DANGER ! Before carrying out any type of operation on the electrical system, make sure the power supply is turned off.

=

DANGER ! Risk of crushing hands between moving mechanical parts.

X

DANGER! Risk of burns. Parts very hot.

A.5 General prohibition signs

9

Do not remove the safety devices and guards, the machine's guards and safety devices must only be removed on a temporary basis to allow maintenance, making sure that adequate measures are taken to reduce the risks that derive from their removal.

7

No access to the machine's working area for anybody other than the person running the machine.

8

Do not clean or lubricate moving parts.

?

No smoking in the vicinity of the machine.

A.6 Warning signs

- 6 Make sure that the guards and safety devices are working properly.
Immediately notify those in charge of any faults and malfunctions in the safety devices and of any dangerous situation that may come to your knowledge.
- 4 Turn off the power supply before inserting or removing plugs from the power sockets.
- 5 Wear working clothes.
- / Wear safety footwear.
- O Wear a safety helmet.
- 3 Use gloves.
- 1 Use earplugs.
- R Use safety glasses

The company will not be held liable for any damage or injury deriving from the use of unqualified operators, improper use of the product, deliberate or otherwise, or from non-compliance with the above-listed safety standards.

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