OPTIMUM
MASCHINEN - GERMANY

Operating manual

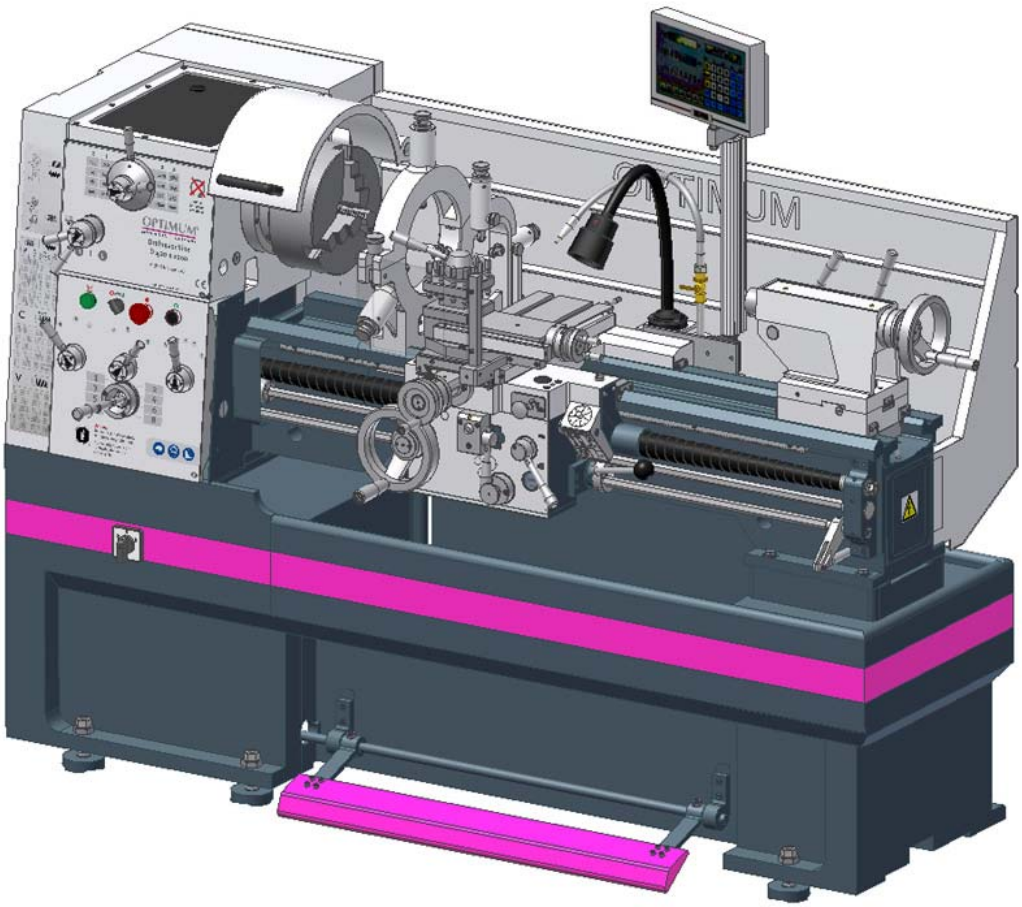
Version 2.0.0

Lathe

○ OPTIturn® D420 x 1000 DRO — Item no. 340 11601

○ OPTIturn® D420 x 1500 — Item no. 340 1167

○ OPTIturn® D420 x 1500 DPA — Item no. 340 1167DPA



US

Table of contents

1 Safety
1.1 Type plates 7
1.2 Safety warnings (warning notes) 8
1.2.1 Classification of hazards 8
1.2.2 Further ideograms 9
1.3 Proper use 10
1.4 Reasonably foreseeable misuses 10
1.4.1 Avoiding misuse 10
1.5 Possible dangers caused by the lathe 11
1.6 Qualification of personnel 12
1.6.1 Target group 12
1.6.2 Authorized personnel 12
1.6.3 Obligations of the operating company 12
1.6.4 Obligations of the operator 13
1.6.5 Additional requirements regarding the qualification 13
1.7 Operator positions 13
1.8 Safety measures during operation 14
1.9 Safety devices 14
1.9.1 Lockable main switch 15
1.9.2 EMERGENCY-STOP button 15
1.9.3 Protective cover of the headstock 16
1.9.4 Protective covers drive 16
1.9.5 Lathe chuck protection with position switch 16
1.9.6 Chip shield 17
1.9.7 Prohibition, warning and mandatory labels 17
1.10 Safety check 18
1.11 Personal protective equipment 19
1.12 Safety during operation 19
1.13 Safety during maintenance 20
1.13.1 Disconnecting and securing the lathe 20
1.13.2 Using lifting equipment 20
1.13.3 Mechanical maintenance work 20
1.14 Accident report 20
1.15 Electrical system 21
1.16 Inspection deadlines 21
2 Technical Data
2.1 Power connection 22
2.2 Machine data 22
2.3 Dimensions 23
2.4 Work area 23
2.5 Environmental conditions 23
2.6 Operating material 23
2.7 Emissions 24
3 Assembly
3.1 Unpacking the machine 25
3.2 Scope of delivery 25
3.3 Transport 25
3.3.1 Load suspension point 26
3.3.2 Gravity of the machine 26
3.3.3 Lifting by crane 27
3.3.4 Lifting with a forklift 28
3.4 Installation and assembly 28

3.4.1 Requirements regarding the installation site ... 28
3.5 Cleaning of the machine ... 29
3.5.1 Lubrication ... 29
3.6 Assembly ... 29
3.6.1 Anchor-free assembly ... 29
3.6.2 Anchored assembly ... 30
3.7 Dimensions, installation plan D420 ... 31
3.8 Coolant equipment ... 32
3.9 First commissioning ... 32
3.10 Power connection ... 33
3.11 Optional lathe accessories ... 33

4 Operation

4.1 Control and indicating elements D420 ... 34
4.2 Safety ... 35
4.3 Control elements overview ... 35
4.3.1 Display elements overview ... 36
4.3.2 Operating symbols ... 36
4.4 Switching on the machine ... 37
4.4.1 Switching on the D420 ... 37
4.5 Switching off the machine ... 37
4.6 Resetting an emergency stop condition ... 37
4.7 Power failure, Restoring readiness for operation ... 37
4.8 Direct run ... 37
4.9 Foot brake ... 38
4.10 Gearbox settings and speed adjustment ... 38
4.10.1 Speed adjustment for the D420 ... 38
4.11 Turning direction ... 39
4.12 Feed ... 40
4.12.1 Infeed speed ... 40
4.12.2 Feed direction ... 40
4.13 Tool holder ... 40
4.14 Quick action tool holder ... 41
4.15 Spindle nose ... 42
4.15.1 Adjusting the cam-lock bolts to the workpiece holder ... 43
4.16 Lathe chuck ... 43
4.16.1 Speed information, maintenance recommendations, reference speed ... 44
4.16.2 Influencing factors that significantly impact the tensioning force ... 44
4.16.3 Lathe chuck maintenance ... 45
4.16.4 Clamping long workpieces ... 45
4.17 Mounting workpiece holder ... 46
4.17.1 Centring point ... 46
4.17.2 Face plate Ø 350 mm (13.78") ... 47
4.17.3 Three-jaw lathe chuck Ø 200 mm (7.874") ... 47
4.17.4 Four-jaw lathe chuck Ø 250 mm (9.842") ... 49
4.18 Mounting of rests ... 50
4.18.1 Follow and steady rests ... 50
4.19 Bed bridge ... 52
4.20 Feed tables ... 53
4.20.1 Straight turning and facing ... 53
4.21 Tables for thread-cutting ... 54
4.21.1 Metric threads ... 54
4.21.2 Thread based on inch system ... 55
4.21.3 Module and diametral pitch ... 55
4.21.4 Exchange, change of position of the change gear wheels ... 56

4.21.5 Threading gauge....57
4.22 Tailstock....57
4.22.1 Cross-adjustment of the tailstock....58
4.23 General operating instructions....58
4.23.1 Longitudinal turning....58
4.23.2 Face turning and recessing....59
4.23.3 Fixing the lathe saddle....59
4.23.4 Turning short tapers with the top slide....59
4.23.5 Thread cutting....60
4.24 Cooling lubricant....61

5 Cutting speeds

5.1 Selecting the cutting speed....63
5.2 Influences on the cutting speed....63
5.3 Example for the determination of the required speed on your lathe....63
5.4 Table cutting speeds....64

6 Maintenance

6.1 Safety....65
6.1.1 Preparation....66
6.1.2 Restarting....66
6.1.3 Cleaning....66
6.2 Checkup, inspection and maintenance....66
6.3 Lubricating and cleaning the lathe chuck....73
6.4 Repair....73
6.5 Cooling lubricants and tanks....75
6.5.1 Inspection plan for water-mixed cooling lubricants....76

7 Spare parts - D420

7.1 Ordering spare parts....78
7.2 Lathe bed, feed 1-2....79
7.3 Lathe bed, actuation, spindle break 2-2....80
7.4 Change gears....83
7.5 Headstock 1-10....84
7.6 Headstock 2-10....85
7.7 Headstock 3-10....86
7.8 Headstock 4-10....87
7.9 Headstock 5-10....88
7.10 Headstock 6-10....89
7.11 Headstock 7-10....89
7.12 Headstock 8-10....90
7.13 Headstock 9-10....91
7.14 Headstock 10-10....91
7.15 Headstock feed gear 1-9....95
7.16 Headstock feed gear 2-9....96
7.17 Headstock feed gear 3-9....97
7.18 Headstock feed gear 4-9....98
7.19 Headstock feed gear 5-9....99
7.20 Headstock feed gear 6-9....99
7.21 Headstock feed gear 7-9....100
7.22 Headstock feed gear 8-9....100
7.23 Headstock feed gear 9-9....101
7.24 Lathe saddle 1-9....104
7.25 Lathe saddle 2-9....104
7.26 Lathe saddle 3-9....105
7.27 Lathe saddle 4-9....105

7.28 Lathe saddle 5-9 106
7.29 Lathe saddle 6-9 106
7.30 Lathe saddle 7-9 107
7.31 Lathe saddle 8-9 107
7.32 Lathe saddle 9-9 - threading gauge 108
7.33 Top slide and compound slide 1-2 110
7.34 Top slide and compound slide 2-2 111
7.35 Central lubrication lathe saddle 114
7.36 Tailstock 115
7.37 Chuck guard 117
7.38 Follow rest 118
7.39 Steady rest 119
7.40 Digital position display - DPA 2000 120
7.41 Chip protection D420 DPA 121
7.42 Machine light, cooling unit 121
7.43 D420 version coolant tank external 123
7.44 Wiring diagram 124

8 Troubleshooting

9 Appendix

9.1 Copyright 127
9.2 Terminology/Glossary 127
9.3 LIMITED WARRANTY 128
9.4 EC Declaration of Conformity D420 129

Preface

Dear customer,

Thank you very much for purchasing a product made by OPTIMUM.

OPTIMUM metal working machines offer a maximum of quality, technically optimum solutions and convince by an outstanding price performance ratio. Continuous enhancements and product innovations guarantee state-of-the-art products and safety at any time.

Before commissioning the machine please thoroughly read these operating instructions and get familiar with the machine. Please also make sure that all persons operating the machine have read and understood the operating instructions beforehand.
Keep these operating instructions in a safe place nearby the machine.

Information

The operating instructions include indications for safety-relevant and proper installation, operation and maintenance of the machine. The continuous observance of all notes included in this manual guarantee the safety of persons and of the machine.

The manual determines the intended use of the machine and includes all necessary information for its economic operation as well as its long service life.

In the paragraph "Maintenance" all maintenance works and functional tests are described which the operator must perform in regular intervals.

The illustration and information included in the present manual can possibly deviate from the current state of construction of your machine. Being the manufacturer we are continuously seeking for improvements and renewal of the products. Therefore, changes might be performed without prior notice. The illustrations of the machine may be different from the illustrations in these instructions with regard to a few details. However, this does not have any influence on the operability of the machine.
Therefore, no claims may be derived from the indications and descriptions. Changes and errors are reserved!

Your suggestion with regard to these operating instructions are an important contribution to optimising our work which we offer to our customers. For any questions or suggestions for improvement, please do not hesitate to contact us.

If you have any further questions after reading these operating instructions and you are not able to solve your problem with a help of these operating instructions, please contact your specialised dealer or

LDS Industries, LLC
930 W. National Ave.
Addison, IL 60101
Tel.: 1-630-785-6437

1 Safety

Glossary of symbols

☞	gives further advice
➜	calls on you to act
❍	Enumeration

This part of the operating manual

- ❍ explains the meaning and use of the warning references contained in the operating manual,
- ❍ explains how to use the lathe properly
- ❍ highlights the dangers that might arise for you or others if these instructions are not obeyed,
- ❍ tells you how to avoid dangers.

In addition to this operating manual, please observe

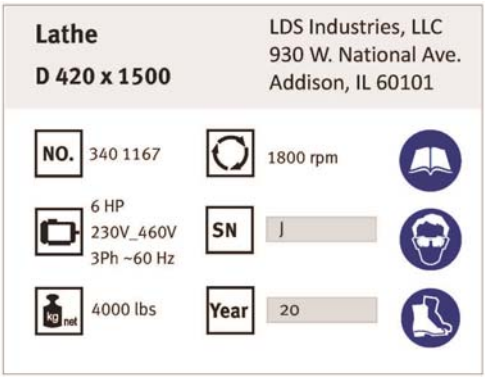
- ❍ applicable laws and regulations,
- ❍ legal regulations for accident prevention,
- ❍ the prohibition, warning and mandatory signs as well as the warning notes on the lathe.

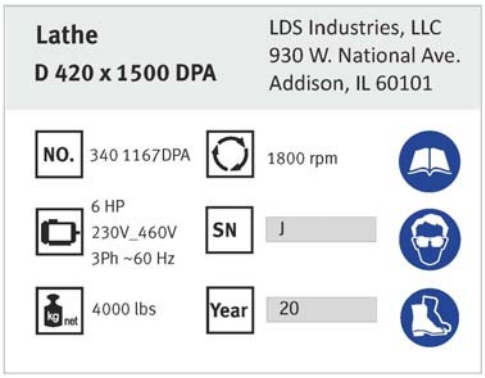
Consult OSHA, state and local regulations in order to determine compliance, danger and risks to the operator.

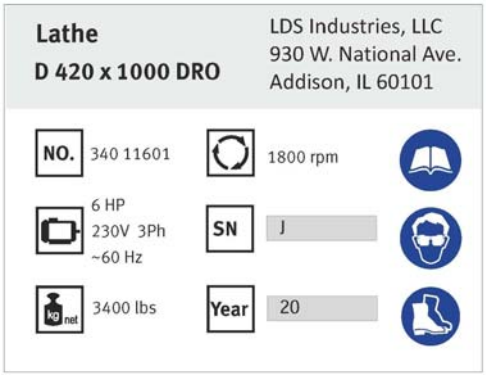
Always keep this documentation close to the lathe.

If you would like to order another operating manual for your machine, please indicate the serial number of your machine. Please find the serial number on the type plate.

1.1 Type plates







INFORMATION

If you are unable to solve a problem using this manual, please contact us for advice:

Exclusive USA Agent

LDS Industries, LLC

930 W. National Ave.

Addison, IL 60101

Tel.: 1-630-785-6437

1.2 Safety warnings (warning notes)

1.2.1 Classification of hazards

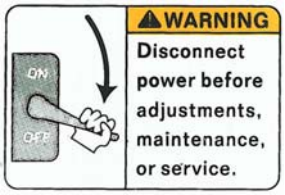
We classify the safety warnings into various levels. The table below gives an overview of the classification of symbols (ideogram) and warnings for the specific danger and its (possible) consequences.

Ideogram	Warning alert	Definition/Consequences
	**DANGER!**	Imminent danger that will cause serious injury or death to persons.
	WARNING!	Risk: A danger that might cause serious injury or death to a person.
	CAUTION!	Danger or unsafe procedure that might cause injury to persons or damage to property.
	**ATTENTION!**	Situation that could cause damage to the lathe and to the product and other types of damages. No risk of injury to persons.
	**INFORMATION**	Application advice and other important or useful information and notes. No dangerous or harmful consequences for persons or objects.

In the case of specific dangers, we replace the pictogram

or

1.2.2 Further ideograms




Warning danger of slipping!


Warning risk of stumbling!


Warning hot surface!


Warning biological hazard!


Warning of automatic start-up!


Warning tilting danger!


Warning suspended loads!


Caution, danger of explosive substances!


Activation forbidden!


Stepping onto the machine prohibited!


Clean with compressed air prohibited!


Read the operating instructions before commissioning!


Wear protective glasses!


Use protective gloves!


Use protective boots!


Use protective suit!


Use ear protection!


Only switch in standstill!


Protect the environment!


Contact address

1.3 Proper use

WARNING!

In the event of improper use, the lathe

- **will endanger personnel,**
- **will endanger the lathe and other material property of the operator,**
- **the correct function of the lathe may be affected.**

The lathe is designed and manufactured to be used in environments where there is no potential danger of explosion.

The lathe is designed and manufactured for straight turning and facing round and regular formed
three-, six- or twelve-square workpieces in cold metal. The lathe must only be installed and operated in a dry and ventilated place.

If the lathe is used in any way other than described above, modified without authorization of Optimum Maschinen Germany GmbH, then the lathe is being used improperly.

We will not be held liable for any damages resulting from any operation which is not in accordance with the intended use.

We expressly point out that the guarantee or CE conformity will expire due to any constructive technical or procedural changes not performed by the company Optimum Maschinen Germany GmbH.

It is also part of intended use that you

- observe the limits of the lathe,
- the operating manual is observed,
- the inspection and maintenance instructions are observed.

☞ "Technical Data“ on page 22

In order to achieve optimum cutting performance, it is essential to choose the right turning tool, feed, tool pressure, cutting speed and coolant.

WARNING!

Severe injuries due to improper use.

It is forbidden to make any modifications or alternations to the operation values of the lathe. They could endanger the personnel and cause damage to the lathe.

1.4 Reasonably foreseeable misuses

Any other use as the one determined under the "proper use" or any use beyond the described use shall be deemed as not in conformity and is forbidden.

Any other use has to be discussed with the manufacturer.

It is only allowed to process metal, cold and non-inflammable materials with the lathe.

In order to avoid misuse, it is necessary to read and understand the operating instructions before the first commissioning.

The operators must be qualified.

1.4.1 Avoiding misuse

➜ Use of suitable cutting tools.

➜ Adapting the speed adjustment and feed to the material and workpiece.

➜ Insert the workpiece tightly, without vibration and without one-sided imbalances.

➜ The machine is not designed for the use of hand tools (e.g. emery cloth or files). It is forbidden to use any hand tools on this machine.

➜ The machine is not suitable for attachment kits for cylindrical grinding. When mounting attachment kits for cylindrical grinding additional protective devices must be fitted.

➜ The machine is not designed to allow long parts to protrude beyond the spindle hole. If longer parts have to protrude beyond the spindle hole, an additional operator-side, permanent device must be mounted, which completely covers the protruding part and provides complete protection against spinning parts.

➜ Long workpieces must be propped up. Use the steady rest or follow rest in conjunction with the tailstock quill to support longer parts and prevent the workpiece from flapping around and flying away.

➜ Risk of fire and explosion due to the use of flammable materials or cooling lubricants. Before processing inflammable materials (e.g. aluminium, magnesium) or using inflammable auxiliary materials (e.g. spirit) it is necessary to take additional preventive measures in order to safely avoid health risks.

➜ When processing carbons, graphite and carbon-fibre-reinforced carbons, the machine is no longer being used properly. When processing carbons, graphite and carbon-fibre-reinforced carbons and similar materials, the machine can be damaged quickly, even if the dusts generated are completely sucked out during the work process.

➜ The processing of plastics at the lathe leads to static charge. The static charge of machine parts from processing plastics cannot be safely conducted away from the lathe.

➜ When using lathe dog as a carrier for rotating workpieces between the tips, the standard lathe chuck protection must be replaced with circular lathe chuck protection.

1.5 Possible dangers caused by the lathe

The lathe has undergone a safety inspection. The construction and type are state of the art.

Nevertheless, there is a residual risk as the lathe operates with

- high revolutions,
- rotating parts,
- electrical voltage and currents.

We have used construction resources and safety techniques to minimize the health risk to personnel resulting from these hazards.

If the lathe is used and maintained by personnel who are not duly qualified, there may be a risk resulting from incorrect or unsuitable maintenance of the lathe.

INFORMATION

Everyone involved in the assembly, commissioning, operation and maintenance must

- be duly qualified,
- strictly follow these operating instructions.

In the event of improper use

- there may be a risk to the personnel,
- the lathe and further property might be endangered,
- the correct function of the lathe may be affected.

Always disconnect the lathe if cleaning or maintenance work is being carried out.

WARNING!

The lathe may only be used with the safety devices activated.

Disconnect the lathe immediately whenever you detect a failure in the safety devices or when they are not mounted!

All additional devices installed by the operator have to be equipped with the prescribed safety devices.

This is your responsibility being the operating company!

☞ **"Safety devices“ on page 14**

1.6 Qualification of personnel

1.6.1 Target group

This manual is addressed to

- the operating companies,
- the operators,
- the personnel for maintenance works.

Therefore, the warning notes refer to both operation and maintenance of the lathe.

Determine and indicate clearly who will be responsible for the different activities on the lathe (operation, maintenance and repair).

Unclear responsibilities constitute a safety risk!

Always disconnect the main plug of the lathe and secure the main switch by a lock. This will prevent it from being used by unauthorized persons.

The qualifications of the personnel for the different tasks are mentioned below:

Operator

The operator has been instructed by the operating company regarding the assigned tasks and possible risks in case of improper behaviour. Any tasks which need to be performed beyond the operation in the standard mode must only be performed by the operator if it is indicated in these instructions and if the operating company expressively commissioned the operator.

Electrical specialist

Due to professional training, knowledge and experience as well as knowledge of respective standards and regulations the electrical specialist is able to perform work on the electrical system and recognise and avoid any possible dangers.

The electrical specialist is specially trained for the working environment in which he is working and knows the relevant standards and regulations.

Qualified personnel

Due to their professional training, knowledge and experience as well as their knowledge of relevant regulations the qualified personnel is able to perform the assigned tasks and to recognise and avoid any possible dangers themselves.

Instructed person

Instructed personnel were instructed by the operating company about the assigned tasks and any possible risks in case of improper behaviour.

1.6.2 Authorized personnel

WARNING!

Inappropriate operation and maintenance of the lathe constitutes a danger for the personnel, objects and the environment.

Only authorized personnel may operate the lathe!

Persons authorized to operate and maintain should be trained technical personnel and instructed by the ones who are working for the operating company and for the manufacturer.

1.6.3 Obligations of the operating company

The operator must instruct the personnel at least once per year regarding

- all safety standards that apply to the lathe.
- the operation,
- accredited technical guidelines.

The operating company must also

- check personnel‘s state of knowledge,
- document the trainings/instructions,
- require personnel to confirm participation in training/instructions by means of a signature,
- check whether the personnel is working in a safety and risk-conscious manner and following the operating instructions.
- define and document the inspection deadlines for the machine in accordance with § 3 of the Factory Safety Act and perform an operational risk analysis in accordance with § 6 of the Work Safety Act.

1.6.4 Obligations of the operator

The operator must

- have read and understood the operating manual,
- be familiar with all safety devices and regulations,
- be able to operate the lathe.

1.6.5 Additional requirements regarding the qualification

Additional requirements apply for work on electrical components or equipment:

- They must only be performed by a qualified electrician or person working under the instructions and supervision of a qualified electrician.

Before starting work on electrical parts or operating agents, following measures are to be performed in the following order.

➜ disconnect all poles,

➜ secure against restarting,

➜ check if the machine is zero potential.

1.7 Operator positions

The operator position is in front of the lathe.

Fig. 1-1: Operator positions

1.8 Safety measures during operation

CAUTION!

Risk due to inhaling dusts and mist hazardous to health.

Dependent on the material which need to be processed and the used auxiliaries dusts and mist may be caused which might impair you health.

Make sure that the generated health hazardous dusts and mist are safely sucked off at the point of origin and is dissipated or filtered from the working area. To do so, use a suitable extraction unit.

CAUTION!

Risk of fire and explosion by using flammable materials or cooling lubricants.

Before processing inflammable materials (e.g. aluminium, magnesium) or using inflammable auxiliary materials (e.g. spirit) it is necessary to take additional preventive measures in order to safely avoid health risks.

CAUTION!

Risk of becoming entangled or lacerations when using hand tools.

The machine is not designed for the use of hand tools (e.g. emery cloth or files). It is forbidden to use any hand tools on this machine.

Before processing inflammable materials (e.g. aluminium, magnesium) or using inflammable auxiliary materials (e.g. spirit) it is necessary to take additional preventive measures in order to safely avoid health risks.

1.9 Safety devices

Use the lathe only with properly functioning safety devices.

Stop the lathe immediately if safety device fails or is not functioning for any reason.

It is your responsibility!

If a safety device has been activated or has failed, the lathe must only be used if you

- have removed the cause of the failure,
- have verified that there is no danger resulting for the personnel or objects.

WARNING!

If you bypass, remove or override a safety device in any other way, you are endangering yourself and other persons working on the lathe. The possible consequences are:

- **injuries due to components or parts of components flying off at high speed,**
- **contact with rotating parts,**
- **fatal electrocution,**
- **pulling-in of clothes.**

The lathe includes the following safety devices:

- a lockable main switch,
- an EMERGENCY-STOP mushroom switch,
- a lathe chuck protection with position switch,
- a protective cover on the headstock with position switch,
- protective covers on the machine bed,
- a safety screw at the tailstock,
- a recoil spring as protective cover on the lead screw, the coil spring prevents the pulling-in of clothes into the lead screw.
- an overload clutch on the feed rod,
- safety screws for the Cam-lock bolts on the workpiece holder,
- a chip shield.

WARNING!

The separating protective equipment provided and delivered with the machine are designed to reduce the risk of workpieces or fragments of them being expelled, but does not completely exclude this risk.

1.9.1 Lockable main switch

In the position " 0 " the lockable main switch can be secured against accidental or non-authorized switching-on by means of a padlock.

When the main switch is switched off, the power supply is interrupted.

Except for the areas marked by the pictogram in the margin. In these areas there might be voltage, even if the main switch is switched-off.

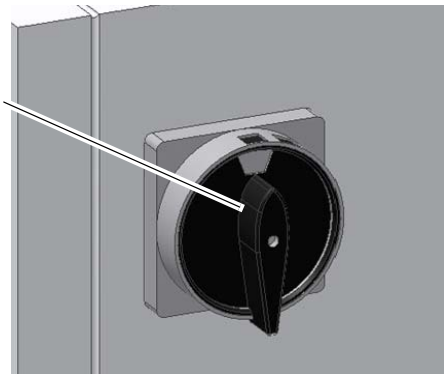


Fig.1-2: Main switch

WARNING!

Dangerous voltage even if the main switch is switched-off.

In the areas marked by the pictogram in the margin, there might be live parts, even if the main switch is switched off.

1.9.2 EMERGENCY-STOP button

CAUTION!

The drive or the lathe chuck will continue to run for a while afterwards depending on the mass moment of inertia of the lathe chuck and workpiece.

The emergency stop button shuts the machine down.

Turn the knob clockwise to unlock the emergency stop button.

CAUTION!

The emergency stop button may only be activated in an emergency. A normal shut-down of the machine must not be executed using the emergency stop mushroom button.

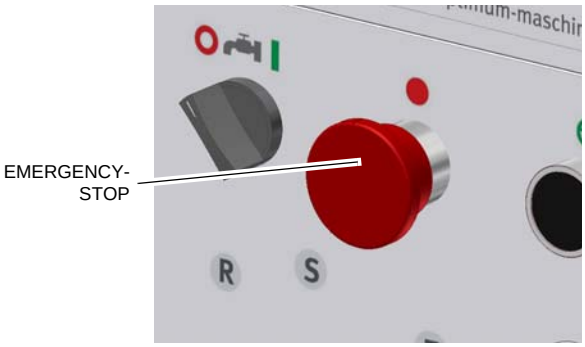


Fig.1-3: EMERGENCY-STOP button

By activating the emergency stop, the 24V voltage drive control is shut off.

1.9.3 Protective cover of the headstock

The headstock of the lathe is equipped with a protective cover and a position switch.

The machine only starts when the protective cover is closed.

The 24V control voltage switches off with the opening of the protective cover.

Switch the 24V control voltage on again when the protective cover was dismounted for maintenance or the exchange of gears.

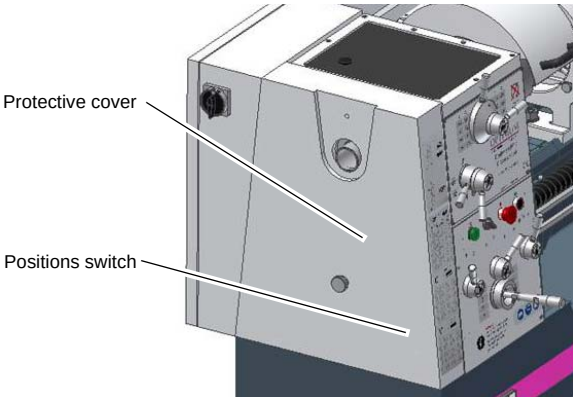


Fig. 1-4: Position switch protective cover on the headstock

1.9.4 Protective covers drive

The machine bed of the lathe is equipped with permanently installed safety covers.

DANGER!

The machine may only be started back up when all safety covers have been installed and screwed on tightly.

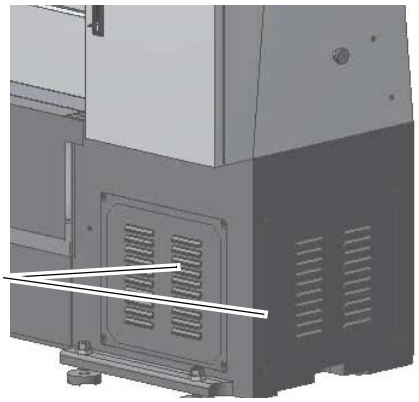


Fig. 1-5: Protective cover on the drive

WARNING!

Only remove the protective cover when the main switch of the lathe is turned off and secured by a padlock.

1.9.5 Lathe chuck protection with position switch

The lathe is equipped with a lathe chuck protection. The lathe can only be switched on if the lathe chuck protection is closed.

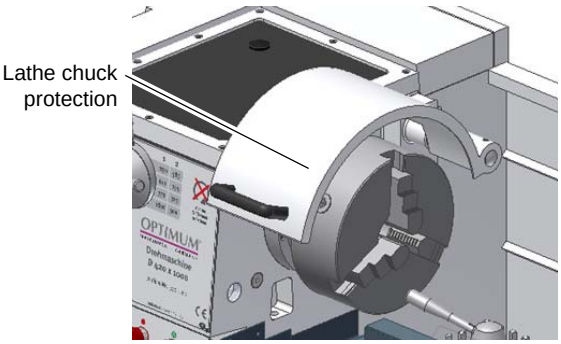


Fig. 1-6: lathe chuck protection

1.9.6 Chip shield

Polycarbonate windows

The polycarbonate viewing pane for protecting against chips, which also has a safety-critical function with respect to ejected parts, must be visually inspected at regular intervals by the responsible customer personnel to guarantee the operational safety of the machine.

Polycarbonate viewing panes are subject to an ageing process and are classified as wear parts.

The aging of polycarbonate viewing panes can not be detected by visual inspection. It is therefore necessary to replace the polycarbonate viewing pane after a certain time.

Prolonged exposure from polycarbonate viewing panes to cutting fluids can lead to accelerated ageing, i.e. deterioration of the mechanical properties (brittleness). Coolant vapours, detergents, greases and oils or other corrosive substances from the operator side can also lead to a deterioration of the polycarbonate windows. The result is a reduced retention capability of the polycarbonate viewing pane against chips and potentially flying parts.

1.9.7 Prohibition, warning and mandatory labels

INFORMATION

All warning and mandatory signs must be legible. Check them regularly.

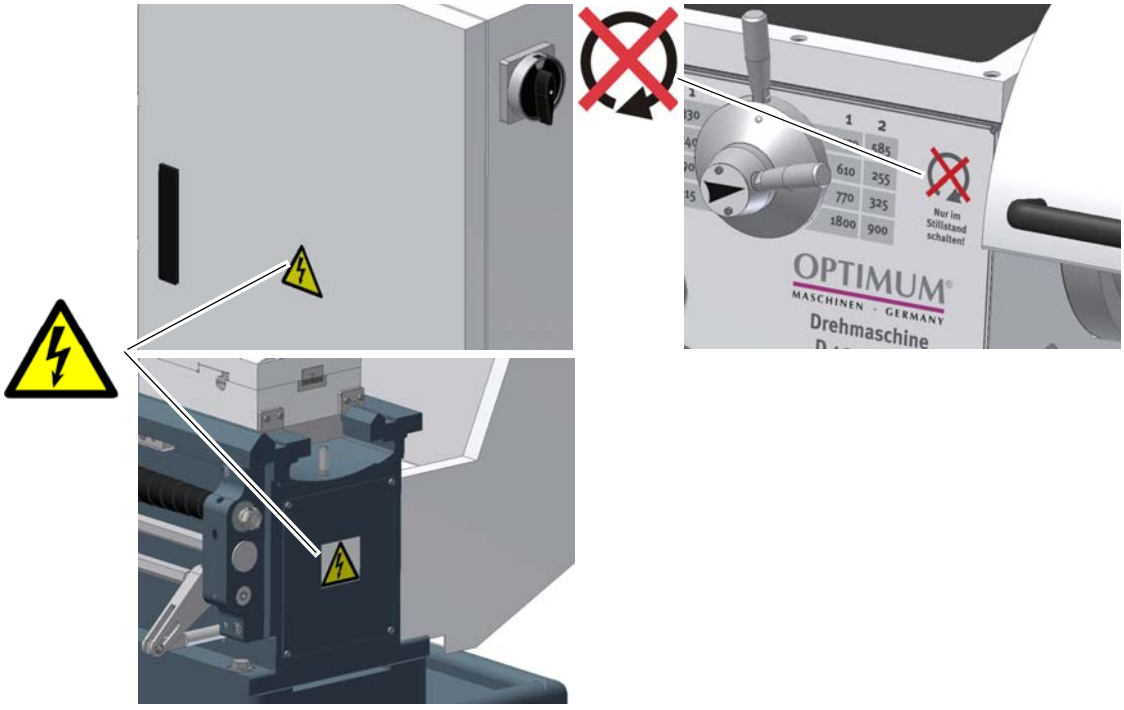


Fig. 1-7: Pictograms

Explanation of pictograms used: ☞ "Further ideograms“ on page 9

Symbols used: ☞ "Control elements overview“ on page 35

1.10 Safety check

Check the lathe at least once per shift. Inform the person responsible immediately of any damage, defects or changes in the operating function.

Check all safety devices

- at the beginning of each shift (with the machine stopped),
- once a week (with the machine in operation),
- after all maintenance and repair work.

Check that prohibition, warning and information signs and the labels on the lathe

- are legible (clean them, if necessary),
- are complete.

INFORMATION

Organise the checks according to the following table;

General check		
Equipment	**Check**	**OK**
Protective covers	Mounted, firmly bolted and not damaged	
Signs, Markings	Installed and legible	
Date:	**Checked by (signature):**	

Functional check		
Equipment	**Check**	**OK**
EMERGENCY-STOP mushroom switch	After activating the emergency stop mushroom button, the control voltage on the lathe will shut off. The spindle continues to rotate for a while based on the mass moment of inertia of the spindle and workpiece.	
Position switch Lathe chuck protection	The lathe may only be operated with the lathe chuck protection closed.	
Position switch Protective cover of the headstock	The lathe may only turn on if the protective cover on the headstock is closed.	
Position switch Spindle brake	The lathe must be switched off if the mechanical spindle brake is activated.	
Date:	**Checked by (signature):**	

1.11 Personal protective equipment

For certain work personal protective equipment is required.

Protect your face and your eyes: Wear a safety helmet with facial protection when performing work that exposes your face and eyes to hazards.

Use protective gloves when handling pieces with sharp edges.

Use safety shoes when you assemble, disassemble or transport heavy components.

Use ear protection if the noise level (emission) in the workplace exceeds 80 dB (A).

Before starting work make sure that the required personal protective equipment is available at the work station.

CAUTION!

Dirty or contaminated personnel protective equipment can cause illnesses.

Clean it each time after use and at least once a week.

1.12 Safety during operation

We specifically point out the dangers when describing the work with and on the lathe.

WARNING!

Before activating the lathe ensure that this will neither endanger other persons nor cause damage to equipment.

Avoid any risky working practices:

Avoid any risky working practices:

- Make sure that your work does not endanger anyone.
- Clamp the workpiece tightly before activating the lathe.
- Mind the maximum chuck opening.
- Use protective glasses!
- Do not remove the turning chips by hand. Use a chip hook and / or a hand brush to remove turning chips.
- Clamp the turning tool at the correct height and with the least possible overhang.
- Turn off the lathe before measuring the workpiece.
- The instructions mentioned in these operating instructions have to be strictly observed during assembly, operation, maintenance and repair.
- Do not work on the lathe if your concentration is reduced, for example, because you are taking medication.
- Observe the accident prevention regulations issued by your Employers Liability Insurance Association or other supervisory authorities responsible for your company.
- Inform the supervisor about all hazards or faults.
- Stay at the lathe until all movements have come to a complete standstill.
- Use the prescribed personnel protective equipment. Make sure to wear a well-fitting work suit and, if necessary, a hairnet.

1.13 Safety during maintenance

Inform the operators in good time about any maintenance and repair works.

Report all safety-relevant changes and performance characteristics of the lathe. Any changes must be documented, the operating instructions updated and machine operators instructed accordingly.

1.13.1 Disconnecting and securing the lathe

Turn off the main switch of the lathe before starting any maintenance or repair work.

Use a padlock to prevent the switch from being turned on without authorization and keep the key in a safe place.

All machine parts as well as all dangerous voltages are switched off.

Only the positions which are marked with the pictogram on the side constitute an exception. These positions may be live even if the main switch is switched off.

Attach a warning sign on the lathe.

WARNING!

Live parts and machine part movements can lead to severe injury to you or others!

Proceed with extreme care if you cannot switch off the lathe by turning off the main switch due to required work (e.g. functional control).

1.13.2 Using lifting equipment

WARNING!

The use of unstable lifting and load suspension equipment that might break under load can cause severe injuries or even death.

Check that the lifting and load-suspension equipment are of sufficient load-bearing capability and are in perfect condition.

Observe the accident prevention regulations issued by your Employers Liability Insurance Association or other supervisory authorities responsible for your company.

Fasten the loads properly.

Never walk under suspended loads!

1.13.3 Mechanical maintenance work

Remove or install protection safety devices before starting or after completing any maintenance work; these include:

- covers,
- safety indications and warning signs,
- earth (ground) connections.

If you remove protection or safety devices, refit them immediately after completing the work.

Check if they are working properly!

1.14 Accident report

Inform your supervisors and Optimum Maschinen Germany GmbH immediately in the event of accidents, possible sources of danger and any actions which almost led to an accident (near misses).

There are many possible causes for "near misses".

The sooner they are notified, the faster the causes can be eliminated.

INFORMATION

We provide information about the specific dangers when working with and on the lathe in the descriptions for these types of work.

1.15 Electrical system

☞ "Electrical specialist“ on page 12

Have the machine and/or the electric equipment checked regularly. Immediately eliminate all defects such as loose connections, defective wires, etc.

A second person must be present during work on live components to disconnect the power in the event of an emergency. Disconnect the lathe immediately if there is a malfunction in the power supply!

The operator of the machine must ensure that the electrical systems and operating equipment are inspected with regards to their proper condition, namely,

- by a qualified electrician or under the supervision and direction of a qualified electrician, prior to initial commissioning and after modifications or repairs, prior to recommissioning
- and at certain intervals.

The deadlines must be set so that arising, foreseeable defects can be detected in time.

The relevant electro-technical rules must be followed during the inspection.

1.16 Inspection deadlines

Define and document the inspection deadlines for the machine in accordance with OSHA, state and local regulations. ☞ "Checkup, inspection and maintenance“ on page 66

2 Technical Data

The following data give dimensions and weight and are the manufacturer's authorized machine data.

2.1 Power connection	D420 x 1000	D420 x 1500
Motor	6.0 HP, 230V, 3Ph, 60Hz 6.0 HP, 460V, 3Ph, 60Hz (optional)	

2.2 Machine data	D420 x 1000	D420 x 1500
Diameter three-jaw chuck	200mm (7-7/8"")	
Height of centers	210 mm (8.27")	
Distance between centers	1000 mm (39")	1500 mm (59")
Swing over machine bed	420 mm (16.5")	
Swing over support	255 mm (10")	
Swing bed insert removed	590 mm (23.23")	
Distance between centers with bed insert removed	240 mm (9.45")	
Spindle speed [rpm]	45 | 70 | 90 | 108 | 140 | 165 | 215 | 330 255 | 385 | 510 | 585 | 770 | 900 | 1170 | 1800	
Number of speeds	16	
Spindle taper	MT 6	
Spindle seat	Camlock ASA D 1 - 6"	
Spindle thru hole	51.8 mm (2.04")	
Longitudinal feed range	0.05 - 1.7mm/rev. (0.002" - 0.067"/rev)	
Longitudinal Lead Screw size	28mm Dia - 4 TPI	
Longitudinal Feed Dial graduation	0.01" (1rev = 0.77")	
Thread Cutting Pitches - Inches [tpi]	72 - 2 45 pitches	
Thread Cutting Pitches - Metric [mm]	0.2 - 14 42 pitches	
Diametrical Pitches [dp]	8 - 44 23 pitches	
Modular Pitches [metric]	0.3 - 3.5 18 pitches	
Operating travel cross slide	210 mm (8.27")	
Crossfeed range	0.025 - 0.085mm/rev. (0.001" - 0.033"/rev)]	
Cross feed Lead Screw size	16mm Dia - 10 TPI	
Cross feed Dial graduation (dual dial mm/inch)	0.02mm (1rev = 5.08mm") indirect 0.001" (1rev = 0.2") indirect	
Operating travel compound slide	102 mm (4.02")	
Adjustment range of the compound slide	+ - 90°	
Compound feed Lead Screw size	13mm Dia - 10 TPI	

2.2 Machine data	D420 x 1000	D420 x 1500
Compound feed Dial graduation (dual dial mm/inch)	0.02mm (1rev = 2.54mm") 0.001" (1rev = 0.1")	
Taper bore of tailstock sleeve	MT 4	
Tailstock - sleeve diameter	50 mm (1.97")	
Tailstock sleeve travel	120 mm (4.72")	
Tailstock cross adjustment	+ - 13 mm (0.5")	
Tailstock feed Lead Screw size	16mm Dia - 10 TPI	
Tailstock feed Dial graduation	0.001" (1rev = 0.1")	
Maximum dimensions of the turning tool shank to fit in quadruple tool holder	31 x 31mm (1.22" x 1.22")	

2.3 Dimensions	D420 x 1000	D420 x 1500
height	1375 (1615) mm/ 54.13 (63.58)"	
length	2025 mm (79.72")	2525 mm (99.40")
depth	915 mm (36.02")	
total weight [lbs]	3400	3970
floor loading	9 KN / m^2 [1.3 psi]	

2.4 Work area	D420 x 1000	D420 x 1500
	Keep a work area of at least 3.3 feet around the machine free for operation and maintenance.	

2.5 Environmental conditions	D420 x 1000	D420 x 1500
temperature	40 - 95 °F	
humidity	25 - 80 %	

2.6 Operating material see also ☞ "Lubricant“ on page 77	D420 x 1000	D420 x 1500
headstock	Mobilgear 627 or other equivalent oil, filling quantity 12.9 litres (13.63 US qt)	
gear of apron	Mobilgear 629 or other equivalent oil, filling quantity 1.2 litres (1.27 US qt)	
feed gear	Mobilgear 629 or other equivalent oil, filling quantity 1.4 litres (1.48 US qt)	
bright steel parts and lubricating nipples	acid-free lubricating oil	
coolant equipment	industrial cooling agent / lubricants maxi. filling quantity: 18.4 litres (19.44 US qt)	

2.7 Emissions

The level of noise emitted by the lathe is 80 dB(A) at no-load operation.

INFORMATION

This numeric value had been measured on a new machine under conventional operating conditions. Depending on the age or wear of the machine, the noise behavior of the machine might change.

Furthermore, the extent of the noise emission is also depending on manufacturing influence factors, such as speed, material and clamping conditions.

INFORMATION

The mentioned numerical value is an emission level and not necessarily a safe working level.

Unless the degree of noise emission and the degree of noise disturbance are depending on one another it is not possible to use it in order to reliably determine if it is necessary to take further preventive measures or not.

The following factors influence the actual degree of the noise disturbance of the operator:

- Characteristics of the working chamber, e.g. size or damping behavior**,**
- Other noise sources, e.g. the number of machines,
- Other processes proceeding nearby and the period during which the operator is exposed to the noise.

Furthermore, the admissible pollution level may be different from one country to another due to the national regulations.
This information regarding the noise emission should allow the operator of the machine to perform a better evaluation of the endangerments and risks.

CAUTION!

The machine operator has to wear an appropriate ear protection depending on the overall stress caused by noise and on the basic limit values.

We generally recommend using a sound and ear protection.

3 Assembly

INFORMATION

The lathe is delivered pre-assembled.

3.1 Unpacking the machine

Transport the lathe in its packing crate near its final installation site with a forklift before unpacking it. If the packaging shows signs of possible transport damage, take the necessary precautions not to damage the machine when unpacking. If any damage is discovered, the carrier and/or shipper must immediately be notified of this fact to establish any claim which might arise.

Inspect the machine completely and carefully, making sure that all materials, such as shipping documents, manuals and accessories supplied with the machine have been received.

3.2 Scope of delivery

When the lathe is delivered, please check immediately that it has not been damaged during transport.
Also check that no fastening screws have come loose. Compare the scope of delivery with the attached packing list.

3.3 Transport

WARNING!

Severe or fatal injuries may occur if parts of the machine tumble or fall down from the forklift truck or from the transport vehicle. Follow the instructions and information on the transport crate.

Note the total weight of the lathe.

Use only transport and load suspension devices that can hold the total weight of the lathe.

WARNING!

The use of unstable lifting and load suspension equipment that might break under load can cause severe injuries or even death. Check that the lifting and load suspension gear has sufficient load capacity and that it is in perfect condition.

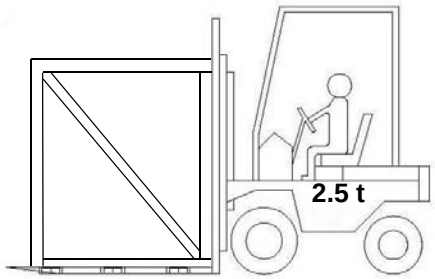
Observe the accident prevention regulations issued by your Employers Liability Insurance Association or other supervisory authorities responsible for your company.

Fasten the loads properly.

Never walk under suspended loads!

- Weights

Weight of the lathe “total weight [lbs]“ on page 23



3.3.1 Load suspension point

ATTENTION!

Damage, bending of the lead screw and feed rod or selector shaft by the lifting slings.

Make sure that the lead screw, the feed rod and the selector shaft of the lathe do not touch the lifting slings during lifting.

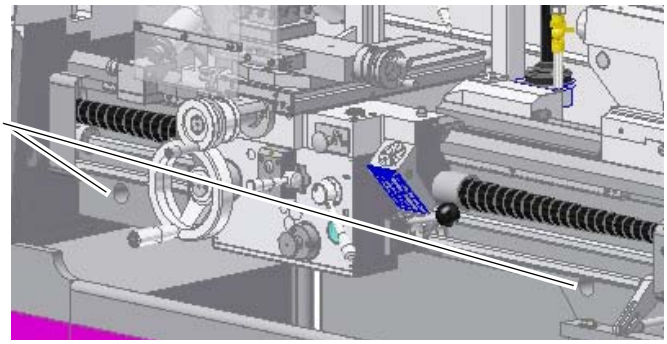


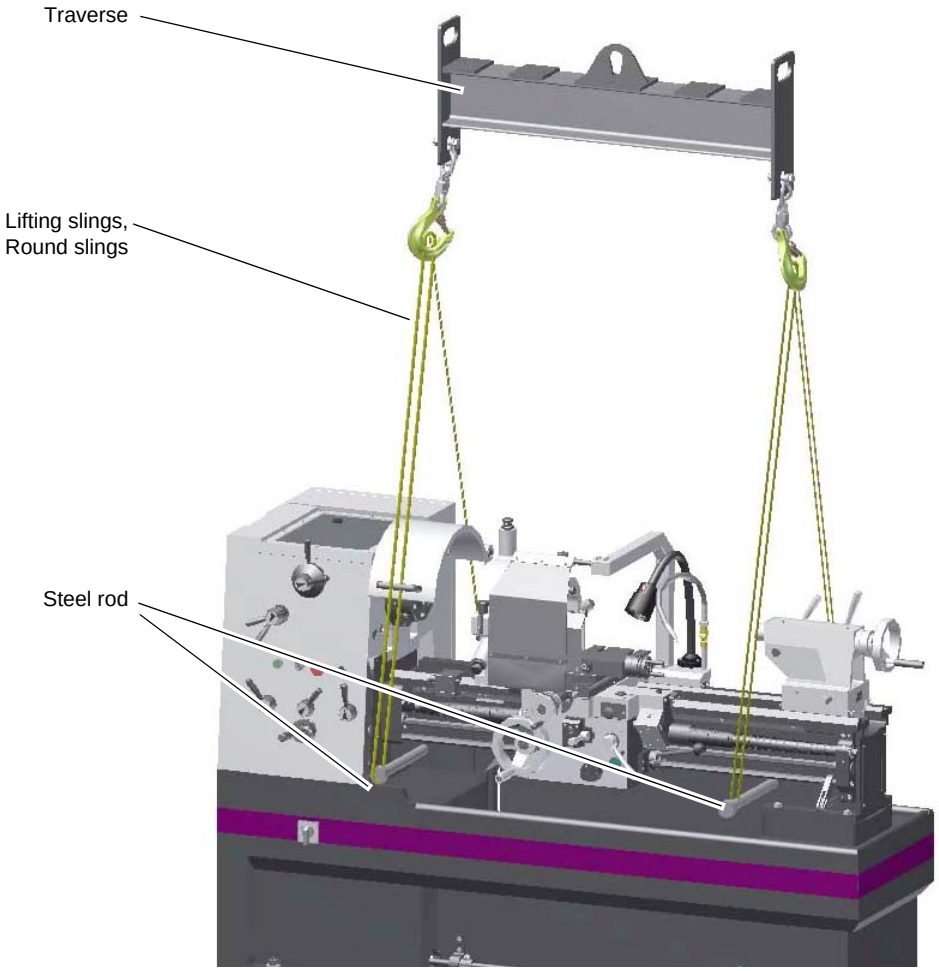
Fig. 3-1: drill hole for the load end position

3.3.2 Gravity of the machine

☞ "Dimensions, installation plan D420“ on page 31

3.3.3 Lifting by crane

Weight of the lathe “total weight [lbs]“ on page 23



- ➜ Disassemble the splashguard on the lathe.
- ➜ Insert a steel rod with 35mm (1.375") diameter and a length of about 800mm (32") into the drill hole in the lathe bed.
- ➜ Suspend a lifting sling to each of the two sides of the lathe bed and to the ends of the piece of steel. Secure the lifting slings on the steel rods with clamping rings to prevent slipping.
- ➜ Firmly clamp the tailstock.
- ➜ Slowly raise the machine using the crane.

3.3.4 Lifting with a forklift

Weight of the lathe “total weight [lbs]“ on page 23

Transporting the lathe on the lower portion of the packing crate is recommended. Disassemble the lateral parts of the packing crate.

Optional transport by fork-lift truck:

➜ Disassemble the splashboard on the lathe.

➜ Lift the lathe using the jack screws until the forks of the forklift fit under the machine bed.

➜ Lift the lathe from the back with a forklift.

3.4 Installation and assembly

ATTENTION!

Before you install the machine have the load-bearing capacity of the floor checked by an expert. The floor or ceiling of the hall must carry the weight of the machine plus any additional parts and auxiliary equipment, as well as operator and stockpiled materials. If necessary, the floor must strengthened.

3.4.1 Requirements regarding the installation site

Organize the working area around the lathe according to the local safety regulations.
☞ "Work area“ on page 23

The working area for operating, maintenance and repair must not be hindered.

INFORMATION

In order to attain good functionality and a high processing accuracy as well as a long service life of the machine, the installation site should fulfil certain criteria.

Please observe the following points:

- The machine must only be installed and operated in a dry and well-ventilated place.
- Avoid places near machines generating chips or dust.
- The installation site must be free from vibrations ergo far from presses, planing machines, etc.
- The substructure must be suitable for the lathe. Also make sure that the floor has sufficient load bearing capacity and is level.
- The substructure must be prepared in a way that potential coolants cannot penetrate the floor.
- Any parts sticking out such as stops, handles, etc. have to be secured by measures taken by the customer if necessary in order to avoid endangerment of persons.
- Provide sufficient space for the staff preparing and operating the machine and transporting the material.
- Also make sure the machine is accessible for setting and maintenance works.
- Provide for sufficient illumination (Minimum value: 500 lux, measured at the tool tip). At lower illumination intensities, additional illumination has to be ensured e.g. by means of a separate workplace lamp.

INFORMATION

The mains plug of the lathe must be freely accessible.

3.5 Cleaning of the machine

CAUTION!

Do not use compressed air to clean or dry the machine.

Your new lathe must be completely cleaned after being unpacked, to make sure that all the moving parts and sliding surfaces cannot be damaged when operating the machine. Each unit leaves the factory with all its polished parts and sliding surfaces suitably greased, to avoid oxidation in the period of time that elapses until it is started up. Remove all the wrapping and clean all the surfaces with a degreaser to soften and remove the protecting greases and coatings.

Clean all the surfaces with a clean cotton cloth and lubricate the lathe as explained in the following section, before connecting the power and beginning to operate the machine.

3.5.1 Lubrication

The lubrication and initial greasing of your new lathe consists of checking the oil levels through the headstock, apron and feed box oil sight glasses to make sure there is lubrication. The oil tanks must be filled to half way up the sight glass. Once these operations have been carried out the machine can be started up.

➜ The headstock, feed box and apron oil must be changed 200 hours after being filled for the first time, then after every 1000 hours of operation.

☞ "Feed gear“ on page 69

☞ "Apron“ on page 69

☞ "Headstock“ on page 70

➜ Use the oil types recommended in the reference table ☞ "Operating material“ on page 23. This table can be used to compare the characteristics of each different type of oil of your choice. ☞ "Lubricant“ on page 77

➜ The lubrication nipples must be lubricated every 8 hours using an oiler. Furthermore, lubricating the slide tracks of the machine bed once a day is also recommended.

ATTENTION!

Check the manual lubrication pump unit for proper functionality weekly and ensure sufficient oil is reaching all slides.

3.6 Assembly

3.6.1 Anchor-free assembly

➜ Put the locating discs comprised in the delivery volume under the lathe's substructure.

➜ Align the lathe with a machine spirit level.

❍ Check the alignment of the machine after a few days of usage.

➜ Use the adjusting screws in order to adjust the lathe.

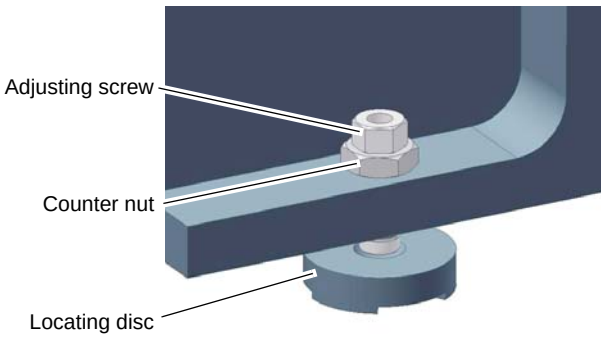


Fig. 3-2: Adjusting screw

ATTENTION!

An insufficient rigidity of the substructure leads to superposition of vibrations between the lathe and the substructure (natural frequency of the components). Critical speeds with unpleasant vibrations are rapidly achieved if the rigidity of the whole system is insufficient and will lead to bad turning results.

3.6.2 Anchored assembly

Use the anchored assembly in order to attain a firm connection to the substructure. An anchored assembly is always reasonable if parts are manufactured to the maximum capacity of the lathe.

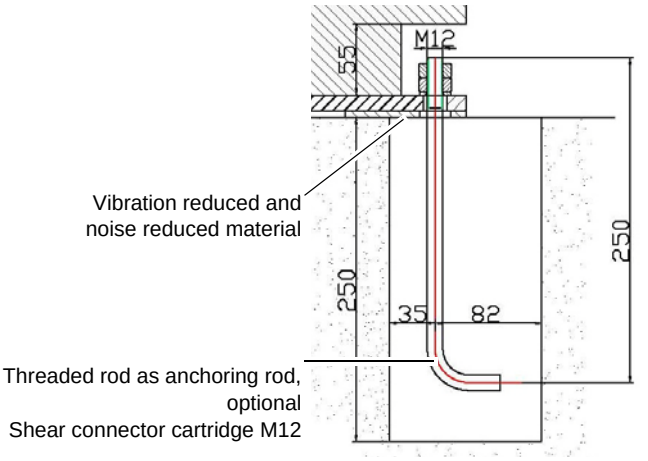
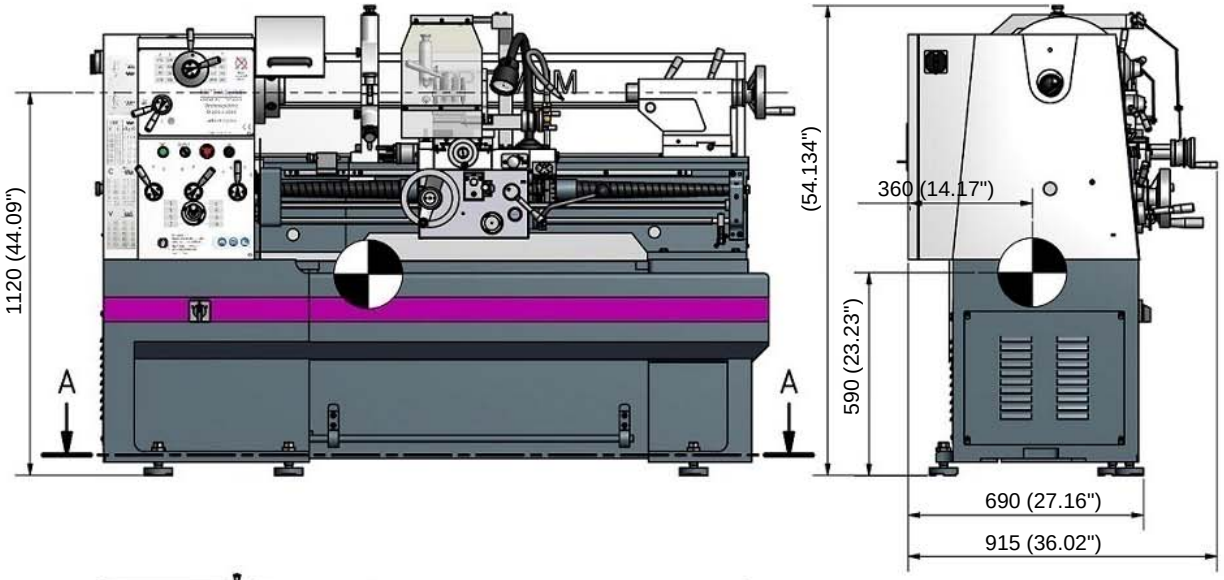
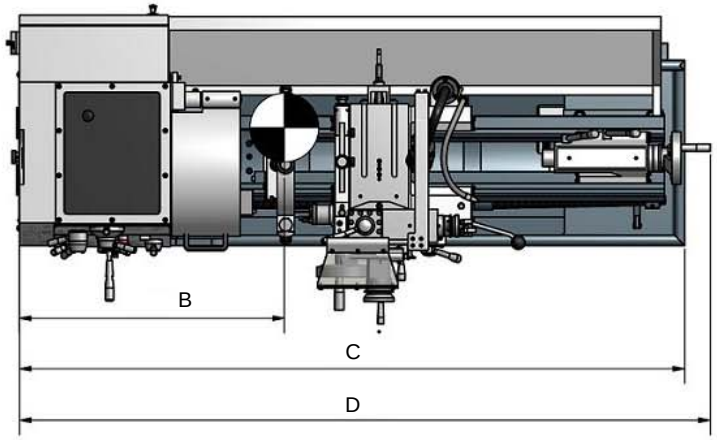


Fig. 3-3: Drawing of the anchoring

3.7 Dimensions, installation plan D420





	D420x1000	D420x1500
B	775 (30.51")	800 (31.50")
C	1940 (76.37")	2440 (96.06")
D	2025 (79.38")	2525 (99.40")
J	1180 (46.46")	1680 (66.14")
K	1890 (66.53")	2400 (94.48")

Unit: mm (inch)

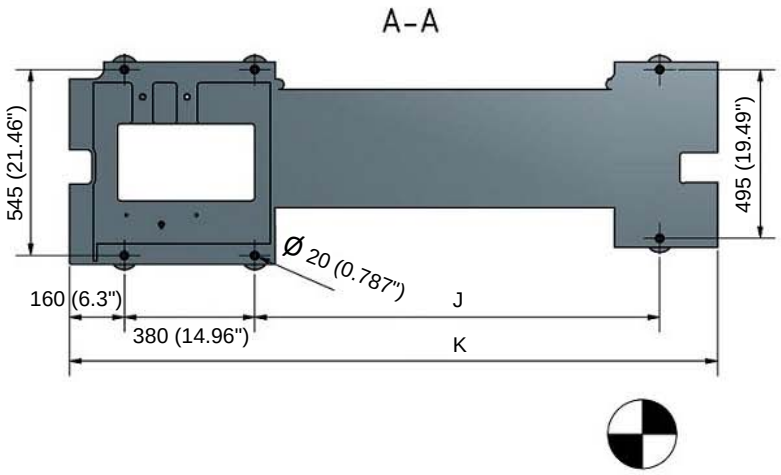


Fig. 3-4: D420

3.8 Coolant equipment

The lathe is equipped with an external coolant tank. The external coolant tank allows for easier handling, monitoring and exchange of the coolant.

CAUTION!

Please read the notes on the required properties of the cooling lubricant to be used and the proof test interval.

☞ **"Cooling lubricant“ on page 61**
☞ **"Cooling lubricants and tanks“ on page 75**

➜ Mount the coolant pump on the coolant tank using the attached fastening material.
➜ Mount the drain of coolant into the fixing. Attach the hose with the hose clamp supplied.
➜ Fill in coolant.
❍ Filling quantity ☞ "Operating material“ on page 23.

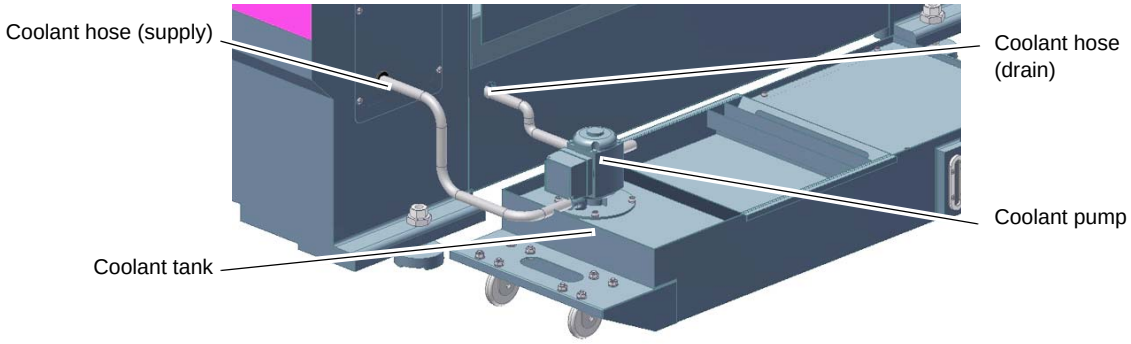


Fig. 3-5: Coolant equipment

ATTENTION!

Destruction of the pump due dry running. The pump is lubricated by the cooling agent. Do not operate the pump without coolant.

3.9 First commissioning

WARNING!

The machine may only be commissioned after proper installation.

Having the lathe initially commissioned by inexperienced staff endangers people and the machine. We do not assume any liability for damages caused by incorrectly performed commissioning.

ATTENTION!

Before commissioning the machine check all screws, fixtures resp. safety devices and tighten up the screws if necessary!

WARNING!

Risk from using improper workpiece clamping materials or operating the machine at an inadmissible speed.

Only use the tool holders (e.g. drill chuck) which were delivered with the machine or which are offered as optional equipment by OPTIMUM.

Only use tool holders in the intended admissible speed range.

3.10 Power connection

☞ "Wiring diagram“ on page 124

➜ Connect the electrical supply cable. The connection points are at the terminal block for the main switch and are marked with L1, L2, L3.

➜ Check the fusing (fuse) of your electrical supply according to the technical instructions regarding the total connected power of the lathe.

➜ Firmly connect the machine.

ATTENTION!

Ensure that all 3 phases (L1, L2, L3) and the ground wire are connected correctly.

ATTENTION!

Make sure that the direction of rotation of the drive motor and cooling lubricant pump is correct. If the rotational direction switch is switched to the down position, the spindle must rotate anticlockwise. If necessary, exchange two phase connections. The guarantee will become null and void if the machine is connected incorrectly.

3.11 Optional lathe accessories

Designation	article number	designation	article number
RÖHM three jaw chuck, 200mm	344 1535	RÖHM three jaw chuck, 250mm	344 4020
RÖHM four jaw chuck, 200mm	344 1536	RÖHM four jaw chuck, 250mm	344 4021
RÖHM face plate, 400mm	344 4038	RÖHM lathe chuck, 4 jaws, 200mm, with direct holding fixture Camlock D 1-6"	344 1536
quick change tool holder SWH 5 - B	338 4305		

4 Operation

4.1 Control and indicating elements D420

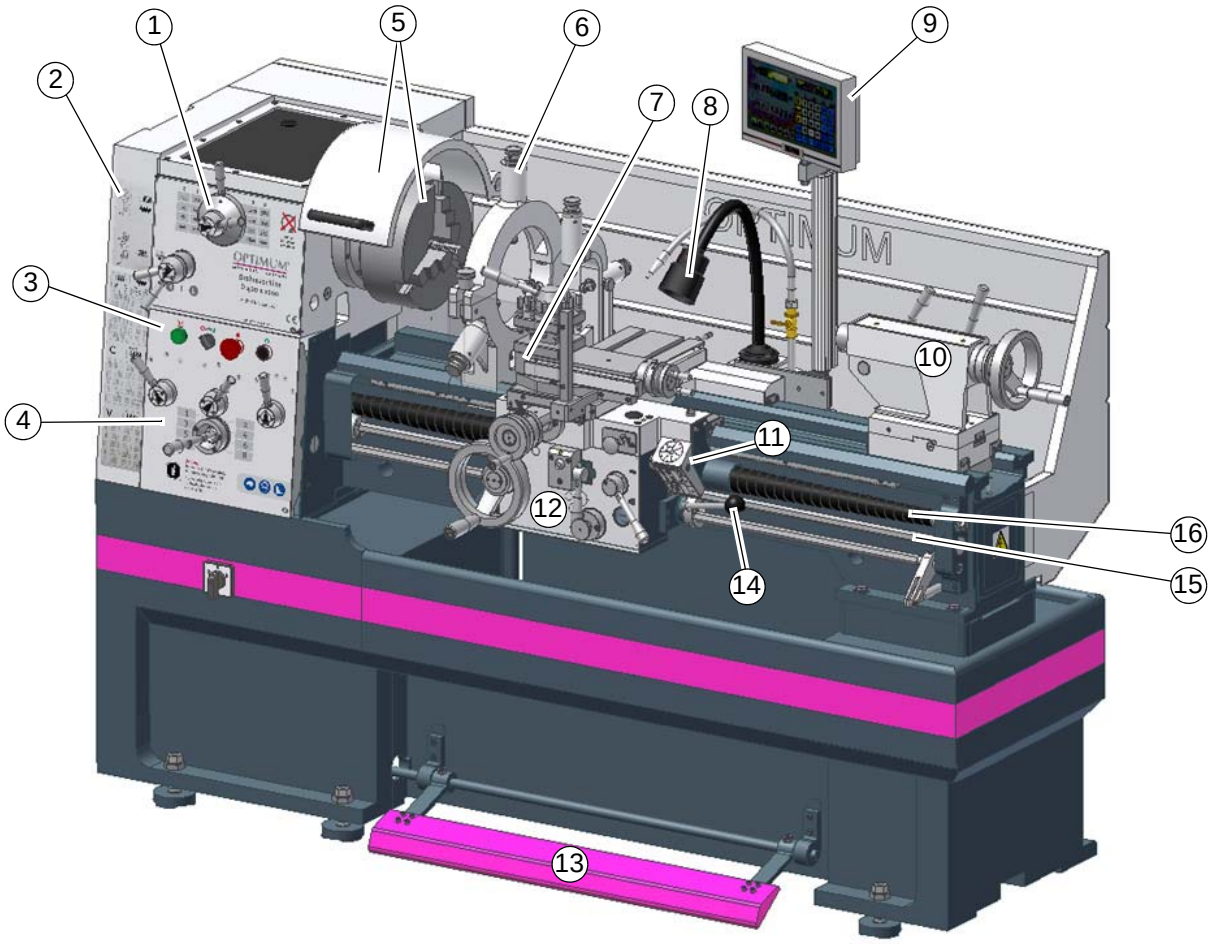


Fig. 4-1: D460

Pos.	Designation	Pos.	Designation
1	Selector lever speed adjustment	2	Change wheel and infeed table
3	Control panel	4	Selector lever feed gear
5	Lathe chuck protection and chuck	6	Steady rest (example)
7	Chip shield	8	Machine lighting
9	Digital position display DPA 2000	10	Tailstock
11	Threading gauge	12	Lathe slide control panel
13	Mechanical spindle brake	14	Spindle rotation actuating lever
15	Feed rod	16	Lead screw

4.2 Safety

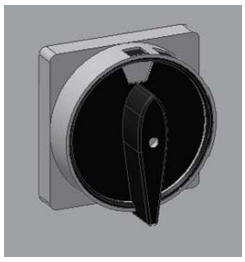
Commission the lathe only under the following conditions:

- The lathe is in proper working order.
- The lathe is used as prescribed.
- The operating manual is followed.
- All safety devices are installed and activated.

All failures should be eliminated immediately. Stop the lathe immediately in the event of any abnormality in operation and make sure it cannot be started-up accidentally or without authorisation. Notify the person responsible immediately of any modification.

☞ "Safety during operation“ on page 19

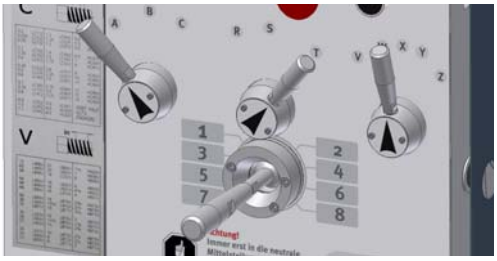
4.3 Control elements overview



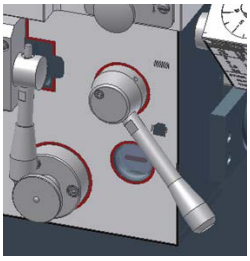
Lockable
Main switch

Selection lever
Feed direction

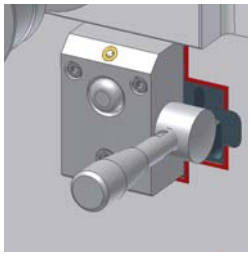
Feed adjustment
selector lever



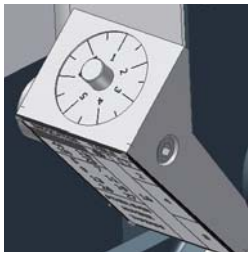
Feed adjustment selector lever



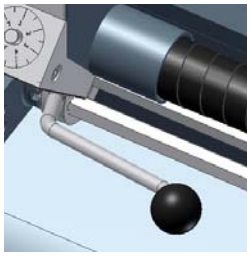
Shift lever thread cutting



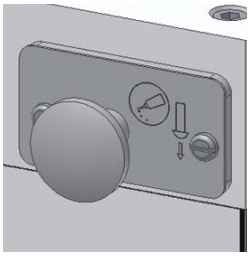
Cross feed / longitudinal feed engaging lever



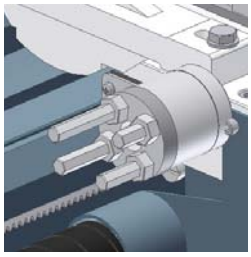
Threading gauge



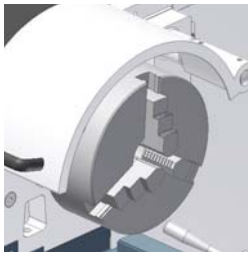
Actuating lever rotational direction



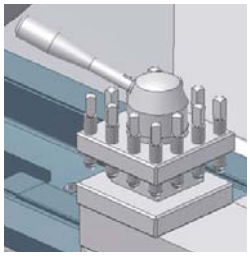
Pump central lubrication



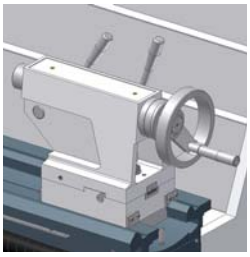
End position
Bed slide



Lathe chuck

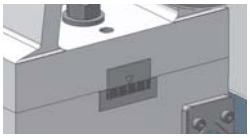


Quadruplicate tool holder

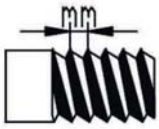
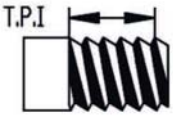
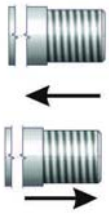
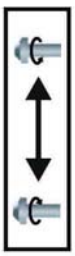


Tailstock

4.3.1 Display elements overview

 control light for operation	 Oil sight glass Apron	 Oil sight glass Headstock	 Oil sight glass Feed gear
 Adjustable scale Threading gauge	 Scale cross offset tailstock		

4.3.2 Operating symbols

H high speed range	**L** low speed range
 Feed direction	 Metric thread [mm / spindle revolution]
 Inch thread [threads / inch]	 Feed speed
 Modular thread / diametrically thread	 Longitudinal feed direction
 Turning direction	 Refill oil

 Check filling level	 Coolant ON / OFF
 Read the maintenance manual ☞ "Checkup, inspection and maintenance“ on page 66	 Direct run, momentary switch

4.4 Switching on the machine

4.4.1 Switching on the D420

➜ Switch on the main switch.

➜ Check that the EMERGENCY-STOP mushroom switch is not pressed or unlocked. Turn the EMERGENCY-STOP mushroom switch to the right in order to unlock it.

➜ Turn on the controls, the operation control light must be lit.

➜ Close the lathe chuck protection.

☞ "Direct run“ on page 37

☞ "EMERGENCY-STOP button“ on page 15

☞ "Cooling lubricant“ on page 61

☞ "Troubleshooting“ on page 126

4.5 Switching off the machine

➜ Switch off the main switch.

➜ If the lathe has been shut off for a longer period of time, switch it off using the main switch and secure it against unauthorised start-up. ☞ "Disconnecting and securing the lathe“ on page 20

CAUTION!

The emergency stop mushroom switch may only be activated in an emergency. A normal shut-down of the machine must not be executed using the emergency stop switch.

4.6 Resetting an emergency stop condition

➜ Set the rotational direction control lever to the neutral position.

➜ Unlock the emergency stop switch again.

➜ Switch the control on.

4.7 Power failure, Restoring readiness for operation

➜ Set the rotational direction control lever to the neutral position.

➜ Switch the control on.

4.8 Direct run

Use the direct run button to facilitate engaging the gearbox settings. The spindle starts turning, while the direct run is pressed. The lathe chuck protection must be closed for this. Briefly activate the direct run.

4.9 Foot brake

Activating the foot brake deactivates the motor and brakes the spindle.

➜ Set the rotational direction control lever back to the neutral position.

4.10 Gearbox settings and speed adjustment

ATTENTION!

Change the speed levels and gearbox settings only when the machine is at a standstill.

Use the momentary switch to facilitate engaging the gearbox settings. ☞ "Direct run" on page 37

4.10.1 Speed adjustment for the D420

If the selector lever A is turned to the right, the table at the right is relevant.

If the selector lever A is turned to the left, the table at the left is relevant.

The speed is adjusted in connection with the position of the step switch by the selector lever **B** .

There are 16 speeds available.

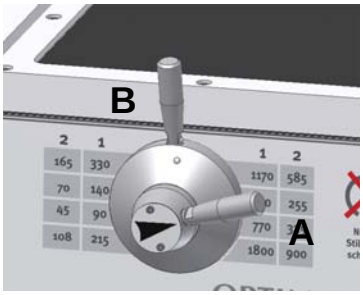


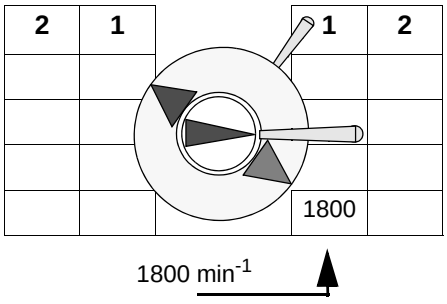
Fig. 4-2: Speed setting

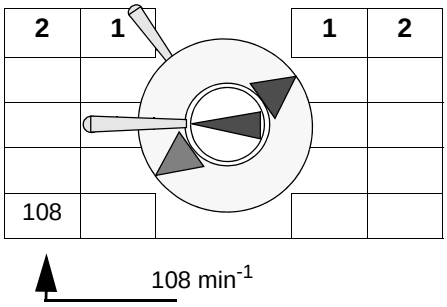
high speed

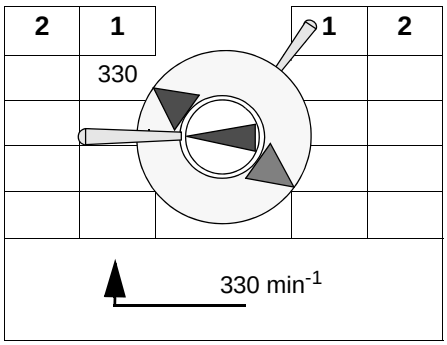
step switch

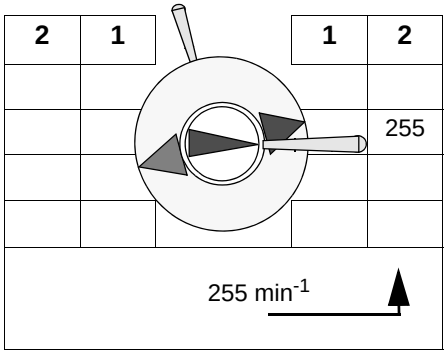
low speed

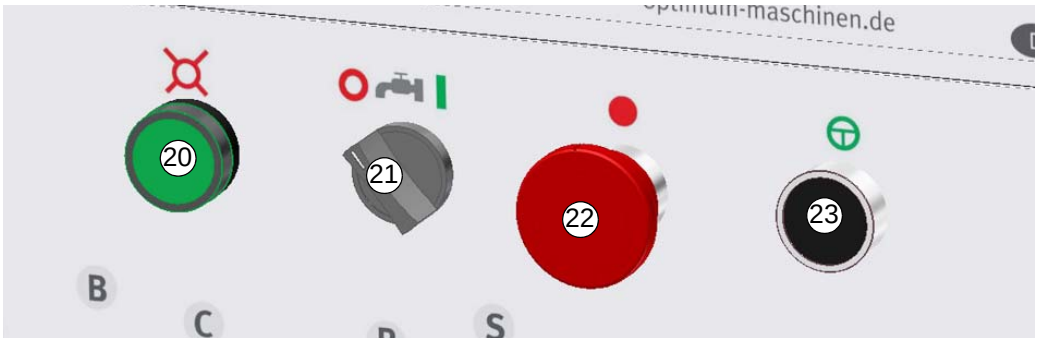
step switch











Pos.	Designation	Pos.	Designation
20	Operation control light	21	ON / OFF coolant pump
22	EMERGENCY-STOP button	23	Direct run

4.11 Turning direction

The rotation of lathe is switched using the control lever. The lathe can only be switched on, when the lathe chuck protection is closed.

➜ Push the control lever down for anti-clockwise turning direction.

➜ Push the control lever up for clockwise turning direction.

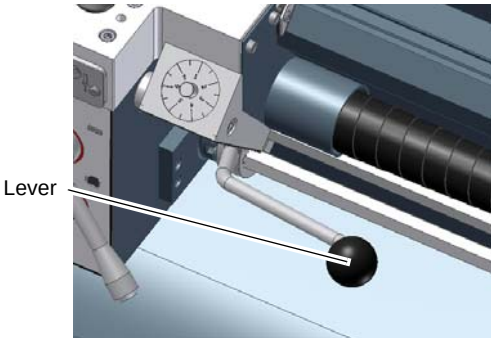


Fig.4-3: Lever spindle rotational direction

ATTENTION!

Wait until the lathe has come to a complete standstill, before changing the rotational direction by turning the actuating control lever for the direction of spindle rotation. Use the spindle brake to slow down the lathe more effectively.

A change of direction of rotation during operation leads to the destruction of components.

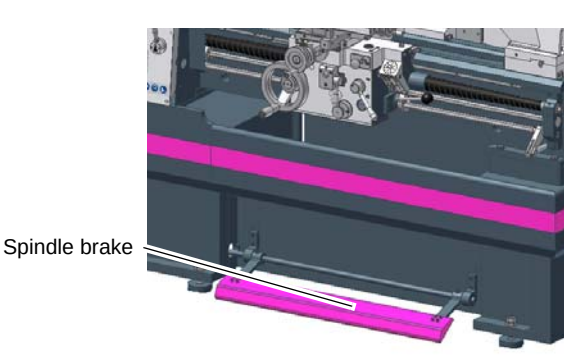


Fig.4-4: Spindle brake

4.12 Feed

The selector levers are used to set the feed or the pitch required for thread cutting.

ATTENTION!

Always switch the selector lever to the neutral position first before selecting another gear.

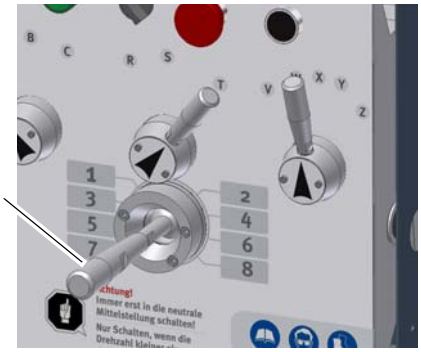


Fig. 4-5: Feed selection lever

Only switch the step lever when the speed of the spindle is 500 min^{-1} or less. For switching all other levers at the spindlehead, the head spindle must have come to a halt.

ATTENTION!

Damage to couplings, mechanical parts. The automatic feed is not designed to move onto mechanical stops or the mechanical end of the headstock.

4.12.1 Infeed speed

There are rates of feed in the range from 0,05 up to 1,7 mm per spindle rotation at disposal. Use the table on the lathe to adjust the rate of feed.

Look for the symbol on the table of the lathe to select the rate of feed. Select the rate of feed by the selector levers.

4.12.2 Feed direction

The selection lever is used to change the feed direction.

➜ Turn the selector lever up or down according to the symbols for production of longitudinal feed in direction to the spindle head or for production of a right-hand thread.

Fig. 4-6: Control panel headstock

4.13 Tool holder

Clamp the lathe tool into the tool holder.

The lathe tool needs to be clamped as short and tight as possible when turning in order to be able to absorb the cutting force well and reliably during the chip formation.

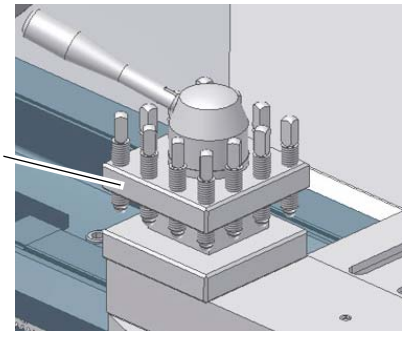


Fig. 4-7: Tool holder

Adjust the height of the tool. Use the tailstock with the center point in order to determine the required height. If necessary, put the steel washers beneath the tool to achieve the required height.

4.14 Quick action tool holder

Clamp the lathe tool into the quick action tool holder.

The lathe tool needs to be clamped as short and tight as possible when turning in order to be able to absorb the cutting force well and reliably during the chip formation.

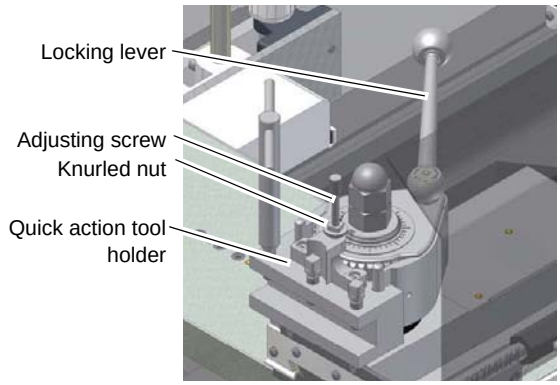


Fig. 4-8: Quick action tool holder

Adjust the height of the lathe tool by means of the adjusting screw on the tool holder. Counter the position of the tool holder by means of the knurled nut. Use the tailstock with the centring point in order to determine the required height. Having set the height, firmly tighten the quick action tool holder using the locking lever.

Tool height

For the facing process, the cutting edge of the tool must be exactly aligned with the height of the lathe centre to obtain a shoulder-free face. The facing process is a turning operation in which the turning tool feeds perpendicular to the axis of rotation of the workpiece in order to produce a flat surface. The different methods are
transversal facing, transversal slicing and longitudinal facing.

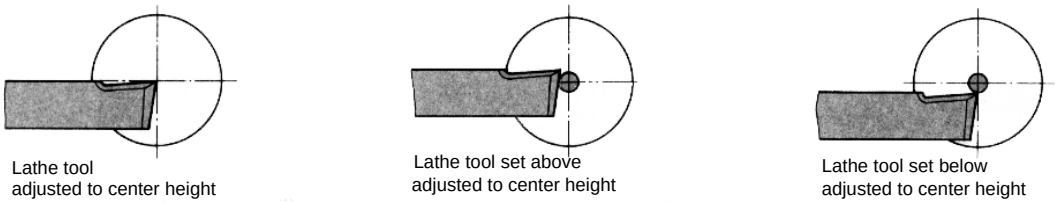
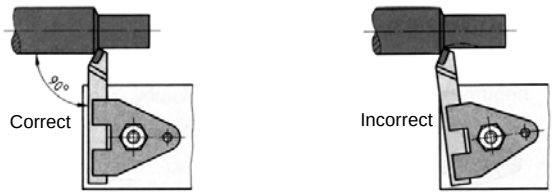


Fig. 4-9: Height of tool

Tool angle

ATTENTION!

The tool must be clamped with its axis perpendicular to the axis of the workpiece. If it is clamped at an angle, the lathe tool may be sucked into the workpiece.



Tool clamped perpendicular to the axis of the workpiece

Tool clamped at an angle to the feed direction.

Fig. 4-10: Graph: angle of the tool

Turning tool forms

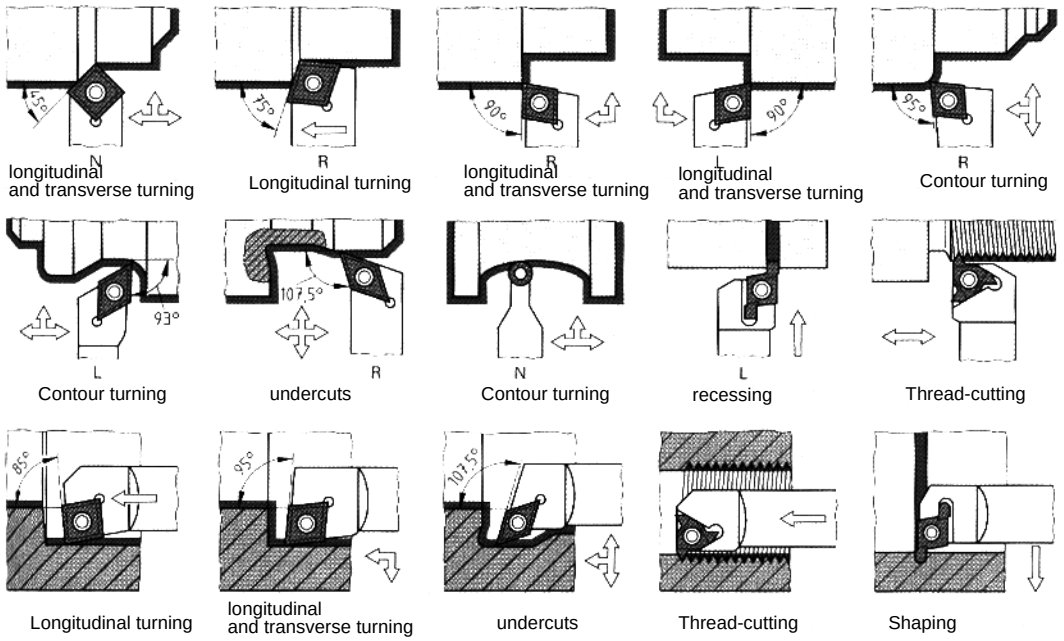


Fig. 4-11: Lathe tool profiles

4.15 Spindle nose

WARNING!

Do not clamp any workpieces that exceed the permitted clamping capacity of the workpiece mounts, lathe chuck, etc. The lathe chuck does not have enough clamping force, if its capacity is being exceeded. The clamping jaws may loosen.

Only use lathe chucks designed for the speed of the machine. Do not use lathe chucks with an external diameter that is too large. Please ensure that lathe chucks are manufactured to EN 1550 standards.

The spindle nose is designed as a Camlock ASA D 1-6" (ISO 702) holding fixture.

Fasten workpiece holder

CAUTION!

If the reference mark on the clamp bolt is not between the two V markings, the chuck must be removed and this bolt (D) must be re-adjusted.

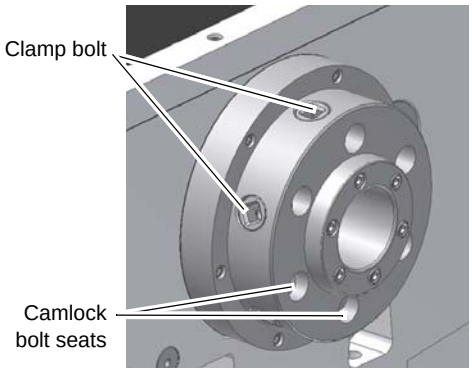
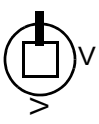


Fig. 4-12: Spindle nose

➜ Fasten the workpiece holder by turning the clamp bolts clockwise.

The right clamp position is reached, when the reference mark on the clamp holder is between the two marks on the lathe spindle fixture.



Mark clamp bolt
"Open position"

Mark clamp bolt
"Closed position"

Fig. 4-13: Cam-lock clamp bolt marks

4.15.1 Adjusting the cam-lock bolts to the workpiece holder

Insert all of the bolts in the screwed flange of the chuck, until the reference mark, the circular reference line (F) is in line with the wall of the chuck flange surface and the semicircular grooves are in line with the holes of the safety screw (E).

➜ Fit the safety screw (E) into each bolt and tighten.

➜ Make sure that the two contact sides (plate and shaft) are free from impurities.

Now the chuck can be mounted.

Before coupling the chuck to the shaft nose, check that the clamp bolts are in an unlocked position.

➜ Fasten the workpiece holder by turning the clamp bold clockwise.

INFORMATION

The reference mark (F) on each Cam-lock bolt serves as an orientation for the correct adjustment.

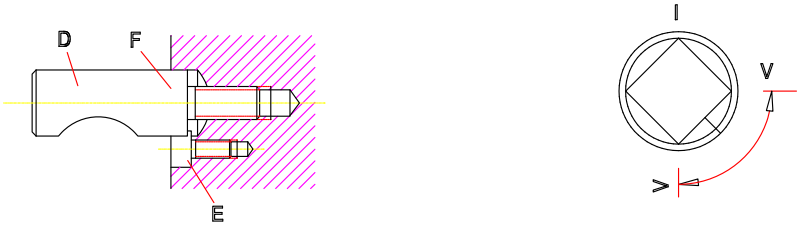


Fig. 4-14: Cam-lock seat

4.16 Lathe chuck

During turning, the workpiece is subject to cutting forces, weight forces and unbalance forces which have to be absorbed by a sufficiently strong clamping force. Massive workpieces with higher degrees of stiffness lead to a considerable loss of clamping force. This loss of clamping force is lower for thin-walled, distortion-sensitive workpieces with less stiffness.

The maximum rotational speed of a lathe chuck may only be applied at maximum actuating force and with perfectly working chucks.

Replacement lathe chucks must be designed for the maximum rotational speed of the machine, the permissible lathe chuck speed with respective jaws and/or top jaws, as well as the maximum measured static clamping force at maximum introduced force must be specified in the operating instructions for the lathe chuck or be indicated on the lathe chuck itself. Replacement lathe chucks must comply with BS EN 1550 standards. The minimum distance to the machine bed must not be less than 25 mm (0.98").

WARNING!

Do not clamp any workpieces that exceed the permitted chucking capacity of the lathe chuck. The clamping force of the chuck is too low if its capacity is being exceeded. The lathe chuck does not have enough clamping force, if its capacity is being exceeded. The clamping jaws may loosen.

Only use lathe chucks designed for the speed of the machine.

Do not use lathe chucks with an external diameter that is too large.

Please ensure that lathe chucks are manufactured to BS EN 1550 standards.

4.16.1 Speed information, maintenance recommendations, reference speed

The reference speed is the number of rotations at which the mathematical centrifugal force with the corresponding jaw design is equivalent to the greatest tensioning force of the machine is at a standstill. The reference speed applies for jaws mounted inside in tiers, whereby they must not protrude past the outer diameter of the chuck.

At the determined reference speed, 1/3 of the existing tensioning force when the machine is shut off is available for clamping the workpiece. The prerequisite is that the clamping chuck be in proper working order.

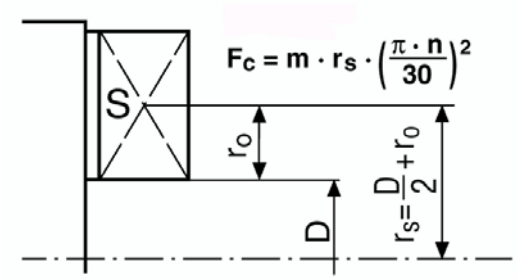
In general, compliance with the labels on the clamping jaws and lathe chuck (perm. speed, max. turning diameter, ...), the information in the respective lathe chuck operating instructions and, for special jaws, the additional information on the respective drawing is required.

The lathe chucks included in the scope of delivery cannot be used with top jaws.

4.16.2 Influencing factors that significantly impact the tensioning force

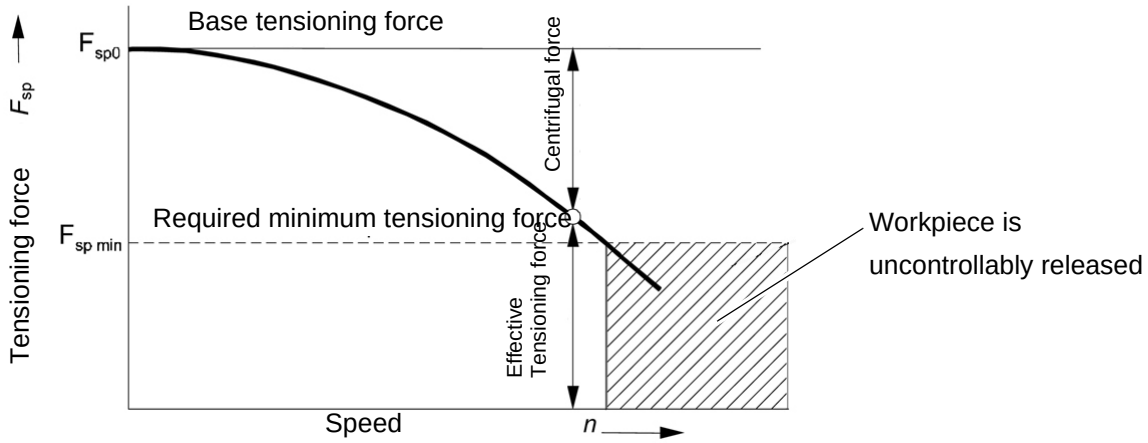
Clamping jaw centrifugal force

To calculate the required tensioning force for processing a workpiece, the centrifugal force of the clamping jaws must be taken into account.



Fc	Centrifugal force in N
m	Mass in kg/set
rs	Centre of gravity distance to the centre of the chuck in metres
n	Speed rpm
r_0	Centre of gravity distance to the clamping jaw

The permissible speeds can be determined in accordance with German VDI Guideline 3106 "Determining the permissible speed for lathe chucks (jaw chucks). This guideline also allows for the determination of the residual tensioning force at a specified speed.



4.16.3 Lathe chuck maintenance

A crucial prerequisite for fault-free functionality of a lathe chuck is regular and thorough lubrication of the sliding surfaces. This prevents tensioning force reduction and premature wear and tear.

Always comply with the manufacturer maintenance instructions when using replacement lathe chucks.

Coolant squirts on the lathe chuck and removes the grease from the jaws. In order to maintain the tensioning force and the accuracy of the lathe chuck for a long time, it is necessary to regularly lubricate the lathe chuck. Insufficient lubrication will result in malfunctions at significantly reduced tensioning force, which affects the accuracy and causes excessive wear and seizing.

Lubricate the installed lathe chuck at least once per week. The used lubricant should be of high quality and provided for high pressure bearing surfaces. The lubricant should withstand the coolant and other chemicals.

We recommend the use of ALTEMP Q NB 50 by Klueber for the lubrication of the sliding surfaces and clamping fixture of the supplied lathe chucks. You may optionally use a lubricant for lathe chucks from other renowned lathe chuck manufacturers.

Clamping jaws and jaw mounting screws are wear and tear parts. The service life is limited. We therefore recommend having them inspected at regular intervals by a specialist (e.g. inspection for cracks using a dye penetration process or magnet powder test (fluxing), eddy current testing, ultrasound testing) and replace if necessary.

4.16.4 Clamping long workpieces

❍ **through the hollow shaft of the spindle**

CAUTION!

Long rotating parts that protrude from the hollow shaft of the spindle must be secured by the operator using suitable covers. A cover can be a sleeve that is mounted on the headstock that, as a permanent safety device, completely covers the protruding workpiece.

❍ **between the tips**

CAUTION!

Long workpieces must be additionally supported. They are supported by the tailstock sleeve and, if necessary, a rest.

☞ **"Mounting of rests“ on page 50**

❍ **with a lathe dog**

CAUTION!

When clamping workpieces between the tips of the lathe while using a lathe dog, the existing lathe chuck protection must be replaced with a circular lathe chuck protection.

Workpieces that require a high concentricity precision are machined between the centres. For holding purposes, a centre hole is drilled into both plain machined faces of the workpiece.

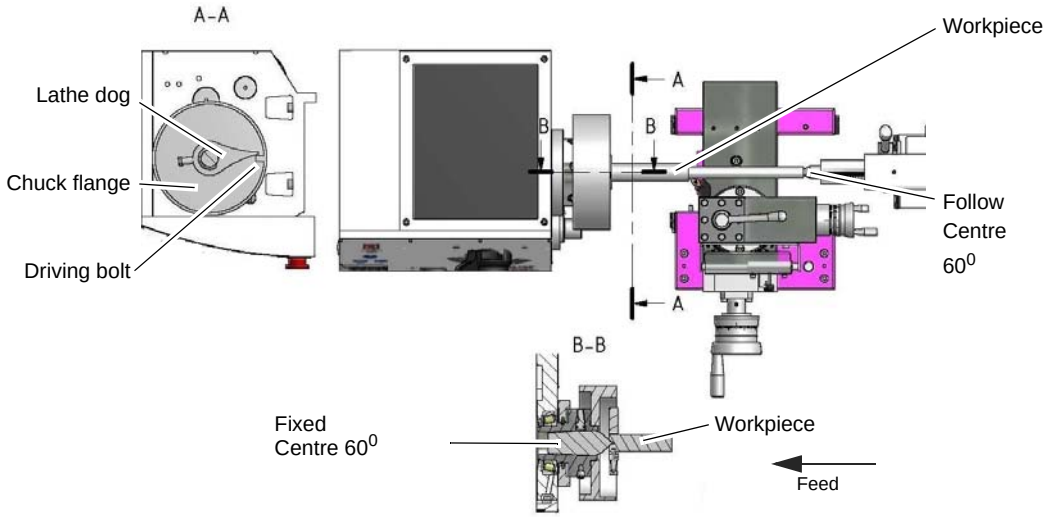


Fig. 4-15: Illustration: Turning between centres

The lathe dog is clamped onto the workpiece. The driving bolt, which is screwed into the flange for the lathe chuck, transmits the torque to the lathe dog.

The fixed centre glides into the centre hole of the workpiece on the spindle nose side. The follow centre glides into the centre hole of the workpiece at the tailstock side.

4.17 Mounting workpiece holder

CAUTION!

When clamping workpieces or assembling heavyweight lathe chucks and rests, reasonable stress loads on the operator or assembler may be exceeded.

Recommended threshold values when lifting and carrying loads				
	Reasonable load in lbs and frequency of lifting and carrying			
	occasionally		more frequently	
Age years	Women	Men	Women	Men
15 - 18	33	77	22	44
19 - 45	33	120	22	66
from 45	33	100	22	55

4.17.1 Centring point

➜ Clean the taper bore of the head spindle holding fixture.

➜ Clean the Morse taper and the taper of the centre.

➜ Press the centre with the Morse taper into the taper bore of the head spindle holding fixture.

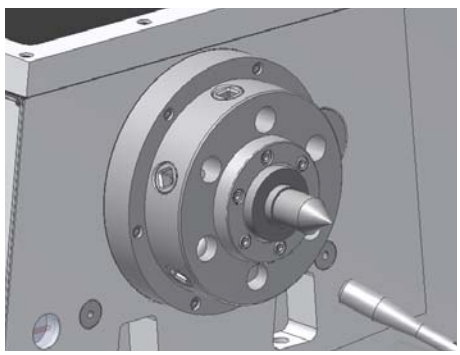


Fig. 4-16: Centre

4.17.2 Face plate Ø 350 mm (13.78")

CAUTION!

The net weight of the face plates considerably exceeds the acceptable load for the operator or machine setter. ☞ **"Recommended threshold values when lifting and carrying loads“ on page 46**

➜ Check that the seatings at the lathe spindle holding fixtures and on the tool holder to be fitted are clean and that the supporting surfaces are not damaged.

➜ Check that all clamping bolts in the lathe spindle holding fixture are open.

➜ Mount the face plate to the lathe spindle holding fixture. Use the supplied eye bolt as load suspension device.

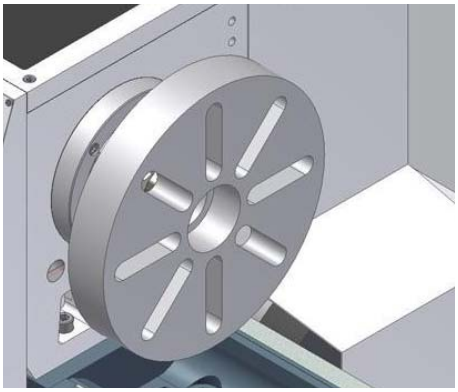


Fig. 4-17: Face plate

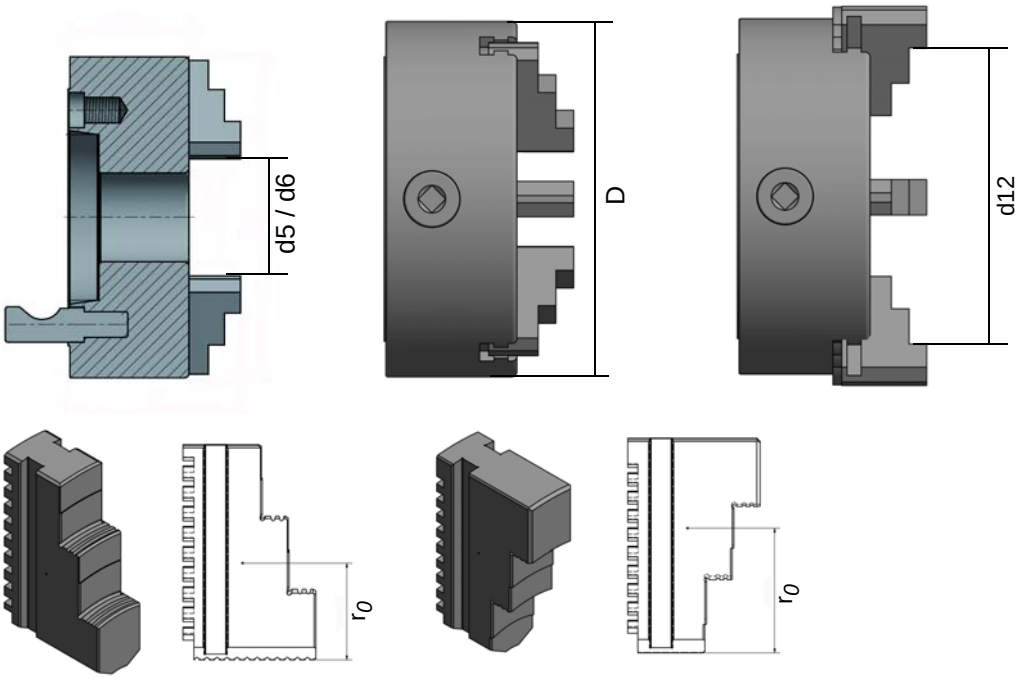
➜ Fix the clamp bolt as described under ☞ "Spindle nose“ on page 42

4.17.3 Three-jaw lathe chuck Ø 200 mm (7.874")

Hand-activated, centrically clamping three-jaw lathe chuck with spiral ring and clamping jaws that are tiered both inside and outside.

Recommended rotational speed for clamping jaws graded internally, flush with the external chuck diameter	on the lathe chuck, or in the operating instructions for the lathe chuck
minimum clamping force of all jaws reached with a lathe chuck key when lathe chuck is at a standstill	37 KN (8,318 lb_F)
D	200 mm (7.874")
maximum admissible clamping diameter d12 for clamping jaws assembled with internal grading	200 mm (7.874")
maximum admissible clamping diameter d6 for clamping jaws assembled with external grading	90 mm (3.543")
minimum clamping diameter d5 for clamping jaws assembled with external grading	4 mm (0.157")

The recommended rotational speed applies to the clamping jaws tiered on the inside that are delivered with the lathe chuck which finish flush with the external chuck diameter.

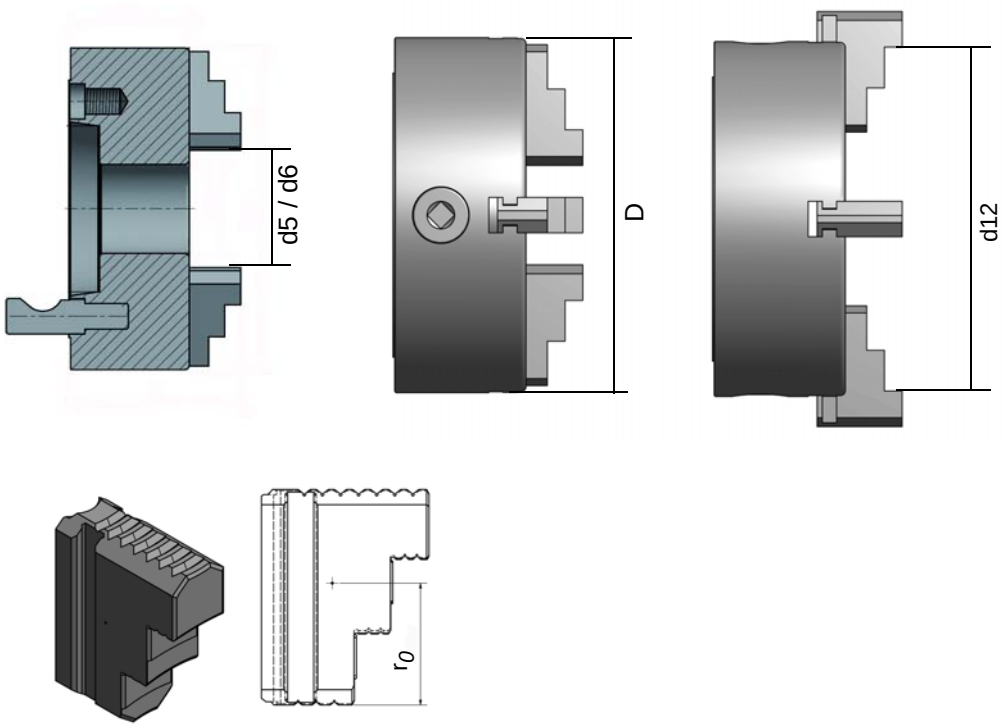

d5 / d6
D
d12
r0
r0

4.17.4 Four-jaw lathe chuck Ø 250 mm (9.842")

Manually activated four-jaw lathe chuck with individually clampable and turnable jaws (reversible jaws).

Recommended rotational speed for clamping jaws graded internally, flush with the external chuck diameter	on the lathe chuck, or in the operating instructions for the lathe chuck
minimum clamping force of all jaws reached with a lathe chuck key when lathe chuck is at a standstill	46 KN (10,341 lb_F)
maximum admissible unbalance of the workpiece	25gmm/kg
D	250 mm (9.842")
maximum admissible clamping diameter d12 for clamping jaws assembled with internal grading	250 mm (9.842")
maximum admissible clamping diameter d6 for clamping jaws assembled with external grading	110 mm (4.33")
minimum clamping diameter d5 for clamping jaws assembled with external grading	5 mm (0.196")

The recommended rotational speed applies to the clamping jaws tiered on the inside that are delivered with the lathe chuck which finish flush with the external chuck diameter.



CAUTION!

The net weight of the four-jaw lathe chuck considerably exceeds the acceptable load for the operator or machine setter. ☞ "Recommended threshold values when lifting and carrying loads“ on page 46

- ➜ Check that the seatings at the lathe spindle holding fixtures and on the tool holder to be fitted are clean and that the supporting surfaces are not damaged.
- ➜ Check that all clamp bolts in the lathe spindle holding fixture are unlocked.
- ➜ Mount the lathe chuck to the lathe spindle holding fixture. Use the supplied eye bolt as load suspension device.
- ➜ Attach the clamp bolts as described under ☞ "Spindle nose“ on page 42

INFORMATION

The centring step of the four jaw chuck to the hub flange was not finished because of the precision of concentric run. The hub flange must be adjusted to the four chuck flange.

- ➜ Adjust the centring step at the hub flange in axial run-out deviation and concentric run to the four jaw chuck.

CAUTION!

The net weight of the four-jaw lathe chuck considerably exceeds the acceptable load for the operator or machine setter. ☞ "Recommended threshold values when lifting and carrying loads“ on page 46

- ➜ Check that the seatings at the lathe spindle holding fixtures and on the tool holder to be fitted are clean and that the supporting surfaces are not damaged.
- ➜ Check that all clamp bolts in the lathe spindle holding fixture are unlocked.
- ➜ Mount the lathe chuck to the lathe spindle holding fixture. Use the supplied eye bolt as load suspension device.
- ➜ Attach the clamp bolts as described under ☞ "Spindle nose“ on page 42

4.18 Mounting of rests

CAUTION!

The net weight of the fixed rest exceeds 77 lbs.
☞ "Recommended threshold values when lifting and carrying loads“ on page 46

4.18.1 Follow and steady rests

Use the steady rest or the follow rest to support longer parts and prevent the workpiece from flapping around and flying away.

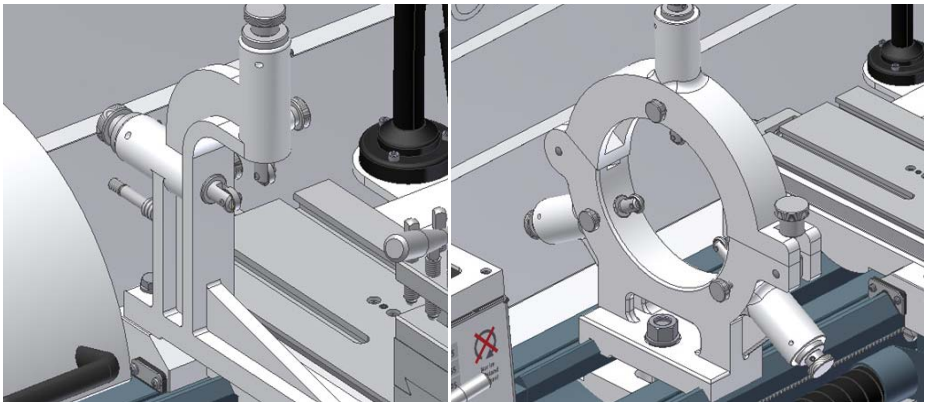


Fig. 4-18: Follow rest Steady rest

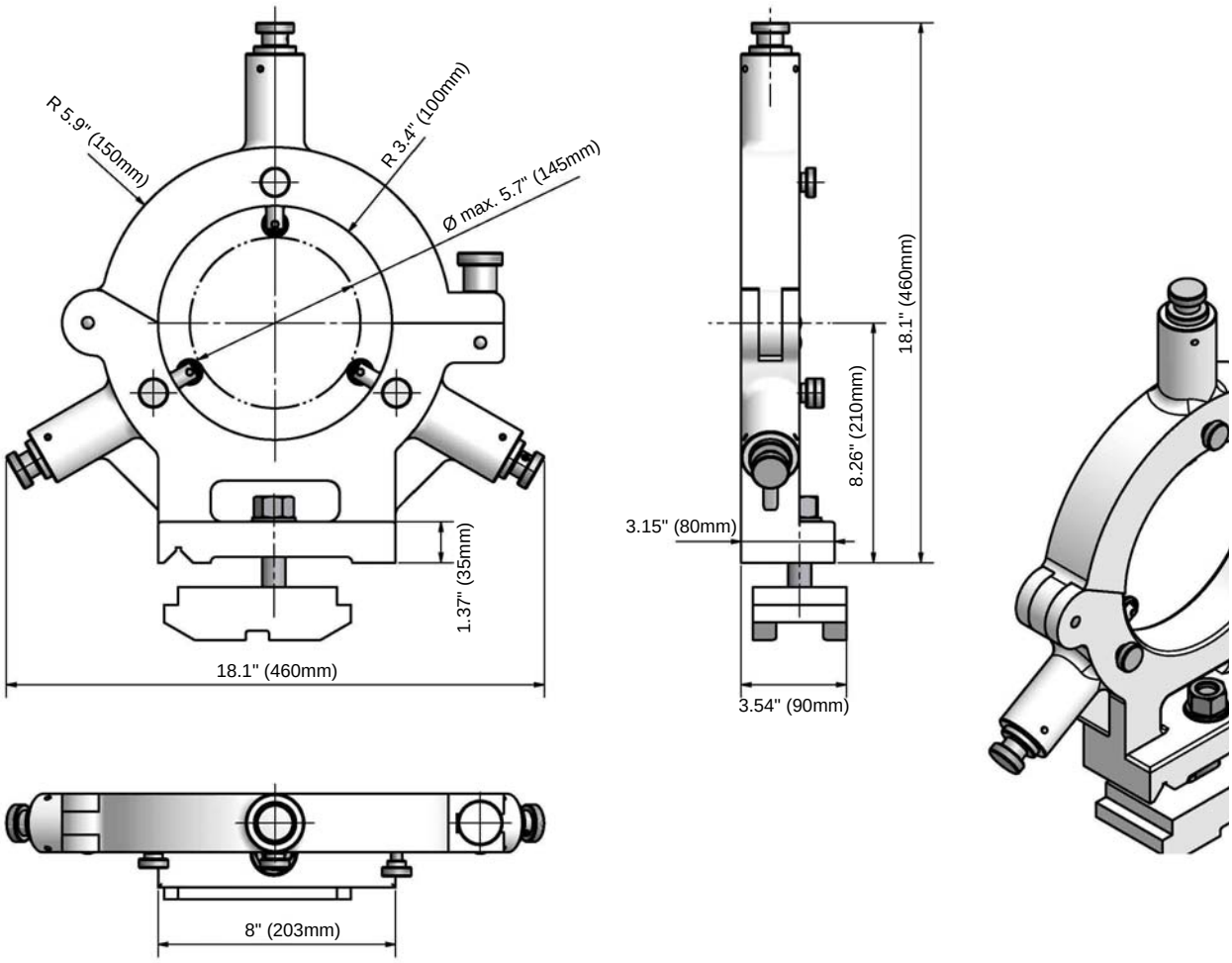


Fig. 4-19: steady rest

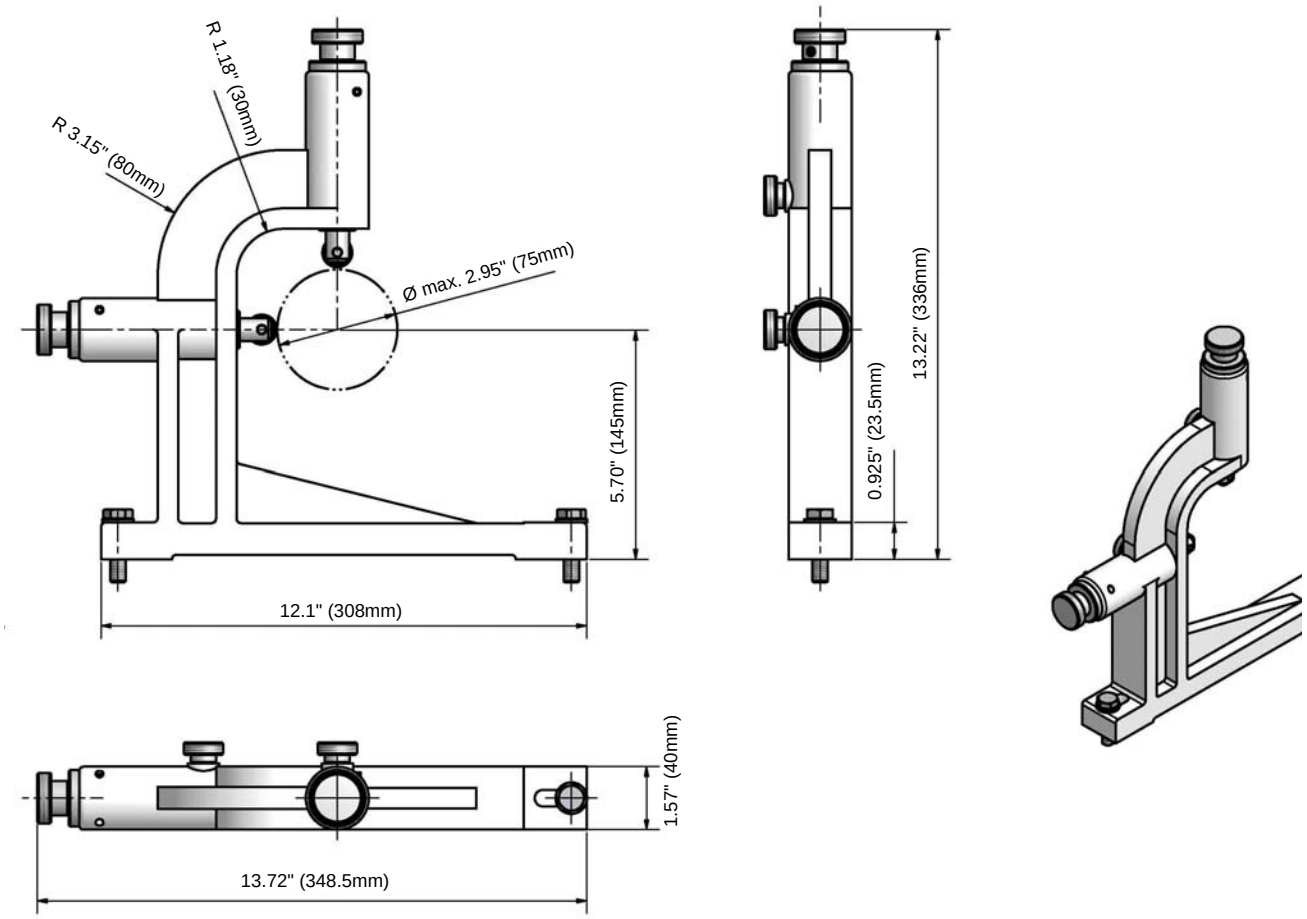


Fig. 4-20: follow rest

4.19 Bed bridge

Remove the bed insert if the diameter of the workpiece turned is larger. By removing the bed insert, the rotational diameter can be increased. The rotation length is limited.

➜ First detach the fastening screws and then pull out the alignment pins.

➜ For re-assembly, repeat these steps in reverse order.

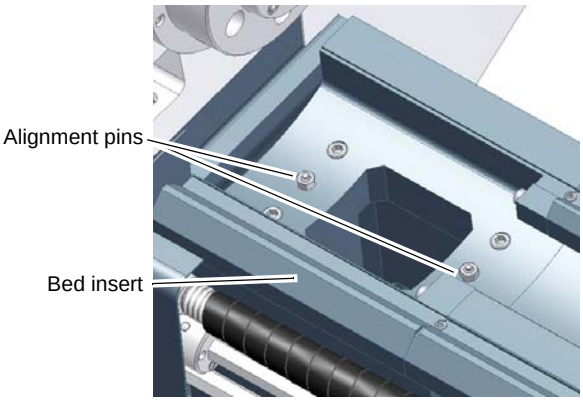


Fig. 4-21: Bed insert

4.20 Feed tables

4.20.1 Straight turning and facing

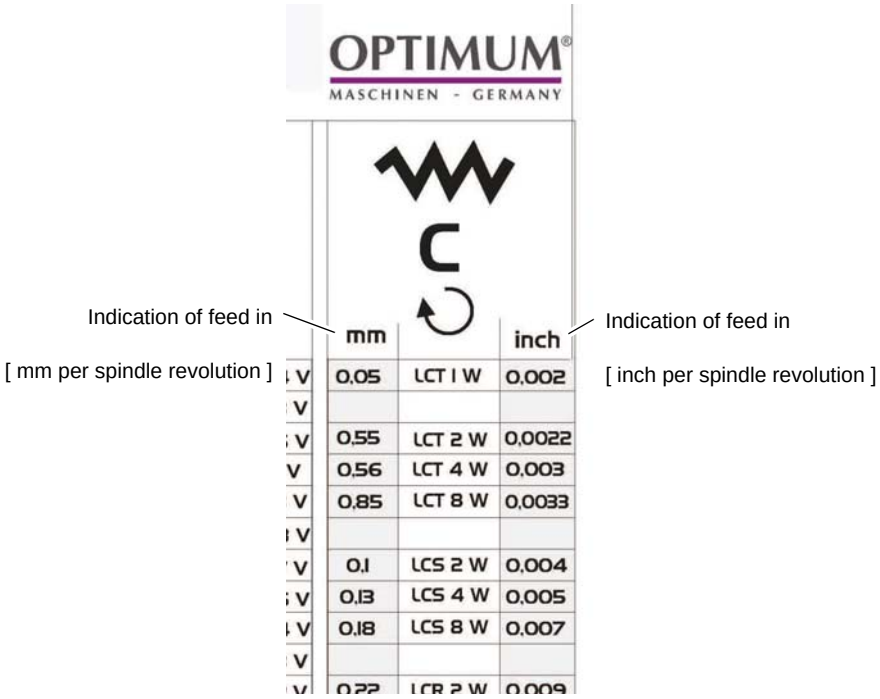
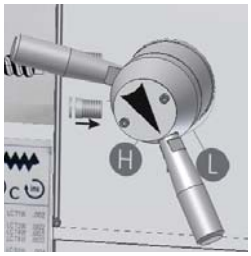


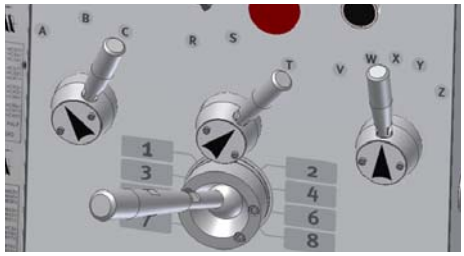
Fig. 4-22: Feed table

Setting the feed

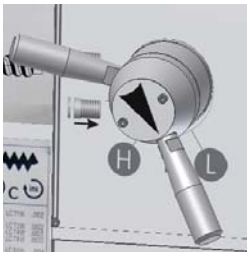
Example: Feed 0.05 mm / spindle revolution



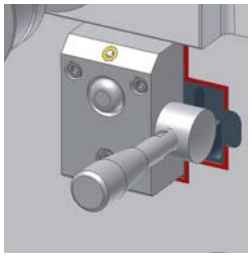
Turn selector switch to position **L**



Turn selector lever to position: **C** / **T** / **1** / **W**



Choose feed direction



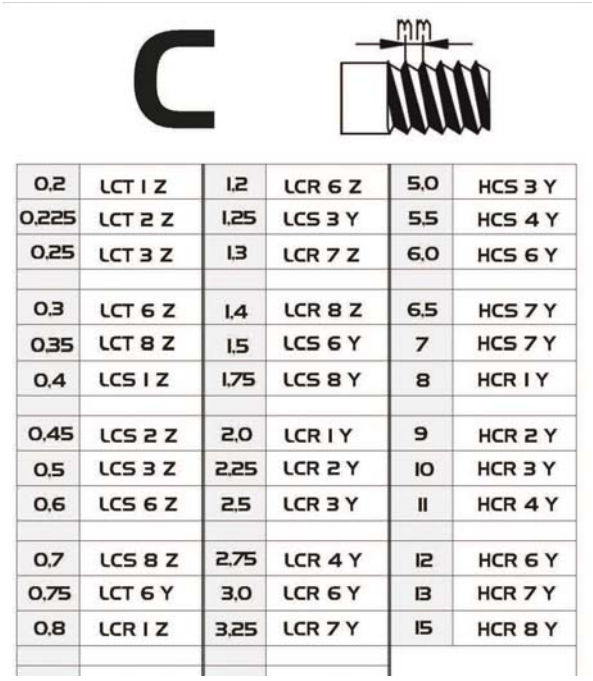
- ➜ Detach the clamping screw on the lathe saddle at longitudinal feed.Fig. 4-34: “Lathe saddle tightening screw“ on page 59
- ➜ Activate the automatic transverse feed by pulling up the lever.
- ➜ Activate the automatic longitudinal feed by pulling out the lever to the right and then pushing it up.
- ➜ Slightly move the hand wheel of the corresponding slide to help the engaging lever locking into place.

☞ "Cutting speeds“ on page 63

4.21 Tables for thread-cutting

4.21.1 Metric threads

Indications on the thread pitch in [mm per spindle revolution]

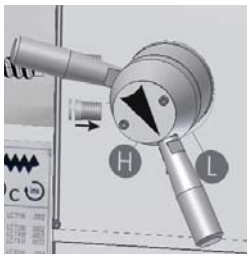


0,2	LCT 1 Z	1,2	LCR 6 Z	5,0	HCS 3 Y
0,225	LCT 2 Z	1,25	LCS 3 Y	5,5	HCS 4 Y
0,25	LCT 3 Z	1,3	LCR 7 Z	6,0	HCS 6 Y
0,3	LCT 6 Z	1,4	LCR 8 Z	6,5	HCS 7 Y
0,35	LCT 8 Z	1,5	LCS 6 Y	7	HCS 7 Y
0,4	LCS 1 Z	1,75	LCS 8 Y	8	HCR 1 Y
0,45	LCS 2 Z	2,0	LCR 1 Y	9	HCR 2 Y
0,5	LCS 3 Z	2,25	LCR 2 Y	10	HCR 3 Y
0,6	LCS 6 Z	2,5	LCR 3 Y	11	HCR 4 Y
0,7	LCS 8 Z	2,75	LCR 4 Y	12	HCR 6 Y
0,75	LCT 6 Y	3,0	LCR 6 Y	13	HCR 7 Y
0,8	LCR 1 Z	3,25	LCR 7 Y	15	HCR 8 Y

Fig. 4-23: Tables for thread cutting metric threads

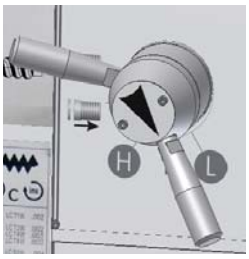
Adjusting threads

Example: thread pitch 3 mm (M 24)

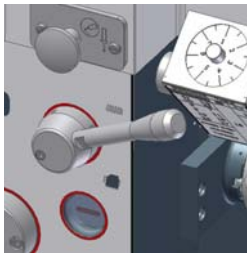


Turn selector switch to position **L**

Turn selector lever to position: **C** / **R** / **6** / **Y**



Choose left-hand or right-hand thread by feed direction



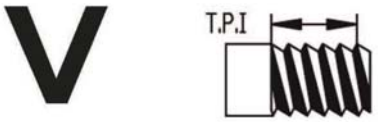
➜ Detach the clamping screw at the lathe saddle.
Fig. 4-34: “Lathe saddle tightening screw“ on page 59

➜ Activate the automatic feed by the engaging lever thread cutting.

➜ Move the hand wheel of the lathe saddle a little in order to facilitate the locking of the engaging lever.

4.21.2 Thread based on inch system

Indications on the thread pitch in
[Inch threads are indicated as number of threads on
the length of one inch]



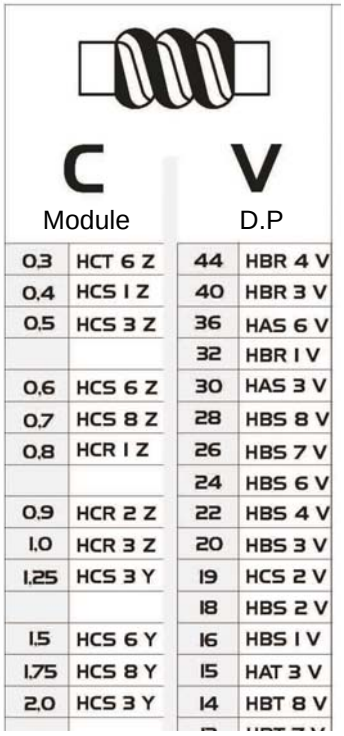
72	LAR 6 V	22	LBS 4 V	7½	HAS 3 V
60	LAR 3 V	20	LBS 3 V	7	HBS 8 V
56	LBR 8 V	18	LCS 2 V	6	HBS 6 V
54	LAR 2 V	18	LBS 2 V	5	HBS 3 V
48	LBR 6 V	16	LBS I V	4½	HBS 2 V
44	LBR 4 V	15	LAT 3 V	4	HBS I V
40	LBR 3 V	14	LBT 8 V	3¾	HAT 3 V
36	LAS 6 V	13½	LAT 2 V	3½	HBT 8 V
32	LBR I V	13	LBT 7 V	3¼	HBT 7 V
30	LAS 3 V	12	LBT 6 V	3	HBT 6 V
28	LBS 8 V	11½	LBT 5 V	2⅞	HBT 5 V

Fig. 4-24: Table for thread-cutting based on inch-system

4.21.3 Module and diametral pitch

INFORMATION

The position of the change gear wheels must be changed for the production of module and diametral pitch.



C Module		V D.P	
0,3	HCT 6 Z	44	HBR 4 V
0,4	HCS I Z	40	HBR 3 V
0,5	HCS 3 Z	36	HAS 6 V
		32	HBR I V
0,6	HCS 6 Z	30	HAS 3 V
0,7	HCS 8 Z	28	HBS 8 V
0,8	HCR I Z	26	HBS 7 V
		24	HBS 6 V
0,9	HCR 2 Z	22	HBS 4 V
1,0	HCR 3 Z	20	HBS 3 V
1,25	HCS 3 Y	19	HCS 2 V
		18	HBS 2 V
1,5	HCS 6 Y	16	HBS I V
1,75	HCS 8 Y	15	HAT 3 V
2,0	HCS 3 Y	14	HBT 8 V

Fig. 4-25: Table for module and diametral pitch

INFORMATION

In countries where the metric system of measurement is used, its inverse of diametral pitch is used as a "module" with the unit "1" (amount of teeth / 3.14) instead diametral pitch (amount of teeth / inch) .

$$\text{Module} = \frac{\text{amount of teeth}}{3.14} \qquad \text{D.P} = \frac{\text{amount of teeth}}{\text{diameter}} \qquad \text{Module} = \frac{25.4}{\text{D.P}}$$

4.21.4 Exchange, change of position of the change gear wheels

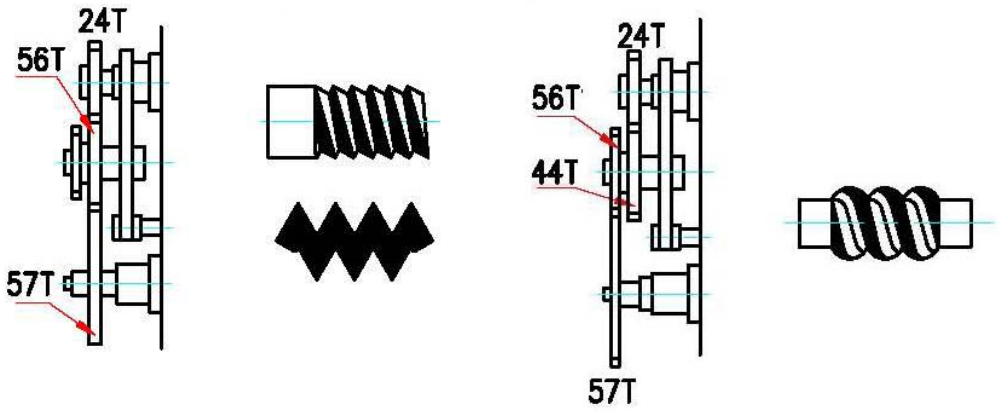


Fig.4-26: Position of the change gears for metric, inch threads and for module and diametral pitch

The change gear wheels for the feed are mounted to a quadrant respectively directly on the lead screw.

➜ Always disconnect the main plug of the lathe and secure the main switch by a padlock, against unauthorized or accidental activation.

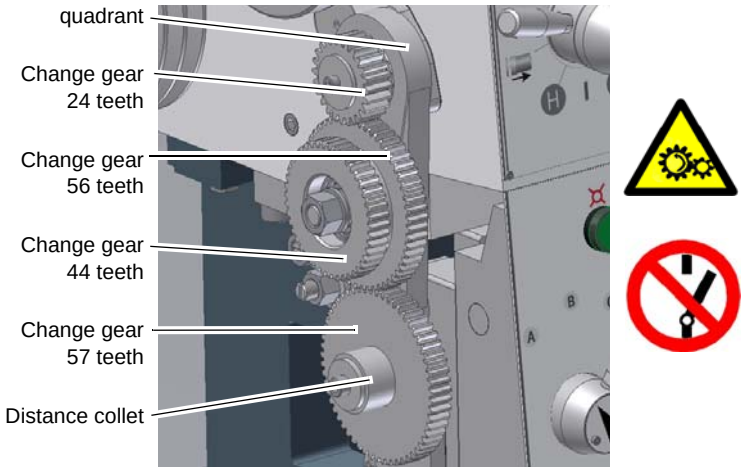


Fig.4-27: Change gears

❍ The change gear wheel 57 teeth must cam with the change gear wheel 44 teeth.

➜ Loosen the locking screw on the quadrant.

➜ Dismount the distance collet together with the change gear wheel 57 teeth.

➜ Put the distance collet on the shaft again and then the change gear wheel 57 teeth. Refasten the change gear wheel.

➜ Position the quadrant in a way that the change gear wheel 57 teeth cams with the change gear wheel 44 teeth.

➜ Remount the quadrant.

4.21.5 Threading gauge

The threading gauge is used to re-engage the lead-screw nut in connection with the thread cutting engaging lever with the lead screw at the right place when cutting threads.

ATTENTION!

Dismount or disengage the toothed wheel of the threading gauge when you are not cuttinga thread. This considerably reduces the wear and tear on the toothed wheel.

➜ Compare the thread to be cut with the indication in the table on the thread-ing gauge.

➜ Cam in the treading gauge with the lead screw. Tighten the clamping screw.

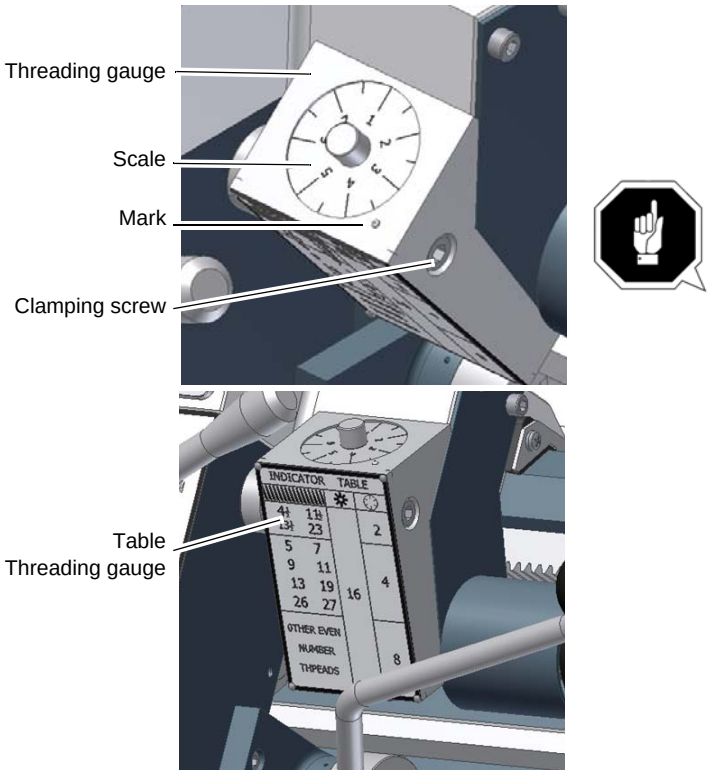


Fig. 4-28: Threading gauge

➜ Only close the thread cutting engaging lever after a thread cutting cycle, when the figure corresponds with the mark according to the specification in the table of the threading gauge.

4.22 Tailstock

The tailstock sleeve is used to hold the tools (bits, centring points, etc.)

➜ Clamp the required tool in the tailstock sleeve.

❍ Use the scale on the sleeve to re-adjust and / or adjust the tool.

➜ Clamp the sleeve with the clamping lever.

❍ Use the hand wheel to move the sleeve back and forth.

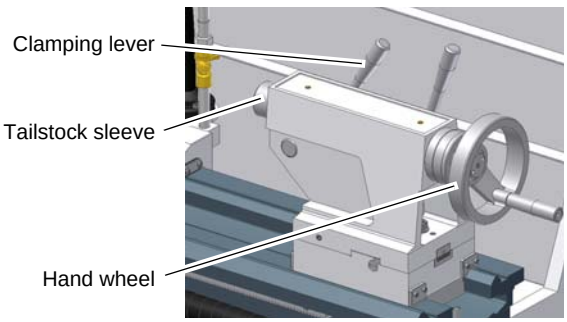


Fig. 4-29: Tailstock

4.22.1 Cross-adjustment of the tailstock

The cross-adjustment of the tailstock is used for turning long, thin bodies.

➜ Loosen the adjusting screws in the front and in the rear of the tailstock.

❍ By alternately loosening and tightening the two (front and rear) adjusting screws, the tailstock is moved out of the central position. The desired cross-adjustment can be read off the scale.

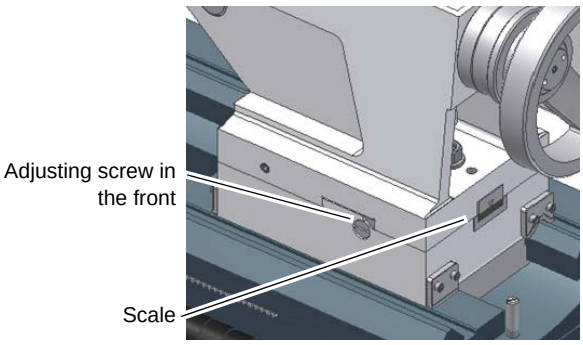


Fig. 4-30: Cross-adjustment of the tailstock

➜ Re-tighten the tailstock adjusting screws.

INFORMATION

The tailstock may be cross-adjusted by approximately + - 13 mm (0.51") to the front or the back.
Example:
A 300 mm (11.81") long shaft is to be taper-turned between the centers with an angle of 1°.
Cross-adjustment of the tailstock = 300 mm (11.81") x Tan 1°. The tailstock must be cross-adjusted by approximately 5.236 mm (0.206").

CAUTION!

Check clamping of the tailstock and the sleeve, respectively for the turning jobs between the centres!

Tighten the securing screw at the end of the lathe bed in order to prevent the tailstock from unintentional drawing-out of the lathe bed.

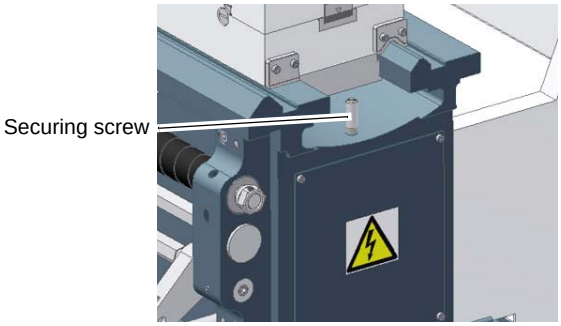


Fig. 4-31: Tailstock

4.23 General operating instructions

4.23.1 Longitudinal turning

In the straight turning operation, the tool feeds parallel to the axis of rotation of the workpiece. The feed can be either manual - by turning the handwheel on the lathe saddle or the top slide - or by activating the automatic feed. The cross feed for the depth of cut is achieved using the cross slide.

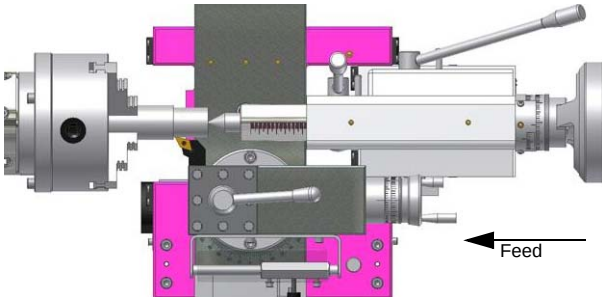


Fig. 4-32: Longitudinal turning

4.23.2 Face turning and recessing

During face turning, the tool feeds perpendicular to the axis of rotation of the workpiece. Feed is done manually, using the cross-slide hand wheel. The crossfeed for cut depth is made with the top slide or lathe saddle.

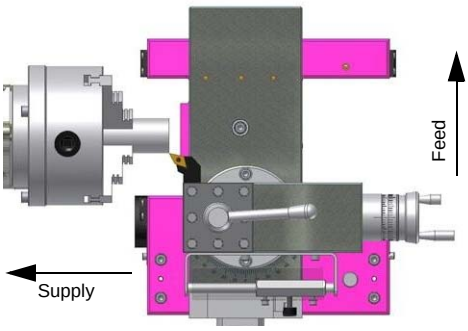


Fig. 4-33: Facing operation

4.23.3 Fixing the lathe saddle

The cutting force produced during facing, recessing or slicing processes may displace the lathe saddle.

➜ Secure the lathe slide using the tightening screw.

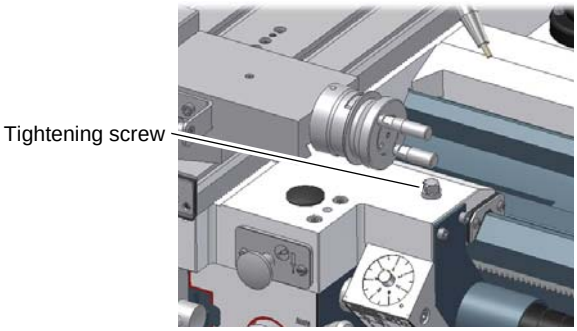


Fig. 4-34: Lathe saddle tightening screw

4.23.4 Turning short tapers with the top slide

Short tapers are turned manually with the top slide. Swivel the top slide to the required angle. The infeed is achieved with the cross slide.

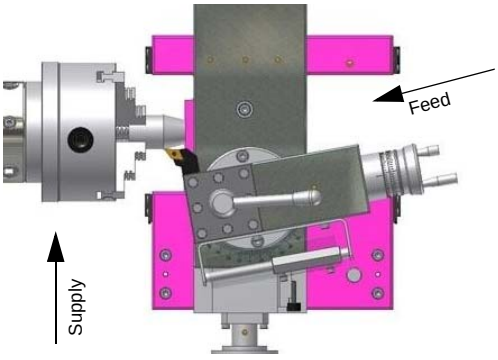


Fig. 4-35: Turning tapers

➜ Loosen the two clamping screws in the front and in the rear of the top slide.

➜ Swivel the top slide.

➜ Clamp the top slide in place again.

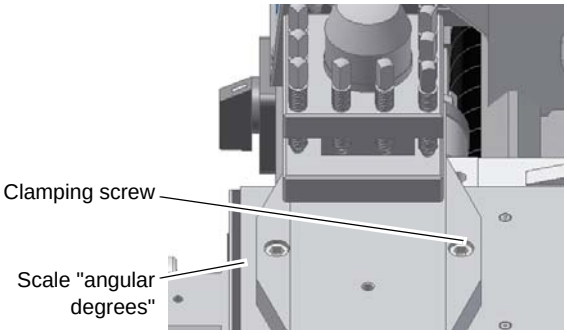


Fig. 4-36: Top slide

4.23.5 Thread cutting

The tread cutting process requires that the operator has a good knowledge of turning and sufficient experience.

INFORMATION

Due to a safety mechanism, it is not possible to use the

- longitudinal feed via the lead screw and
- cross feed / longitudinal feed with feed rod

at the same time.

NOTES!

Example of an external thread:

- The workpiece diameter must have been turned to the diameter of the desired thread.
- The workpiece requires a chamfer at the beginning of the thread and an undercut at the thread run out.
- The speed must be as low as possible.
- The thread cutting tool must be exactly the same shape as the thread, it must be absolutely rectangular and must be clamped in a way that it coincides exactly with the turning centre.
- The threading engaging lever must be engaged during the whole thread cutting process. This does not apply to thread pitches that can be carried out with the thread gauge.
- The thread is produced in various cutting steps in a way that the cutting tool has to be turned out of the thread completely (with the cross slide) at the end of each cutting step.
- The tool is withdrawn with the lead screw nut engaged and the thread cutting tool disengaged by actuating the "Direction of rotation control lever".
- Stop the lathe and feed the thread cutting tool in low cut depths using the cross slide.

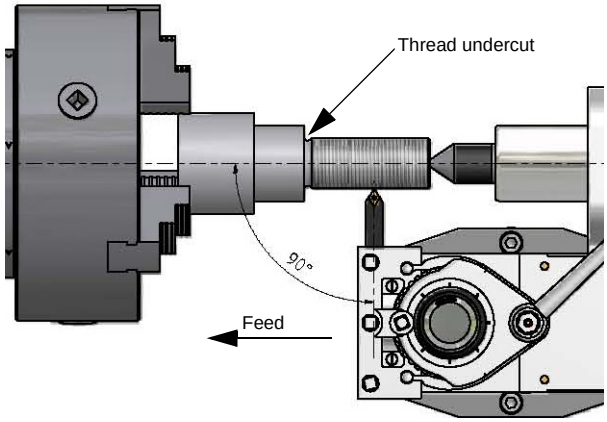


Fig. 4-37: Thread-cutting

- Before each passage, place the top slide approximately 0.2 to 0.3 mm (0.01" to 0.012") to the left and right alternately in order to cut the thread free. In this way, the thread cutting tool cuts only on one thread flank with each passage. Do not execute any more free cutting just before reaching the full thread depth

4.24 Cooling lubricant

WARNING!

Ejection and overflowing of coolants and lubricants. Make sure you do not get the cooling lubricants on the floor. Spilled on the floor cooling agents must be removed immediately.

Friction during the cutting process causes high temperatures at the cutting edge of the tool.

The tool should be cooled during the milling process. Cooling the tool with a suitable cooling lubricant ensures better working results and a longer service life of the cutting tool.

INFORMATION

The lathe is lacquered with a one-component paint. Take this criterion into account when selecting your cooling lubricant.

The company Optimum Maschinen Germany GmbH does not assume any guarantee for subsequent damages due to unsuitable cooling lubricants.

The flashpoint of the emulsion must be higher than 285°F.

When using cooling lubricants that cannot be mixed with water (oil content > 15%) with a flashpoint, ignitable aerosol air mixtures might develop. There is a potential danger of explosion.

The selection of cooling lubricants and slideway oils, lubricating oils or greases as well as their care is determined by the machine operator or operating company.

Therefore, Optimum Maschinen Germany GmbH cannot be held liable for machine damages caused by unsuitable coolants and lubricants as well as by inadequate maintenance and servicing of the coolant. In case of problems with the cooling lubricant and the slideway oil or grease, please contact your supplier for mineral oils.

CAUTION!

The cooling lubricant needs to be checked at least weekly, including during downtimes, with regard to its concentration, ph-value, bacteria and fungal decay.

☞ **"Cooling lubricants and tanks“ on page 75**

☞ **"Inspection plan for water-mixed cooling lubricants“ on page 76**

We would like to ask you to have the following machine-related properties of the cooling lubricant confirmed in writing by the manufacturer of the cooling lubricant.

- The products must comply with the provisions of the current OSHA, state and local regulations.
- Request documentation for the products such as the product description and safety data sheet from the cooling lubricants manufacturer.

They need to be environmentally friendly and workplace-friendly. Thus, they need to be free of nitrite, PCB, chlorine and nitrosinable diethanolamin.

- The manufacturer should be able to submit a certificate concerning skin-tolerance.
- If possible, it should be universally applicable for all chippings and materials.
- Long service life of the emulsion e.g. long-term stable and resistant to bacteria.
- Safe corrosion protection.
- Re-emulsifiable and non-adhesive. Sticking and residue behaviour.
- It should not attack the varnish of the machine.
- It should not attack any machine elements (metals, elastomeres).
- Low foaming behaviour of the emulsion.
- It should be as finely dispersed as possible in order to avoid clogging in the needle slot screen.

5 Cutting speeds

5.1 Selecting the cutting speed

The variety of factors makes it impossible to present universal indications about the "correct“ cutting speed.

Tables with reference values about cutting speeds to be set must be evaluated with utmost caution since they only apply for very particular cases. The reference values without cooling (no best values) which are indicated in AWF documents are highly recommended. Furthermore, the tables of reference values of the manufacturers of cutting materials should be evaluated e.g. for hard metal cutting materials the indications of the company Friedrich Krupp Widia-Fabrik, Essen applies.

q_{c60} is the cutting speed at 60 min. service life, q_{c240} according for 240 min. service life. Select q_{c60} for simple, easily replaceable lathe tools; q_{c240} for simple tool sets depending on one another; q_{c480} for complicated tool sets where the tool change requires more time due to the dependencies on one another and the accuracies of the cutting insert. The same considerations apply with regard to maintenance of the tools.

It generally applies: High cutting speeds result in low-time chipping, little cutting speeds result in cost-efficient chipping.

5.2 Influences on the cutting speed

$\mathbf{q_c}$ = Cutting speed in [m/min]

$\mathbf{t}$ = Service life in [min]

The service life $\mathbf{t}$ is the period of time in minutes during which the cutting insert performs cutting tasks until it is necessary to re-sharpen it. It is of utmost commercial importance. For the same material $\mathbf{t}$ is smaller the higher you select the value $\mathbf{q_c}$ e.g. only a few minutes at $\mathbf{q_c}$ = 2000 m/min. Different materials require different $\mathbf{q_c}$ for the same $\mathbf{t}$. All considerations of this type require that the other cutting conditions are maintained constant
(material, tool and setting conditions). If only one of these condition changes it is also necessary to change $\mathbf{q_c}$ in order to obtain the same $\mathbf{t}$. Therefore, only cutting speed tables are reasonable which show all relevant cutting conditions.

5.3 Example for the determination of the required speed on your lathe

The necessary speed is depending on the diameter of the workpiece, of the material to be machined, of the turning tool, as well as of the setting of the turning tool (cutting material) to the workpiece.

Material to be turned: St37 (A29)

Cutting material (turning tool): Hard metal

Setting angle [k_r] of the turning tool to the workpiece: 90°

selected infeed [f]: about 0.16mm/rev

Target value of the cutting speed [q_c] according to the table: 180 meters per minute

Diameter [d] of your workpiece: 60mm = 0.06m [meters]

Speed $n = \frac{\vartheta c}{\pi \times d} = \frac{180m}{min \times 3,14 \times 0,06m} = 955 min^{-1}$

Set the speed on you lathe below the calculated speed.

INFORMATION

To convert m/min (metres per minute) to FTP (feet per minute) use the following formula:

FTP = 3.281 x m/min

5.4 Table cutting speeds

Reference values for cutting speeds q_c in **m/min** when turning high speed steel and hard metal. (Excerpt from VDF 8799, Gebr. Boehringer GmbH, Göppingen)

Material	Tensile strength R_m in N mm²	Cutting material [3]	Infeed *f* in mm/rev. and setting angle k_r [1] [2]																												
			0.063			0.1			0.16			0.25			0.4			0.63			1			1.6			2.5		
			45⁰	60⁰	90⁰	45⁰	60⁰	90⁰	45⁰	60⁰	90⁰	45⁰	60⁰	90⁰	45⁰	60⁰	90⁰	45⁰	60⁰	90⁰	45⁰	60⁰	90⁰	45⁰	60⁰	90⁰	45⁰	60⁰	90⁰
St 34; St 37; C22; St 42	up to 500	High-speed steel							50	40	34.5	45	35.5	28	35.5	28	22.4	28	22.4	18	25	20	16	20	16	12.5	16	12.5	10
		P 10	250	236	224	224	212	200	200	190	180	180	170	160	162	150	140	140	132	125	125	118	112	112	106	100			
St 50; C 35	500...600	High-speed steel							45	35.5	28	35.5	28	22.4	28	22.4	18	25	20	16	20	16	12.5	16	12.5	10	12.5	10	8
		P 10	224	212	200	200			180	170	160	160	150	140	140	132	125	125	118	112	112	106	100	100	95	90			
St 60; C45	600...700	High-speed steel							35.5	28	22.4	28	22.4	18	25	20	16	20	16	12.5	16	12.5	10	12.5	10	8	10	8	6.3
		P 10	212	200	190	190	180	170	170	160	150	150	140	132	132	125	118	118	112	106	106	100	95						
St 70; C60	700...850	High-speed steel							28	22.4	18	25	20	16	12.5	16	12.5	16	12.5	10	12.5	10	8	10	8	6.3	8	6.3	5
		P 10	180	170	160	160	150	140	140	132	125	125	118	112	106	100	95	95	90	85	85	80	75						
Mn-; CrNi-, CrMo- among others alloyed steels	700...850	High-speed steel							25	20	16	20	16	12.5	16	12.5	10	12.5	10	8	11	9	7	9	7	5.6	7.5	6	4.5
		P 10	180	170	160	160	150	140	140	132	125	125	118	112	106	100	95	95	90	85	85	80	75						
	850...1000	High-speed steel							20	16	12.5	16	12.5	10	12.5	10	8	10	8	6.3	8	6.3	5	7.1	5.6	4.5	5.6	4.5	3.6
		P 10	140	132	125	125	118	112	100	95	90	90	85	80	71	67	63	63	60	56	56	53	50						
	1000..1400	High-speed steel							14	11	9	11	9	7	9	7	5.6	7	5.6	4.5	5.6	4.5	3.6	4.5	3.6	2.8	3.6	2.8	2.2
		P 10	80	75	71	71	67	63	63	60	56	56	53	50	50	47.5	45	45	42.5	40	33.5	33.5	31.5						
Rust-resistant steel	600..700	P 10	80	75	71	71	67	63	56	53	50	50	47.5	45	45	42.5	40	33.5	33.5	31.5	31.5	30	28						
Tool steel	1500..1800	High-speed steel							9	7	5.6	5.6	4.5	3.6	4	3.2	2.5												
		P 10	45	42.5	40	40	37.5	35.5	35.5	33.5	31.5	28	26.5	25	25	23.4	22	22	21	20	18	17	16						
Mn - High-carbon steel		P 10	33.5	33.5	31.5	31.5	30	28	28	26.5	25	22	21	20	20	19	18	18	17	16									
GS-45	300..500	High-speed steel							45	35.5	28	35.5	28	22	31.5	25	20	25	20	16	20	16	12.5	16	12.5	10	12.5	10	8
		P 10	150	140	132	118	112	106	106	100	95	95	90	85	85	80	75	75	71	67	67	63	60						
GS-52	500..700	High-speed steel							28	22	18	25	20	16	20	16	12.5	16	12.5	10	12.5	10	8	11	9	7	9	7	5.6
		P 10	106	100	95	95	90	85	85	80	75	75	71	67	67	63	60	60	56	53	53	50	47.5						
GS-15	HB...2000	High-speed steel							45	40	31.5	31.5	28	22	22	20	16	18	16	12.5	12.5	11	9	11	10	8	9	8	6.3
		K20	125	118	112	112	106	106	100	95	95	90	85	85	80	75	75	71	67	67	63	60							
GS-25	HB 2000..2500	High-speed steel							28	25	20	20	18	14	14	12.5	10	11	10	8	9	8	6.3	7.5	6.7	5.3	6	5.3	4.25
		K10	95	90	85	85	80	75	75	71	67	67	63	60	60	56	53	53	50	47.5	47.5	45	42.5	42.5	40	37.5			
GTS-35 GTW-40		High-speed steel							37.5	33.5	33.5	28	26.5	25	22	21	20	18	17	16	12.5	12	11	11	10	10	9	8.5	8
		K10/P10	95	90	85	85	80	75	75	71	67	67	63	60	60	56	53	53	50	47.5	47.5	45	42.5	42.5	40	37.5			
White cast iron	RC420..570	K10	19	18	17	17	16	15	15	14	13.2	13.2	12.5	11.8	11.8	11.2	10.6	10.6	10	9.5	9	8.5	8	8	7.5	7.1			
Cast bronze DIN 1705		High-speed steel							53	50	47.5	47.5	45	42.5	42.5	40	37.5	37.5	35.5	33.5	31.5	30	28	28	26.5	25	25	23.6	22.4
		K 20	315	300	280	280	265	250	250	236	224	224	212	200	200	190	180	180	170	160	160	150	140	140	132	125			
Red brass DIN 1705		High-speed steel							75	71	67	63	60	56	50	47.5	45	40	37.5	35.5	31.5	30	28	28	26.5	25	25	23.6	22.4
		K 20	425	400	375	400	375	355	355	335	315	335	315	300	300	280	265	265	250	236	250	236	224	236	224	212			
Brass DIN 1709	HB 800..1200	High-speed steel							112	106	100	90	85	80	67	63	60	50	47.5	45	37.5	33.5	33.5	26.5	25	23.6			
		K 20	500	475	450	475	450	425	450	425	400	400	375	355	355	335	315	335	315	300	300	280	265	280	265	250			
AL cast DIN 1725	300..420	High-speed steel	125	118	112	100	95	85	75	71	67	56	53	50	42.5	40	37.5	31.5	30	28	25	23.6	22.4						
		K 20	250	236	224	224	212	200	200	190	180	180	170	160	160	150	140	140	132	125	125	118	112	118	112	106	100	95	90
Mg alloy DIN 1729		High-speed steel	850	800	750	800	750	710	750	710	670	670	630	600	630	600	560	600	560	530	600	560	530	560	530	500	530	500	475
		K 20	1600	1500	1400	1320	1250	1250	1180	1120	1120	1120	1060	1000	1000	950	900	900	850	800	800	750	710	710	670	630	630	600	560

1) The entered values apply for a chipping depth of up to 2.24 mm. From 2.24 mm to 7.1 mm the values must be reduced by 1 stage of the row R10 by approximately 20%. From 7.1 mm to 22.4 mm the values must be reduced by 1 stage of the row R5 by approximately 40%.

2) The values q_c must be reduced by 30 .... to 50% for turning a crust, for removal of cast skin or for sand inclusions.

3) The service life **t** for hard metal P10, K10, K20 = 240 min; for high speed steel SS = 60 min.

6 Maintenance

In this chapter you will find important information about

- Inspection
- Maintenance
- Repair

of the lathe.

The diagram below shows you which tasks fall under these categories.

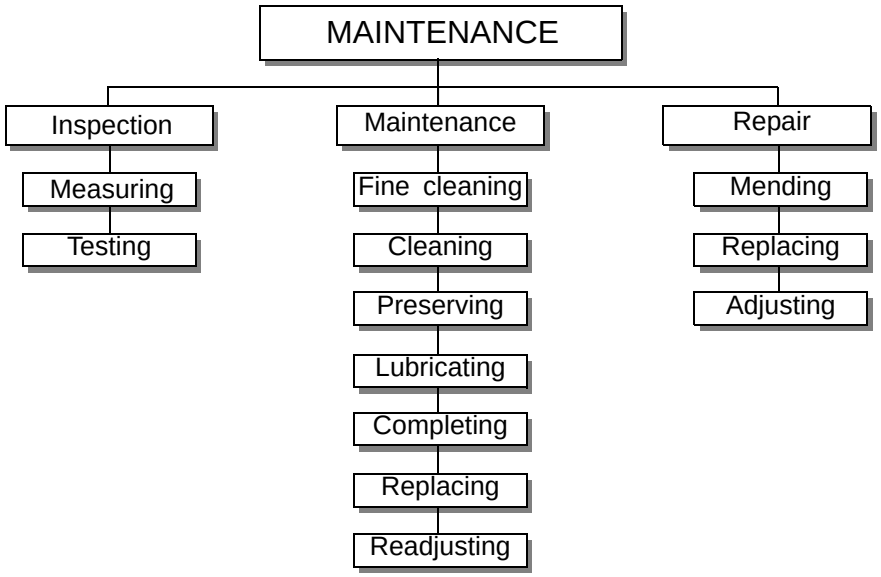


Fig. 6-1: Maintenance – Definition according to DIN 31 051

ATTENTION!

Properly performed regular maintenance is an essential prerequisite for

- **operational safety,**
- **failure-free operation,**
- **long durability of the lathe and**
- **the quality of the products which you manufacture.**

Installations and equipment from other manufacturers must also be in good order and condition.

6.1 Safety

WARNING!

The consequences of incorrect maintenance and repair work may include:

- **Very serious injury to personnel working on the lathe,**
- **Damage to the lathe.**

Only qualified personnel should carry out maintenance and repair work on the lathe.

Electrical systems and operating materials may only be installed, modified and repaired by a trained electrician or supervised and under the control of a trained electrician and must comply with electrotechnical regulations.

WARNING!

Do not climb onto or into the machine while working.

6.1.1 Preparation

WARNING!

Only carry out work on the lathe, if the main switch is switched off and secured against restarting by means of a padlock.

☞ "Disconnecting and securing the lathe“ on page 23

Attach a warning label.

6.1.2 Restarting

Before restarting, run a safety check.

☞ "Electrical system“ on page 24
☞ "Safety check“ on page 21

WARNING!

Before starting the lathe, you must check that there is no danger for persons and that the lathe is not damaged.

6.1.3 Cleaning

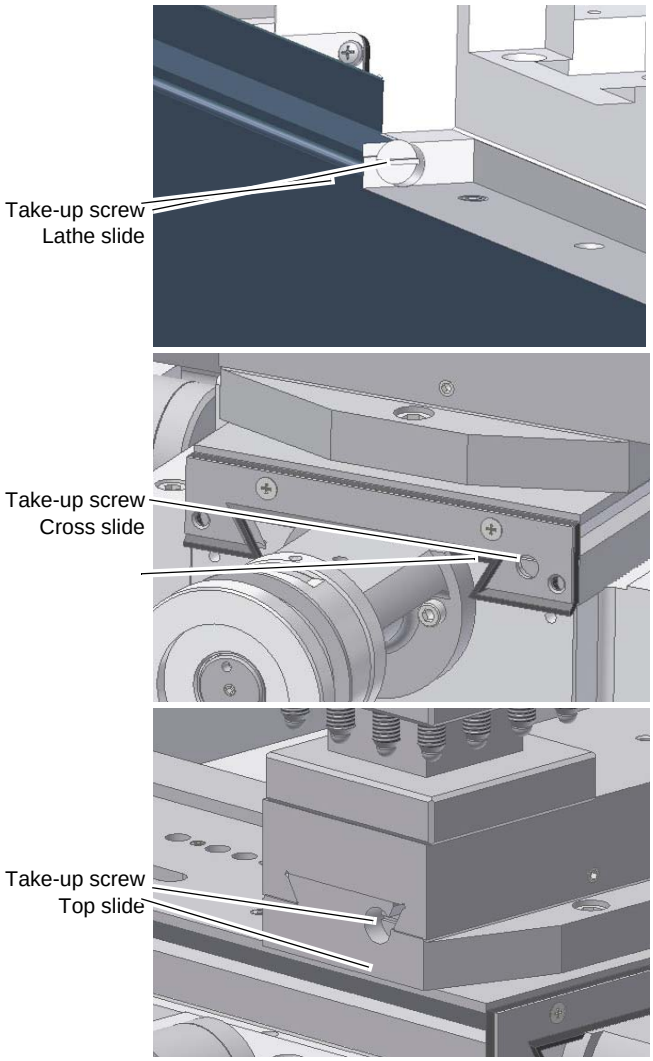
CAUTION!

Use a chip hook for removal of chips and wear suitable protective gloves.

6.2 Checkup, inspection and maintenance

The type and level of wear depends to a large extent on the individual usage and operating conditions. Any indicated intervals therefore are only valid for the corresponding approved conditions.

Interval	Where?	What?	How?
Start of work, after every maintenance or repair work	Lathe	☞ "Safety check“ on page 21	
	Lathe	Oiling	➜ Oil all guideways. ➜ Slightly lubricate the change gears with lithium-based grease . Img.4-29: “Change gears“ on page 69
	Camlock clamp bolt Lathe spindle fixture	Mounting check	☞ "Mounting workpiece holder“ on page 59

Interval	Where?	What?	How?
As required	Slideways	Readjust	Excessive clearance in the slideways can be reduced by readjusting the tapered gibs. ➜ Turn the take-up screw clockwise. The tapered gib is moved to the rear and reduces the clearance of the corresponding slideway.  Fig.6-2: Take-up screws, slideways

Interval	Where?	What?	How?
Start of work, after every maintenance or repair work	**feed gear / apron / headstock**	Visual inspec-tion	➜ Check the oil level in the inspection glass ❍ of the feed gear, ❍ of the apron, ❍ of the headstock. ❍ The oil level must at least attain the centre resp. top marking of the oil sight glass. ☞ "Operating material“ on page 26.

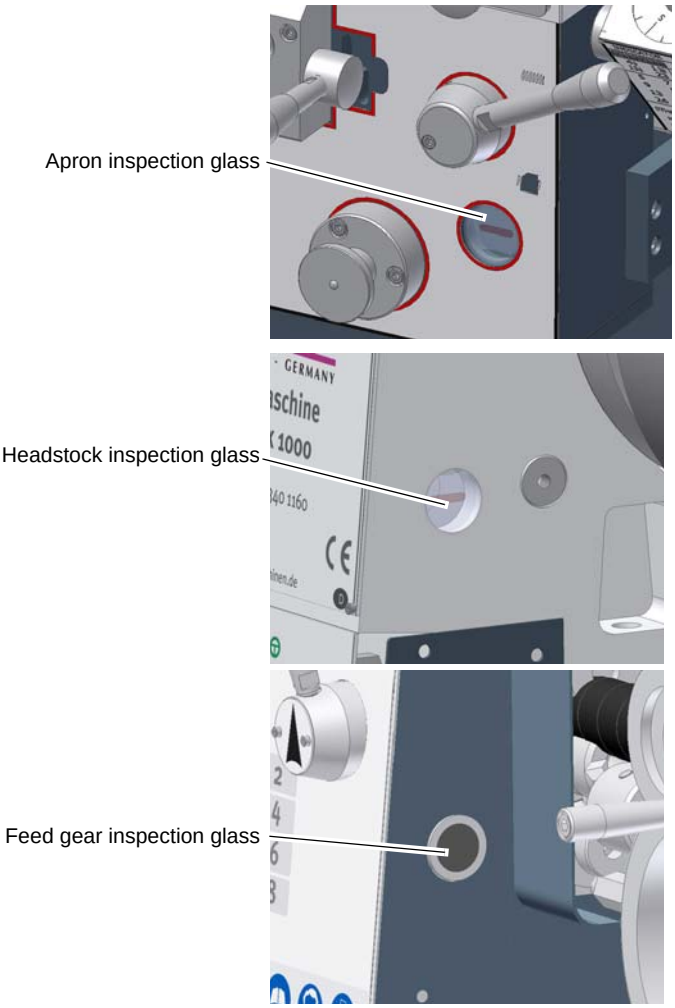


Fig. 6-3: Oil-sight glasses

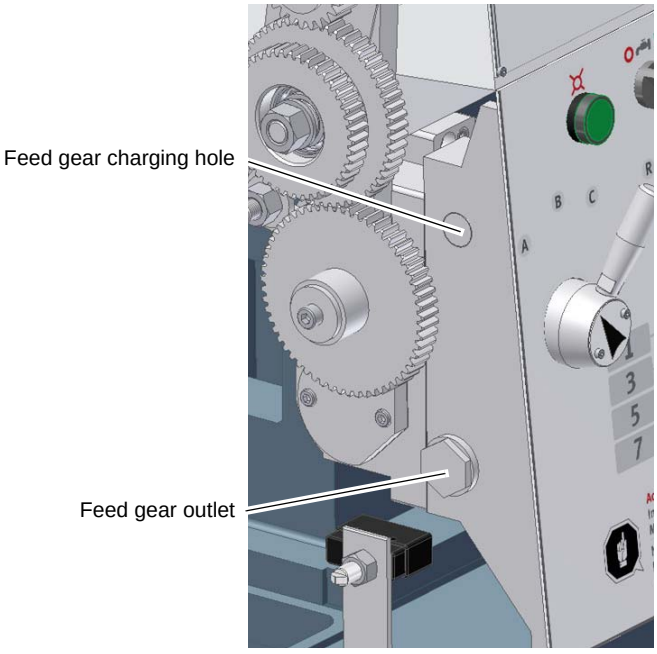
<table>
<tr><th>Interval</th><th>Where?</th><th>What?</th><th>How?</th></tr>
<tr><td rowspan="2">First after 200 hours in service, then once a year</td><td>Feed gear</td><td>Oil change</td><td>➜ For oil change use an appropriate collecting container with sufficient capacity.
➜ Unscrew the screw from the drain hole.
➜ Unscrew the screw from the filler hole.
➜ Close the drain hole if no more oil drains.
➜ Fill up to the middle of the reference mark of the oil sight glass into the filler hole using a suitable container. ☞ "Operating material“ on page 23
 

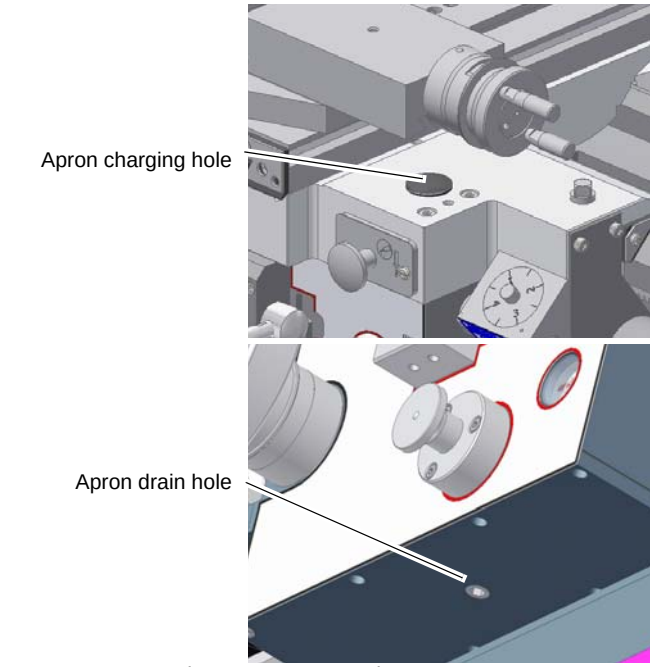
Fig. 6-4: Feed gear openings</td></tr>
<tr><td>Apron</td><td>Oil change</td><td> 

Fig. 6-5: Apron openings</td></tr>
</table>

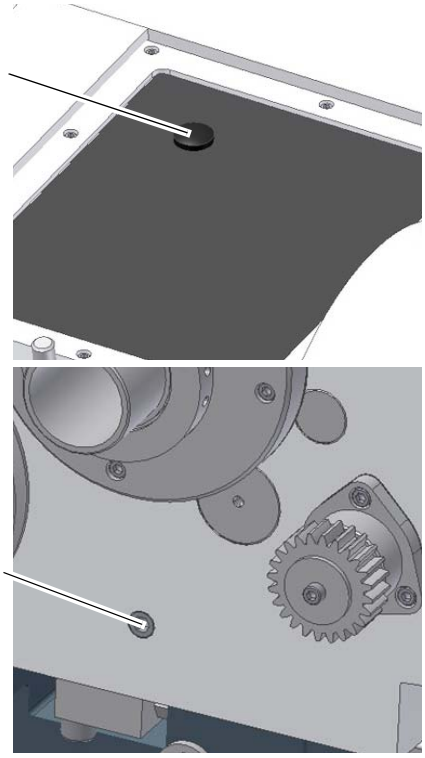
<table>
<tr><th>Interval</th><th>Where?</th><th>What?</th><th>How?</th></tr>
<tr><td>First after 200 operating hours, then once a year</td><td rowspan="2">Headstock</td><td>Oil change</td><td> 

Fig. 6-6: Headstock openings</td></tr>
<tr><td>As required</td><td>V-belt check, re-tighten</td><td>Tighten the V-belt set as required.
➜ If necessary, exchange the complete set of V-belts only.

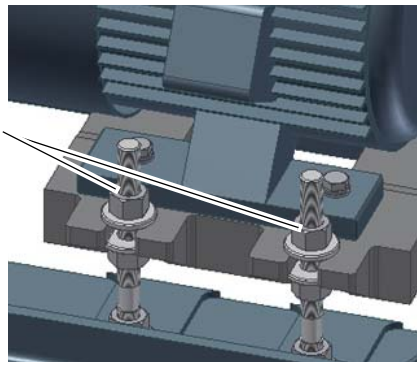
➜ Use the adjusting screws to tighten the V-belts.
➜ Tighten the adjusting screws in a way that one single V-belt may be squeezed approximately 5mm.
 

Fig. 6-7: Adjusting equipment V-belt

ATTENTION!
Only exchange the complete set of V-belts, never a single one.</td></tr>
</table>

Interval	Where?	What?	How?
every week	Lathe	Oiling	➜ Lubricate respectively fill-in all lubricating nipples and oiler cups with machinery oil.

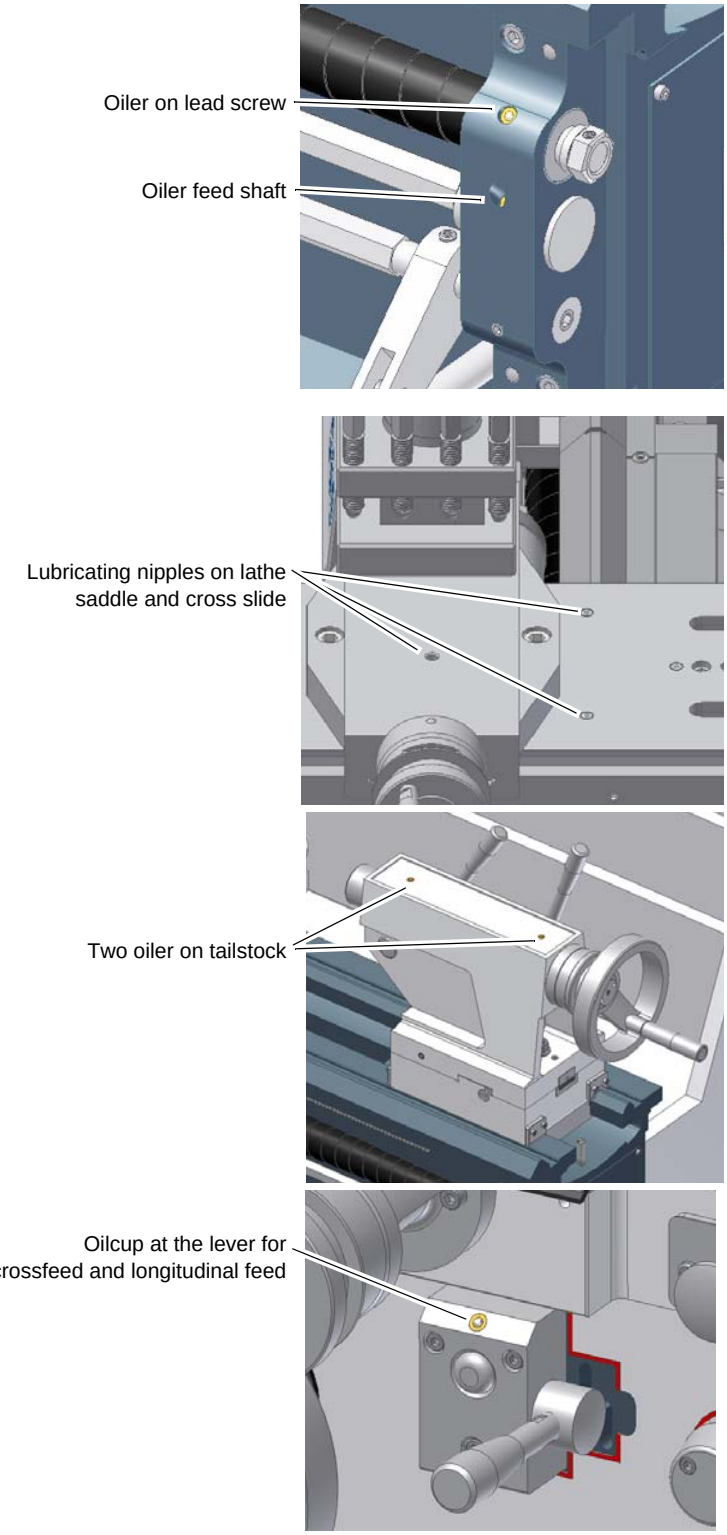
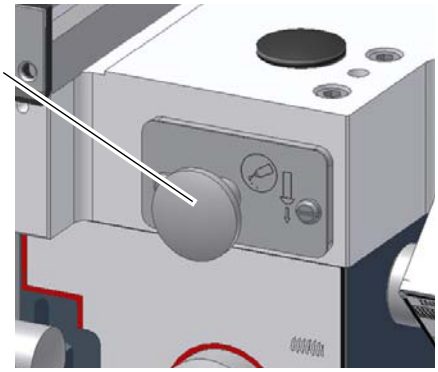


Fig. 6-8: Lubricating nipple

Interval	Where?	What?	How?
every week	Lathe slide	Actuate	Pump central lubrication  Fig. 6-9: Central lubrication system
every week	Lathe chuck	Lubricate	☞ "Lathe chuck maintenance“ on page 57 Lubricate the installed lathe chuck at least once per week. The used lubricant should be of high quality and designed for high-pressure bearing surfaces. The lubricant should withstand the coolant and other chemicals. We recommend the use of ALTEMP Q NB 50 by Klueber for the lubrication of the sliding surfaces and clamping fixture of the supplied lathe chucks.
at least annually	Cooling lubricant system	Replace Clean Disinfect	☞ "Cooling lubricants and tanks“ on page 75 ☞ "Inspection plan for water-mixed cooling lubricants“ on page 76
based on operator's empirical values and/or in accordance with OSHA, state and local regulations	Electrical system	Electrical inspection	☞ "Obligations of the operating company“ on page 12 ☞ "Electrical system“ on page 21

Interval	Where?	What?	How?
after 3 years		The service life off the position switch on the rotational direction switch may have been reached due to the operating conditions. Replacement is recommended to ensure further, fault-free operation.	By the service technicians

6.3 Lubricating and cleaning the lathe chuck

ATTENTION!

Do not use compressed air to remove dust and foreign substances from the lathe chuck.

Coolant squirts on the lathe chuck and removes the grease from the master jaws. In order to maintain the tensioning force and the long-term accuracy of the lathe chuck, it is necessary to regularly lubricate the lathe chuck. Insufficient lubrication will result in malfunctions at reduced tensioning force, which affects the accuracy and causes excessive wear and seizing.

Depending on the chuck type and operating state, the tensioning force of a lathe chuck can decrease by up to 50 percent of the nominal tensioning force.

A presumably securely clamped workpiece can then fall out of the chuck during processing.

Lubricate the lathe chuck at the worm and at the lubricating nipple. Lubricate the lathe chuck at least once per week. The used lubricant should be of high quality and designed for high-pressure bearing surfaces. The lubricant should withstand the coolant and other chemicals.

Numerous different lathe chucks are available on the market with various different lubricating methods. Follow the operating instructions of the corresponding lathe chuck manufacturer.

6.4 Repair

Repairs must be carried out only by qualified technical staff; and must follow the instructions and guidelines given in this manual. Should technical assistance be required, contact
LDS Industries at 1-630-785-6437.
Optimum Maschinen - Germany and LDS Industries are not liable for, nor do they guarantee against, damage or operating malfunctions resulting from alteration, abuse, lack of maintenance or this product's use for other than its intended purpose. Failure to read and follow this operating manual is not covered.

For repairs only use:

- Proper and suitable tools,
- Parts purchased from Optimum, or its authorized agent.

6.5 Cooling lubricants and tanks

CAUTION!

The cooling lubricant can cause diseases. Avoid direct contact with cooling lubricant or parts covered in cooling lubricant.

Cooling lubricant circuits and tanks for water-cooling lubricant mixtures must be completely emptied, cleaned and disinfected as needed, but at least once per year or every time the cooling lubricant is replaced.

If fine chips and other foreign matters are accumulated in the coolant tank, the machine can no longer be correctly supplied with coolant. Furthermore, the lifetime of the coolant pump is reduced.

When processing cast iron or similar materials generating fine chips, cleaning the coolant tank more often is recommended.

The cooling lubricant must be replaced, the cooling lubricant circuit and tank emptied, cleaned and disinfected if

- the pH value drops by more than 1 based on the value during initial filling. The maximum permissible pH value during initial filing is 9.3
- there is a perceivable change in the appearance, odour, floating oil or increase of the bacteria to more than 10/6/ml
- there is an increase in nitrite content to more than 20 ppm (mg/1) or nitrate content to more than 50 ppm (mg/1)
- there is an increase in the N-nitrosodiethanolamine (NDELA) to more than 5 ppm (mg/a)

CAUTION!

Comply with the manufacturer's specifications for mixture ratios, hazardous substances, e.g. system cleaners, including their permissible minimum use times.

CAUTION!

Since the cooling lubricant escapes under high pressure, pumping out the coolant by using the existing cooling lubricant pump via a pressure hose into a suitable tank is not recommended.

ENVIRONMENTAL PROTECTION

During work on the cooling lubricant equipment please make sure that

- **collector tanks are used with sufficient capacity for the amount of liquid to be collected.**
- **liquids and oils should not be spilled on the ground.**

Clean up any spilled liquid or oils immediately using proper oil-absorption methods and dispose of them in accordance with current statutory environmental regulations.

Collect leakages

Do not re-introduce liquids spilled outside the system during repair or as a result of leakage from the reserve tank, instead collect them in a collecting container for disposal.

Disposal

Never dump oil or other substances which are harmful to the environment into water inlets, rivers or channels. Used oils must be delivered to a collection centre. Consult your supervisor if you do not know where the collection centre is.

6.5.1 Inspection plan for water-mixed cooling lubricants

Company: No.: Date: used cooling lubricant			
size to be checked	Inspection methods	Inspection intervals	Procedure and comment
noticeable changes	Appearance, odour	daily	Find and rectify causes, e.g. skim off oil, check filter, ventilate cooling lubricant system
pH value	Laboratory techniques electrometric with pH meter (DIN 51369) Local measurement method: with pH paper (Special indicators with suitable measuring range)	weekly [1)]	if pH value decreases > 0.5 based on initial filing: Measures in accordance manufacturer's recommendations > 1.0 based on initial filing: Replace cooling lubricant, clean cooling lubricant circulation system
Usage concentration	Manual refractometer	weekly [1)]	Method results in incorrect values with tramp oil content
Base reserve	Acid titration in accordance with Manufacturer's recommendation	as required	Method is independent of tramp oil content
Nitrite content	Test sticks method or laboratory method	weekly [1)]	> 20 mg/L nitrite: Replace cooling lubricant or part or inhibiting additives; otherwise NDELA (N-nitrosodiethanolamine) in the cooling lubricant system and in the air must be determined > 5 mg/L NDELA in the cooling lubricant system: Replacement, clean and disinfect cooling lubricant circulation system, find nitrite source and, if possible, rectify.
Nitrate/nitrite content of the preparation water, if this is not removed from the public grid	Test sticks method or laboratory method	as required	Use water from the public grid if there is water from the pubic grid has > 50 mg/l nitrate: Inform the waterworks

[1)] The specified inspection intervals (frequency) are based on continuous operation. Other operational conditions can result in other inspection intervals; exceptions are possible in accordance with OSHA, state and local regulations.

Editor:

Signature:

Lubricant	Viskosity ISO VG DIN 51519 mm²/s (cSt)	Designation according DIN 51502	ARAL	BP	Esso	Klüber Lubrication	Mobil	Shell	Texaco
Gear oil	VG 680	CLP 680	Aral Degol BG 680	BP Energol GR-XP 680	SPARTAN EP 680	Klüberoil GEM 1-680	Mobilgear 636	Shell Omala 680	Meropa 680
	VG 460	CLP 460	Aral Degol BG 460	BP Energol GR-XP 460	SPARTAN EP 460	Klüberoil GEM 1-460	Mobilgear 634	Shell Omala 460	Meropa 460
	VG 320	CLP 320	Aral Degol BG 320	BP Energol GR-XP 320	SPARTAN EP 320	Klüberoil GEM 1-320	Mobilgear 632	Shell Omala 320	Meropa 320
	VG 220	CLP 220	Aral Degol BG 220	BP Energol GR-XP 220	SPARTAN EP 220	Klüberoil GEM 1-220	Mobilgear 630	Shell Omala 220	Meropa 220
	VG 150	CLP 150	Aral Degol BG 150	BP Energol GR-XP 150	SPARTAN EP 150	Klüberoil GEM 1-150	Mobilgear 629	Shell Omala 150	Meropa 150
	VG 100	CLP 100	Aral Degol BG 100	BP Energol GR-XP 100	SPARTAN EP 100	Klüberoil GEM 1-100	Mobilgear 627	Shell Omala 100	Meropa 100
	VG 68	CLP 68	Aral Degol BG 68	BP Energol GR-XP 68	SPARTAN EP 68	Klüberoil GEM 1-68	Mobilgear 626	Shell Omala 68	Meropa 68
	VG 46	CLP 46	Aral Degol BG 46	BP Bartran 46	NUTO H 46 (HLP 46)	Klüberoil GEM 1-46	Mobil DTE 25	Shell Tellus S 46	Anubia EP 46
	VG 32		Aral Degol BG 32	BP Bartran 32	NUTO H 32 (HLP 32)	LAMORA HLP 32	Mobil DTE 24	Shell Tellus S 32	Anubia EP 32
Gear grease		G 00 H-20	Aral FDP 00 (Na-verseift) Aralub MFL 00 (Li-verseift)	BP Energrease PR-EP 00	FIBRAX EP 370 (Na-verseift)	MICRO-LUBE GB 00	Mobilux EP 004	Shell Alvania GL 00 (Li-verseift)	Marfak 00
Bearing grease		K 3 K-20 (Li-verseift)	Aralub HL 3	BP Energrease LS 3	BEACON 3	CENTO-PLEX 3	Mobilux 3	Shell Alvania R 3 Alvania G 3	Multifak Premium 3

7 Spare parts - D420

7.1 Ordering spare parts

Please indicate the following :

Serial No.

Machines name

Date of manufacture

Article No.

The article no. is located in the spare parts list.

The serial no. is on the type plate.

When requesting spare parts which might vary in length, indicate the distance between centres of the machine.

7.2 Lathe bed, feed 1-2

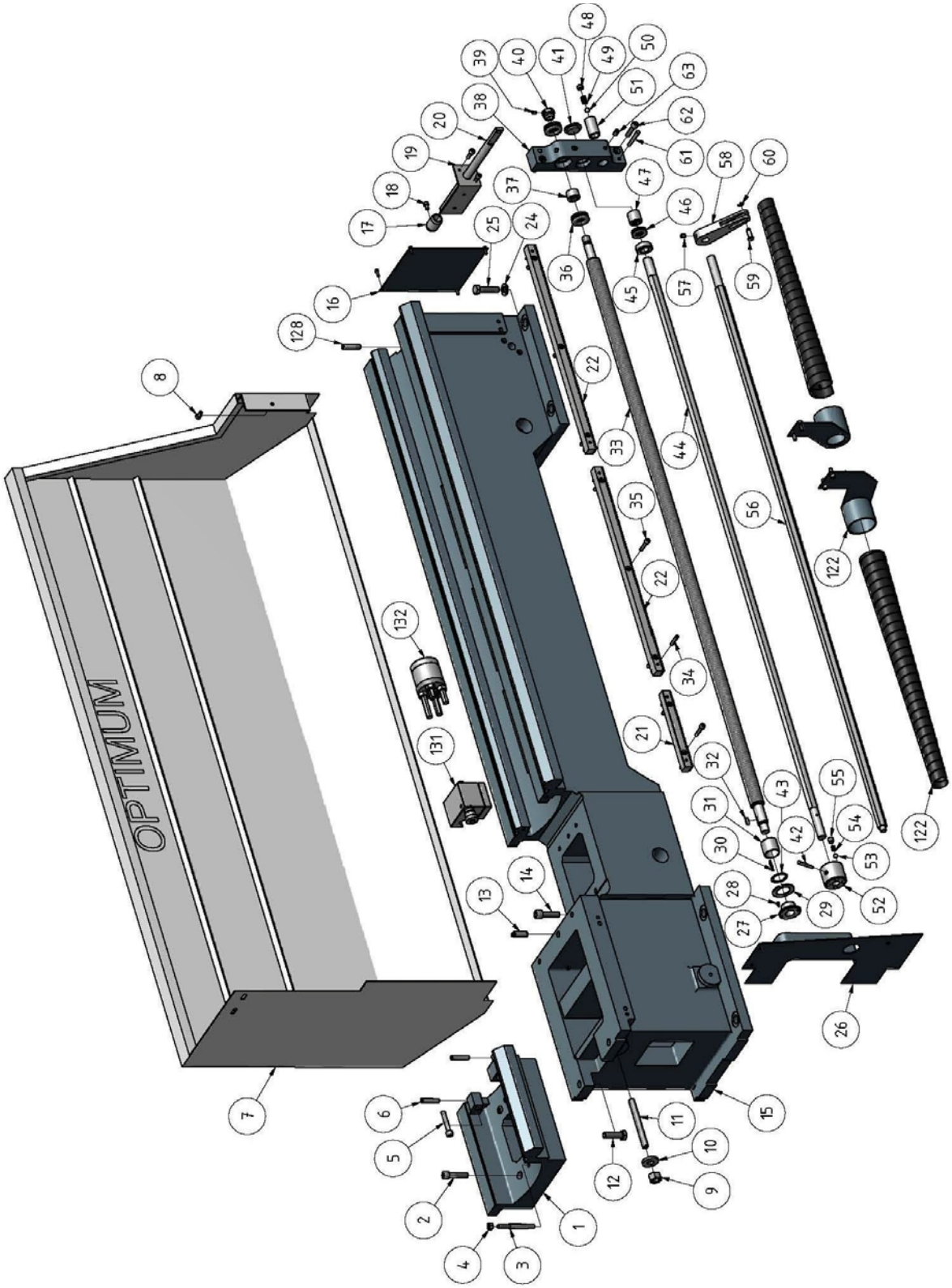


Fig. 7-1: Lathe bed, feed

7.3 Lathe bed, actuation, spindle break 2-2

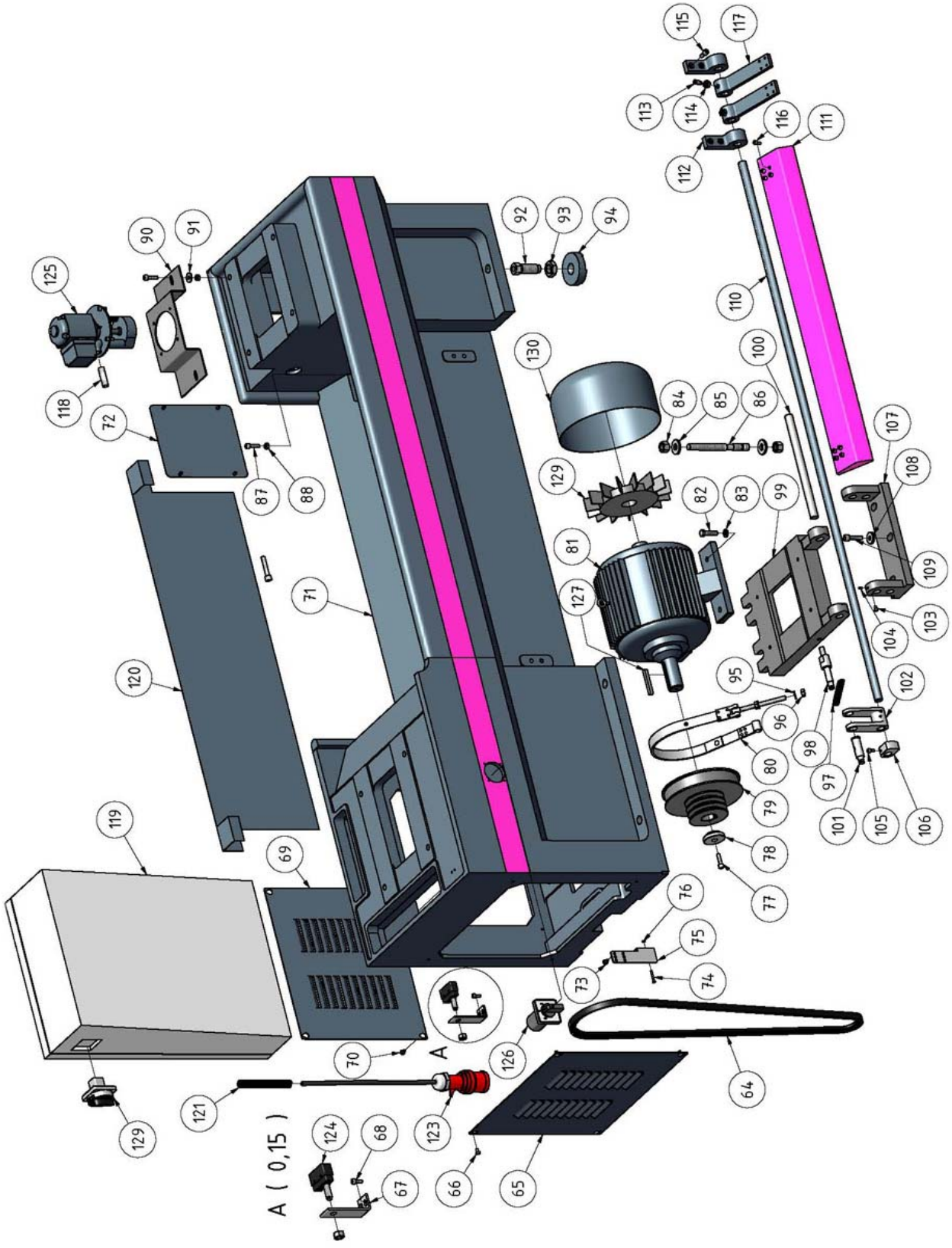


Fig. 7-2: Lathe bed, actuation, spindle break

Spare part list lathe bed, feed, actuation, spindle break

Pos.	Description	Quantity	Size	Article nr.
1	Gap Block	1		03401160801
2	Hexagon socket screw	2	GB70-85/M10x45	
3	Taper Pin	2	GB881-86/8x85	
4	Nut	2	GB6170-86/M8	
5	Hexagon socket screw	2	GB70-85/M8x50	
6	Pin	2	GB118-86/8x40	
7	Guard Assay D420x1000 (1500)	1		03401160806 / 116506
8	Hexagon socket screw	3	GB70-85/M6x12	
9	Nut	1	GB41-76/M14	
10	Washer	1	CD6236-01-44/45	
11	Screw	1		03401160811
12	Bolt	6	GB21-76/M12x40	
13	Pin	4	GB119-86/12x30	
14	Hexagon socket screw	6	GB70-85/M12x40	
15	Bed D420x1000	1		03401160815
15	Bed D420x1500	1		03401165815
16	Cover	1		03401160816
17	Block	1		03401160817
18	Hexagon socket screw	1	GB70-85/M6x10	
19	Hold	1		03401160819
20	Rod	1		03401160820
21	Rack	1		03401160821
22	Rack	1		03401160822
23	Hexagon socket screw	3	GB70-85/M6x20	
24	Washer	2	GB97.1-86/12	
25	Bolt	2	GB5783-86/M12x45	
26	Cover	1		03401160826
27	Sleeve	1		03401160827
28	Pin	1		03401160828
29	Washer	1		03401160829
30	Spring	1	GB2089-80/1.8x2.5x55	03401160830
31	Cover	1		03401160831
32	Key	1	GB1567-86/5x16	03401160832
33	Lead Screw D420x1500	1		03401165833 Inch
34	Spring Pin	4	GB879-86/6x30	
35	Hexagon socket screw	4	GB70-85/M6x30	
36	Thrust Bearing	1	8203	03401160836
37	Sleeve	1		03401160837
38	Bracket	1		03401160838
39	Set Screw	1	GB78-85/M6x8	
40	Nut	1		03401160840
41	Plug	1		03401160841
42	Taper Pin	1	GB117-86/5x45	
43	Retaining ring	1	GB894.2-86/28	03401160843
44	Feed Rod D420x1500	1		03401165844
45	Sleeve	1		03401160845
46	Thrust Bearing	1	8103	03401160846
47	Sleeve	1		03401160847
48	Set Screw	2	GB77-85/M12x8	
49	Spring	2	GB2089-80/1x9x20	03401160849
50	Steel Ball	2	GB308-84/9.5	03401160850
51	Sleeve	1		03401160851
52	Clutch	1		03401160852
53	Steel Ball	1	GB308-84/8	03401160853
54	Spring	1	GB2089-80/1.2x6x46	03401160854
55	Screw	4	GB77-85/M10x10	
56	Started Rod D420x1500	1		03401165856
57	Screw	1		03401160857
58	Lever	1		03401160858
59	Pin	1		03401160859
60	Circlip	1	GB896-86/6	03401160860
61	Taper Pin	2	GB117-86/6x50	
62	Hexagon socket screw	2	GB70-85/M8x35	
63	Screw	2	GB80-85/M8x14	
64	Belt	3	V13-1890	03401160864
65	Cover	1		03401160865
66	Cross Screw	4	GB818-85/M6x10	
67	Limited Switch Seat	1		03401160867
68	Hexagon socket screw	2	GB70-85/M6x16	
69	Cover	1		03401160869
70	Cross Screw	4	GB818-85/M6x10	
71	Stand	1		03401160871

Spare part list lathe bed, feed, actuation, spindle break

Pos.	Description	Quantity	Size	Article nr.
72	Cover	1		03401160872
73	Cross Screw	1	GB818-85/M6x10	
74	Screw	1	GB818-85/M4x30	
75	Limited Switch Seat	1		03401160875
76	Nut	1	GB6172-86/M4	
77	Hexagon socket screw	1	GB70-85/M8x30	
78	Washer	1		03401160878
79	Belt Pulley	1		03401160879
80	Belt Brake	1		03401160880
81	Motor	1	230V/60Hz	03401160881 230V
82	Bolt	1	GB30-76/M10x40	
83	Washer	1	GB93-86/10	
84	Nut	1	GB4176/M16	
85	Washer	1		03401160885
86	Screw	1		03401160886
87	Hexagon socket screw	1	GB70-85/M8x30	
88	Nut	1	GB6170-86/M8	
89	Screen	1		03401160889
90	Coolant Pump Seat	2		03401160890
91	Washer	2	GB96-85/8	
92	Bolt	4		03401160892
93	Nut	4	GB6173-86/M24x2	
94	Block-Leveling	4		03401160894
95	Washer	1	GB97.1-85/10	
96	Nut	1	GB6170-86/M10	
97	Spring	1	Q81-3/3x16x115	03401160897
98	Shaft	1		03401160898
99	Motor Seat	1		03401160899
100	Shaft	1		034011608100
101	Shaft	1		034011608101
102	Arm Brake	1		034011608102
103	Hexagon socket screw	1	GB70-85/M5x8	
104	Screw	1	GB80-85/M6x8	
105	Hexagon socket screw	1	GB70-85/M6x12	
106	Cam	1		034011608106
107	Bracket Motor Seat	1		034011608107
108	Washer	1		034011608108
109	Screw	1	GB70-85/M10x40	
110	Shaft	1		034011608110
111	Pedal Brake	1		034011608111
112	Bracket	1		034011608112
113	Screw	2	GB79-85/M10x25	
114	Nut	2	GB6170-86/M10	
115	Screw	4	GB70-85/M8x20	
116	Screw	8	GB70-85/M6x16	
117	Arm	2		034011608117
118	Hose connector	1		034011608118
119	Switch case	1		034011608119
120	Splash board D420x1500	1		034011658120
121	Cable protection	1		034011608121
122	Lead screw cover D420x1500	1		034011658122
123	Connection cable	1		034011658123
124	Cover safety switch	1		034011658124
125	Coolant pump	1	230V/60HZ	034011658125 230V
126	Change over switch	1		034011658126
127	Fitting key	1	DIN 6885/10x8x70	
128	Bolt	1		034011658128
129	Fan	1		034011658129 USA
130	Motor cover	1		034011658130 USA

7.4 Change gears

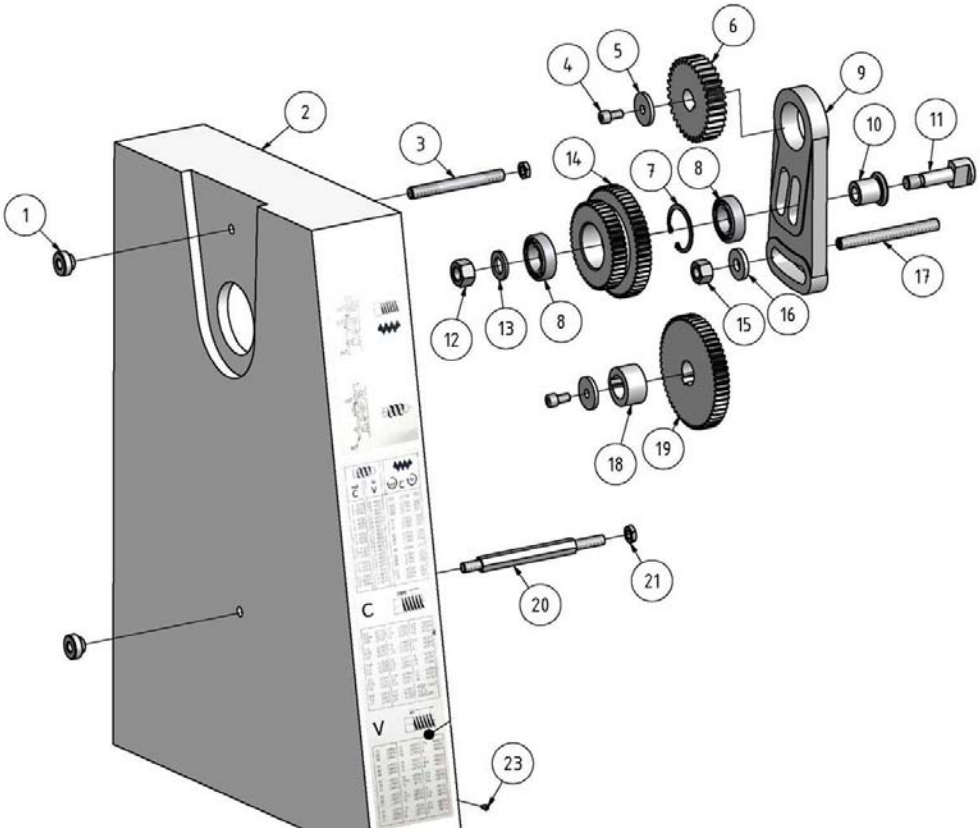


Fig. 7-3: Change gears

Spare part list change gears				
Pos.	Description	Quantity	Size	Article nr.
1	Nut	1		03401160201
2	Cover	1		03401160202
3	Bolt	1	GB900-88/M10x85	
4	Hexagon socket screw	2	GB70-85/M8x16	
5	Washer	2		03401160205
6	Change Gear (Metric)	1	33T	03401160206
6	Change Gear (Inch)	1	24T	
6	Change Gear (Inch)	1	24T	
7	Circlip	1	GB893.1-86/47	03401160207
8	Ball bearing	1	6005-2Z	0406005.2Z
9	Swing France	1		03401160209
10	Sleeve	1		03401160210
11	Shaft	1		03401160211
12	Nut	1	GB6172-86/M14	
13	Washer	1	GB97.1-84/14	
14	Change Gear (Metric)	1	35/48	03401160214
14	Change Gear (Inch)	1	44/52T	
15	Nut	1	GB41-76/M14	
16	Washer	1		03401160216
17	Screw	1		03401160217
18	Sleeve	1		03401160218
19	Change Gear (Metric)	1	54T	03401160219
19	Change Gear (inch)	1	57T	
20	Bolt	1		03401160220
21	Nut	1	GB54-76/M10	
22	Plate	1		03401160222
23	Screw	1	GB818-85/M3x8	

7.5 Headstock 1-10

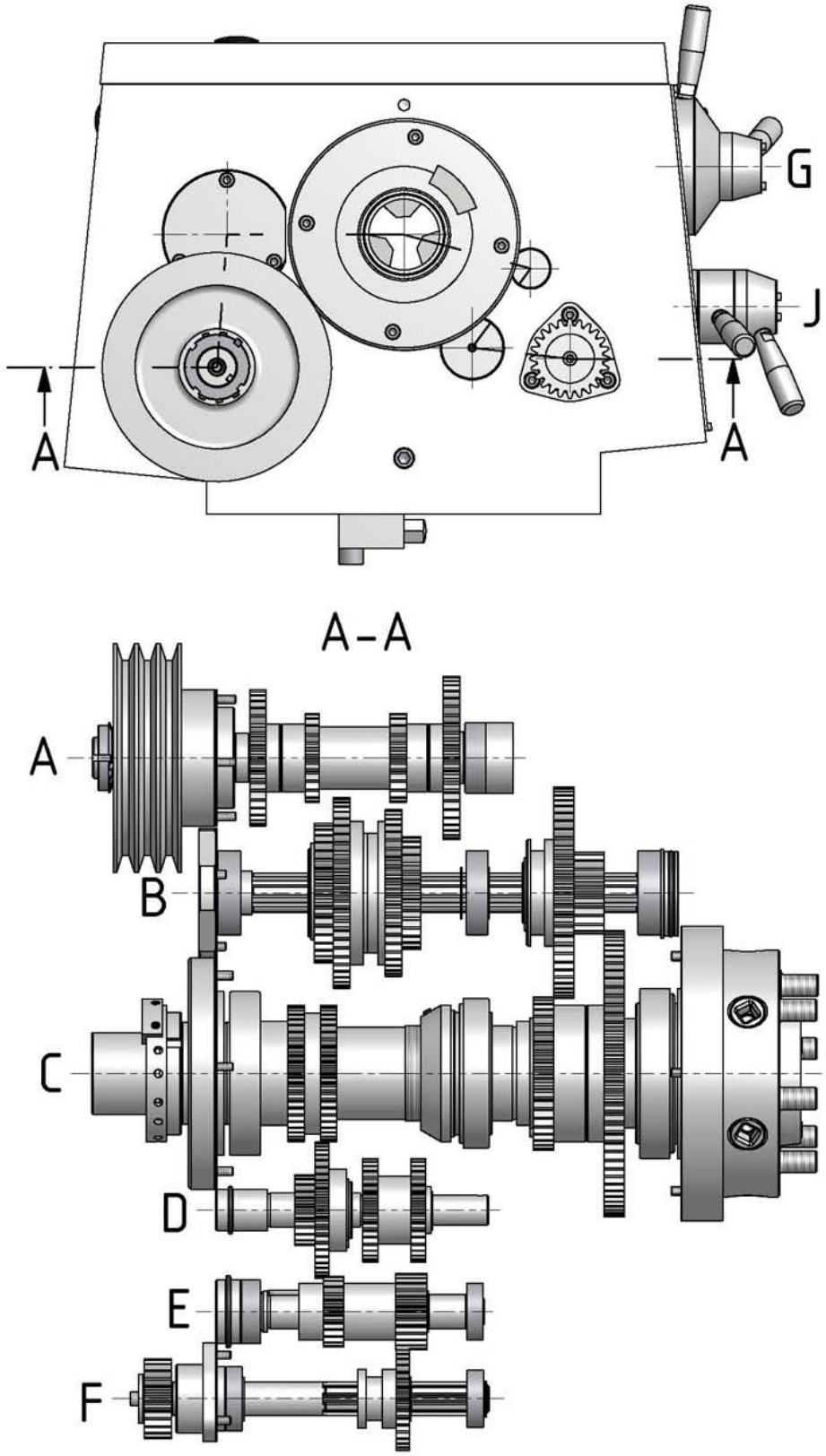


Fig. 7-4: Headstock 1-10

7.6 Headstock 2-10

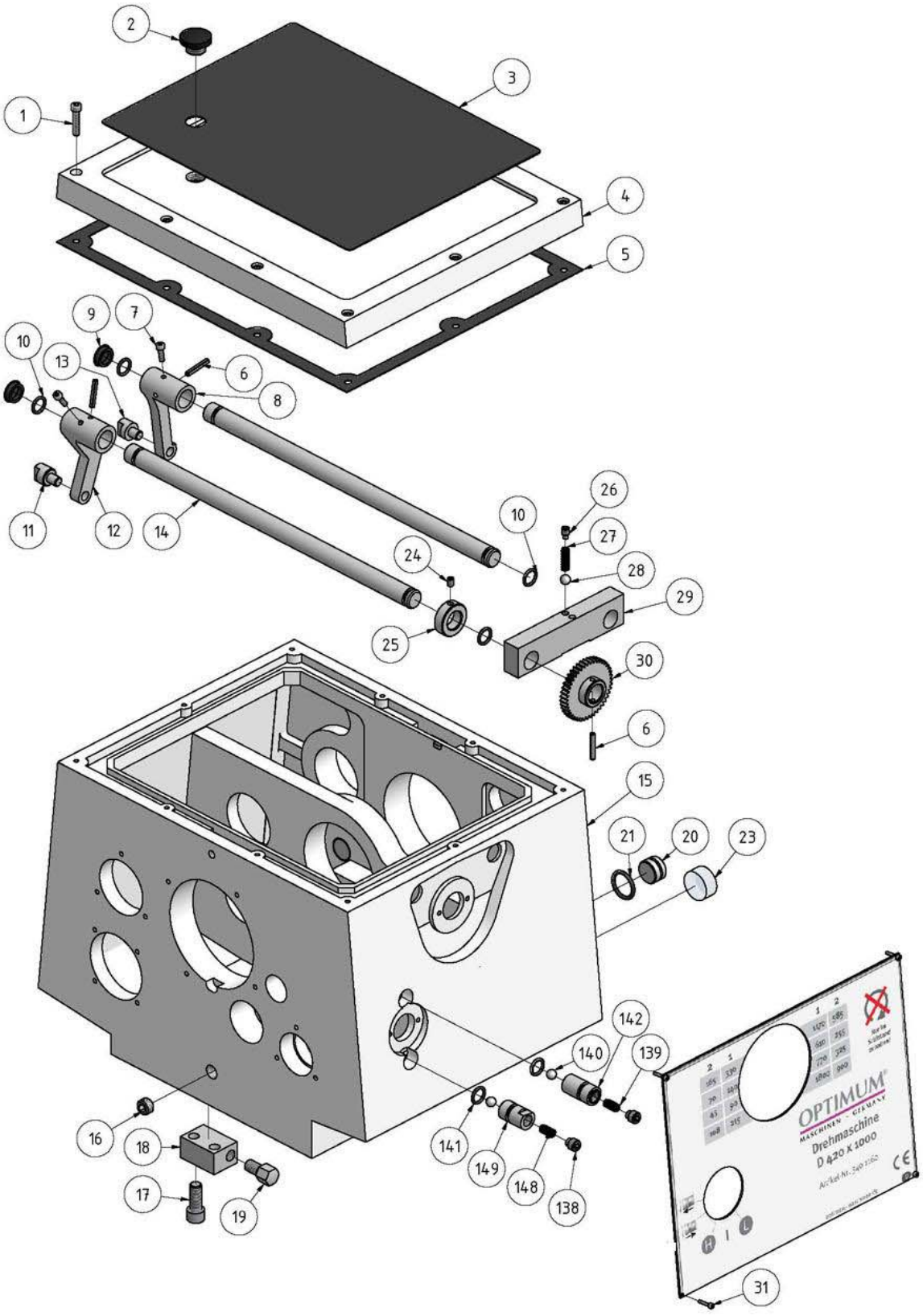


Fig. 7-5: Headstock 2-10

7.7 Headstock 3-10

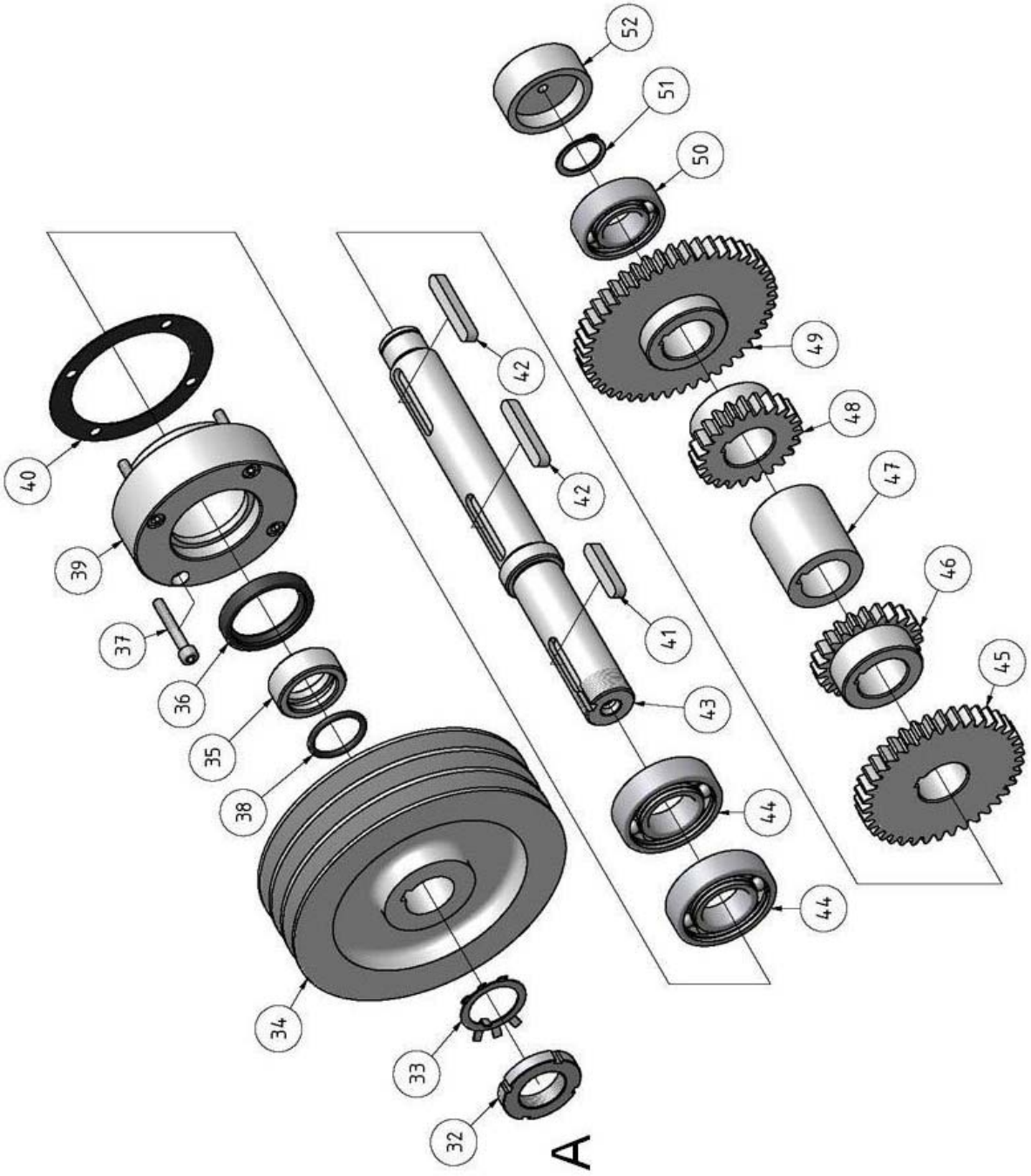


Fig. 7-6: Headstock 3-10

7.8 Headstock 4-10

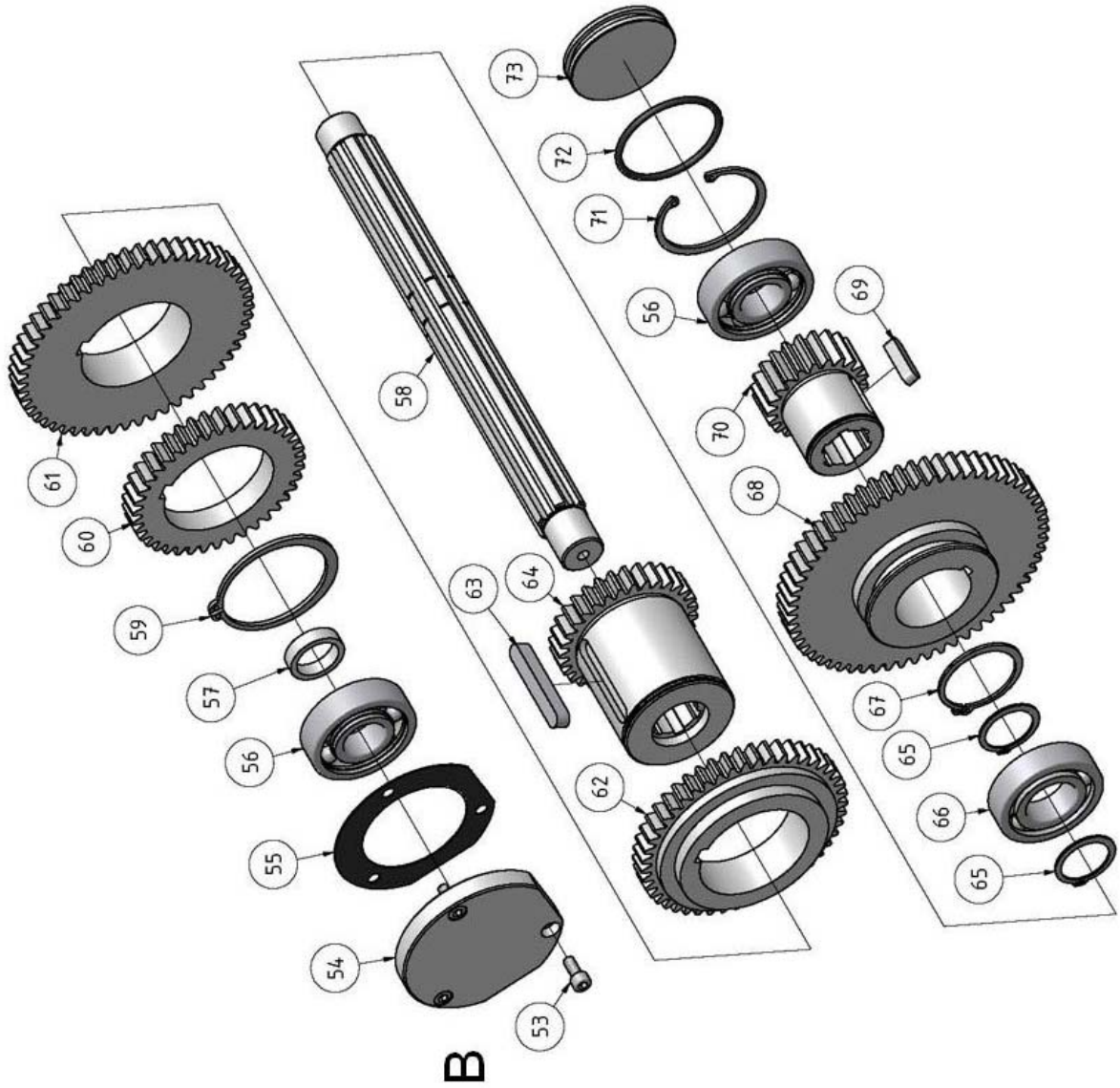


Fig. 7-7: Headstock 4-10

7.9 Headstock 5-10

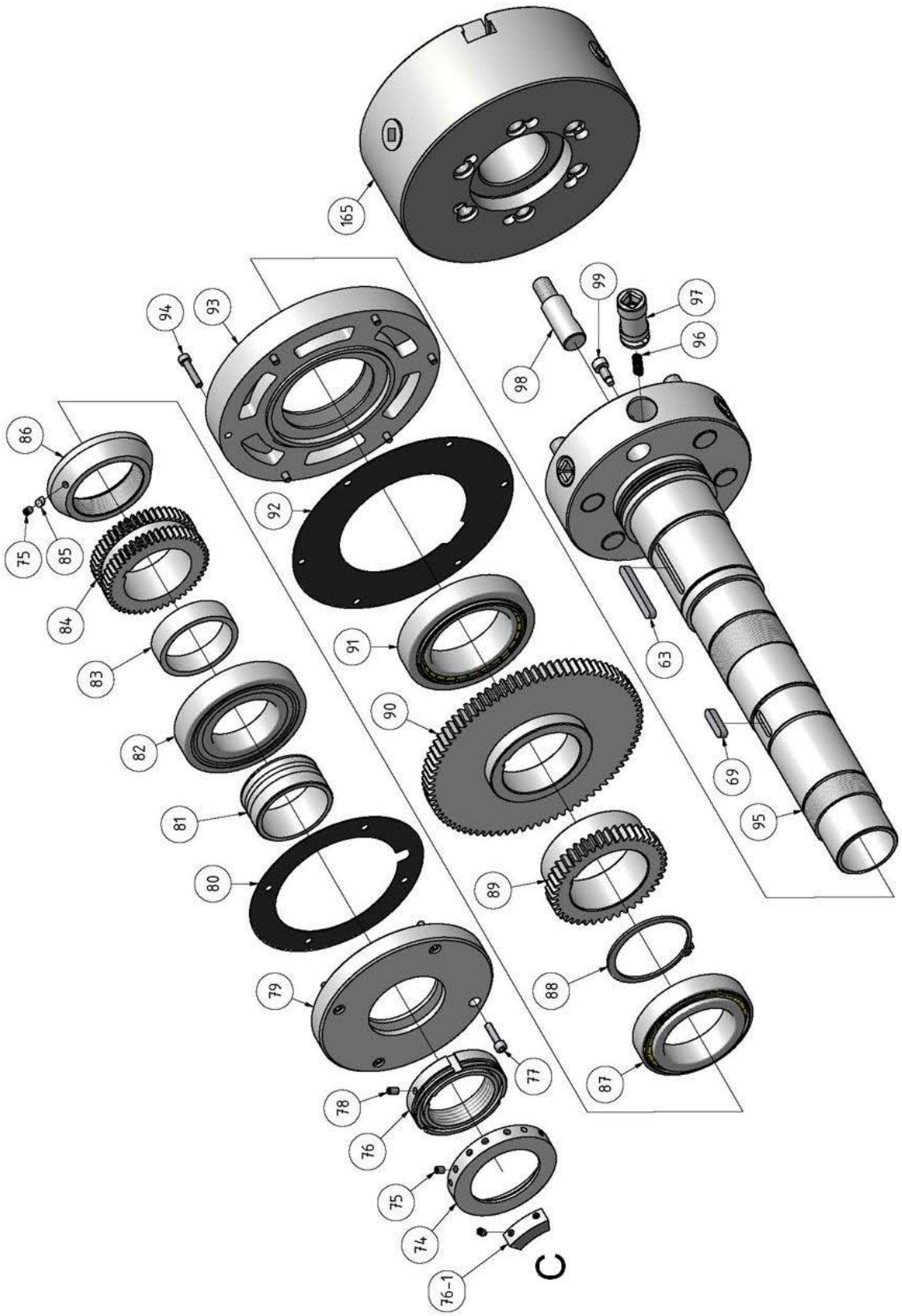


Fig. 7-8: Headstock 5-10

7.10 Headstock 6-10

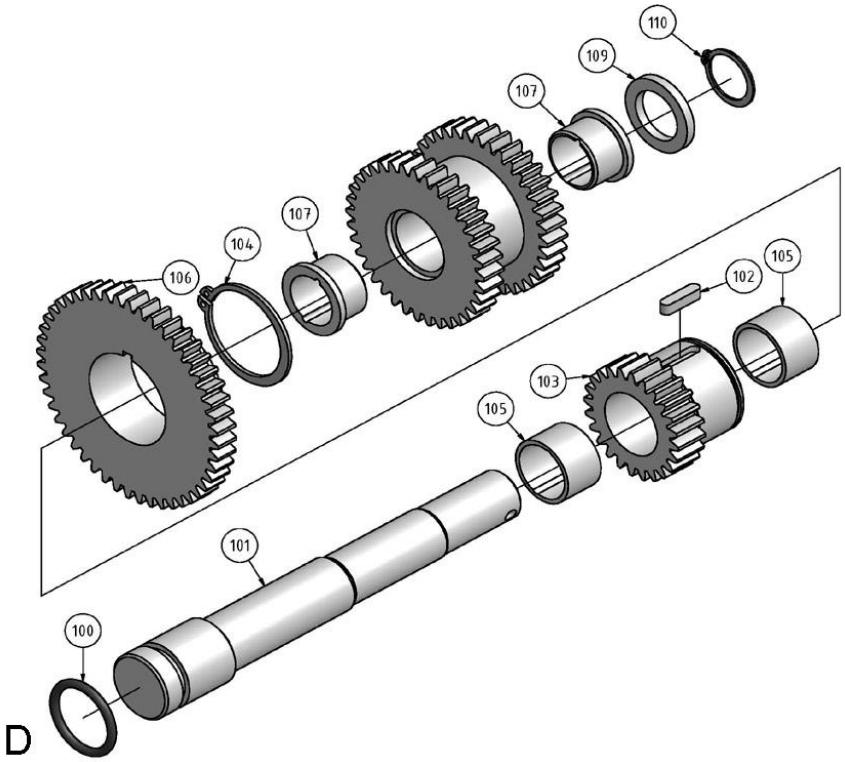


Fig. 7-9: Headstock 6-10

7.11 Headstock 7-10

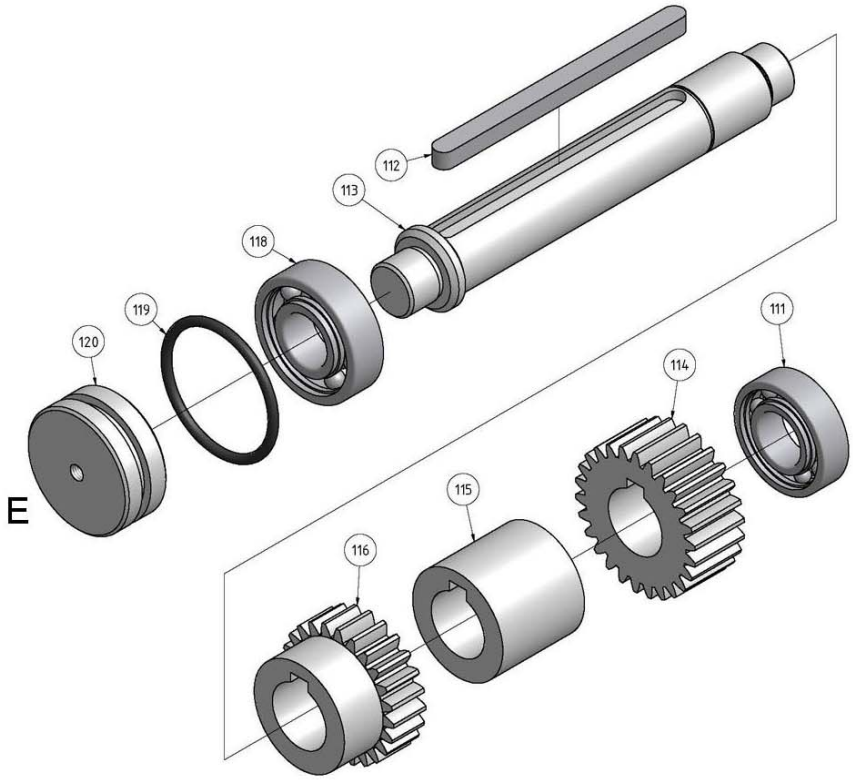


Fig. 7-10: Headstock 7-10

7.12 Headstock 8-10

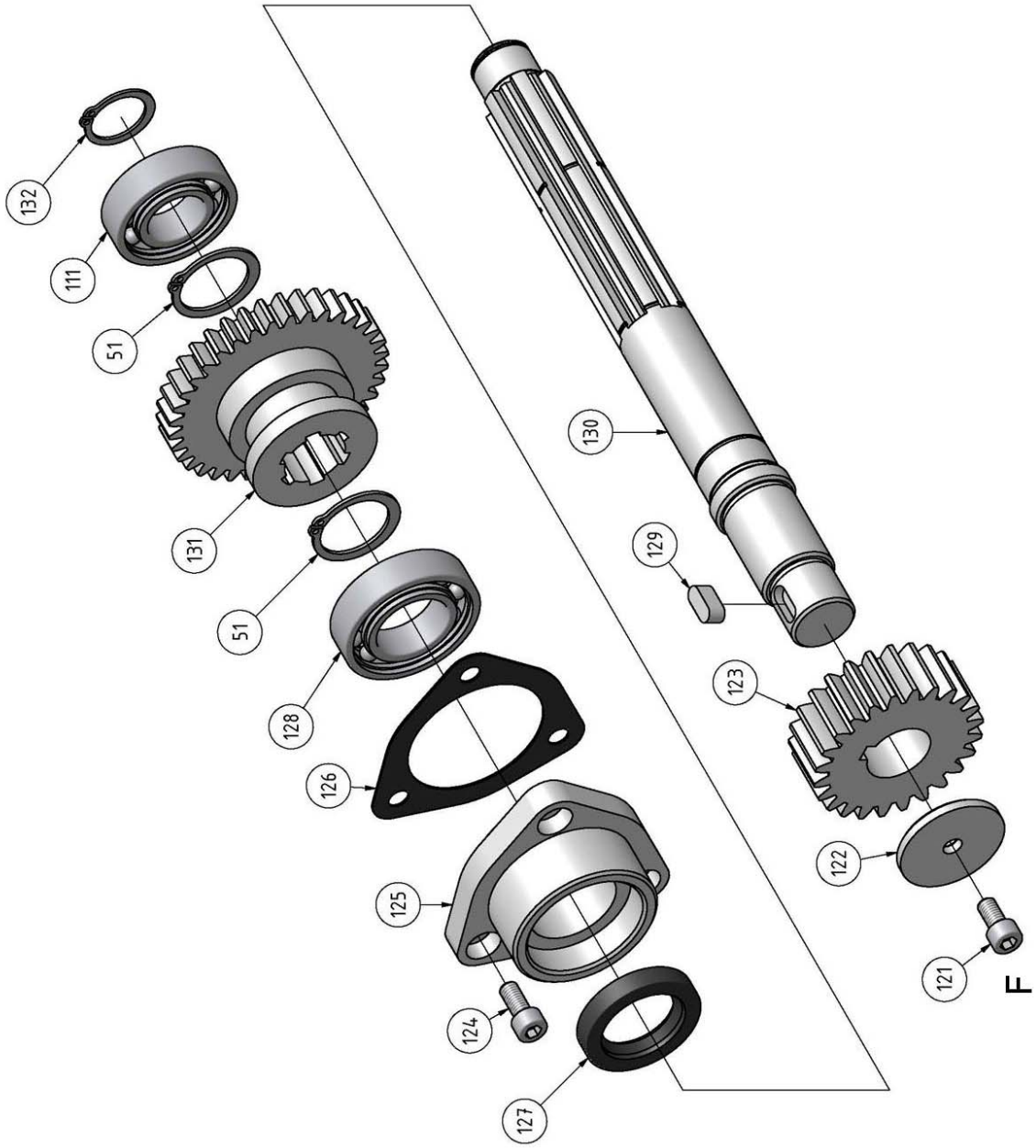


Fig. 7-11: Headstock 8-10

7.13 Headstock 9-10

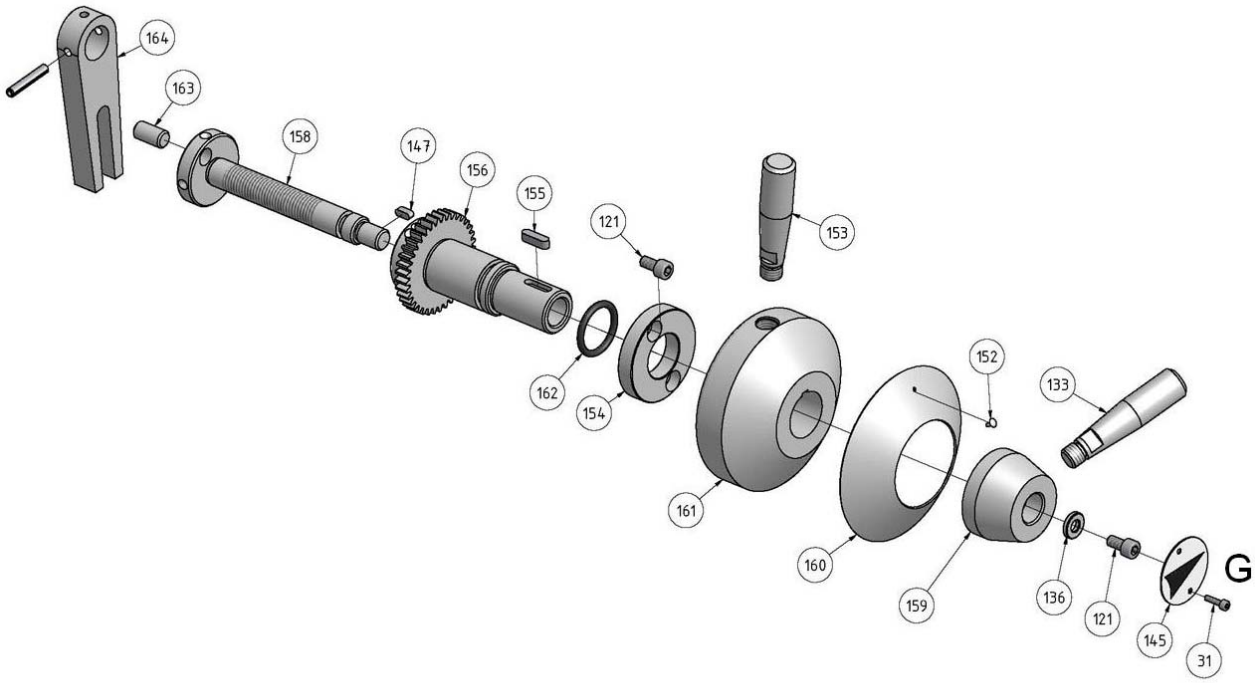


Fig. 7-12: Headstock 9-10

7.14 Headstock 10-10

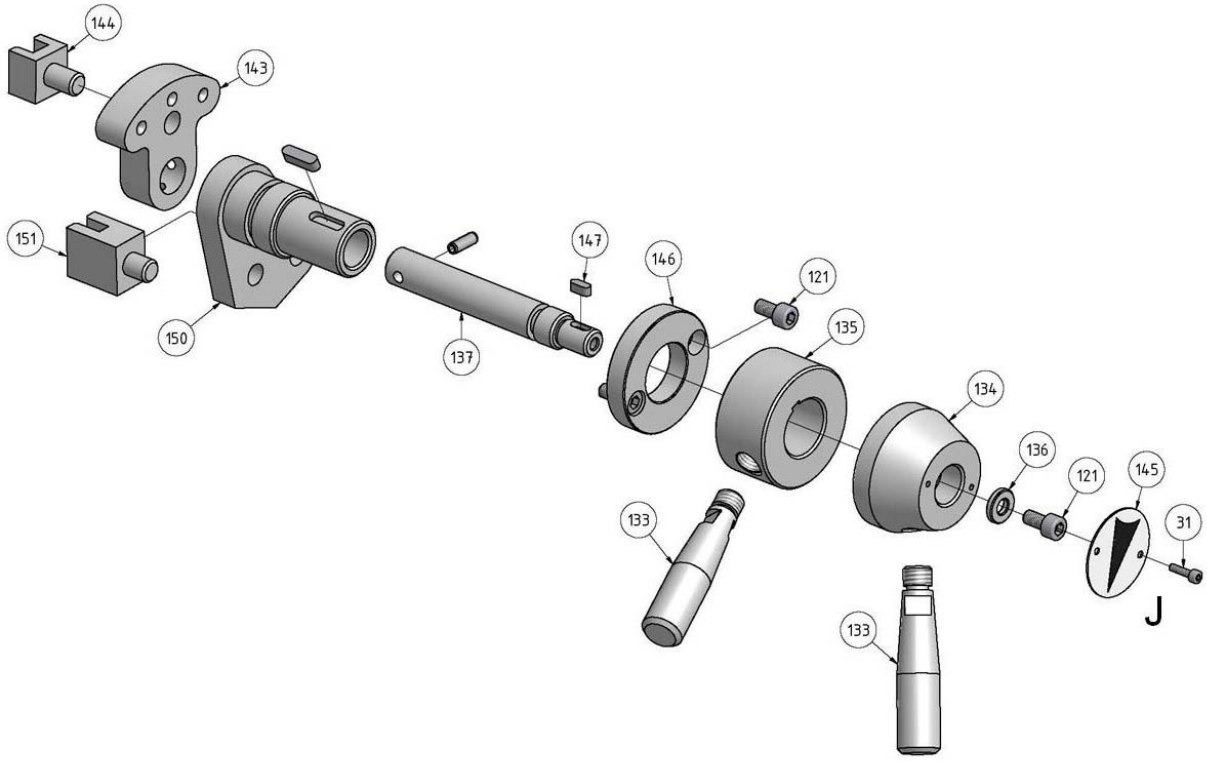


Fig. 7-13: Headstock 10-10

Spare part list headstock				
Pos.	Description	Quantity	Size	Article nr.
1	Hexagon socket screw	10	GB70-85/M6x30	
2	Plug-Oil Inlet	1		03401160102
3	Cover Dress	1		03401160103
4	Headstock Cover	1		03401160104
5	Packing	1		03401160105
6	Spring Pin	2	GB879-85/5x30	
7	Hexagon socket screw	2	GB70-85/M5x16	
8	Bracket	1		03401160108
9	Plug	2		03401160109
10	O-Ring	2	GB3452.1-82/14x2.65	
11	Fork	1		03401160111
12	Lever	1		03401160112
13	Fork	1		03401160113
14	Shaft	2		03401160114
15	Headstock	1		03401160115
16	Oil Plug	1	Q/ZB285.3/ZG 3/8"	03401160116
17	Screw	1	GB70-85/M12x20	
18	Limited Bracket	1		03401160118
19	Adjust Screw	1		03401160119
20	Plug	1		03401160120
21	O-Ring	1	GB3452.1-82/19x2.65	
22	Plate	1		03401160122
23	Oil Sight	1	GB1160.1-86/16	03401160123
24	Fix Screw	1	GB80-85/M6x10	
25	Sleeve	1		03401160125
26	Screw	1	GB77-85/M8x12	
27	Spring	1	GB2089-80/1x5x22	03401160127
28	Steel Ball	1	GB308-84/6.5	03401160128
29	Bracket	1		03401160129
30	Gear	1		03401160130
31	Cross Receessed Head Screw	5	GB818-85/M3x15	
32	Nut	1	GB812-88/M30x1.5	
33	Toolhed Lock Washer	1	GB858-88/30	03401160133
34	Belt Pulley	1		03401160134
35	Spacer	1		03401160135
36	Oil Seal	1	TC55x42x9	
37	Hexagon socket screw	1	GB70-85/M6x40	
38	O-Ring	1	GB1235-76/36x3.5	
39	Bearing Cover	1		03401160139
40	Packing	1		03401160140
41	Key	1	GB1096-79/8x40	03401160141
42	Key	2	GB1096-79/8x50	03401160142
43	Shaft	1		03401160143
44	Ball Bearing	2	80206	03401160144
45	Gear	1		03401160145
46	Gear	1		03401160146
47	Sleeve	1		03401160147
48	Gear	1		03401160148
49	Gear	1		03401160149
50	Ball Bearing	1	80205	03401160150
51	Retaining ring	4	GB894.1-86/25	
52	Plug	1		03401160152
53	Hexagon socket screw	3	GB70-85/M6x14	
54	Cover	1		03401160154
55	Packing	1		03401160155
56	Ball Bearing	2	80305	03401160156
57	Spacer	1		03401160157
58	Shaft	1		03401160158
59	Retaining ring	1	GB894.1-86/65	
60	Gear	1		03401160160
61	Gear	1		03401160161
62	Gear	1		03401160162
63	Key	1	GB1096-79/8x60	03401160163
64	Gear	1		03401160164
65	Retaining ring	2	GB894.1-86/30	
66	Ball Bearing	1	6202-2Z	0406202.2R
67	Retaining ring	1	GB894.1-86/45	
68	Gear	1		03401160168
69	Key	2	GB1096-79/8x30	03401160169
70	Gear	1		03401160170
71	Retaining ring	1	GB893.1-86/62	
72	O-Ring	1	GB1235-76/56x3.5	

Spare part list headstock				
Pos.	Description	Quantity	Size	Article nr.
73	Cover	1		03401160173
74	Balance Piece	4		03401160174
75	Fix Screw	4	GB77-85/M6x8	
76	Set Nut	1		03401160176
76-1	Counter weight	1		034011601761
77	Hexagon socket screw	4	GB70-85/M6x25	
78	Fix Screw	3	GB77-85/M6x10	
79	Cover	1		03401160179
80	Packing	1		03401160180
81	Cycle Oil Ring	1		03401160181
82	Ball Bearing	1	6213-2Z	0406213.2R
83	Sleeve	1		03401160183
84	Gear	1		03401160184
85	Fix Black	1		03401160185
86	Set Nut	1		03401160186
87	Taper Roller	1	32014 X/Q	04032014
88	Retaining ring	1	GB894.1-86/75	03401160188
89	Gear	1		03401160189
90	Gear	1		03401160190
91	Taper Roller	1	32016 X/Q	04032016
92	Packing	1		03401160192
93	Cover	1		03401160193
94	Hexagon socket screw	6	GB70-85/M6x30	
95	Spindle	1	D1-6	03401160195
96	Spring	6		03401160196
97	Cam Lock	6		03401160197
98	Cam Lock Stud	6		03401160198
99	Screw	6		03401160199
100	O-Ring	1	GB1235-76/28x3.1	
101	Shaft	1		034011601101
102	Key	1	GB1096-79/5x20	034011601102
103	Gear	1		034011601103
104	Retaining ring	1	GB894.1-86/42	
105	Bush	2		034011601105
106	Gear	1		034011601106
107	Bush	2		034011601107
108	Gear	1		034011601108
109	Spacer	1		034011601109
110	Retaining ring	1	GB894.1-86/22	
111	Ball bearing	1	6004-2Z	0406004.2R
112	Key	1	GB1096-79/8x115	034011601112
113	Shaft	1		034011601113
114	Gear	1		034011601114
115	Sleeve	1		034011601115
116	Gear	1		034011601116
117	Gear	1		034011601117
118	Ball Bearing	1	6204-2Z	0406204.2R
119	O-Ring	1	GB1235-76/46x3.5	
120	Cover	1		034011601120
121	Hexagon socket screw	5	GB70-85/M6x12	
122	Spacer	1		034011601122
123	Change Gear	1		034011601123
124	Hexagon socket screw	3	GB70-85/M6x14	
125	Cover	1		034011601125
126	Packing	1		034011601126
127	Oil Seal	1	HG4-692-67/SD25x40x10	
128	Ball Bearing	1	6005-2Z	0406005.2R
129	Key	1	GB1096-79/6x14	034011601129
130	Shaft	1		034011601130
131	Gear	1		034011601131
132	Retaining ring	1	GB894.1-86/20	
133	Lever	3		034011601133
134	Lever Head	1		034011601134
135	Lever Head	1		034011601135
136	Retaining ring	2		034011601136
137	Shaft	1		034011601137
138	Fix Screw	2	GB77-85/M12x10	
139	Spring	1	GB2089-80/0.9x9x40	034011601139
140	Steel Ball	2	GB308-84/10	034011601140
141	O-Ring	2	GB3452.1-82/14x2.65	
142	Bracket	1		034011601142
143	Lever	1		034011601143
144	Fork	1		034011601144

Spare part list headstock				
Pos.	Description	Quantity	Size	Article nr.
145	Plate	2		034011601145
146	Cover	1		034011601146
147	Key	2	GB1096-79/4x10	034011601147
148	Spring	1	GB2089-80/0.9x9x35	034011601148
149	Bracket	1		034011601149
150	Lever	1		034011601150
151	Fork	1		034011601151
152	Rivet	3	GB827-86/2x5	034011601152
153	Lever	1		034011601153
154	Cover	1		034011601154
155	Key	1	GB1096-79/5x18	034011601155
156	Gear Shaft	1		034011601156
157	O-Ring	1	GB3452.1-52/10x2.65	
158	Lever Shaft	1		034011601158
159	Lever Bracket	1		034011601159
160	Plate	1		034011601160
161	Lever Bracket	1		034011601161
162	O-Ring	1	GB1235-76/28x3.1	
163	Pin	1		034011601163
164	Bracket	1		034011601164
165	Three jaw chuck	1		3440722
	Headstock complete	1		03401160115CPL

7.15 Headstock feed gear 1-9

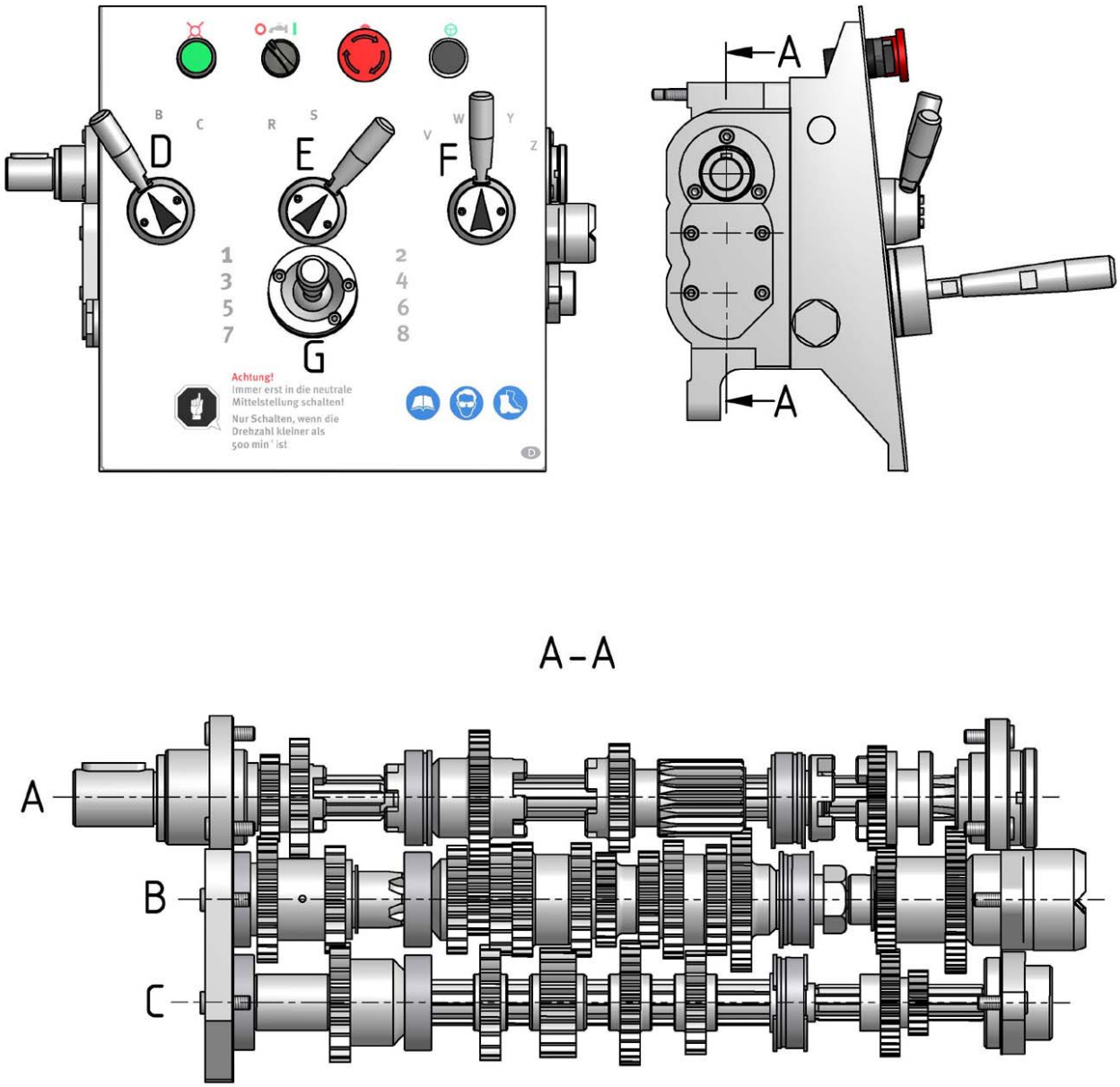


Fig. 7-14: Headstock feed gear 1-9

7.16 Headstock feed gear 2-9

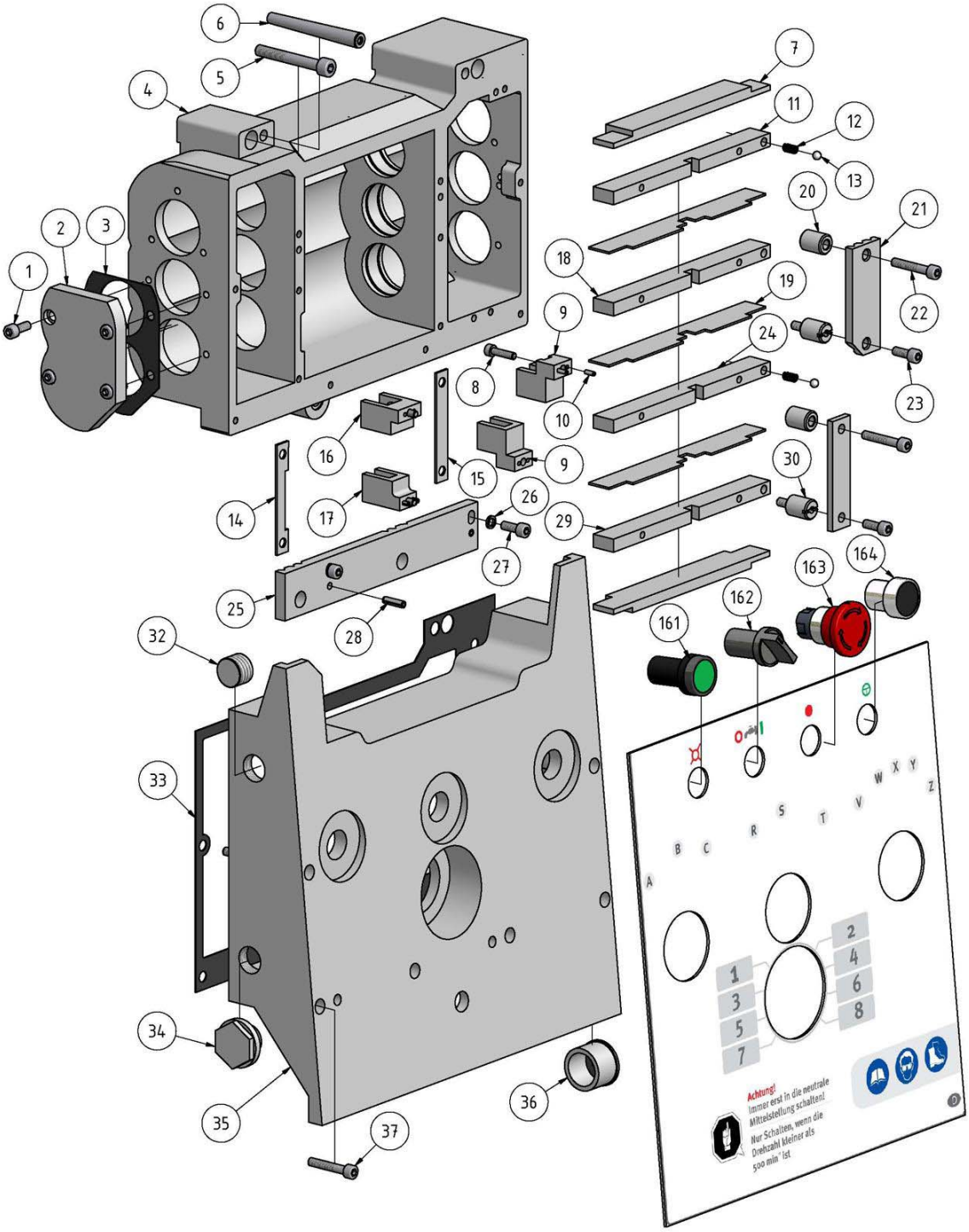


Fig. 7-15: Headstock feed gear 2-9

7.17 Headstock feed gear 3-9

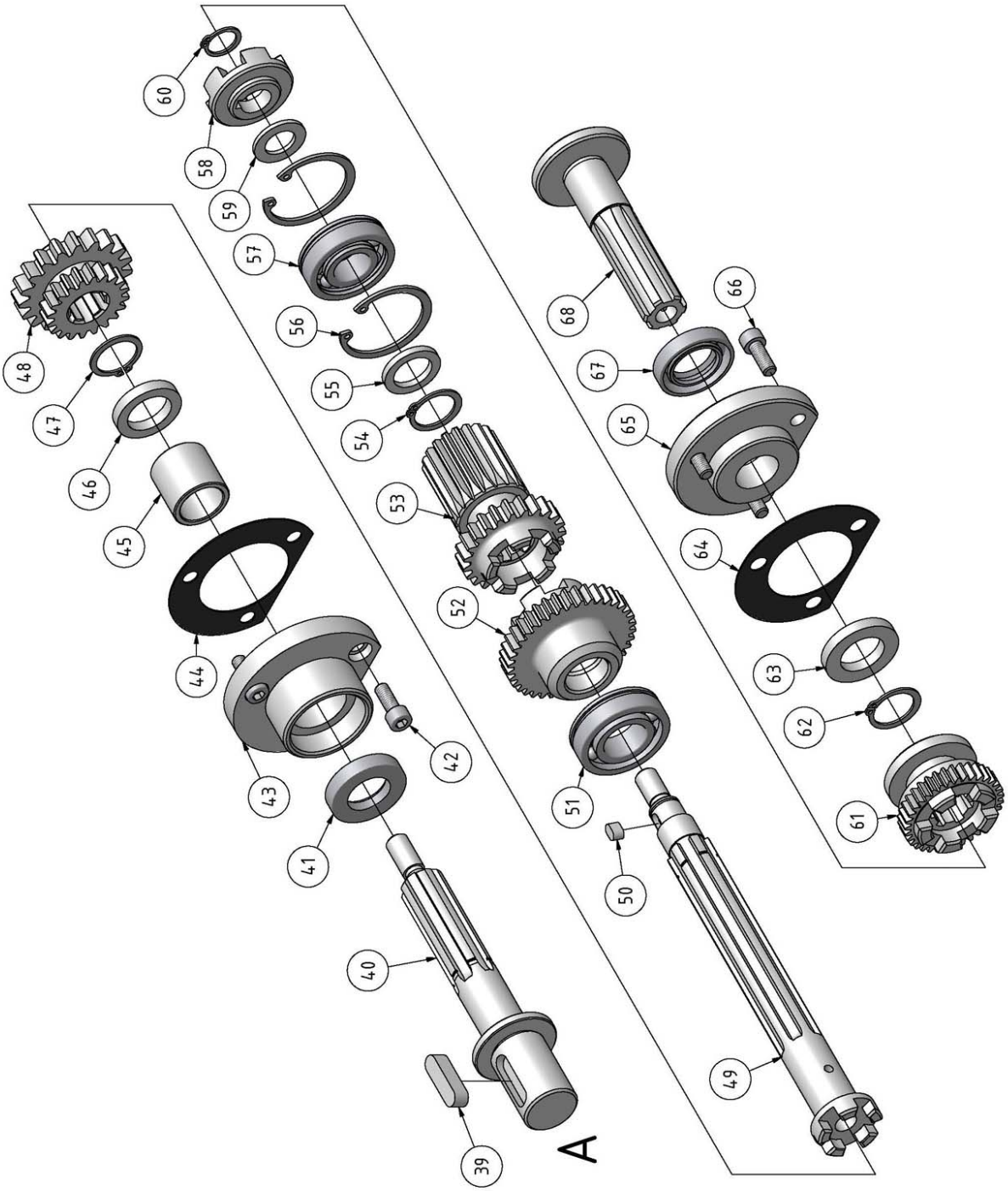


Fig. 7-16: Headstock feed gear 3-9

7.18 Headstock feed gear 4-9

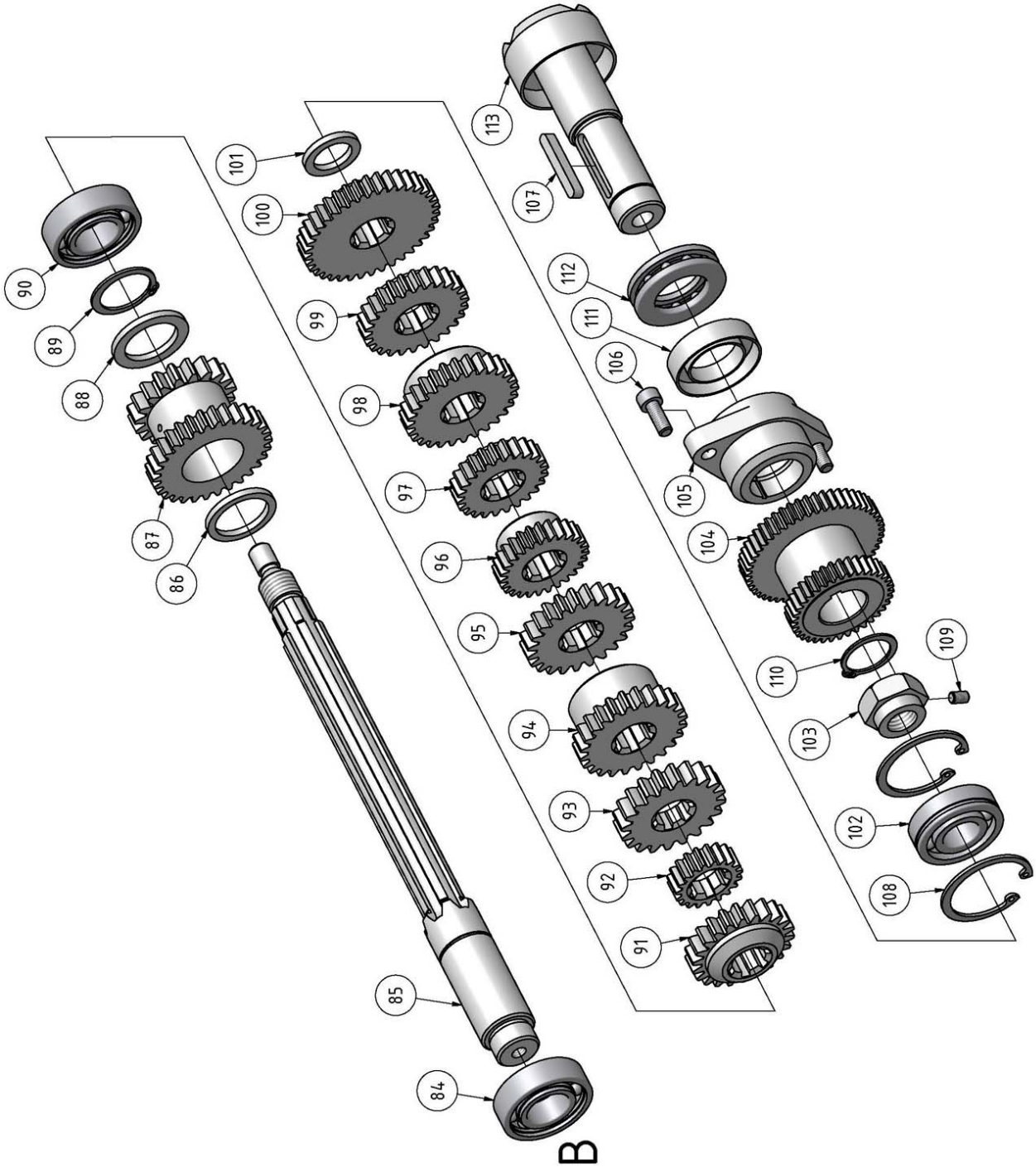


Fig. 7-17: Headstock feed gear 4-9

7.19 Headstock feed gear 5-9

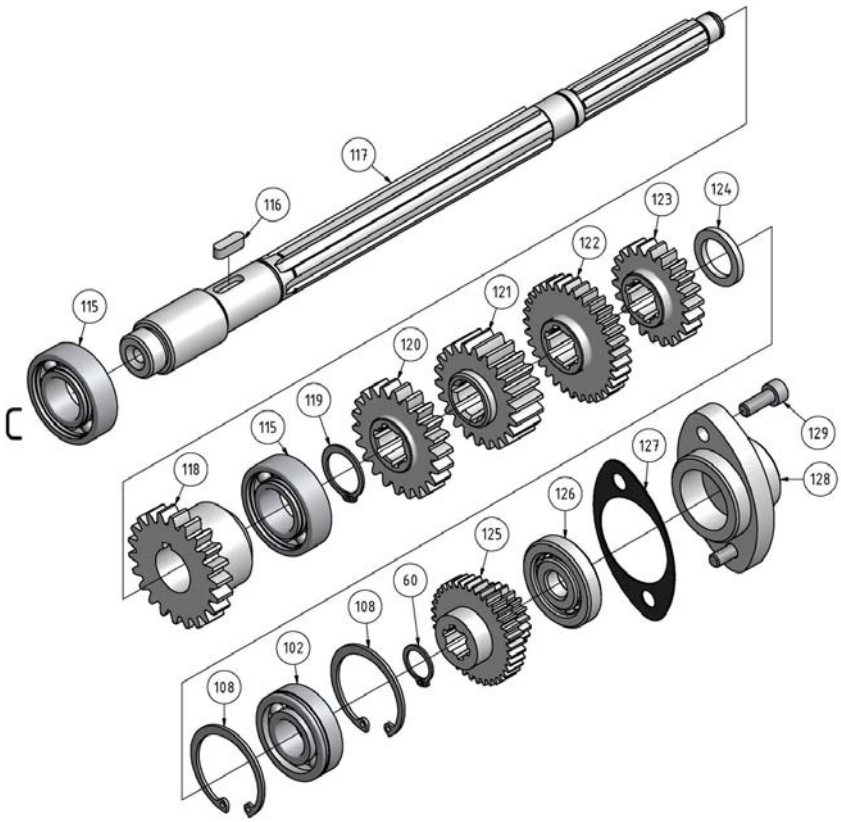


Fig. 7-18: Headstock feed gear 5-9

7.20 Headstock feed gear 6-9

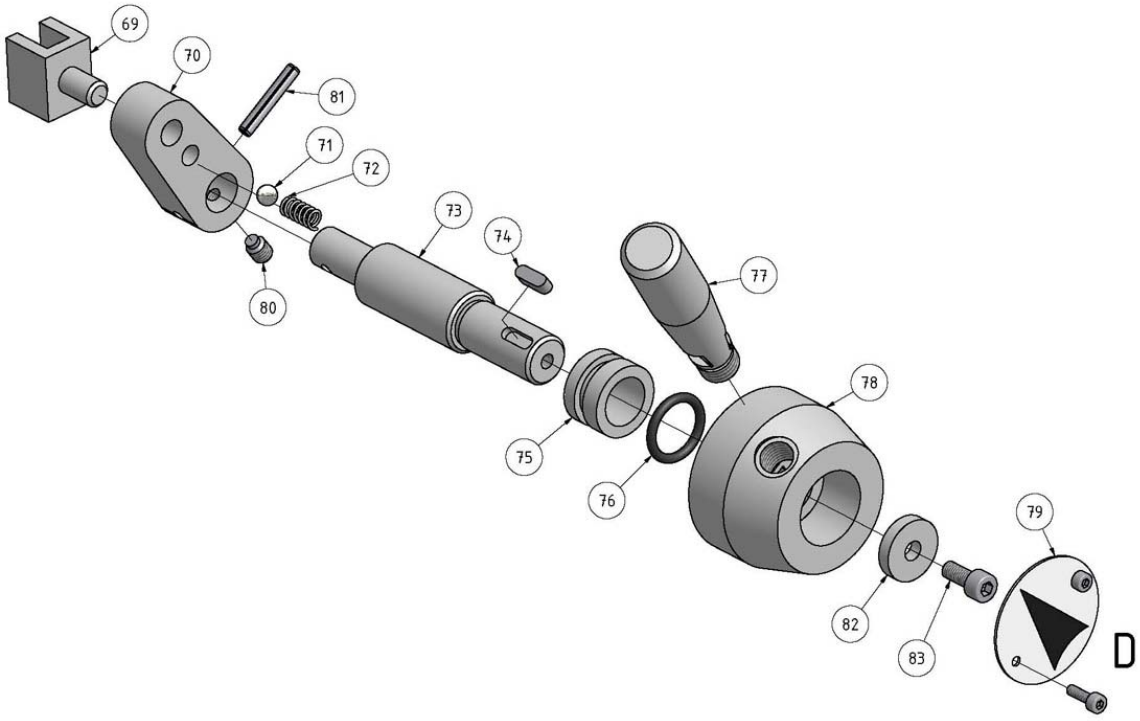


Fig. 7-19: Headstock feed gear 6-9

7.21 Headstock feed gear 7-9

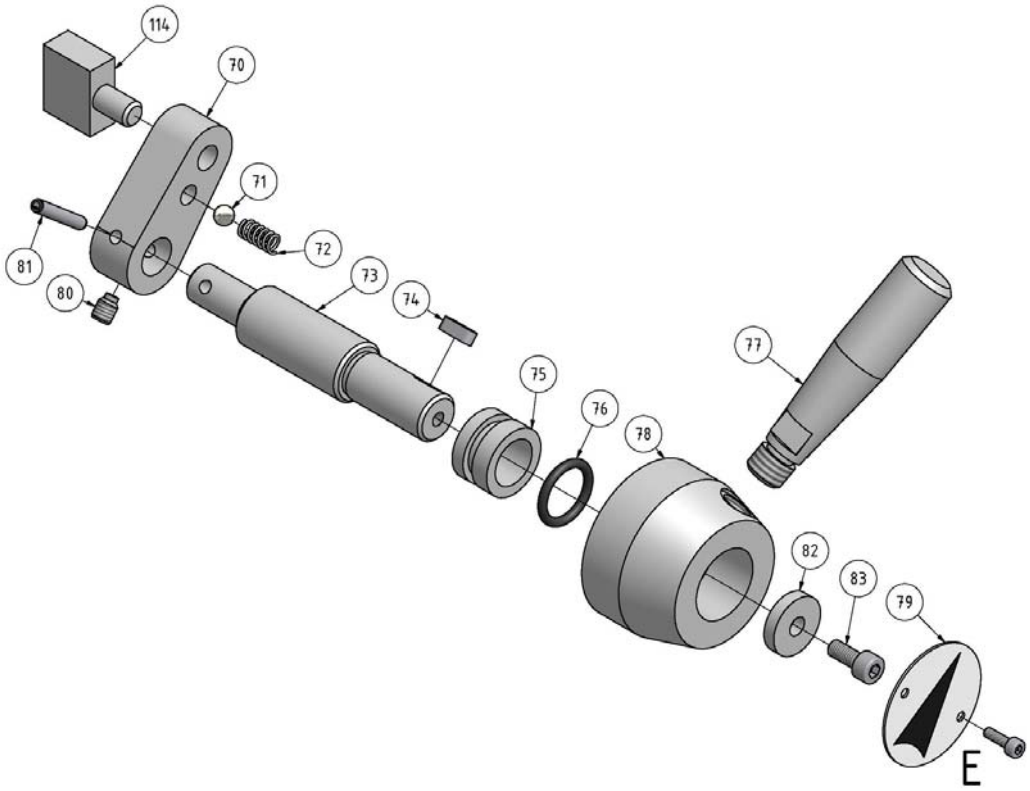


Fig. 7-20: Headstock feed gear 7-9

7.22 Headstock feed gear 8-9

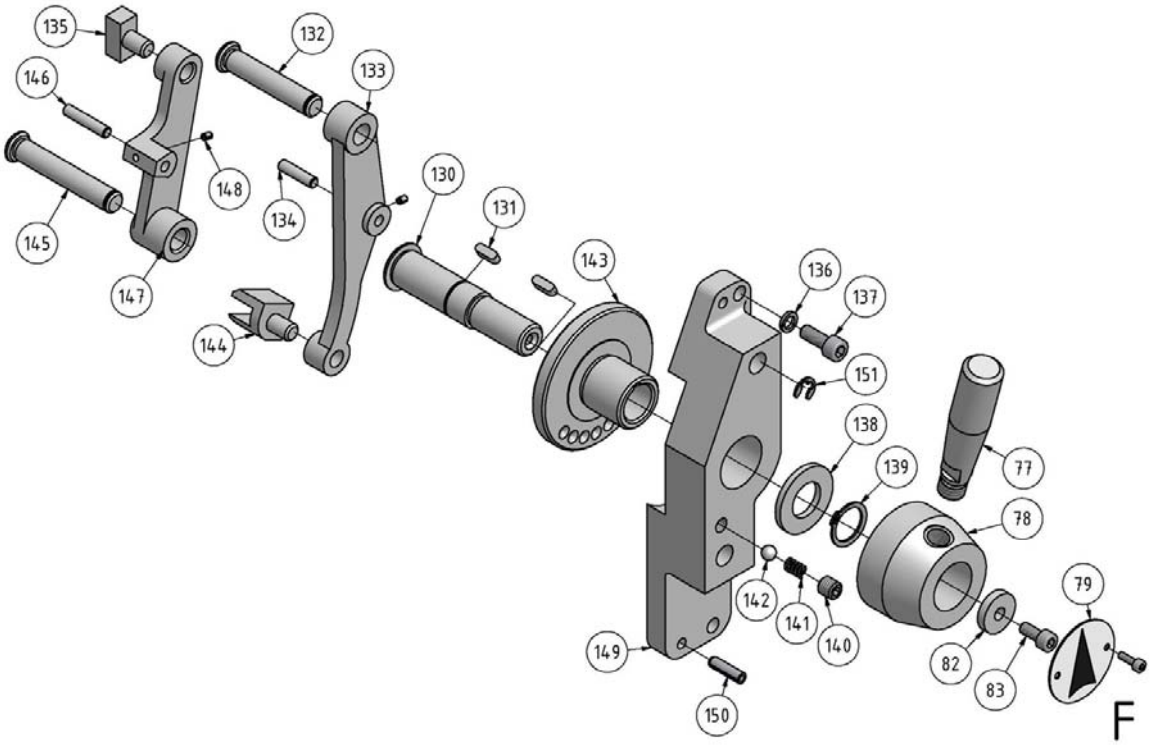


Fig. 7-21: Headstock feed gear 8-9

7.23 Headstock feed gear 9-9

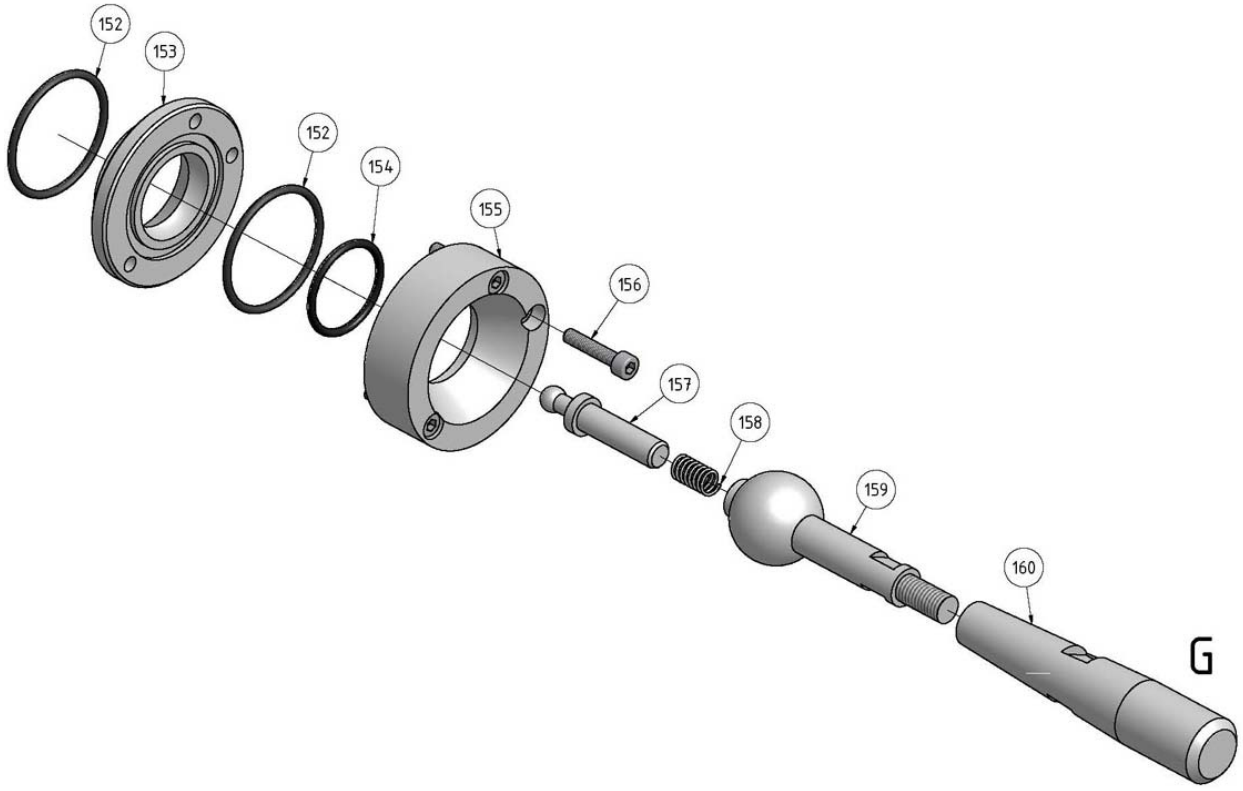


Fig.7-22: Headstock feed gear 9-9

Spare parts list headstock feed gear				
Pos.	Description	Quantity	Size	Article nr.
1	Innensechskantschraube	2	GB70-85/M6x16	
2	Abdeckung	1		03401160302
3	Dichtung	1		03401160303
4	Gehäuse	1		03401160304
5	Innensechskantschraube	2	GB70-85/M8x60	
6	Kegelstift	1	GB118-86/A8x90	03401160306
7	Platte	1		03401160307
8	Innensechskantschraube	2	GB70-85/M5x20	
9	Gabel	2		03401160309
10	Federstift	4	GB879-86/3x10	
11	Gabel	1		03401160311
12	Feder	2	GB2089-80/0.8x5x17	03401160312
13	Stahlkugel	2	GB308-84/6	03401160313
14	Platte	1		03401160314
15	Platte	1		03401160315
16	Gabel	1		03401160316
17	Gabel	1		03401160317
18	Gabel	1		03401160318
19	Antriebsplatte	1		03401160319
20	Hülse	1		03401160320
21	Platte	1		03401160321
22	Innensechskantschraube	2	GB70-85/M6x35	
23	Innensechskantschraube	2	GB70-85/M6x16	
24	Gabel	1		03401160324
25	Schiene	1		03401160325
26	Federring	2	GB93-87/6	
27	Innensechskantschraube	2	GB70-85/M6x16	
28	Federstift	2	GB879-86/5x18	
29	Gabel	1		03401160329
30	Innensechskantschraube	1		03401160330
31	Kreuzschraube	4	GB819-85/M5x8	
32	Ölverschlussschraube	1	GB3289.2-82/ZG1/2"	03401160332
33	Dichtung	1		03401160333
34	Verschluss	1	GB3289.2-82/ZG1/2"	03401160334
35	Abdeckung	1		03401160335
36	Ölschauglas	1	GB1160.1-89/20	03401160336

Spare parts list headstock feed gear				
Pos.	Description	Quantity	Size	Article nr.
37	Innensechskantschraube	4	GB70-85/M6x35	
38	Platte	1		03401160338
39	Passfeder	1	GB1096-79/8x28	03401160339
40	Welle	1		03401160340
41	Dichtung	1	PD20x35x10	
42	Innensechskantschraube	3	GB70-85/M6x16	
43	Halterung	1		03401160343
44	Dichtung	1		03401160344
45	Rollenlager	1	HK 2025	040HK2025
46	Scheibe	1		03401160346
47	Sicherungsring	1	DIN 471/ 20	
48	Zahnrad	1		03401160348
49	Welle	1		03401160349
50	Passfeder	1	GB1096-79/5x8	03401160350
51	Kugellager	1	16004	04016004
52	Zahnrad	1		03401160352
53	Zahnrad	1		03401160353
54	Sicherungsring	1	DIN 471/ 20	
55	Scheibe	1		03401160355
56	Sicherungsring	2	GB894.1-86/40	
57	Kugellager	1	203	03401160357
58	Kupplung	1		03401160358
59	Scheibe	1		03401160359
60	Sicherungsring	1	GB894.1-86/14	
61	Kupplungszahnrad	1		03401160361
62	Sicherungsring	1	DIN 471/ 20	
63	Scheibe	1		03401160363
64	Dichtung	1		03401160364
65	Abdeckung	1		03401160365
66	Innensechskantschraube	3	GB70-85/M6x16	
67	Dichtung	1	PD20x35x10	
68	Welle	1		03401160368
69	Gabel	1		03401160369
70	Hebel	2		03401160370
71	Stahlkugel	2	GB308-84/6.5	03401160371
72	Feder	2	GB2089-80/0.8x5x17	03401160372
73	Welle	2		03401160373
74	Passfeder	2	GB1096-79/4x12	03401160374
75	Hülse	2		03401160375
76	O-Ring	2	GB3452.1-82/16x2.65	
77	Hebel	2		03401160377
78	Hebel	2		03401160378
79	Platte	2		03401160379
80	Schraube	2	GB77-85/M6x6	
81	Federstift	2	GB879-86/4x25	
82	Scheibe	2		03401160382
83	Innensechskantschraube	2	GB70-85/M5x12	
84	Kugellager	1	16004	04016004
85	Welle	1		03401160385
86	Scheibe	1		03401160386
87	Zahnrad	1		03401160387
88	Scheibe	1		03401160388
89	Sicherungsring	1	GB894.1-86/25	
90	Kugellager	1	16004	04016004
91	Zahnrad	1		03401160391
92	Zahnrad	1		03401160392
93	Zahnrad	1		03401160393
94	Zahnrad	1		03401160394
95	Zahnrad	1		03401160395
96	Zahnrad	1		03401160396
97	Zahnrad	1		03401160397
98	Zahnrad	1		03401160398
99	Zahnrad	1		03401160399
100	Zahnrad	1		034011603100
101	Scheibe	1		034011603101
102	Kugellager	1	6203.2R	0406203.2R
103	Mutter	1		034011603103
104	Zahnrad	1		034011603104
105	Halterung	1		034011603105
106	Innensechskantschraube	2	GB70-85/M6x16	
107	Passfeder	1	GB1096-79/5x35	034011603107
108	Sicherungsring	1	GB893.1-86/40	
109	Schraube	1	GB77-85/M5x8	

Spare parts list headstock feed gear				
Pos.	Description	Quantity	Size	Article nr.
110	Sicherungsring	1	GB894.1-86/22	
111	Dichtung	1	PD25x40x10	
112	Axiallager	1	8105	034011603112
113	Welle	1		034011603113
114	Gabel	2		034011603114
115	Kugellager	2	16004	04016004
116	Passfeder	1	GB1096-79/5x16	034011603116
117	Welle	1		034011603117
118	Zahnrad	1		034011603118
119	Sicherungsring	1	GB894.1-86/20	
120	Zahnrad	1		034011603120
121	Zahnrad	1		034011603121
122	Zahnrad	1		034011603122
123	Zahnrad	1		034011603123
124	Scheibe	1		034011603124
125	Zahnrad	1		034011603125
126	Kugellager	1	6001.2R	0406001.2R
127	Dichtung	1		034011603127
128	Halterung	1		034011603128
129	Innensechskantschraube	2	GB70-85/M6x16	
130	Hebel	1		034011603130
131	Passfeder	1	GB1096-79/4x12	034011603131
132	Welle	1		034011603132
133	Hebel	1		034011603133
134	Gabel	1		034011603134
135	Gabel	1		034011603135
136	Federring	2	GB93-87/6	
137	Innensechskantschraube	2	GB70-85/M6x16	
138	Scheibe	1		034011603138
139	Sicherungsring	1	GB894.1-86/17	
140	Schraube	1	GB77-85/M8x8	
141	Feder	1	GB2089-80/0.8x5x17	034011603141
142	Stahlkugel	1	GB308-84/6.5	034011603142
143	Schaltnocken	1		034011603143
144	Gabel	1		034011603144
145	Welle	1		034011603145
146	Gabel	1		034011603146
147	Hebel	1		034011603147
148	Federstift	1	GB879-86/3x4	
149	Halterung	1		034011603149
150	Federstift	1	GB879-86/5x18	
151	Sicherungsring	1	GB896-86/8	
152	O-Ring	1	GB3452.1-82/38.7x2.65	
153	Halterung	1		034011603153
154	O-Ring	1	GB3452.1-82/30x2.65	
155	Abdeckung	1		034011603155
156	Innensechskantschraube	1	GB70-85/M5x25	
157	Wählschalter	1		034011603157
158	Feder	1	GB2089-80/1x8x32	034011603158
159	Hebel	1		034011603159
160	Hebel	1		034011603160
161	Work light	1		03401160361
162	Coolant pump switch	1		03401160362
163	Emergency stop button	1		03401160363
164	Direct run	1		03401160364
	Feed gear box cpl.	1		03401160304CPL

7.24 Lathe saddle 1-9

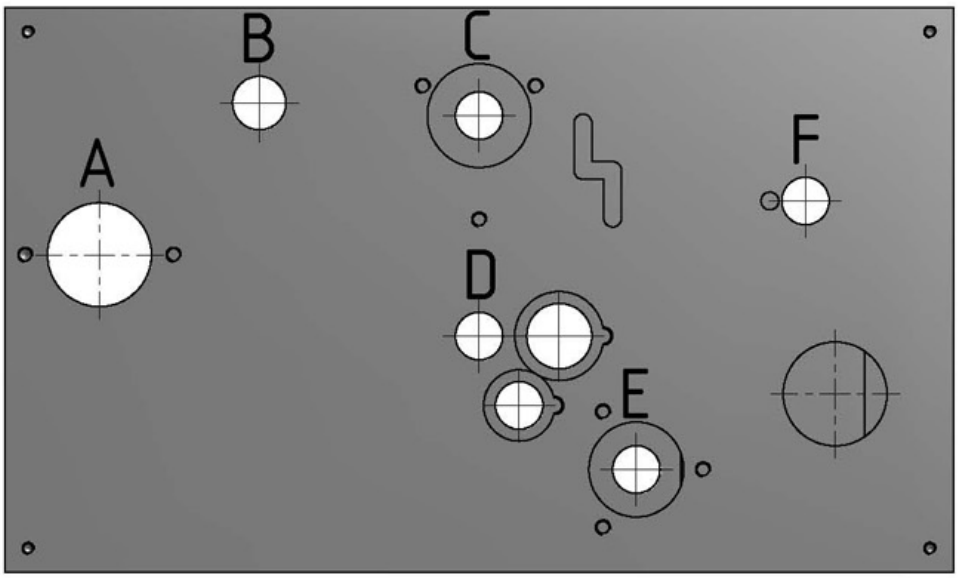


Fig. 7-23: Lathe saddle 1-9

7.25 Lathe saddle 2-9

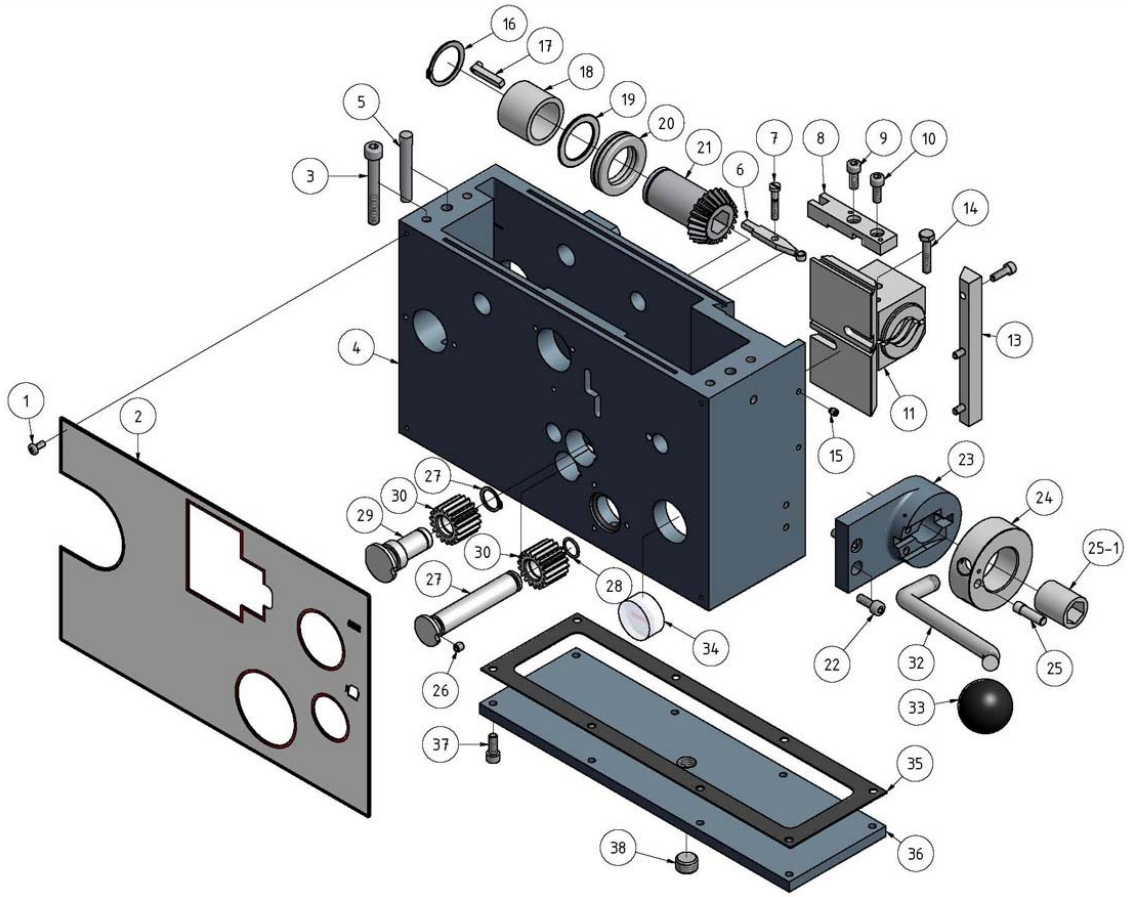


Fig. 7-24: Lathe saddle 2-9

7.26 Lathe saddle 3-9

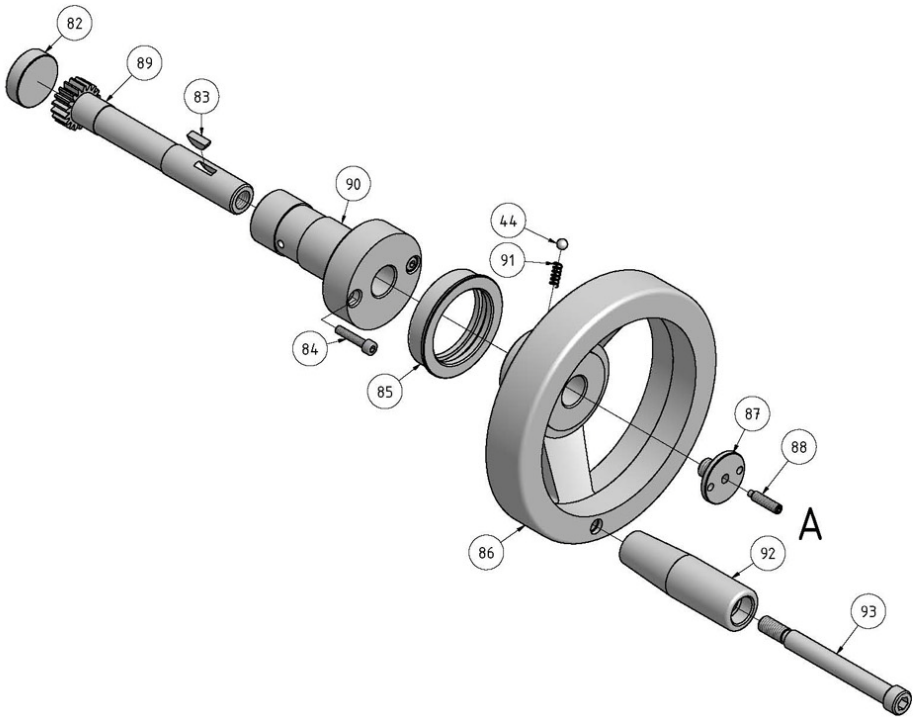


Fig. 7-25: Lathe saddle 3-9

7.27 Lathe saddle 4-9

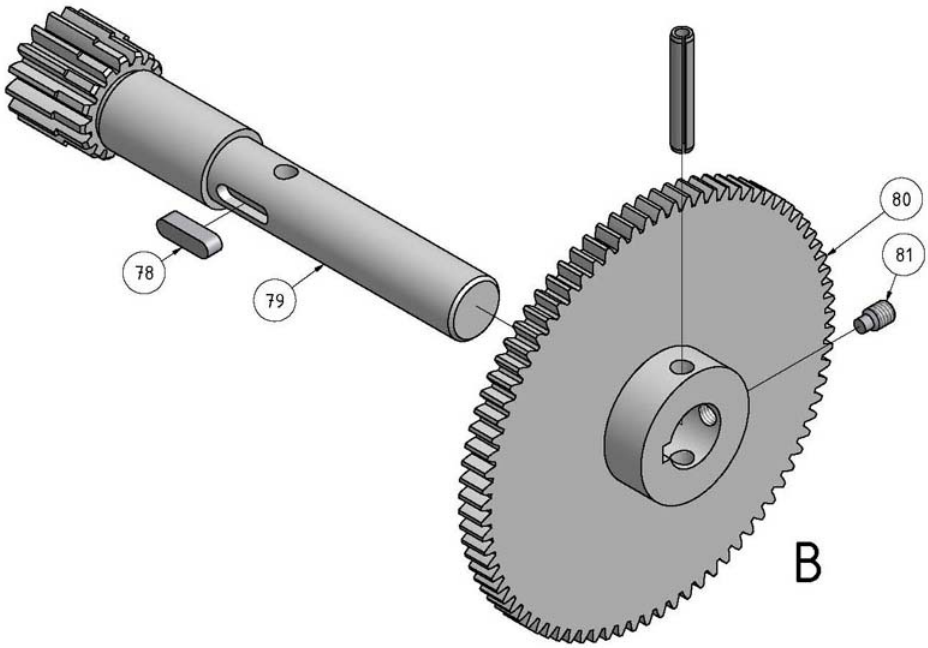


Fig. 7-26: Lathe saddle 4-9

7.28 Lathe saddle 5-9

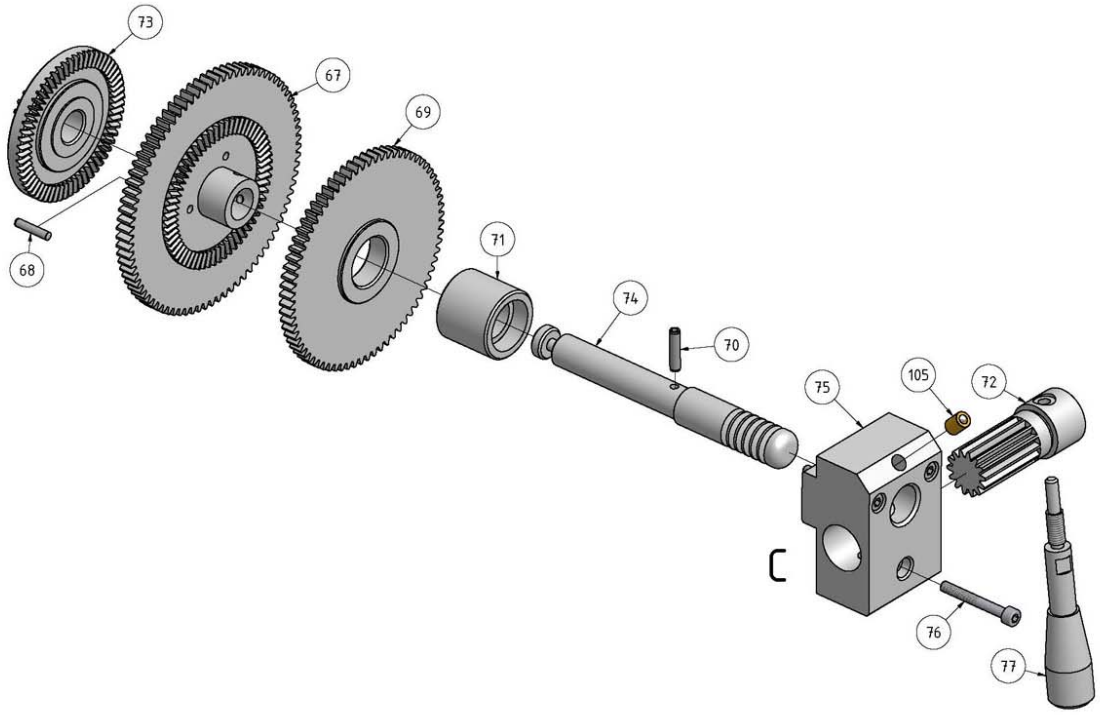


Fig. 7-27: Lathe saddle 5-9

7.29 Lathe saddle 6-9

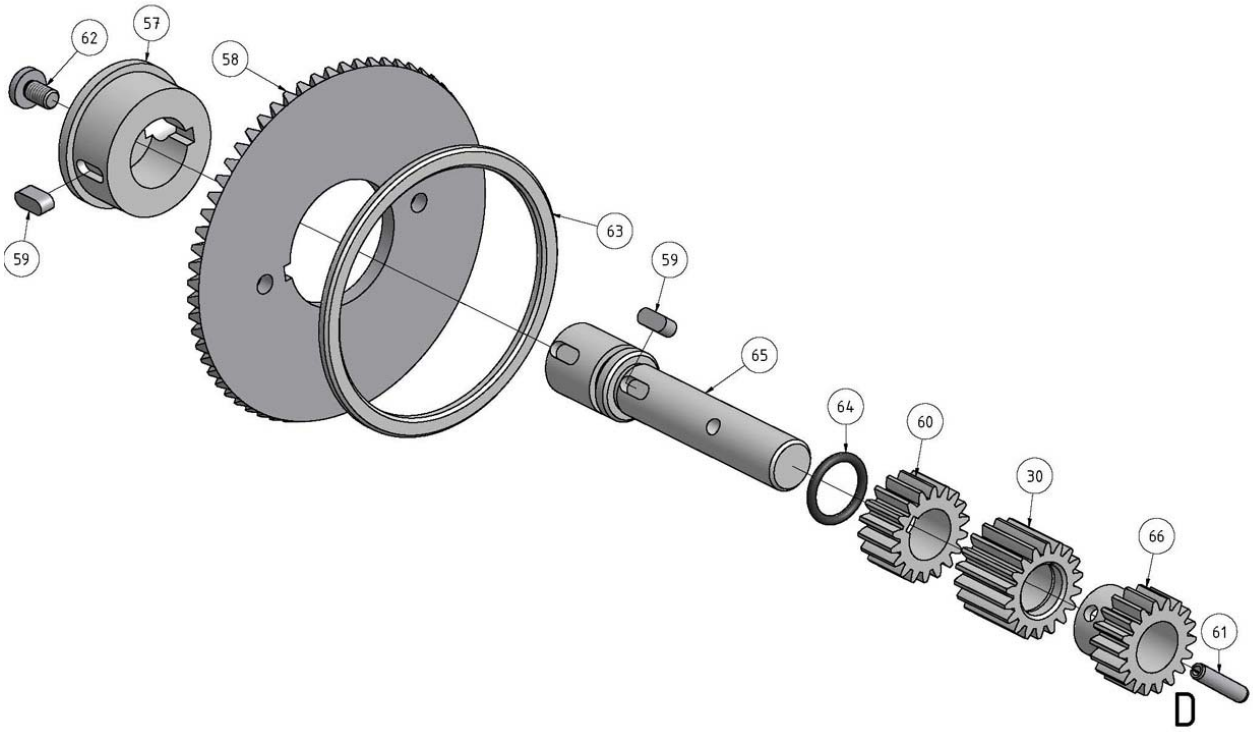


Fig. 7-28: Lathe saddle 6-9

7.30 Lathe saddle 7-9

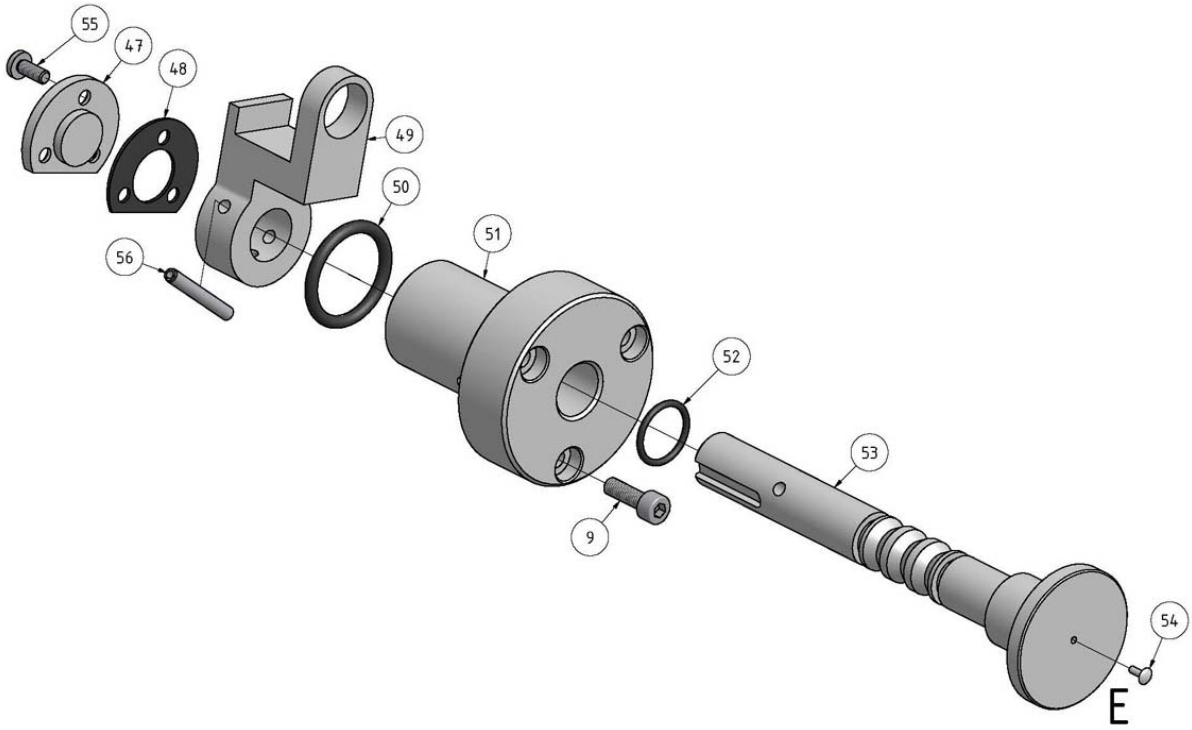


Fig. 7-29: Lathe saddle 7-9

7.31 Lathe saddle 8-9

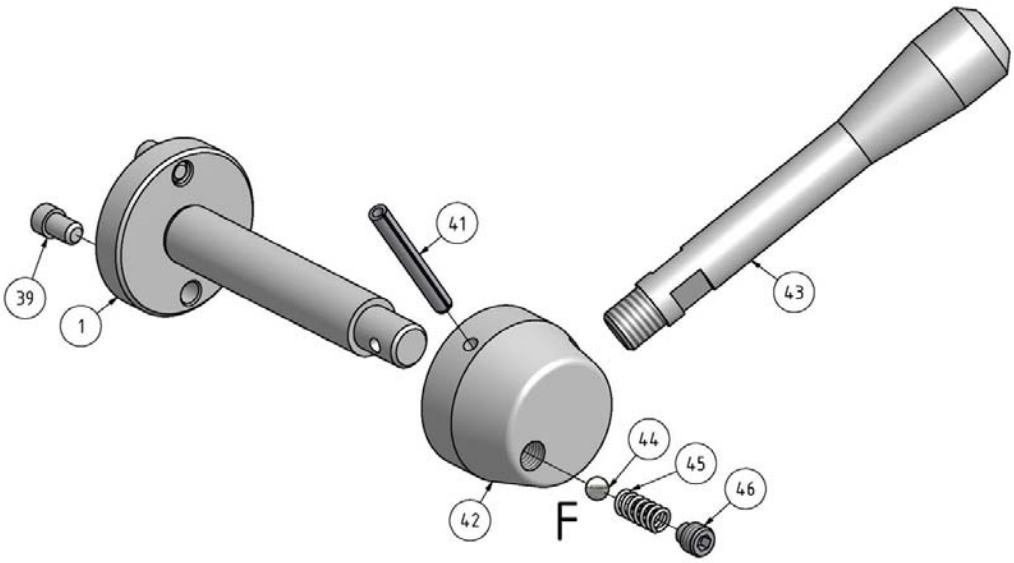


Fig. 7-30: Lathe saddle 8-9

7.32 Lathe saddle 9-9 - threading gauge

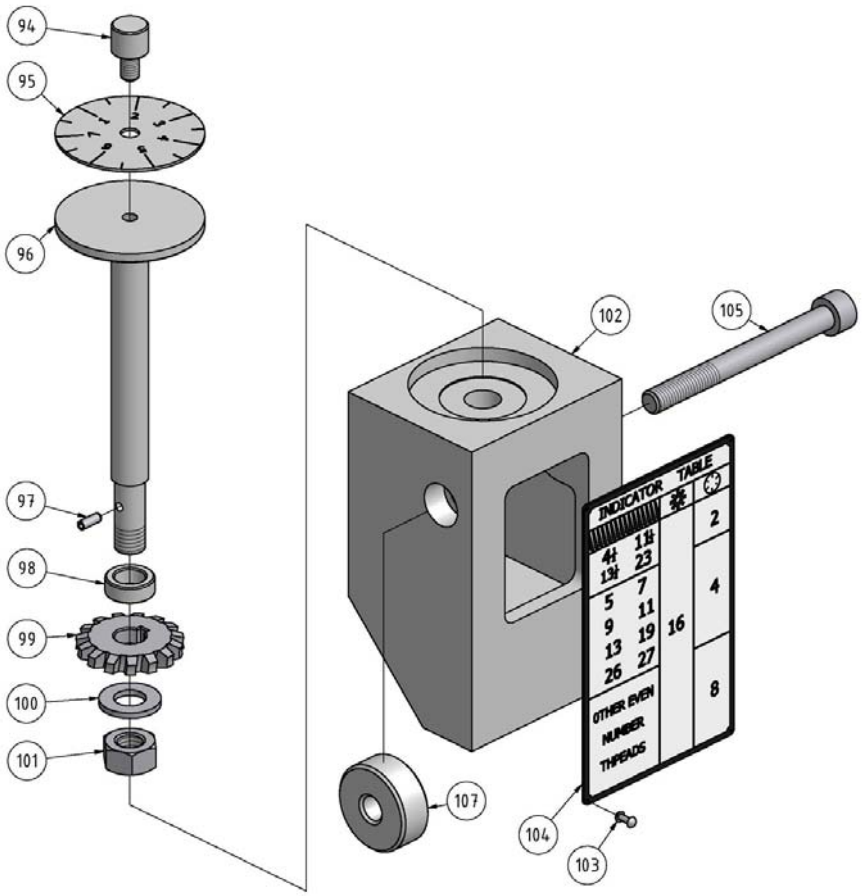


Fig. 7-31: Lathe saddle 9-9

Spare part list lathe saddle

Pos.	Description	Quantity	Size	Article nr.
1	Screw	4	GB818-85/M4x10	
2	Name Plate	1		03401160402
3	Hexagon socket screw	4	GB70-85/M8x60	
4	Apron Casting	1		03401160404
5	Pin	4	GB117-86/B8x60	
6	Lever	1		03401160406
7	Bolt	1		03401160407
8	Stopper	1		03401160408
9	Hexagon socket screw	1	GB70-85/M5x16	
10	Bolt	1	GB5782-86/M6x12	
11	Half Nut	1		03401160411 Inch
13	Gib	1		03401160413
14	Bolt	1	GB5782-86/M6x10	
15	Hexagon socket screw	4	GB79-85/M5x6	
16	Clip	1	GB894.1-86/30	
17	Key	1		03401160417
18	Needle Bearing	1	7943/30	0407943
19	Washer	1		03401160419
20	Thrust Bearing	1	51106	04051106
21	Gear-Drive Level	1		03401160421
22	Hexagon socket screw	2	GB70-85/M6x16	
23	Switch Bracket	1		03401160423
24	Bracket	1		03401160424
25	Pin	1		03401160425
25-1	Bushing	1		03401160425-1
26	Hexagon socket screw	1	GB77-85/M6x6	
27	Shaft	1		03401160427
28	O-Ring	2	GB3452.1-82/11.2x2.62	
29	Shaft	1		03401160429
30	Gear	1		03401160430
31	External Circle	1	GB894.1-86/16	

Spare part list lathe saddle

Pos.	Description	Quantity	Size	Article nr.
32	Spindle Control Lever	1		03401160432
33	Lever Bush	1		03401160433
34	Sight Glass	1	GB1160-86/B20	03401160434
35	Packing	1		03401160435
36	Bottom Platte	1		03401160436
37	Hexagon socket screw	8	GB70-85/M5x16	
38	Oil Plug	1	Q/ZB285.3/ R3/8"	03401160438
39	Pin	2		03401160439
40	Shaft	1		03401160440
41	Spring Pin	1	GB879-86/4x42	
42	Lever Head	1		03401160442
43	Handle	1		03401160443
44	Steel Ball	1	GB308-84/6.5	03401160444
45	Clip	1	GB896-86/8	
46	Hexagon socket screw	1	GB77-85/M8x6	
47	Cover	1		03401160447
48	Packing	1		03401160448
49	Fork	1		03401160449
50	O-Ring	1	GB3452.1-82/25.8x3.55	
51	Sleeve	1		03401160451
52	O-Ring	1	GB3452.1-82/16x1.8	
53	Shaft	1		03401160453
54	Rivet	1	GB827-86/2x6	03401160454
55	Screw	3	GB818-85/M4x10	
56	Spring Pin	1	GB879-86/4x30	
57	Input Bush	1		03401160457
58	Gear-Drive Level	1		03401160458
59	Key	2	GB1096-79/5x12	03401160459
60	Gear	1		03401160460
61	Spring Pin	1	GB879-86/5x22	
62	Screw	1	GB818-85/M6x20	
63	Washer	1		03401160463
64	O-Ring	1	GB3452.1-82/11.2x2.62	
65	Shaft	1		03401160465
66	Gear	1		03401160466
67	Gear	1		03401160467
68	Pin	1	GB119-86/D4x20	
69	Gear	1		03401160469
70	Spring Pin	1	GB879-86/5x22	
71	Sleeve	1		03401160471
72	Gear Shaft	1		03401160472
73	Gear	1		03401160473
74	Shaft	1		03401160474
75	Lever Head	1		03401160475
76	Hexagon socket screw	1	GB70-85/M5x40	
77	Lever	1		03401160477
78	Key	1	GB1096-79/6x18	03401160478
79	Shaft	1		03401160479
80	Gear	1		03401160480
81	Screw	1	GB78-85/M6x10	
82	Plug	1		03401160482
83	Woodruff key	1	GB1099-79/5x6.5x16	03401160483
84	Hexagon socket screw	2	GB70-85/M5x25	
85	Dial	1		03401160485 Inch
86	Hand Wheel	1		03401160486
87	Screw Plug	1		03401160487
88	Set Screw	1	GB79-85/M5x25	
89	Shaft	1		03401160489
90	Sleeve	1		03401160490
91	Spring	1		03401160491
92	Handle	1		03401160492
93	Bolt	1		03401160493
94	Screw	1		03401160494
95	Plate	1		03401160495 Inch
96	Shaft	1		03401160496
97	Spring Pin	1	GB879-86/3x8	
98	Washer	1		03401160498
99	Worm Gear	1		03401160499 Inch
100	Spring Washer	1	GB93-86/10	
101	Nut	1	GB6170-86/M10	
102	Worm Unit	1		034011604102
103	Rivet	4	GB827-86/2x5	034011604103
104	Plate	1		034011604104 Inch

Spare part list lathe saddle				
Pos.	Description	Quantity	Size	Article nr.
105	Lubrication cup	1	8	
106	Spring pin	1	DIN 8752/6x35	
107	Washer	1		034011605107
	Apron cplt.	1		03401160404CPL
	Thread gauge cplt.	1		034011604102CPL

7.33 Top slide and compound slide 1-2

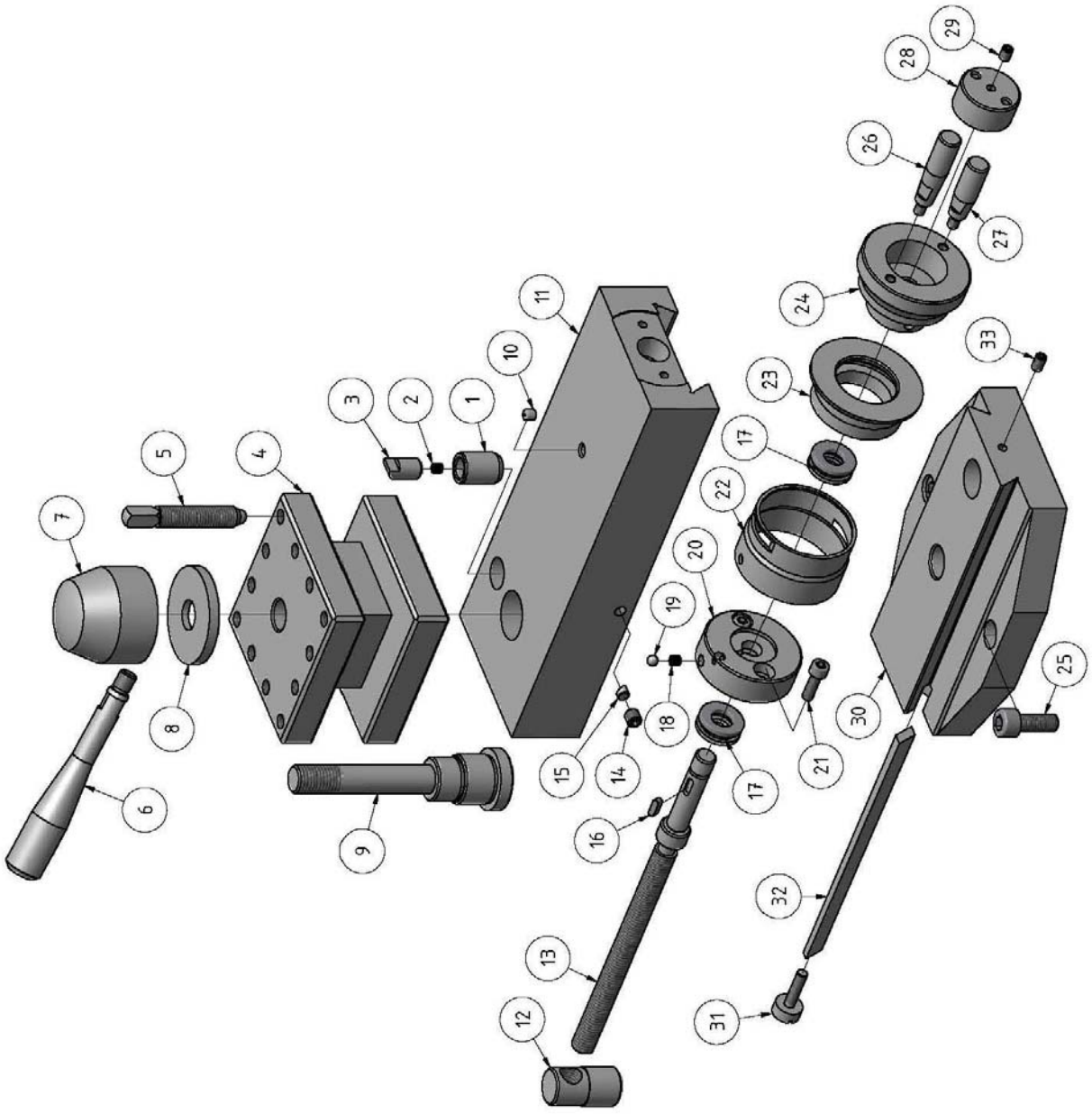


Fig. 7-32: top slide, compund slide 1-2

7.34 Top slide and compound slide 2-2

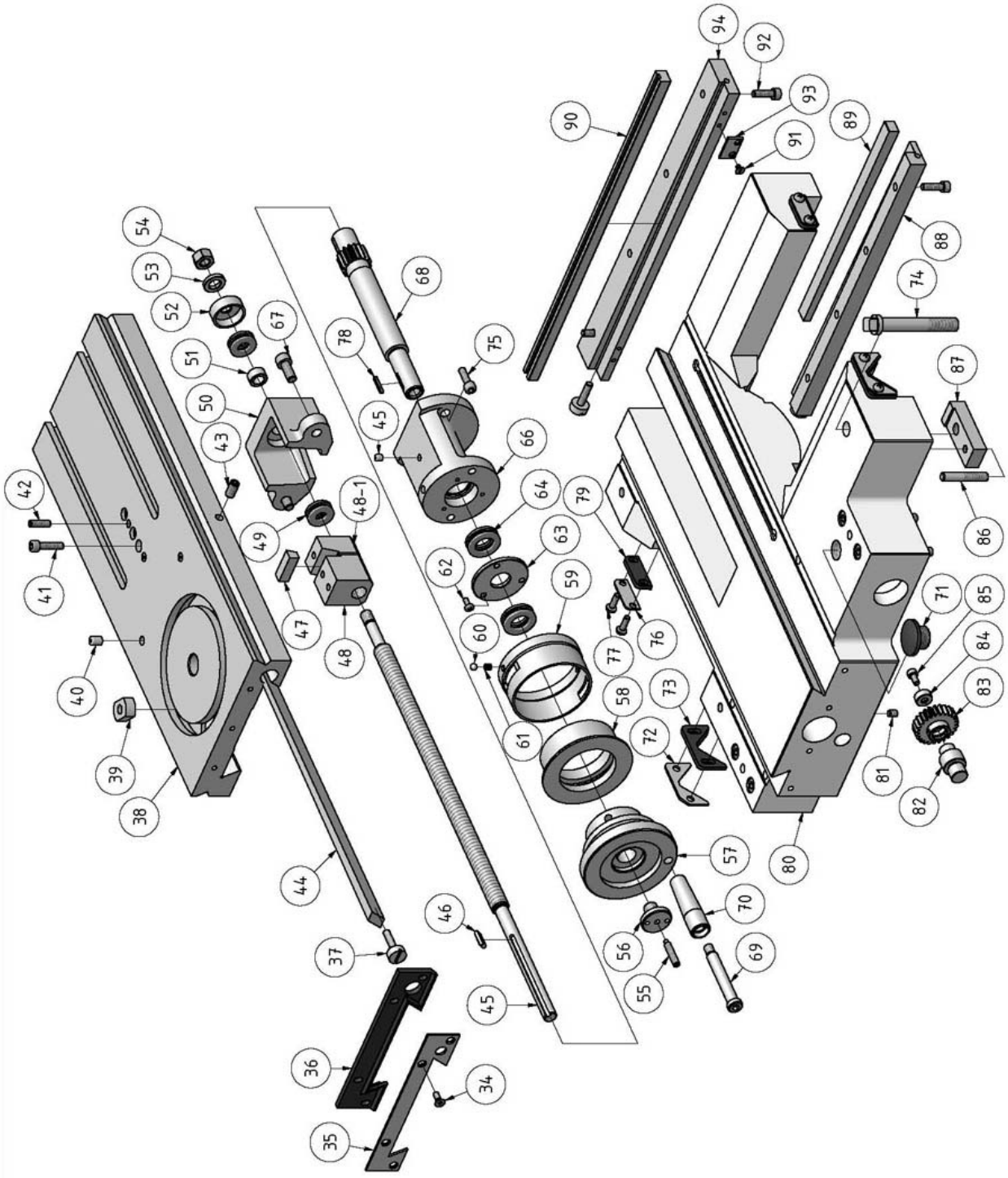


Fig. 7-33: compound slide 2-2

Spare part list compound slide and top slide

Pos.	Description	Quantity	Size	Article nr.
1	Bush	1		03401160701
2	Spring	1	GB2089-80/0.5x5x18	03401160702
3	Pin	1		03401160703
4	Tool Post	1		03401160704
5	Screw	12	GB98-83/M10x50	
6	Clamp Handle	1		03401160706
7	Clamping Handle	1		03401160707
8	Washer	1		03401160708
9	Tool Post Shaft	1		03401160709
10	Ball Cup	1	GB1155-79/8	
11	Compound Rest	1		03401160711
12	Nut	1		03401160712 Inch
13	Feed Screw	1		03401160713 Inch
14	Screw	1	GB77-85/M8x8	
15	Bottom	1		03401160715
16	Key	1	GB1096-79/4x12	03401160716
17	Thrust Bearing	2	8101	03401160617
18	Spring	1	GB2089-80/0.5x5x18	03401160718
19	Steel Ball	1	GB308-77/6	03401160719
20	Seat	1		03401160720
21	Screw	2	GB70-85/M6x20	
22	Scala	1		03401160722
23	Dial-Compound Rest	1		03401160723 Inch
24	Handle	1		03401160724
25	Screw	1	GB70-85/M10x25	
26	Handle	1		03401160726
27	Handle	1		03401160727
28	Screw Plug	1		03401160728
29	Screw	1	GB77-85/M6x8	
30	Swivel Table	1		03401160730
31	Screw	1		03401160731
32	Gib	1		03401160732
33	Screw	1	GB77-85/M6x10	
34	Screw	2	GB819-85/M5x12	
35	Wiper Cover	1		03401160635
36	Wiper	1		03401160636
37	Screw	1		03401160637
38	Cover-Cross Sliding	1		03401160638
39	T-Bracket	1		03401160639
40	Ball Cup	2	GB1155-79/8	
41	Screw	1	GB70-85/M6x25	
42	Screw	1	GB77-85/M6x20	
43	Screw	1	GB77-85/M8x16	
44	Gib	1		03401160644
45	Feed Screw	1		03401160645 Inch
46	Key	1	3x3x20	03401160646
47	Bracket	1		03401160647
48	Spindle nut	1		03401160648 Inch
48-1	Taper	1		034011606481
49	Thrust Bearing	2	8100	03401160649
50	Bracket	1		03401160650
51	Spacer	1		03401160651
52	Bearing Cover	1		03401160652
53	Bracket	1		03401160653
54	Clamping Nut	1	GB6175-86/M10	
55	Screw	1	GB77-85/M6x35	
56	Clamping Screw	1		03401160656
57	Whell	1		03401160657
58	Dial-Feed	1		03401160658
59	Handle Spacer	1		03401160659
60	Steel Ball	1	GB308-77/6	03401160660
61	Spring	1	GB2089-80/0.5x5x18	03401160661
62	Screw	2	GB818-85/M4x10	
63	Washer	1		03401160663
64	Thrust Bearing	2	8103-17/30/6	03401160664
65	Ball Cup	1	GB1155-79/6	
66	Bracket	1		03401160666
67	Screw	2	GB77-85/M8x20	
68	Gear Shaft	1		03401160668
69	Screw	1		03401160669
70	Handle Spacer	1		03401160670
71	Plug	1		03401160571

Spare part list compound slide and top slide

Pos.	Description	Quantity	Size	Article nr.
72	Wiper Cover	1		03401160572
73	Wiper	1		03401160573
74	Clamp Screw	1		03401160574
75	Screw	2	GB70-85/M6x20	
76	Wiper Cover	1		03401160576
77	Screw	8	GB818-85/M5x16	
78	Key	1	GB1096-86/3x3x20	03401160678
79	Wiper	1		03401160579
80	Carriage	1		03401160580
81	Screw	1	GB77-85/M6x8	
82	Shaft	1		03401160582
83	Gear	1		03401160583
84	Washer	1		03401160584
85	Screw	1	GB70-85/M5x10	
86	Support Screw	1		03401160586
87	Clamp Block	1		03401160587
88	Gib	1		03401160588
89	Gib	1		03401160589
90	Gib	1		03401160590
91	Screw	1	GB68-85/M4x6	
92	Screw	8	GB70-85/M6x20	
93	Baffle	1		03401160593
94	Gib	1		03401160594
95	Protective shield			
96	Washer	2	5	
97	Socket head screw	2	DIN 4762 4762/M5x8	
98	Sleeve	1		03401160698
99	Shaft	1		03401160699
100	Holder	1		034011606100
101	Hexagon nut	1	M4	
102	Grub screw	1	M4x10	
103	Socket head screw	2	M6x12	
104	Screw	2	M6x16	
	Top slide cplt.	1		03401160711CPL
	Cross slide cplt.	1		03401160638CPL
	Bed slide cplt.	1		03401160580CPL

7.35 Central lubrication lathe saddle

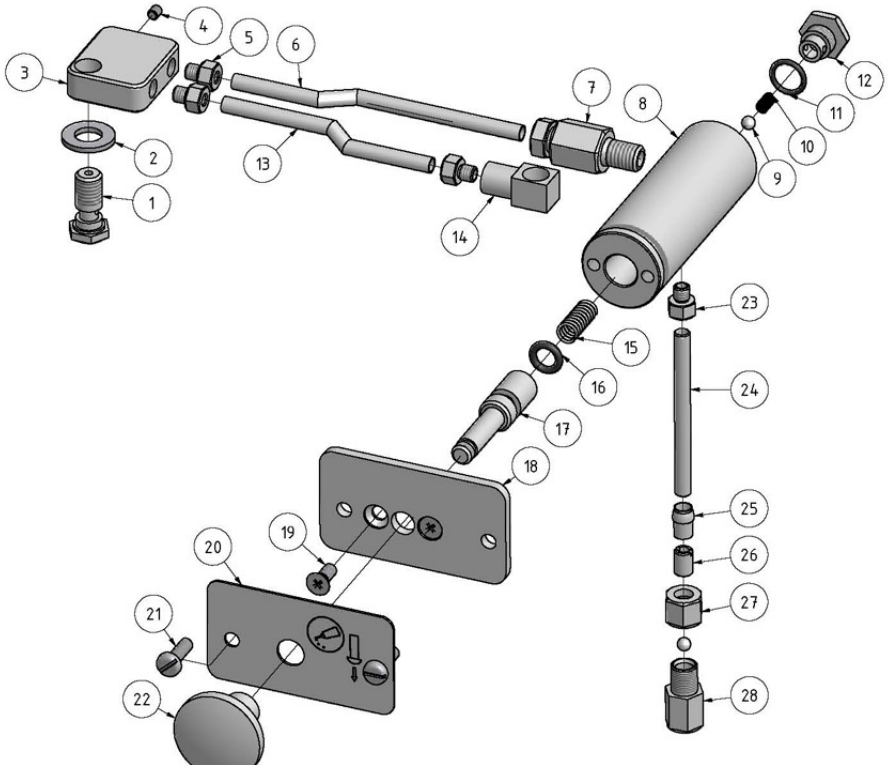


Fig. 7-34: Central lubrication the lathe saddle

Spare part list central lubrication lathe saddle				
Pos.	Description	Quantity	Size	Article nr.
1	Proper Screw	1		03401160501
2	Washer	1	GB97.1-85/10	
3	Distribution	1		03401160503
4	Screw	1	GB77-85/M4x5	
5	Thimble Nut	2		03401160505
6	Lubrication Tube	1	5	03401160506
7	Prober Unit	1	5/Z1/8	03401160507
8	Pump	1		03401160508
9	Ball	1	GB308-77/5	03401160509
10	Spring	1	GB2089-80/ 0.5x4x15	03401160510
11	O-Ring	1	GB3452/11.2x1.8	
12	Plug	1		03401160512
13	Lubrication Tube	1	5	03401160513
14	Joint	1		03401160514
15	Spring	1	GB2089-80/1x7x45	03401160515
16	O-Ring	1	GB3452/8x2.65	
17	Piston	1		03401160517
18	Plate	1		03401160518
19	Screw	2	GB819-85/M5x12	
20	Name Plate	1		03401160520
21	Screw	2	GB67-85/M5x15	
22	Knob	1		03401160522
23	Tie-in	1	6/Z1/8	03401160523
24	Lubrication Tube	1	6x150	03401160524
25	Tie-in	1		03401160525
26	Nut	1		03401160526
27	Double Taper Sheath	1	4	03401160527
28	Valve	1		03401160528
	Central lubrication complete			03401160508CPL

7.36 Tailstock

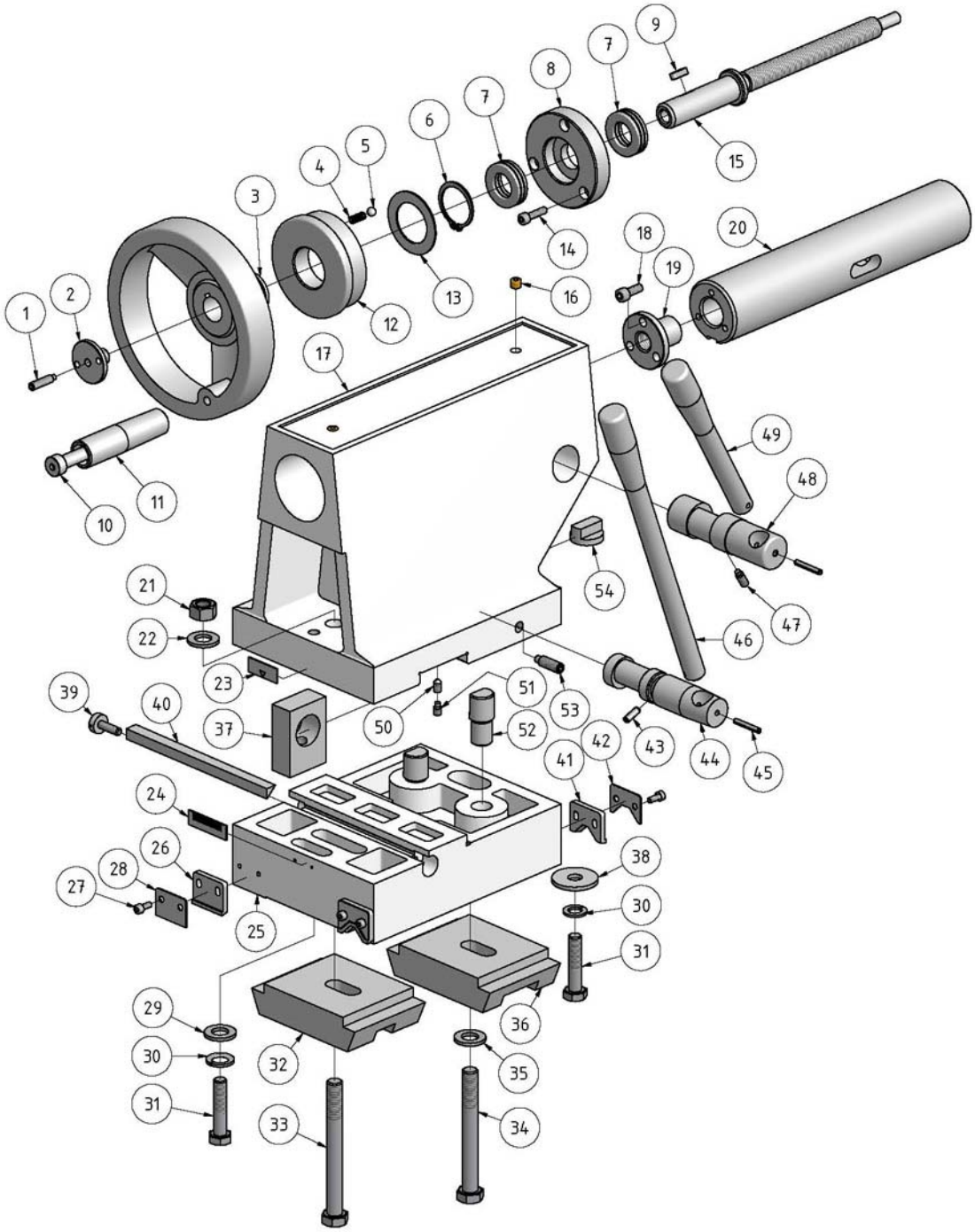


Fig. 7-35: Tailstock

Spare part list tailstock

Pos.	Description	Quantity	Size	Article No.
1	Screw	1	GB78-85/5x25	
2	Screw Plug	1		03401160902
3	Hand Wheel	1		03401160903
4	Spring	1	GB2089-80/0.6x5x16	03401160904
5	Steel Ball	1	GB308-84/6.5	03401160905
6	Retaining Ring	1	GB894.1-86/32	03401160906
7	Thrust Bearing	2	51104	04051104
8	Bracket	1		03401160908

Spare part list tailstock

Pos.	Description	Quantity	Size	Article No.
9	Key	1	GB1096-79/5x25	03401160909
10	Bolt	1		03401160910
11	Handle	1		03401160911
12	Dial	1		03401160912 Inch
13	Retaining Ring	1		03401160913
14	Screw	3	GB70-85/M5x20	
15	Feed Screw	1		03401160915 Inch
16	Oil Cup	2	GB1155-79/8	
17	Tailstock	1		03401160917
18	Screw	3	GB70-85/M6x16	
19	Feed Nut	1		03401160919 Inch
20	Quill	1		03401160920
21	Hexagon Thick Nut	1	GB55-76/M12	
22	Washer	1	GB97-85/12	
23	Scale	1		03401160923
24	Scale	1		03401160924
25	Tail Stock Base	1		03401160925
26	Bedway Wiper	1		03401160926
27	Cross Screw	8	GB818-85/M4x10	
28	Bedway Wiper Plate	2		03401160928
29	Washer	1	GB97.1-86/10	
30	Spring Washer	2	GB93-85/10	
31	Bolt	2	GB5780-86/M10x45	
32	Clamping Bolt	1		03401160932
33	Bolt	1	GB5780-86/M12x110	
34	Bolt	1	GB5780-86/M12x100	
35	Washer	1	GB95-86/12	
36	Clamping Block	1		03401160936
37	Adjusting Block	1		03401160937
38	Washer	1		03401160938
39	Screw	1		03401160939
40	Gib	1		03401160940
41	Bedway Wiper	2		03401160941
42	Bedway Wiper Plate	2		03401160942
43	Spring Pin	1	GB879-86/5x15	
44	Klamping Block	1		03401160944
45	Spring Pin	1	GB879-86/4x25	
46	Clamping Lever	1		03401160946
47	Socket Head Set Screw	1	GB77-85/M6x15	
48	Clamping Shaft	1		03401160948
49	Clamping Lever	1		03401160949
50	Socket Head Set Screw	1	GB79-85/M6x10	
51	Socket Head Set Screw	1	GB77-85/M6x10	
52	Shaft	1		03401160952
53	Socket Head Set Screw	1		03401160953
54	Key	1		03401160954
	Tailstock complete	1		03401160917CPL

7.37 Chuck guard

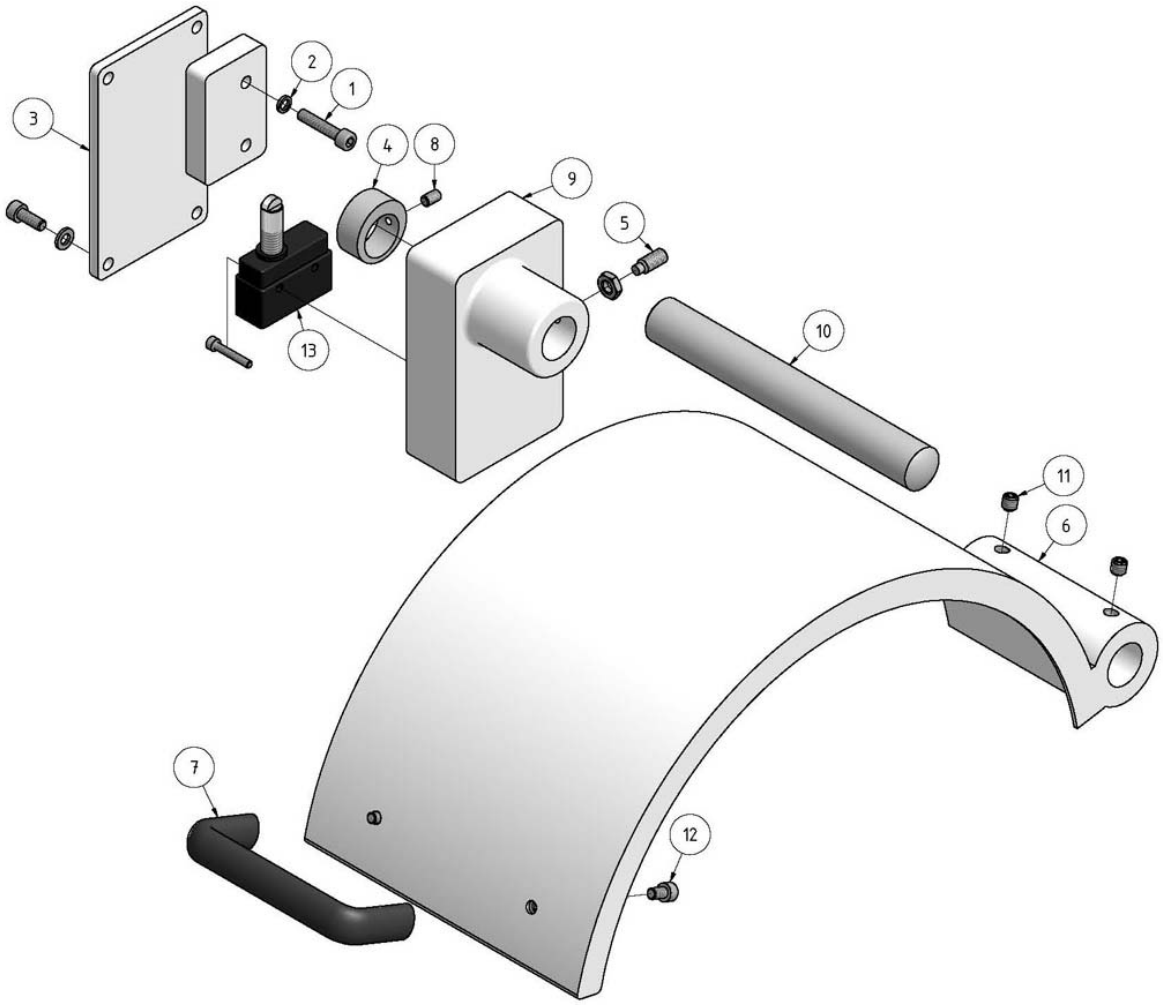


Fig. 7-36: chuck guard

Spare part list chuck guard				
Pos.	Description	Quantity	Size	Article nr.
1	Screw	4	GB70-85/M6x12	
2	Washer	4	GB93-86/6	
3	Support Bracket	1		034011601303
4	Sleeve	1		034011601304
5	Screw	1	GB75-85/M8x20	
6	Cover	3		034011601306
7	Handle	1		034011601307
8	Screw	1	GB 78-85/ M6x10	
9	Cover Bracket	1		034011601309
10	Shaft	1		034011601310
11	Screw	2		034011601311
12	Screw	2		034011601312
13	Lathe chuck safety swich	1		034011601313
	Chuck guard cpl.			034011601306CPL

7.38 Follow rest

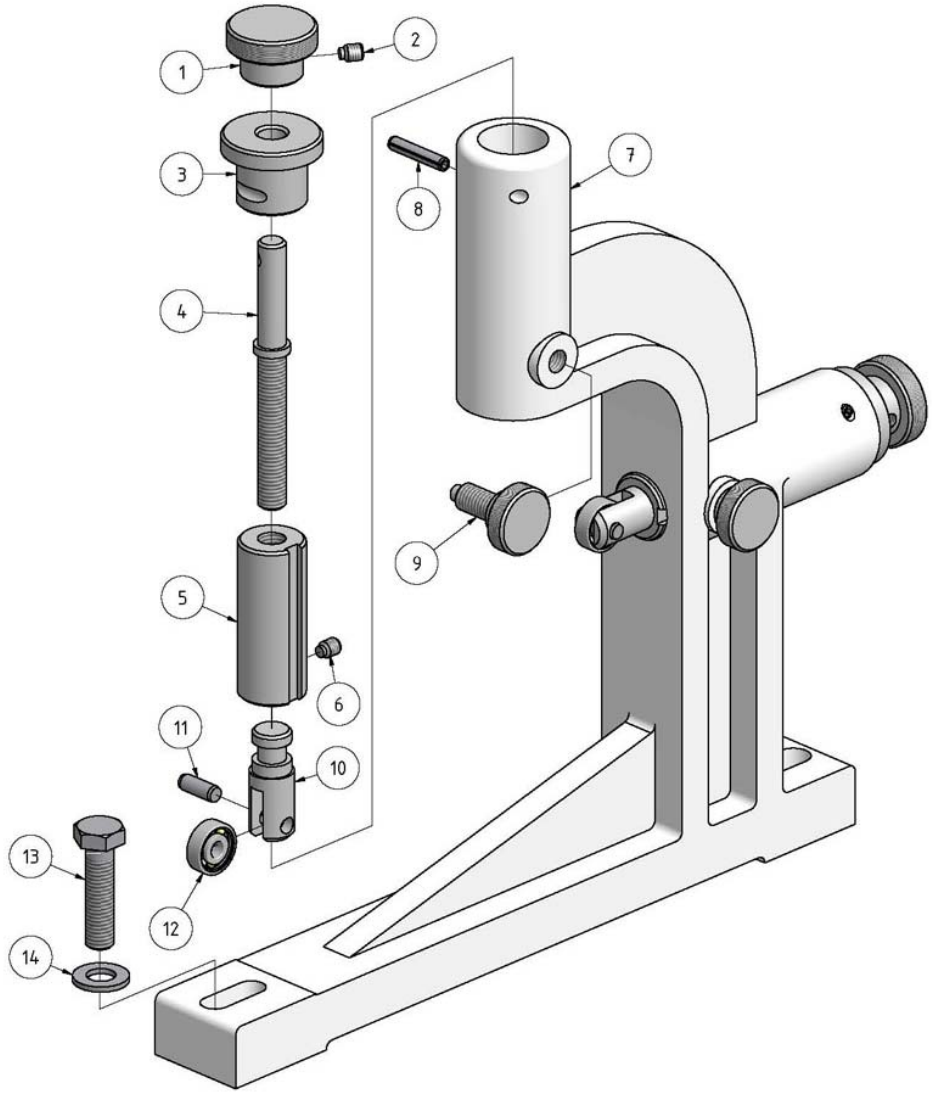


Fig. 7-37: Follow rest

List of spare parts follow rest				
Pos.	Description	Quantity	Size	Article nr.
1	Rotate Handle	2		034011601101
2	Screw	2	GB78-85/M6x8	
3	Bush	2		034011601103
4	Screw Shaft	2		034011601104
5	Sleeve	2		034011601105
6	Screw	2	GB77-85/M6x6	
7	Follow Rest	1		034011601107
8	Spring Pin	2	GB879-86/5x26	
9	Limited Screw	2		034011601109
10	Support Shaft	2		034011601110
11	Pin	2	GB119-86/6x16	
12	Bearing	2	626	03401160112
13	Bolt	2	GB5782-86/M10x40	
14	Washer	2	10	
	Follow rest complete	1		034011601107CPL

7.39 Steady rest

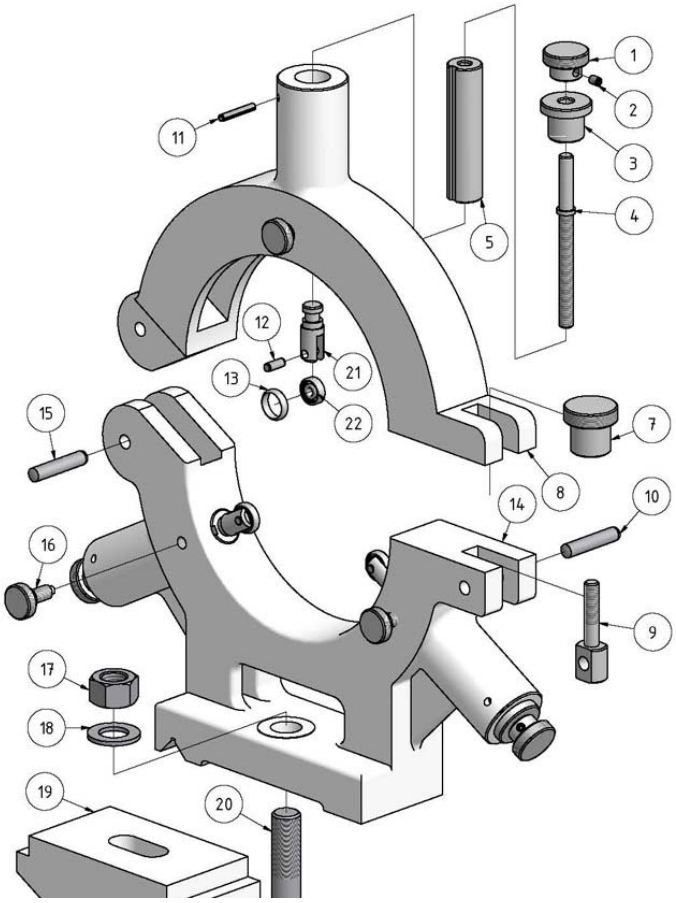


Fig.7-38: Steady rest

List of spare parts steady rest

Pos.	Description	Quantity	Size	Article nr.
1	Rotate Handle	2		034011601201
2	Screw	2	GB78-85/M6x8	
3	Bush	2		034011601203
4	Screw Shaft	2		034011601204
5	Sleeve	2		034011601205
7	Handle	1		034011601207
8	Upside of Steady Rest	1		034011601208
9	Clamping Screw	1		034011601209
10	Pin	1	GB119-86/10x50	
11	Spring Pin	2	GB879-86/5x32	
12	Pin	1	GB119-86/6x20	
13	Guard Bush	1		034011601213
14	Downside of Steady Rest	1		034011601214
15	Pin	1	GB119-86/10x50	
16	Limited Screw	3		034011601216
17	Nut	1	GB6170-86/M16	
18	Washer	1	GB97.1-86/16	
19	Clamping Bracket	1		034011601219
20	Bolt	1	GB5780-86/M16x80	
21	Support Shaft	2		034011601221
22	Bearing	2	80026	034011601222
	Steady rest complete	1		034011601214CPL

7.40 Digital position display - DPA 2000

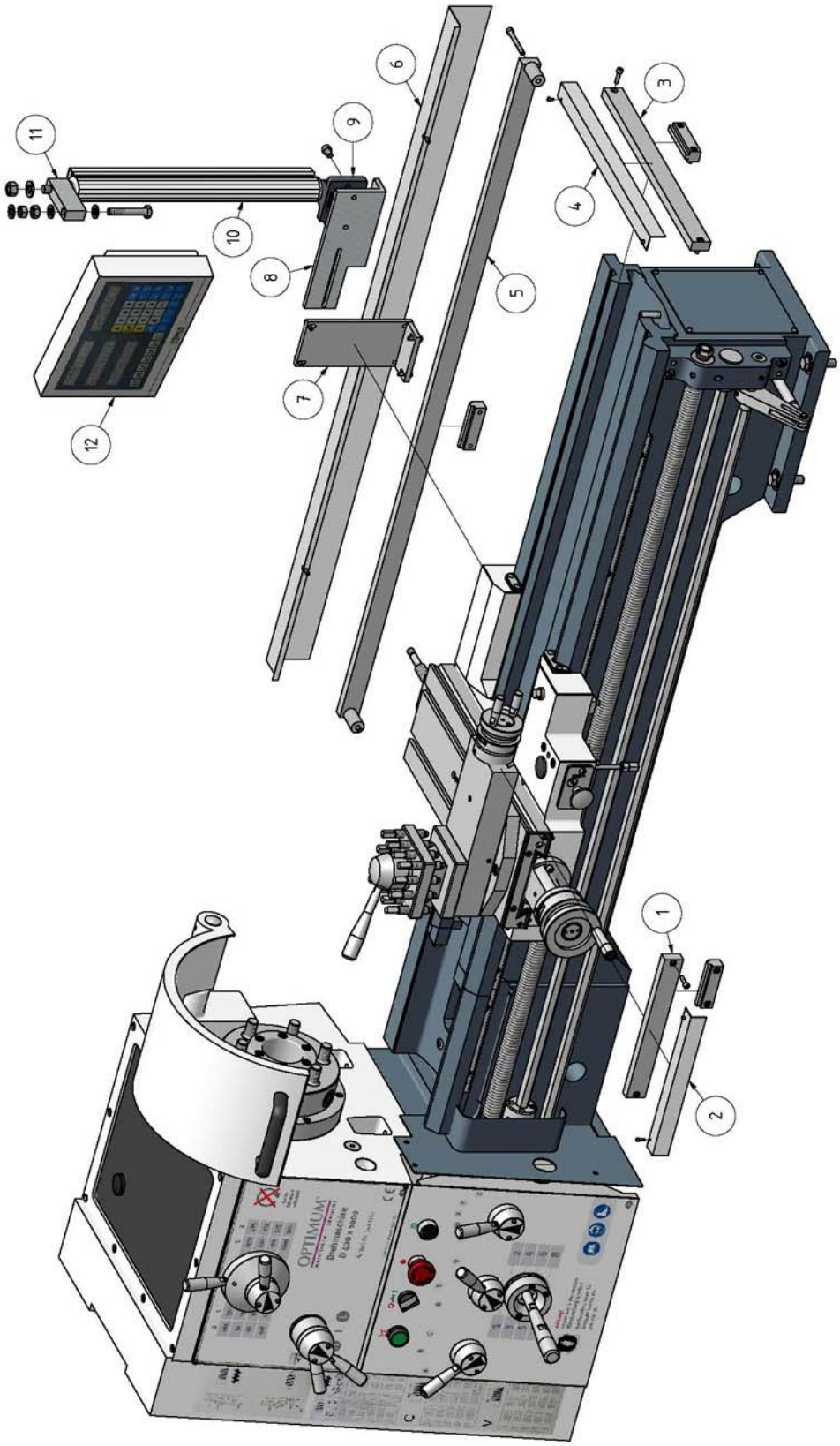


Fig. 7-39: D420x1500DPA

7.41 Chip protection D420 DPA

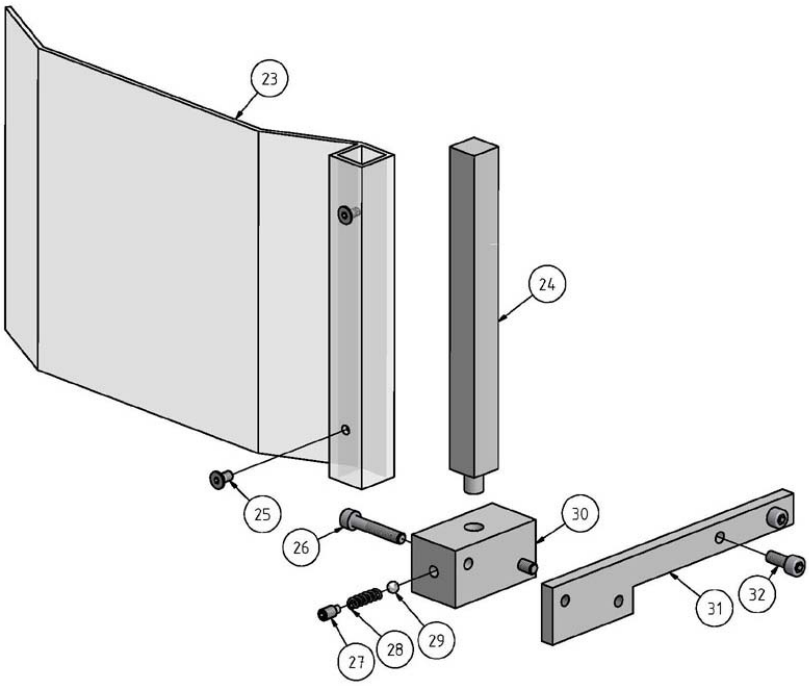


Fig. 7-40: Chip protection DPA

7.42 Machine light, cooling unit

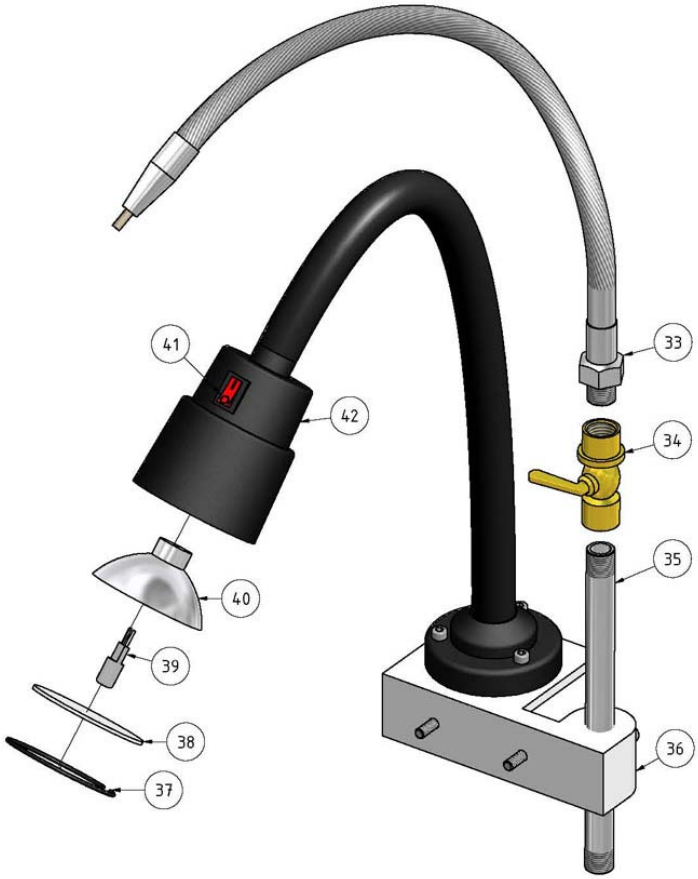


Fig. 7-41: Machine light, cooling unit

List of spare parts - DPA2000 - chip protection - machine light -cooling unit				
Pos.	Description	Quantity	Size	Article No.
1	Measuring gib top slide	1		3384117
2	Cover	1		03401160702
3	Measuring gib cross slide	1		3384127
4	Cover	1		03401160704
5	Measuring gib lathe saddle D420x1500	1		3384252
6	Cover	1		03401160706
7	Plate	1		03401160707
8	Holder	1		03401160708
9	Collet	1		03401160709
10	Rod	1		03401160710
11	Plate	1		03401160711
12	DPA 2000	1		03401160712
13	Protective shield	1		03401160713
14	Washer	2	DIN125/5	
15	Hexagon socket screw	2	DIN 4762/M5x6	
16	Shaft	1		03401160716
17	Collet	1		03401160717
18	Hexagon nut	1	M4	
19	Grub screw	1	M4x10	
20	Screw	2	M6x16	
21	Hexagon socket screw	2	DIN 4762/M6x12	
22	Holder	1		03401160722
23	Protective shield	1		03401160723
24	Rod	1		03401160724
25	Screw	2	M5x10	
26	Hexagon socket screw	2	DIN 4762/M6x35	
27	Grub screw	1	M6x12	
28	Spring	1		03401160728
29	Steel ball	1		03401160729
30	Collet	1		03401160730
31	Plate	1		03401160731
32	Hexagon socket screw	2	DIN 4762/M6x16	
33	Flexible coolant hose	1		03401160733
34	Ball valve	1		03401160734
35	Coolant hose	1		03401160735
36	Holder	1		03401160736
37	Ring	1		03401160737
38	Glas plate	1		03401160738
39	Lamp	1		03401160739
40	Reflector	1		03401160740
41	Switch	1		03401160741
42	Casing machine lamp	1		03401160742

7.43 D420 version coolant tank external

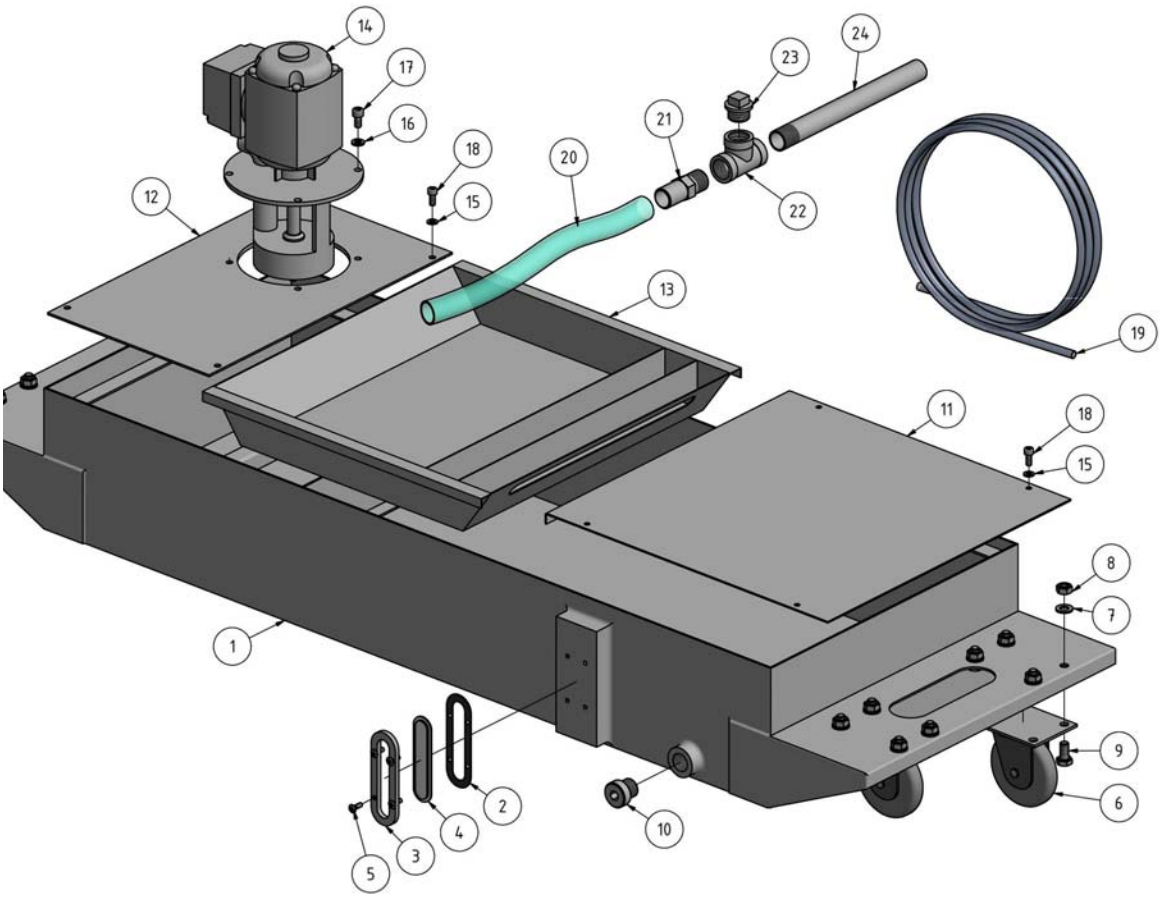


Fig.7-42: Coolant tank

Spare parts coolant tank				
Pos.	Description	Quantity	Size	Article nr.
1	Coolant liquid tank	1		03401150CT01
2	Seal	1		03401150CT02
3	Sight glass holder	1		03401150CT03
4	Sight glass	1		03401150CT04
5	Screw	4	DIN 7047-M4x12	
6	Roll	4		03401150CT06
7	Washer	16	DIN 125 - A 8,4	
8	Hexagon nut	16	ISO 4032 - M8	
9	Hexagon screw	16	ISO 4017 - M8 x 16	
10	Drain screw	1		03401150CT10
11	Sheet plate	1		03401150CT11
12	Motor plate	1		03401150CT12
13	Filter	1		03401150CT13
14	Coolant pump	1	230V/60HZ	03401150CT14 230V
15	Washer	8	DIN 125 - A 5,3	
16	Washer	4	DIN 125 - A 6,4	
17	Hexagon socket screw	4	ISO 4762 - M6 x 12	
18	Innensechskantschraube	8	ISO 4762 - M5 x 12	
19	Coolant hose			03401150CT19

7.44 Wiring diagram

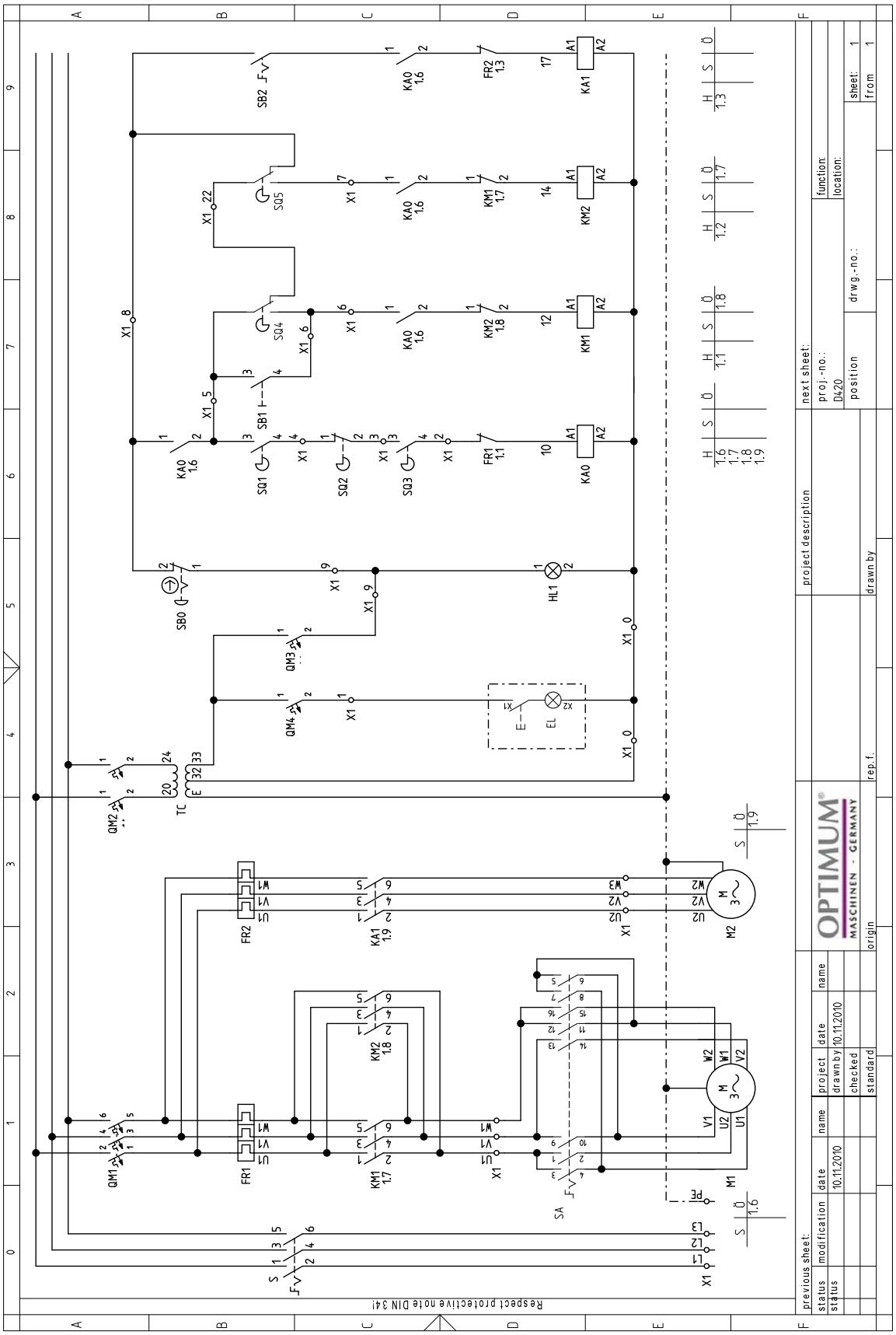


Fig. 7-43: Wiring diagram

List of spare parts electrical components

Pos.	Description	Quantity	Size	Article nr.
QM1	Automatic fuse	1	HUILONG DZ451-63/25A	03401167QM1
QM2	Automatic fuse	1	HUILONG DZ451-63/1A	03401167QM2
QM4	Automatic fuse	1	HUILONG DZ451-63/3A	03401167QM4
QM3	Automatic fuse	1	HUILONG DZ451-63/6A	03401167QM3
FR1	Protective motor relay driving motor	1	3UA5240/10-16 A	03401167FR1
FR2	Protective motor relay cooling pump	1	Siemens 3UA5040; 0,25-0,4 A	03401167FR2
KM1	Motor contactor	1	Siemens/3TB43 24V	03401167KM1
KM2	Motor contactor	1	Siemens/3TB43 24V	03401167KM2
KA1	Motor contactor	1	Siemens 3TH80 24V	03401167KA1
KA0	Motor contactor	1	Siemens 3TH80 24V	03401167KA0
TC	Transformer	1	JBK3-160 400V / 24V; 160 VA	03401167TC
M1	Driving motor, two stage	1	230V/60HZ	03401167M1 230V
M2	Cooling pump	1	230V/60HZ	03401167M2 230V
EL	Machine lighting	1	JC34A /24V	03401167EL
HL1	Control light operating	1	LA103 XD22/24V	03401167HL1
SB0	Emergency stop button	1	LA58-XD/10A, 660V	03401167SB0
SQ3	Switch protective cover on the head-stock	1	LWW5-A110/10A, 220V DC	03401167SQ3
SQ2	Switch chuck guard	1	LWW5-A110/10A, 220V DC	03401167SQ2
S	Mainswitch	1	JCH13-20/20A, 380V	03401167S
SA	Stage switch driving motor	1	LW8PS-25/4D305/5,5kW, 660V	03401167SA
SQ4	Change-over switch reverse	1	LXW5-A110/10A, 220V DC	03401167SQ4
SB5	Change-over switch forward	1	LXW5-A110/10A, 220V DC	03401167SB5
SQ1	Switch spindle break	1	LXW5-A110/10A, 220V DC	03401167SQ1
SB1	Direct run	1	LA103/GB14048.5/10A, 660V	03401167SB1
SB2	Switch cooling pump on/off	1	LA103/10A, 660V	03401167SB2

8 Troubleshooting

Problem	Cause / possible effects	Solution
The lathe does not start.	• The position switch of the spindle break switches the lathe off. • The position switch of the lathe chuck switches the lathe off. • The position switch of the protection cover on the headstock switches the lathe off. • EMERGENCY-STOP actuated.	• Check and adjust the position switch of the spindle brake. • Check and adjust the position switch of the lathe chuck guard. • Check and adjust the position switch of the protection cover on the headstock. • Unclamp the EMERGENCY-STOP. • ☞ "Wiring diagram“ on page 124
The control lamp for operation is not on	• control transformer is defective • control lamp for operation is defective	• replace transformer • replace control lamp for operation
The machine lighting is not on	• control transformer is defective	• replace transformer
Surface of workpiece too rough	• tool blunt • tool springs • feed too high • radius at the tool tip too little	• resharpen tool • clamp tool wit less overhang • reduce feed • increase radius
V-belts squeak and slip	• V-belts defective, used • tension of V-belts is too low	☞ "V-belt check, re-tighten“ on page 70
Wokpiece is becoming cone	• centers are not aligned (tailstock has offset) • top slide not well aligned (cutting with the top slide)	• adjust tailstock to the center • well align top slide
Lathe is chattering	• feed too high • main bearings have clearance	• reduce feed • have the main bearing re-adjusted
center runs hot	• workpiece has expanded	• loosen tailstock tip
Tool has a short edge life	• cutting speed too high • crossfeed too high • insufficient cooling	• reduce cutting speed • lower crossfeed / smooth finish (allowance not over 0,5 mm) • more coolant
Flank wear too high	• clearance angle too small (tool "pushes") • tool tip not adjusted to center height	• increase clearance angle • correct height adjustment of the tool
Cutting edge breaks off	• wedge angle too small (heat build-up) • grinding crack due to wrong cooling • excessive clearance in the spindle bearing arrangement (vibrations)	• increase wedge angle • cool uniformly • have the clearance in the spindle bearing arrangement re-adjusted
Cut thread is wrong	• tool is clamped incorrectly or has been started ginding the wrong way • wrong pitch • wrong diameter	• adjust tool to the center, grind angle correctly. use tool 60° for metric threads, tool 55° for inch-based threads. • adjust right pitch • in a previous step, turn the workpiece to the correct diameter

9 Appendix

9.1 Copyright

9.2 Terminology/Glossary

Term	Explanation
Headstock	Housing for the feed gear and the synchronous belt pulleys.
Lead screw nut	Split nut which engages the lead screw.
Lathe chuck	Clamping tool for holding the workpiece.
Drill chuck	Drill bit adapter
Bed slide	Slide on the slideway of the machine bed which feeds parallel to the tool axis.
Cross slide	Slide on the lathe saddle which moves transversely to the tool axis.
Top slide	Swivelling slide on the cross slide.
Taper mandrel	Taper of the drill bit, the drill chuck or the centring pin.
Tool	Lathe tool, drill bit, etc.
Workpiece	Piece to be turned or machined.
Tailstock	Movable turning aid.
Rest	Follow or steady support for turning long workpieces.
Lathe dog	Device or clamping aid for driving pieces to be turned between centres.
Threading gauge	Help with thread cutting

9.3 LIMITED WARRANTY

***OPTIMUM ONE-YEAR LIMITED WARRANTY**. OPTIMUM, MODELS COVERED IN THIS MANUAL, ARE WARRANTED BY OPTIMUM TO THE ORIGINAL USER AGAINST DEFECTS IN WORKMANSHIP OR MATERIALS UNDER NORMAL USE FOR ONE YEAR AFTER DATE OF PURCHASE. ANY PART WHICH IS DETERMINED TO BE DEFECTIVE IN MATERIAL OR WORKMANSHIP AND RETURNED TO AN AUTHORIZED SERVICE LOCATION, AS OPTIMUM DESIGNATES, SHIPPING COSTS PREPAID, WILL BE, AS THE EXCLUSIVE REMEDY, REPAIRED OR REPLACED AT OPTIMUM OPTION. FOR LIMITED WARRANTY CLAIM PROCEDURES, SEE "PROMPT DISPOSITION" BELOW. THIS LIMITED WARRANTY GIVES PURCHASERS SPECIFIC LEGAL RIGHTS WHICH VARY FROM JURISDICTION TO JURISDICTION.*

***LIMITATION OF LIABILITY.** TO THE EXTENT ALLOWABLE UNDER APPLICABLE LAW, OPTIMUM LIABILITY FOR CONSEQUENTIAL AND INCIDENTAL DAMAGES IS EXPRESSLY DISCLAIMED. OPTIMUM LIABILITY IN ALL EVENTS IS LIMITED TO AND SHALL NOT EXCEED THE PURCHASE PRICE PAID.*

***WARRANTY DISCLAIMER.** A DILIGENT EFFORT HAS BEEN MADE TO PROVIDE PRODUCT INFORMATION AND ILLUSTRATE THE PRODUCTS IN THIS LITERATURE ACCURATELY; HOWEVER, SUCH INFORMATION AND ILLUSTRATIONS ARE FOR THE SOLE PURPOSE OF IDENTIFICATION, AND DO NOT EXPRESS OR IMPLY A WARRANTY THAT THE PRODUCTS ARE MERCHANTABLE, OR FIT FOR A PARTICULAR PURPOSE, OR THAT THE PRODUCTS WILL NECESSARILY CONFORM TO THE ILLUSTRATIONS OR DESCRIPTIONS. EXCEPT AS PROVIDED BELOW, NO WARRANTY OR AFFIRMATION OF FACT, EXPRESSED OR IMPLIED, OTHER THAN AS STATED IN THE "LIMITED WARRANTY" ABOVE IS MADE OR AUTHORIZED BY OPTIMUM.*

***Technical Advice and Recommendations, Disclaimer.** Notwithstanding any past practice or dealings or trade custom, sales shall not include the furnishing of technical advice or assistance or system design. OPTIMUM assumes no obligations or liability on account of any unauthorized recommendations, opinions or advice as to the choice, installation or use of products.*

***Product Suitability.** Many jurisdictions have codes and regulations governing sales, construction, installation, and/or use of products for certain purposes, which may vary from those in neighboring areas. While attempts are made to assure that OPTIMUM products comply with such codes, OPTIMUM cannot guarantee compliance, and cannot be responsible for how the product is installed or used. Before purchase and use of a product, review the product applications, and all applicable national and local codes and regulations, and be sure that the product, installation, and use will comply with them.*

Certain aspects of disclaimers are not applicable to consumer products; e.g., (a) some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you; (b) also, some jurisdictions do not allow a limitation on how long an implied warranty lasts, consequently the above limitation may not apply to you; and (c) by law, during the period of this Limited Warranty, any implied warranties of implied merchantability or fitness for a particular purpose applicable to consumer products purchased by consumers, may not be excluded or otherwise disclaimed.

***Prompt Disposition.** A good faith effort will be made for prompt correction or other adjustment with respect to any product which proves to be defective within limited warranty. For any product believed to be defective within limited warranty, first write or call dealer from whom the product was purchased. Dealer will give additional directions. If unable to resolve satisfactorily, write to OPTIMUM at address below, giving dealer's name, address, date, and number of dealer's invoice, and describing the nature of the defect. Title and risk of loss pass to buyer on delivery to common carrier. If product was damaged in transit to you, file claim with carrier.*

Manufactured for OPTIMUM, LDS Industries, LLC, 930 W. National Ave. Addison, IL 60101, Tel.: 1-630-785-6437

CE

9.4 EC Declaration of Conformity D420

in accordance with the Machinery Directive 2006/42/EC Annex II 1.A

The manufacturer / retailer:	Optimum Maschinen Germany GmbH Dr.-Robert-Pfleger-Str. 26 D - 96103 Hallstadt

hereby declares that the following product

Product designation:	Lathe
Designation of the machine:	D420x1000 D420x1000 DPA D420x1500 D420x1500 DPA
Serial number:	_ __ __ __ __
Year of manufacture:	20__

Manual lathe with optional path measurement display of the axes for craft and industrial plants which meets all the relevant provisions of the above mentioned Directive 2006/42/EC as well as the other directives applied (below) including their amendments in force at the time of declaration.

The following other EU Directives have been applied:

EMC Directive 2014/30/EC

Low Voltage Directive 2014/35/EC

The safety objective meet the requirement of EC Directive 2006/95/EC

The following harmonized standards were applied:

EN 1837:1999+A1:2009 - Safety of machinery - Integral lighting of machines

EN ISO 23125:2010 - Machine tools - Safety - Turning machines (ISO 23125:2010 + Amd. 1:2012)

EN 50370-1:2005 - Electromagnetic compatibility (EMC) - Product family standard for machine tools - Part 1: Emission

EN 50370-2:2003 - Electromagnetic compatibility (EMC) - Product family standard for machine tools - Part 2: Immunity

EN 60204-1:2006/A1:2009 -Safety of machinery - Electrical equipment of machines - Part 1:

General requirements (IEC 60204-1:2005/A1:2008)

EN 50581:2012 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

EN ISO 12100:2010 - Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)

Responsible for documentation: Kilian Stürmer
Phone: +49 (0) 951 96555 - 800

Address:	Dr.-Robert-Pfleger-Str. 26 D - 96103 Hallstadt

Kilian Stürmer
(CEO, General manager)

Hallstadt, 2014-10-20

Index

A
Accident report 20
Anchored assembly 30
Anchor-free assembly 29
Assembly
  anchored 30
  anchor-free 29
C
Cleaning 28
  Cooling lubricant tank 75
Cleaning of the machine 28
Commissioning 32
Cooling lubricant 61, 75
Cooling lubricants 76
Cross-adjustment
  Tailstock 58
Cutting speeds 63
D
Direct run 37
Disinfection
  Cooling lubricant tank 75
Display elements 36
E
Electrical system 21
Emergency stop condition
  reset 37
EMERGENCY-STOP mushroom switch 15
environmental conditions 23
F
Face turning and recessing 59
Feed tables 53
First commissioning 32
Foot brake 38
Four-jaw lathe chuck 49
I
Inspection 65
Inspection deadlines 21
Inspection plan
  for water-mixed cooling lubricants 76
Installation site
  requirements 28
L
lathe accessories, optional 33
Lathe chuck protection 16
Load suspension point 29
Longitudinal turning 58
Lubrication 29
M
Main switch 15, 20
Maintenance 65, 75
Mandatory signs 17
Mechanical maintenance work 20
Metric threads 54
Misuse 10
Mounting
  rests 50
  workpiece holder 46
O
Obligations
  Operating company 12
  Operator 13
operating material 23
P
Power failure 37
Prohibition signs 17
Protective
  equipment 19
Protective cover
  drive 16
  headstock 16
  lathe chuck 16
  the lead screw 14
Q
Qualification of personnel
  Safety 12
R
Requirements
  installation site 28
Requirements regarding the installation site 28
Restoring
  readiness for operation 37
S
Scope of delivery 25
Storage 28
Storage and packaging 28
T
Tailstock 57
technical data
  dimensions 23
  power connection 22
  work area 23
Thread cutting 60
Tool holder 40
Transport 25
  Load suspension point 29
Turning short tapers 59
U
Unpack 28
Using
  Four-jaw lathe chuck 49
  lifting equipment 20
W
Warning signs 17
work area 23