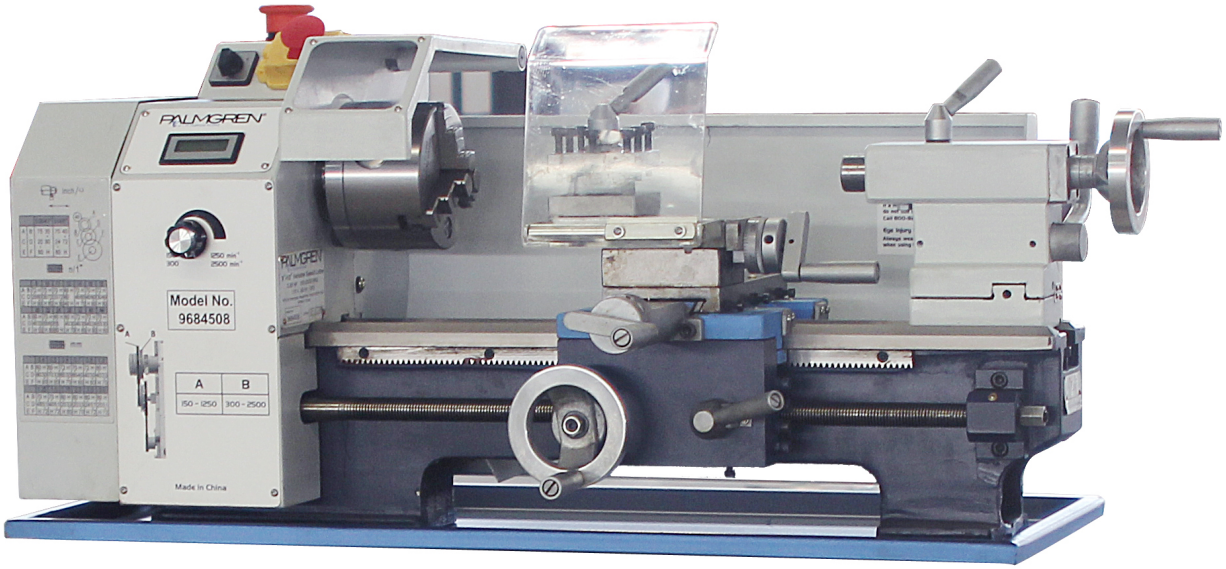
PALMGREN®
a CH Hanson brand

Operating manual

Version 1.0.1

Lathe

TU 2004V Item no. 9684508



US

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Preface

Dear customer,

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

Company metal working machines offer a maximum of quality, technically company 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

C.H.HANSON
2000 North Aurora Rd.
Naperville, IL 60563

1 Safety

Glossary of symbols

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

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 machines 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 machine.

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.

INFORMATION

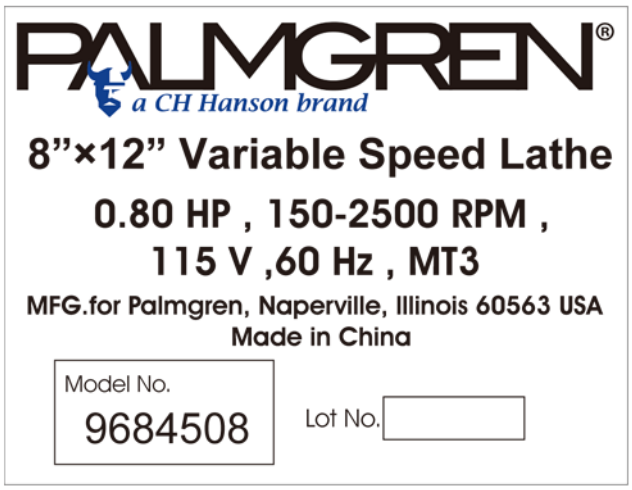
If you are unable to solve a problem using this manual, please contact us for advice:

Exclusive USA Agent

C.H.HANSON

2000 North Aurora Rd.

Naperville, IL 60563



1.1 Safety instructions (Warning notes)

1.1.1 Classification of hazards

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

Ideogram	Warning alert	Definition / consequence
	**DANGER!**	Threatening danger that will cause serious injury or death to people.
	WARNING!	A danger that might cause severe injury to the personnel or can lead to death.
	CAUTION!	Danger or unsafe procedure that might cause injury to people or damage to property.
	**ATTENTION!**	Situation that could cause damage to the machine and product and other types of damage. No risk of injury to people.
	**INFORMATION**	Application tips and other important or useful information and notes. No dangerous or harmful consequences for people or objects.

In case of specific dangers, we replace the pictogram by

general danger

by a warning of

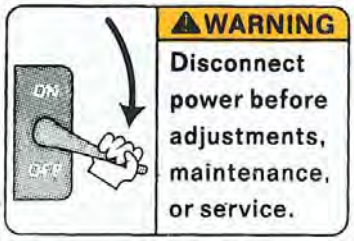
injury of hands,

hazardous electrical voltage,

or

rotating parts.

1.1.2 Further ideograms



Warning danger of slipping!

Caution, danger of explosive substances!

Warning of auto-matic start-up!

Warning hot surface!

Warning biological hazard!

Switching on forbidden!

Pull the main plug!

Use safety glasses!

Use ear protection!

Use protective gloves!

Use protective boots!

Use protective suit!

Protect the environment!

Contact address

1.2 Proper use

WARNING!

- **In case of improper use, the lathe**
- **will endanger employees,**
- **will endanger the lathe and other material property of the operator,**
- **may affect proper operation of the lathe.**

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 3-, 6- or 12-square workpieces in cold metal, castings and plastics or similar materials that do not constitute a health hazard or do not create dust, such as wood, Teflon® etc. The lathe must only be installed and operated in a dry and ventilated place. The workpieces may only be clamped in the lathe chuck using the special chuck key provided.

If the lathe is used in any way other than described above, or modified without authorization, then the lathe- is being used improperly.

We do not take liability for damage caused through improper use.

We would like to stress that any modifications to the construction, or technical or technological modifications that have not been authorized will also render the warranty null and void.

It is also part of proper use, that

- the maximum values of the lathe are complied with,
- the operating manual is constantly observed,
- inspection and maintenance instructions are observed.

☞ "Technical data“ on page 15

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

ATTENTION!

If the lathe is not used as intended or if the safety directives or the operating instructions are ignored the liability of the manufacturer for any damages to persons or objects resulting hereof is excluded and the claim under guarantee is becoming null and void!

1.3 Reasonably foreseeable misuse

Any other use as the one determined under the "Intended 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.

1.3.1 Avoiding misuses

➜ Using suitable cutting tools.

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

➜ Clamp workpieces firmly and vibration-free.

1.4 Possible dangers caused by the lathe

The lathe has undergone a safety inspection (analysis of danger with assessment of risks). It has been designed and built on the basis of this analysis using the latest technological advances.

Nonetheless, there remains a residual risk, since the machine operates with

- high revolutions,
- rotating parts,
- with electrical voltages 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 the staff 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,
- there may be a risk to the machine and other material values,
- the correct function of the lathe may be affected.

Always disconnect the lathe if cleaning or maintenance work is being carried out, or is no longer in use.

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 installations carried out by the operator must incorporate the prescribed safety devices. This is your responsibility.

☞ **"Safety measures during operation“ on page 11**

1.5 Qualification of personnel

1.5.1 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 machine.

Always disconnect the machine plug from the mains. This will prevent it from being used by unauthorized persons.

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,
- there may be a risk to the machine and other material values,
- the correct function of the lathe may be affected.

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

Operator

The operator is instructed by the operating company about 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 his professional training, knowledge and experience as well as his knowledge of respective standards and regulations the electrical specialist is able to perform works on the electrical system and to recognise and avoid any possible dangers himself.

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

Specialist 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.

1.5.2 Authorized personnel

WARNING!

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

Only authorized personnel may operate the machine!

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.

1.5.3 Obligations of the operating company

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

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

The operator 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 safety- and risk-conscious and observe the operating instructions.

1.5.4 Obligations of the operator

The operator must

- ❍have read and understood the instruction manual,
- ❍be familiar with all safety devices and regulations,
- ❍be able to operate the machine.

1.5.5 Additional requirements regarding the qualification

For work on the electric components or operating materials there are additional requirements:

- ❍ Must only be performed by a qualified electrician or person working under the instructions and supervision of a qualifiedelectrician.
- ❍ Before carrying out work on electrical components or operating units, the following measures must be taken, in the order given.

➜ disconnect all poles.

➜ Secure against switching on.

➜ Check if the machine is zero potential.

1.6 Operators positions

The operator's position is in front of the machine.

1.7 Safety measures during operation

CAUTION!

Risk due to inhaling of health hazardous dusts and mist.

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 winding-up or cutting damages 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.

1.8 Safety devices

Use the lathe only with properly functioning safety devices.

Stop the lathe immediately if there is a failure on the safety device or if it 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

- the cause of the failure has been removed,
- you have made sure that there is no existing danger for 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 machine. The possible consequences are

- **injuries may occur due to workpiece or parts of workpieces flying off,**
- **contact with rotating parts,**
- **a fatal electrocution.**

WARNING!

The separating protective equipment which are made available and delivered together with the machine are designed to reduce the risk of workpieces or fractions of them which being expelled, but not to remove them completely. Always work carefully and observe the limits of their machining process.

The lathe includes the following safety devices:

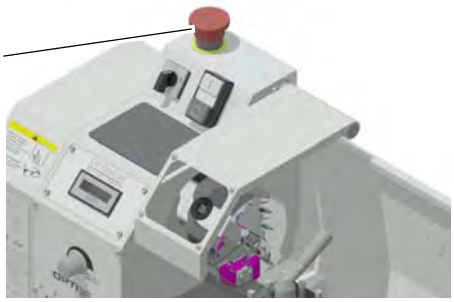
- a EMERGENCY STOP button
- a protective cover on the headstock,
- a special key for the lathe chuck,
- a lathe chuck protection with position switch,

1.9 EMERGENCY-STOP button

The EMERGENCY-STOP button switches the machine off.

Knocking on the emergency stop device triggers an emergency stop.

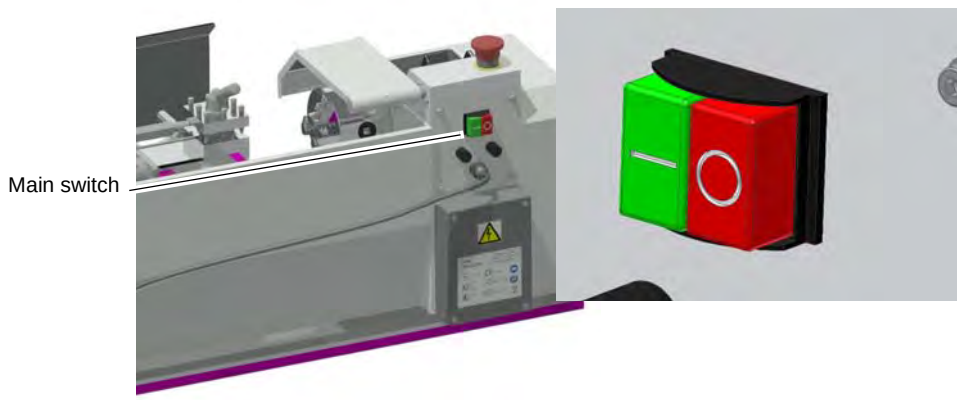
After actuating the button, turn it to the right, in order to restart the machine.



Img.1-1: EMERGENCY-STOP button

1.9.1 Main switch

The lathe is equipped with a main switch. When the main switch is switched off, the power supply to the machine is completely interrupted.



Img.1-2: Main switch

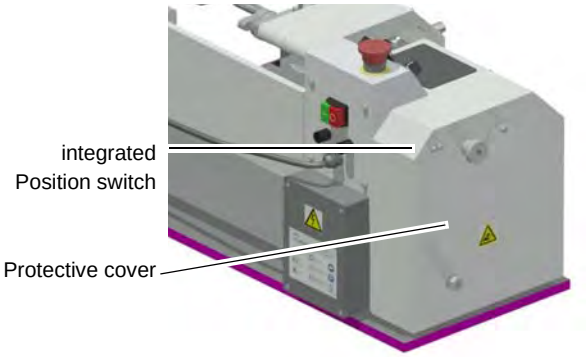
1.9.2 Protective cover with safety switch

The spindle head of the lathe is equipped with a fixed, separating protective cover.

The locked position is monitored by means of an electrical limit switch.

INFORMATION

It is not possible to start the machine until the protective cover is closed.

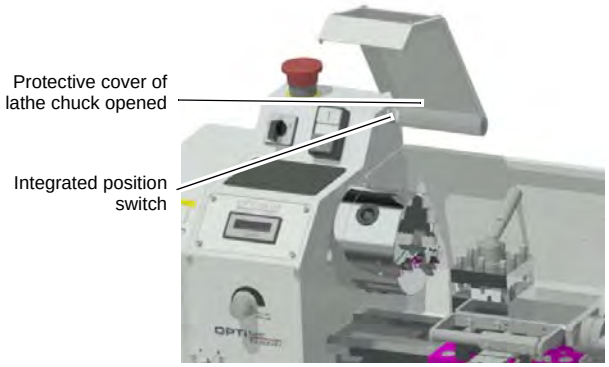


Img.1-3: Protective cover of the headstock

1.9.3 Lathe chuck protection with position switch

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

Img.1-4: Lathe chuck protection closed



Img.1-5: Lathe chuck protection open

1.9.4 Lathe chuck key

The lathe is equipped with a special key for chucks. Once the lathe chuck key has been released, it is pushed out of the lathe chuck by a spring.

CAUTION!

Only operate the lathe using this key.

Img.1-6: Lathe chuck key

1.10 Safety check

Check the lathe regularly.

Check all safety devices

- before starting work,
- once a week,
- after every 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 (replace if necessary).

INFORMATION

Use the following table in order to organize the checks.

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 switch	When the EMERGENCY STOP push button is activated, the lathe must switch off.	
Lathe chuck key	Once the chuck key has been released, it should be automatically pressed out of the lathe chuck.	
Lathe chuck protection / protective cover headstock	The lathe shall only run with the lathe chuck protection / protective cover headstock closed.	

1.11 Personnel 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 works where your face and eyes are exposed to hazards.

Use protective gloves when handling pieces with sharp edges.

During operation of the lathe, the wearing of gloves is prohibited because of the risk of winding up.

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 prescribed personal protective equipment is available at the workplace.

CAUTION!

Dirty or contaminated personnel protective equipment can cause diseases. Clean it each time after use and once a week.

1.12 For your own safety during operation

WARNING!

Before activating the machine assure yourself that this will neither endanger other persons nor cause damage to equipment.

Avoid any risky working practices:

- Make sure that nobody is endangered by your work.
- Clamp the workpiece tightly before activating the lathe.
- For clamping workpieces, only use the special chuck key supplied.
- Mind the maximum chuck opening.
- Wear safety goggles.
- 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 competent supervisory authority, responsible for your company.
- 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.

We specially point out the specific dangers when working with and on the machine.

1.13 Disconnecting and securing the lathe

- Pull the mains plug before beginning any maintenance or repair work or or switch off the supply voltage to the lathe. All machine components and hazardous voltages and movements are disconnected.
- Attach a warning sign on the machine.

1.14 Mechanical maintenance work

Remove or install protection safety devices before starting any maintenance work and re-install them once the work has been completed.This includes:

- 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!

2 Technical data

The following information are the dimensions and indications of weight and the manufacturer‘s approved machine data of lathe TU2004V.

2.1 Electrical connection	
Motor	115V ; 0.89HP ~ 60Hz

2.2 Machine data	
Height of centres [mm]	3.937
Max. swing	7.874"
Max. swing over cross slide	4.488"
Distance between centres	12"
1 Spindle speed range infinitely variable [rpm]	150 - 1250
2. Spindle speed range infinitely variable [rpm]	300 - 2500
Spindle flange	☞ "Spindle nose“ on page 31
Spindle taper	MT 3
Passage 3-jaw chuck	0.7874"
Travel compound slide	2.1654"
Travel cross slide	4.7244"
Lead screw pitch	12 TPI Ø 5/8"
Dial graduation for longitudinal feed of lathe saddle	0.98"dial / 0.01"
Dial graduation for cross feed	0.1"dial / 0.002"
Cross lead screw pitch	20 TPI Ø 3/8"
Compound lead screw pitch	20 TPI Ø 3/8"
Dial graduation for compound slide	0.05"dial / 0.001"
Tailstock cone	MT 2
Tailstock sleeve travel	2.5591"
Longitudinal feed	0.0042" and 0.008"
Tailstock lead screw pitch	20 TPI Ø 3/8"
Dial graduation for tailstock	0.05"dial / 0.002"
Pitch - Inches	8 | 10 | 11 | 12 | 14 | 16 | 18 | 20 | 22 | 24 | 28 | 32 | 40 | 44
Pitch - Metric	0.4 | 0.5 | 0.5 | 0.6 | 0.7 | 0.8 | 1 | 1.25 | 1.5 | 1.75 | 2 | 2.5 | 3

2.3 Dimensions	
Height / Length / Width	☞ "Dimensions, installation plan TU2004V“ on page 19
Total weight	135 lbs

2.4 Operating material	
Slideways, lubrication nipples	e.g. machines oil (Mobil Oil, Fina, ...) We recommend the use of weapon oil, weapon oil is acid-, stain- and resin-free.
Change gears	Chain oil (spray box)

2.5 Environmental conditions	
Temperature	40 - 95 °F
Humidity	25 - 80 %

2.6 Emissions

The generation of noise emitted by the lathe is less than 75 dB(A).
If the lathe is installed in an area where various machines are in operation, the noise exposure (immission) on the operator of the at the working place may exceed 80dB(A).

INFORMATION

This numerical value was measured on a new machine under proper operating conditions. Depending on the age respectively on the wear of the machine it is possible that the noise behaviour of the machine changes.

Furthermore, the factor of the noise emission is also depending on manufacturing influencing factors, e.g. speed, material and clamping conditions.

INFORMATION

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

Though there is a dependency between the degree of the noise emission and the degree of the noise disturbance it is not possible to use it reliably to determine if further precaution measures are required or not.

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

- Characteristics of the working area, e.g. size or damping behaviour**,**
- Other noise sources, e.g. the number of machines,
- Other processes taking place in the proximity and the period of time during which the operator is exposed to the noise.

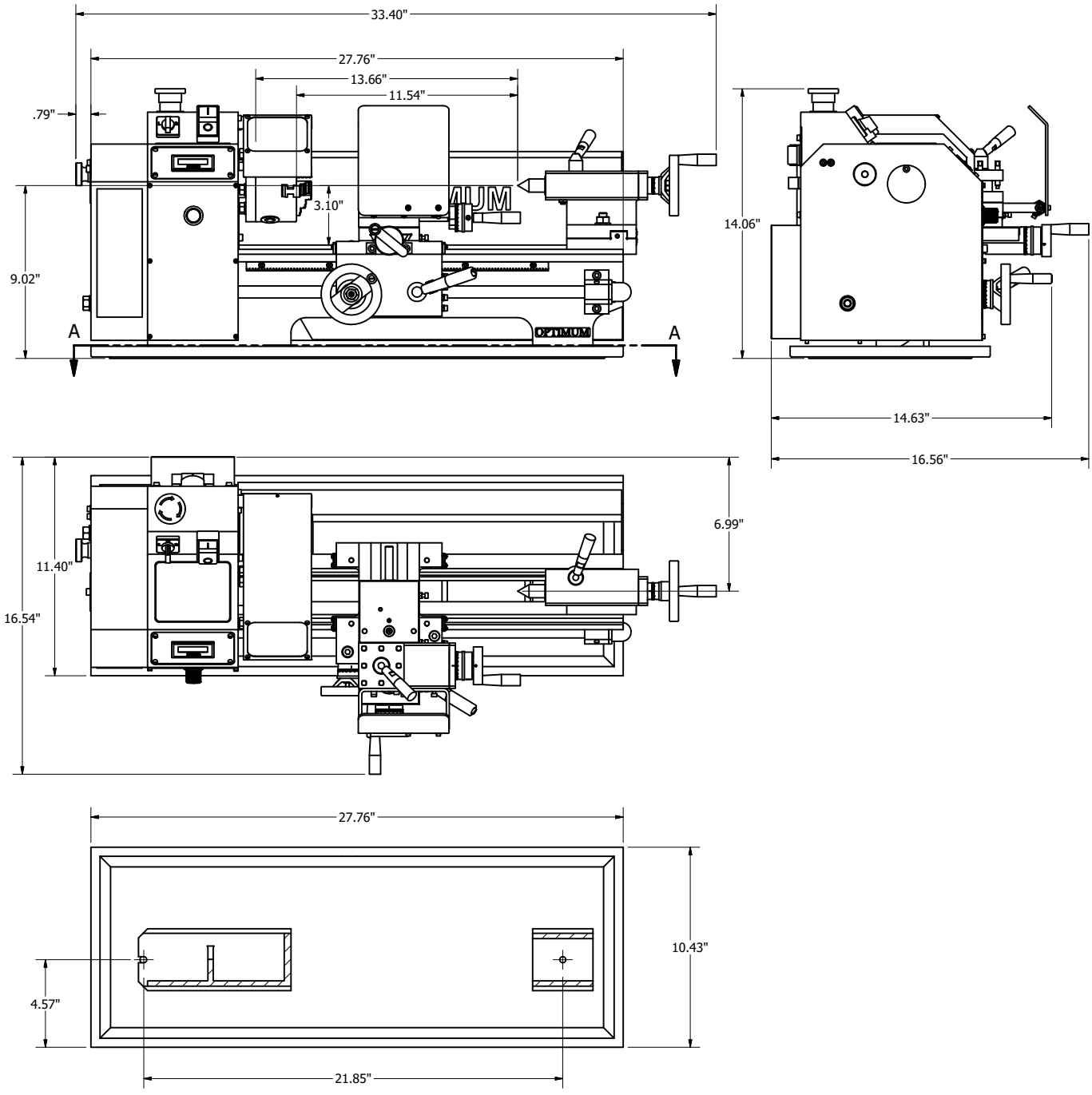
Furthermore, it is possible that the admissible exposure level might be different from country to country due to national regulations.
This information about the noise emission shall allow the operator of the machine to more easily evaluate the endangering and risks.

CAUTION!

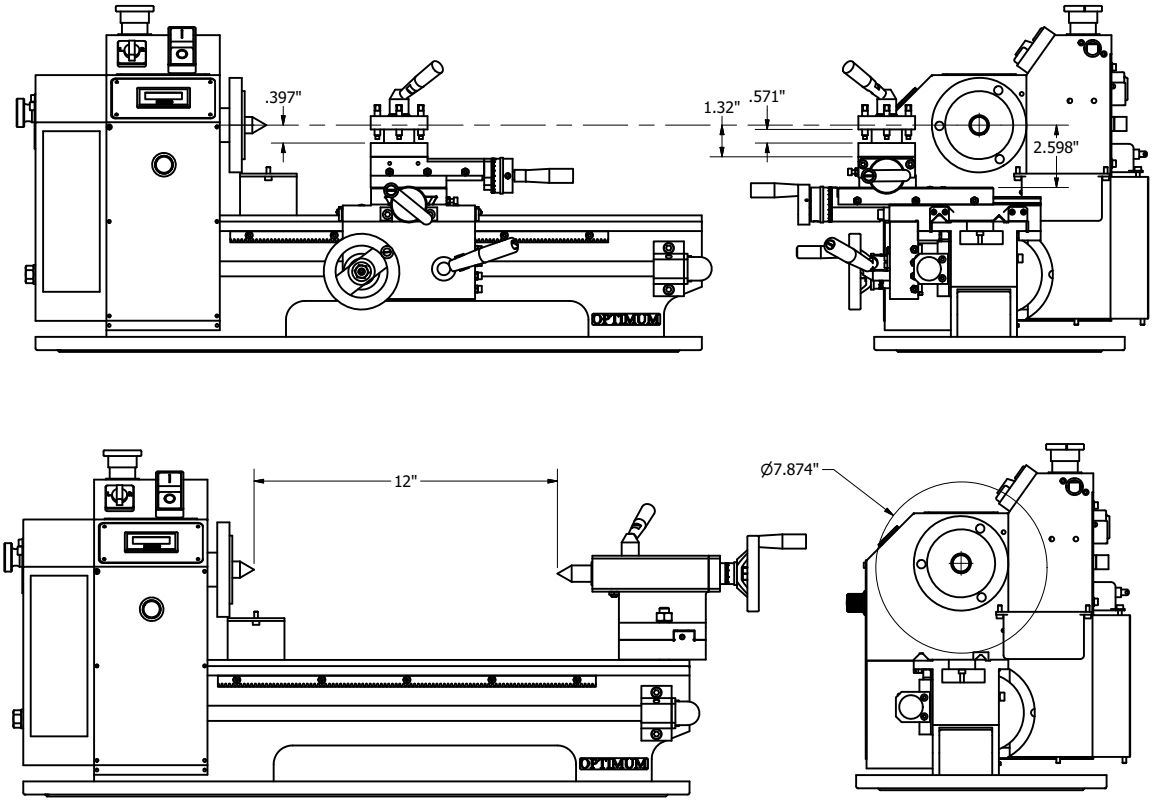
Depending on the overall noise exposure and the basic limit values the machine operators must wear an appropriate hearing protection.

We generally recommend to use a noise protection and a hearing protection.

2.7 Dimensions, installation plan TU2004V



Img. 2-1: Dimensions, installation plan TU2004V


.397"
1.32"
.571"
2.598"
OPTIMUM
12"
Ø7.874"
OPTIMUM

3 Assembly

INFORMATION

The lathe is delivered pre-assembled. When the lathe is delivered, check immediately before and after unpacking hat the lathe has not been damaged during shipping and that all components are included. Also check that no fastening screws have come loose.

3.1 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.

3.2 Transport

- Centres of gravity

- Load suspension points
  (Marking of the positions for the load suspension point)

- Prescribed transportation position
  (Marking of the top surface)

- Means of transport to be used
- Weights

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 case.

WARNING!

The use of unstable lifting and load suspension gear 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 competent supervisory authority, responsible for your company.

Fasten the loads properly. Never walk under suspended loads!

3.3 Storage

ATTENTION!

In case of wrong and improper storage electrical and mechanical machine components might get damaged and destroyed.

Store packed and unpacked parts only under the intended environmental conditions.

Follow the instructions and information on the transportation box:

- Fragile goods
  (Goods require careful handling)

- Protect against moisture and humid environment

☞ "Environmental conditions“ on page 18

- Prescribed position of the packing case
  (Marking of the top surface - arrows pointing to the top)

- Maximum stacking height

  Example:not stackable - do not stack a second packing case
  on top of the first packaging case

3.4 Installation and assembly

3.4.1 Requirements regarding the installation site

INFORMATION

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

Please observe the following points:

- The lathe must only be installed and operated in a dry and well-ventilated place.
- Avoid places nearby machines generating chips or dust.
- The installation site must be free from vibrations also at a distance of presses, planing machines, etc.
- The substructure must be suitable for turning. Also make sure that the floor has sufficient load bearing capacity and is level.
- The substructure must be prepared in a way that possibly used coolant cannot penetrate into 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.
- Also consider that the machine is accessible for setting and maintenance works.
- The mains plug and the main switch of the lathe has to be freely accessible.

❍ Provide for sufficient illumination (Minimum value: 300 lux).
In case of little intensity of illumination provide for additional illumination i.e. by a separate workplace illumination.

INFORMATION

The mains plug of the lathe must be freely accessible.

3.4.2 Load suspension point

➜ Fasten the load suspension gear around the lathe bed.

➜ Make sure that you distribute the loads evenly so that the lathe cannot turn over while lifting.

➜ Make sure that no add-on pieces or varnished parts are damaged due to the load suspension.

3.4.3 Installation

WARNING!

Danger of crushing and overturning. The lathe must be installed by at least 2 people.

➜ Check the horizontal orientation of the base of the lathe with a spirit level.

➜ Check that the foundation has sufficient floor-load capacity and rigidity.

ATTENTION!

An insufficient rigidity of the substructure leads to superposition of vibrations between the machine and the substructure (natural frequency of the components). Critical speeds and moves in the axis with displeasing vibrations are rapidly achieved in case of insufficient rigidity of the whole system and will lead to bad turning results.

➜ Position the lathe on the intended foundation.

➜ Secure the lathe using the through holes with the foundation or substructure.

☞ "Dimensions, installation plan TU2004V“ on page 19

3.5 First commissioning

3.5.1 Cleaning and lubricating

ATTENTION!

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

WARNING!

When first commissioning the lathe by inexperienced staff you endanger people and the machine.

We do not take any liability for damages caused by incorrectly performed commissioning.

Clean machine

➜ Remove the anticorrosive agent applied on the machines for transport and storage purposes. We recommend the use of WD40 oil.

➜ Do not use any solvents, cellulose thinner or any other cleaning agents which might affect the coating of the lathe when cleaning the lathe. Observe the indications and notes of the manufacturer for cleaning agents.

➜ Oil all blank machine parts using an acid-free lubricating oil.

➜ Grease the lathe according to the lubrication chart. ☞ "Inspection and maintenance“ on page 52

➜ Check if all spindles are running smoothly.

➜ Control if the fastening screws of the lathe chuck are firmly tightened.

➜ Clamp a workpiece into the lathe chuck of the lathe or bring the clamping jaws of the lathe chuck completely together before you switch on the lathe.

➜ Make sure that the current supply is working correctly.

➜ Connect the electrical supply cable (shockproof plug).

Control the function of movable and fixed parts. check

WARNING!

Do not stand directly in front of the lathe chuck when you turn on the machine for the first time.

3.5.2 Warming up the machine

ATTENTION!

If the lathe and in particular the lathe spindle is immediately operated at maximum load when it is cold it may result in damages.

If the machine is cold such as e.g. directly after having transportation, the machine should be warmed up for the first 30 minutes at a spindle speed of only 500 1/min.

3.5.3 Optionally available accessories

WARNING!

Risk by using improper workpiece clamping materials or by operating the machine with 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 company.

Only use tool holders in the intended admissible speed range.

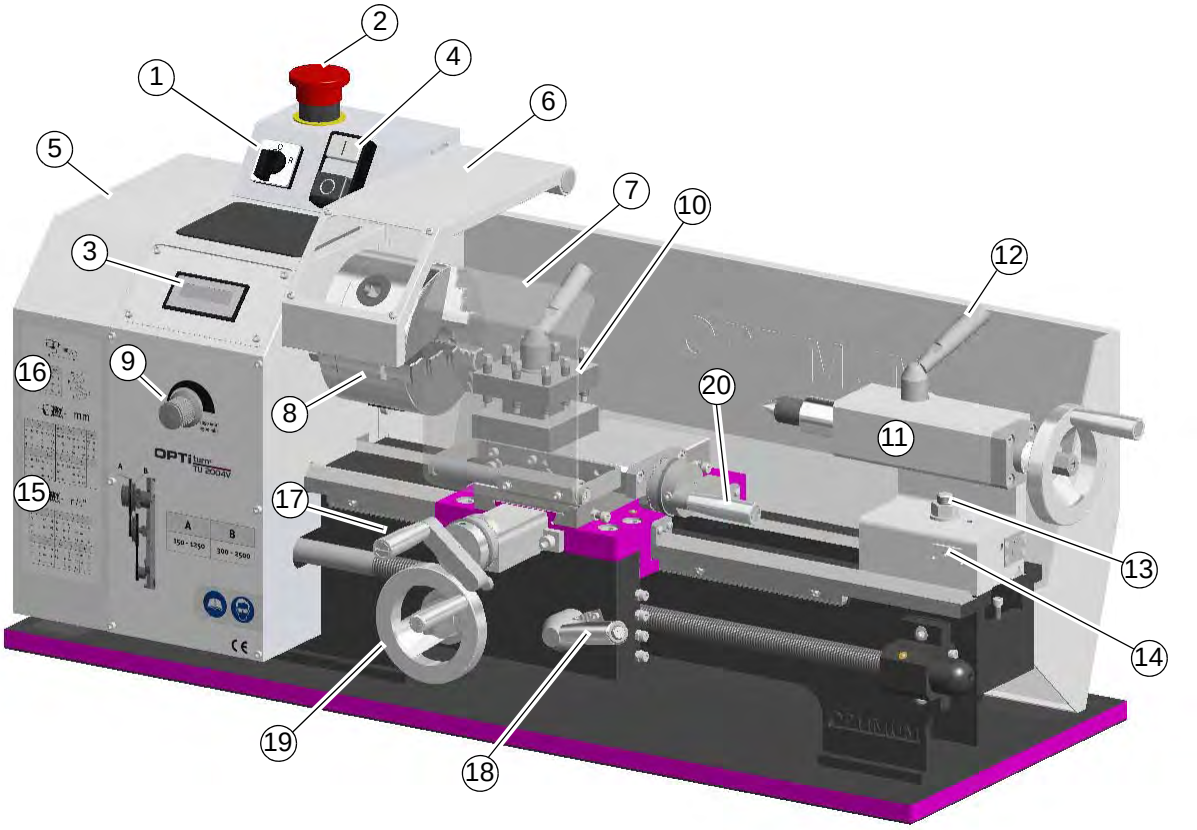
Workpiece clamping materials may only be modified in compliance with the recommendation of company or of the manufacturer of the clamping devices.

Designation:	Item number	
4-jaw chuck 100mm,	344 0711	
flange for 4-jaw chuck 100mm	344 0312	
Face plate Ø 170mm	344 0295	
Follow rest	344 0293	
Steady rest	344 0294	
Set of collet chucks, 1-16mm 15 pieces (ER25)	344 1109	

Collet holder ER 25	344 0305	
Quick change tool holder SWH-AA	338 4311	
Single tool holder 13x50 type D	338 4312	
Set of tools Hard metal indexable inserts 10mm, 7 pieces	344 1111	
Set of tools 8mm, 11 pieces Tipped with hard metal	344 1008	

4 Operation

4.1 Control and indicating elements



Pos.	Designation	Pos.	Designation
1	Turning direction selector	2	Emergency stop button
3	Rotation speed indicator	4	Push button ON / OFF
5	Headstock cover	6	Lathe chuck protection
7	Chips shield	8	Lathe chuck
9	Infinitely variable speed adjustment	10	Tool holder
11	Tailstock	12	Clamping screw tailstock quill
13	Clamping screw	14	Tailstock adjusting screw
15	Thread & infeed table	16	Speed table
17	Handwheel cross slide	18	Engaging lever automatic feed
19	Handwheel lathe saddle	20	Handwheel compound slide

4.2 Safety

Use 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 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.

☞ "For your own safety during operation“ on page 15

4.2.1 Switching elements

Push button ON

The “hand actuated auxiliary switch ON” switches the rotation of the lathe on.

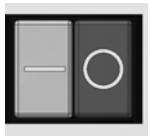
Hand actuated auxiliary switch OFF

The “hand actuated auxiliary switch OFF” switches the rotation of the lathe off.

Speed adjustment

It is possible to set the required speed using the speed adjustment.

Main switch



Interrupts or connects the power supply.

Rotation direction switch

The direction of rotation of the lathe can be switched by actuating the change-over switch.

It is possible to select a speed for each direction of rotation.

- The labelling “R” means right-handed rotation.
- The labelling “L” means left-handed rotation.

ATTENTION!

Wait until the rotation of the spindle has come to complete standstill before changing the direction of rotation by actuating the change-over switch.

A change over of the rotation direction during operation may result in a destruction of the motor and of the rotation direction switch.

INFORMATION

The rotational speed is in a clockwise direction intended low. The clockwise rotation is applied to the backward movement of the bed slide for example for thread cutting operations.

4.2.2 Switching on the machine

CAUTION!

Check that the shift lever is not activated for automatic feed.
Img.4-11: “engaging lever feed "OFF"“ on page 37

By switching on the lathe with high speed setting and activated shift lever, the lathe slide will move with high speed.

ATTENTION!

Turn the potentiometer for speed setting to the lowest possible speed before switching on. The electronics can be damaged when the machine is turned on at full speed setting.

With the ON / OFF - switches the machine is switched. The lathe can only be switched on when the change-over switch is in position "R" or "L".

Rotation direction switch

The direction of rotation of the lathe can be switched by actuating the change-over switch.

- ❍ The labelling “R” means right-handed rotation. The lathe chuck rotates counterclockwise.
- ❍ The labeling “L” means left-handed rotation. In left-handed rotation the bed slide e.g. moved back for threading. In the "0" position, the motor is switched off.

ATTENTION!

Wait until the machine has come to a complete halt before changing the rotational direction by turning the change-over switch. The machine is switched off when you perform a changing the rotational direction during operation.

➜ Perform basic setting on the lathe (speed stage, feed, etc.).

➜ Check if the protective cover of the lathe chuck and the protective cover are closed – close the protective covers if necessary.

➜ Turn the main switch on.

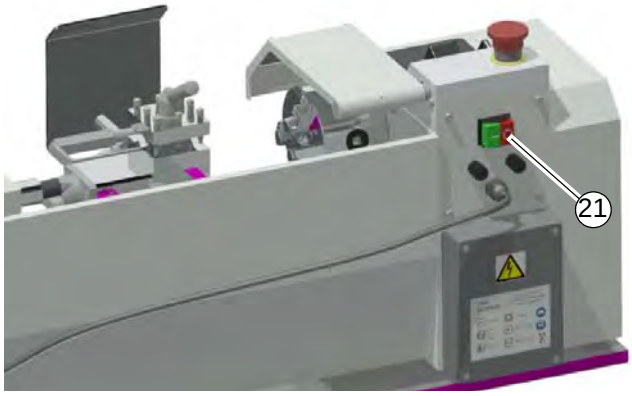
➜ Select the direction of rotation.

➜ Actuate the push button „ON“.

4.2.3 Switching off the machine

➜ Actuate the push button "OFF".

➜ If the machine stands still for a longer period of time, switch off the main switch (21) .



4.2.4 Clamping the tool

Clamp the lathe tool into the tool holder.

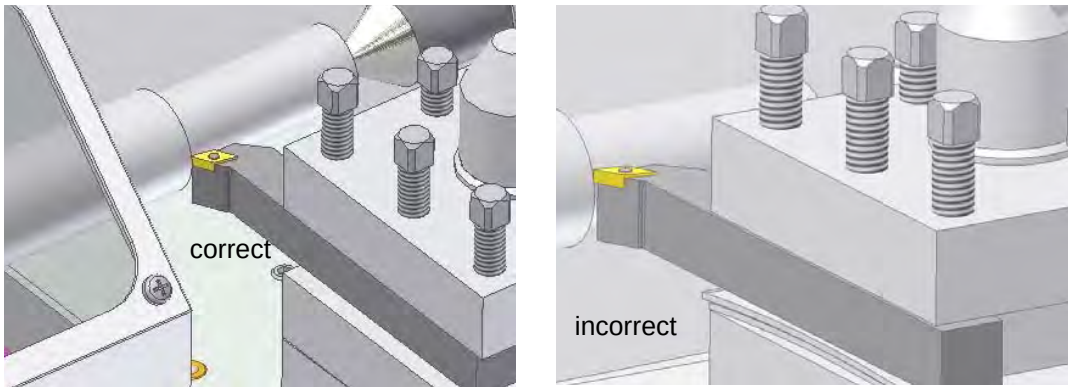
The lathe tool needs to be clamped as short and tight as possible when turning in order to be able to absorb the cutting force well and reliably during the chip formation.

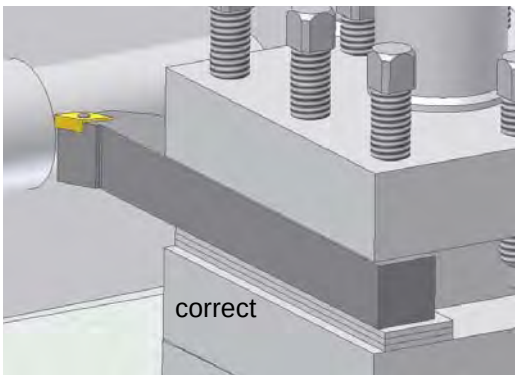
INFORMATION

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.

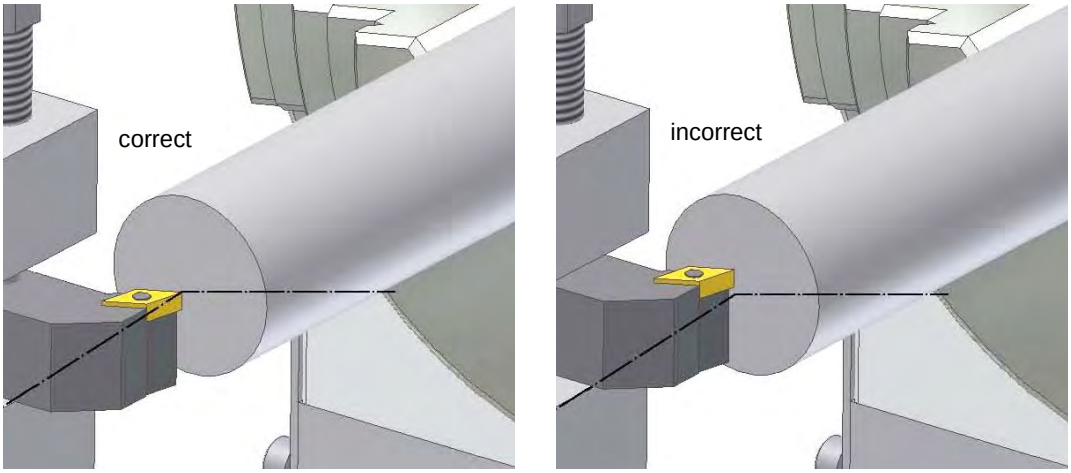
☞ "Dimensions, installation plan TU2004V“ on page 19





Img. 4-1: Clamping the tool

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. Here it is distinguished between cross-facing, cross-slicing and longitudinal facing.

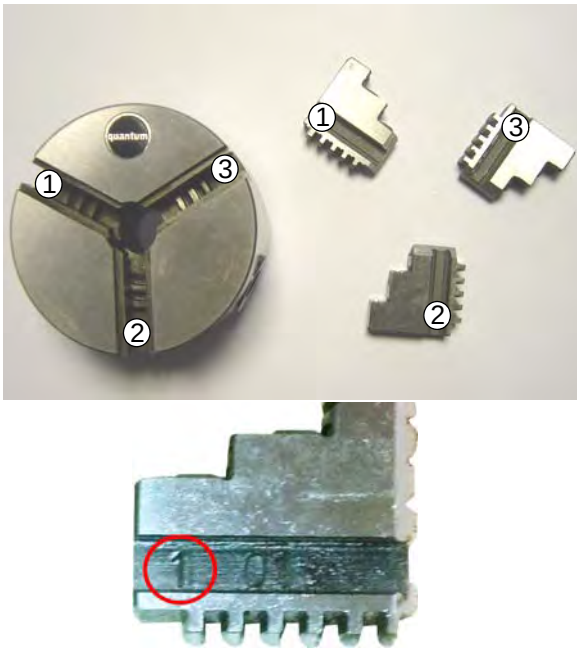


Img. 4-2: Clamping the tool

4.2.5 Replacing the clamping jaws on the lathe chuck

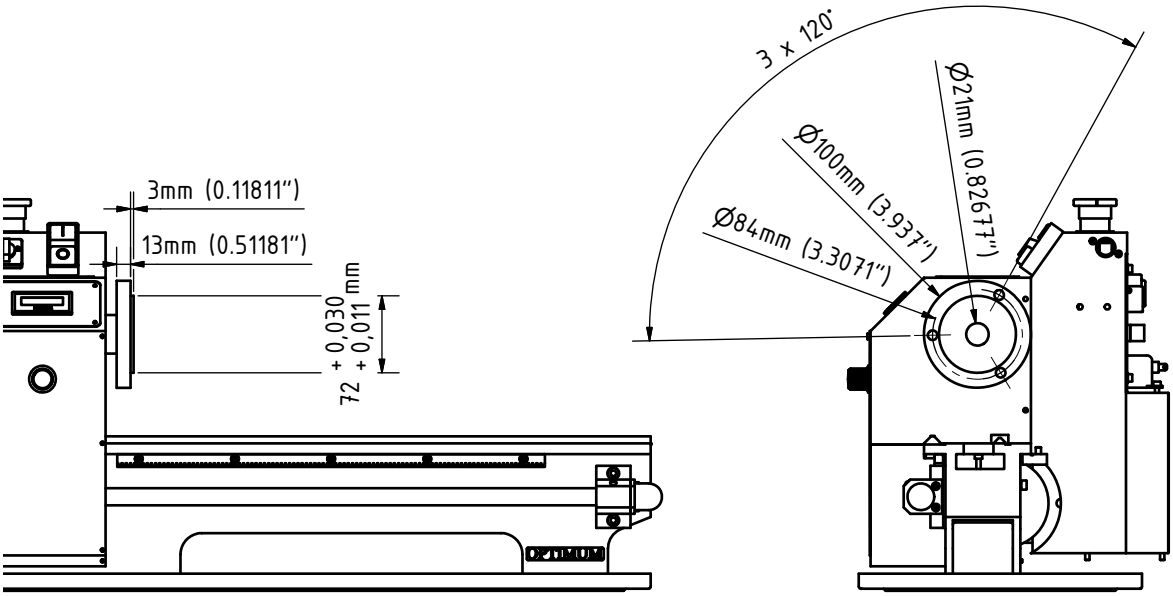
The clamping jaws and the three-jaw chuck are equipped with numbers. Insert the clamping jaws at the correct position and in the right order into the three-jaw chuck.

After the replacement, bring the jaws completely together in order to control if they are inserted correctly.



Img. 4-3: Three-jaw chuck / clamping jaws

4.2.6 Spindle nose



☞ "Optionally available accessories“ on page 24

ATTENTION!

When disassembling the workpiece carrier, it may fall on the engine bed and damage the guide rails. Put a wooden plank or another adequate part on the machine bed in order to avoid damage.

➜ Disconnect the machine from the electrical supply.

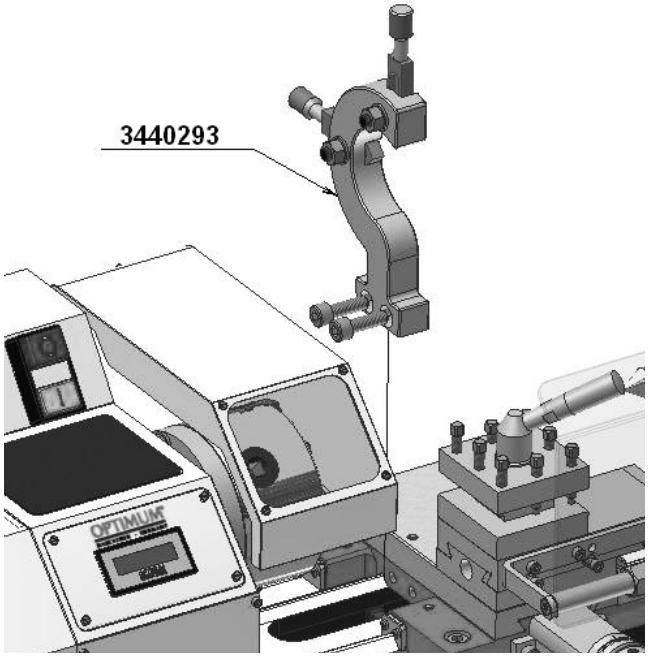
➜ Block the revolutions of the spindle for instance by inserting the square seat of the lathe chuck. Also make sure that the engine bed is not damaged by the arm of the lever.

➜ Loosen the three nuts on the flange of the lathe chuck to disassemble the workpiece carrier.

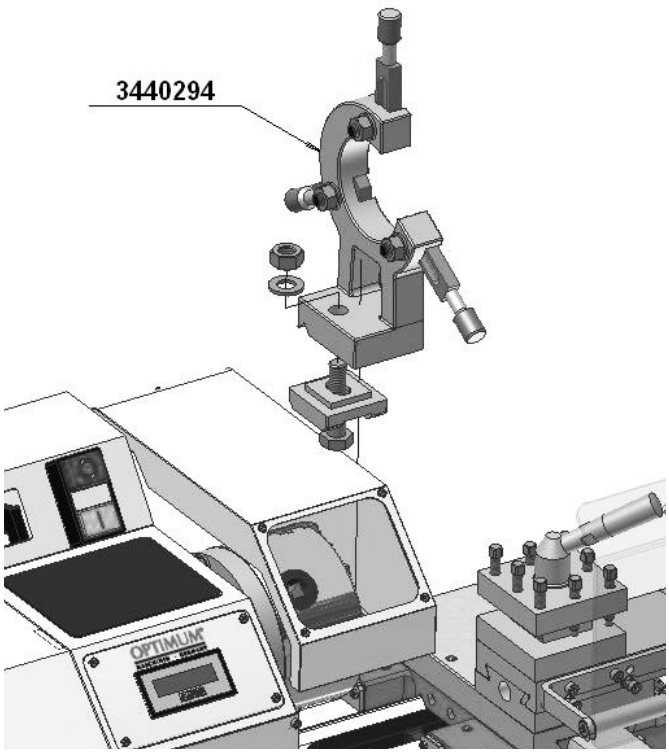
➜ Take the workpiece holder to the front.

➜ If required, loosen the workpiece carrier by knocking slight with a plastic tip or a rubber mallet.

4.2.7 Mounting of rests



Img.4-4: follow rest



steady rest

4.2.8 Use of collet chucks

When using collet chucks to clamp the workpiece higher machining tolerances are available. The exchange of collet chucks for a smaller or larger diameter is simple and can be easily performed.

First, the collect chuck will be pressed into the ring of the union nut and has to rest there byitself. The workpiece will be clamped by fastening the union nut.

Make sure that you are using the correct collet chuck for the corresponding diameter in order to be able to fix the workpiece safety and firmly.

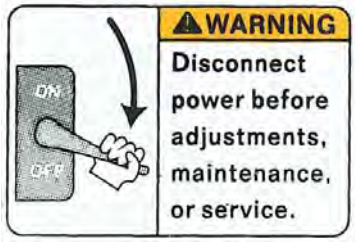
☞ "Optionally available accessories“ on page 24

4.3 Speed adjustment

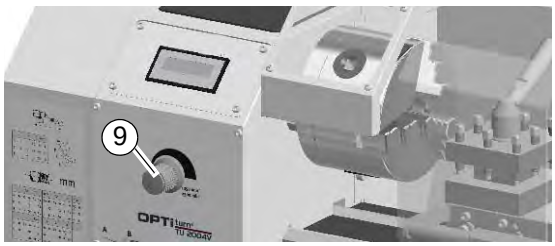
Adjust the speed with the potentiometer (9) .

In order to use another speed range, you must change the position of the belt on the pulleys.

WARNING!



Unplug the shockproof plug of the lathe before opening the protective cover of the headstock.



A	B
150 - 1250	300 - 2500

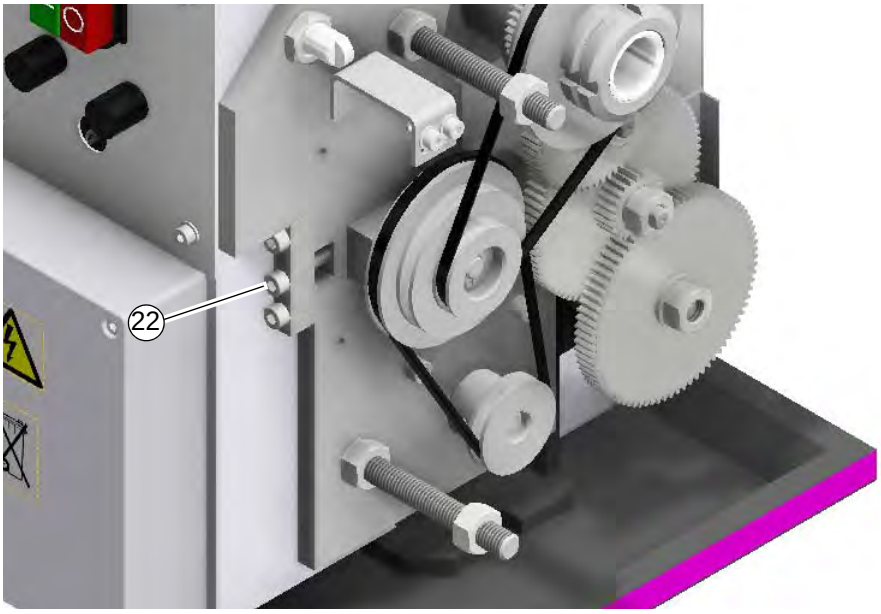
Img. 4-5: Speed adjustment

4.3.1 Changing the speed range

- ➜ Unplug the shockproof plug from the mains.
- ➜ Detach the protective cover of the headstock.
- ➜ Screw in the hexagon socket screw (22) , (Img. 4-6: “V-belt position change“ on page 34) thus the tension of the V-belt is being reduced.
- ➜ Lift the upper V-belt onto the required wheel diameter.
- ➜ Proceed the other way around to tighten the belt. The correct tension of the V- belt has been reached when you can still bend it approximately 3mm with your index finger.

ATTENTION!

Make sure the tension of the V-belt is correct. Excessive or insufficient tension may cause damage.



Img.4-6: V-belt position change

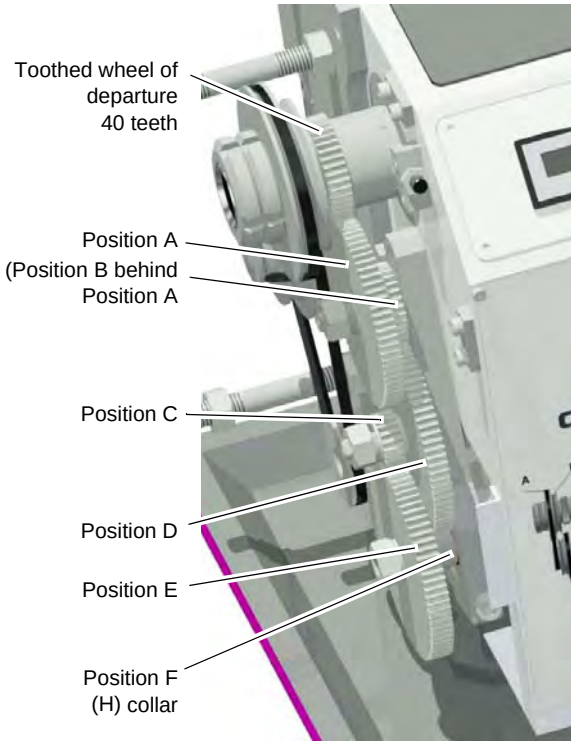
4.4 Adjusting feeds and thread pitches

In order to achieve a change of feed of a certain thread pitch, the change wheels are to be changed according to the table.

Example:

Feed 0.0042"			
A	B	75	30
C	D	20	80
E	F	80	H

- The toothed wheel of departure with 40 teeths cams in the toothed wheel A
- The toothed wheel B cams in the toothed wheel D
- The toothed wheel C cams in the toothed wheel E
- H means the vacuity (collar). You may as well use a smaller toothed wheel which does not cam in with any other toothed wheel.



Img.4-7: Order of the pitch 0.0042"

➜ Unplug the shockproof plug from the mains.
➜ Detach the protective cover of the headstock.
➜ Loosen the locking screw (24) on the quadrant.

➜ Swing the quadrant to the right.

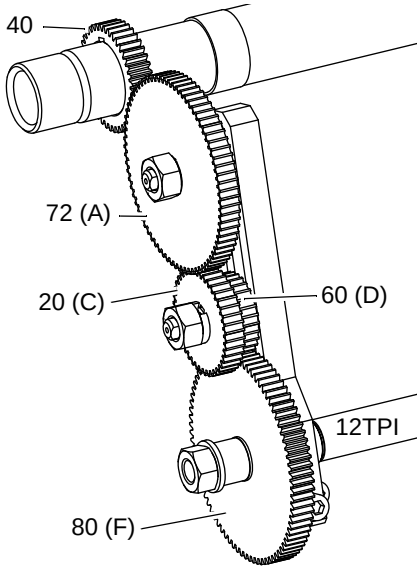
Img. 4-8: Locking screw quadrant

Example of the transmission ratio: n/1"

The thread pitch of the lead screw is 12 TPI.
Example of thread pitch: 8 Tpi

Thread pitch 8 Tpi			
A	B	72	H
C	D	20	60
E	F	H	80

Tpi = 12 TPI / (40 x A x D) / (A x C x F)
= 12 TPI / (40 x D) / (C x F)
= 12 TPI x C x F / (40 x D)
= 12 x 20 x 80 / (40 x 60) = 8



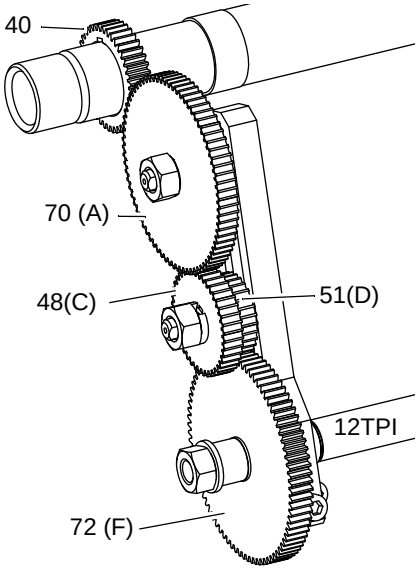
Img. 4-9: Order of the pitch 8/1"

INFORMATION

Metrical threads are indicated as thread pitch. In the following example, the lathe saddle moves by 1.25mm during one turn of the lathe chuck. Inch threads are indicated as number of threads on the length of one inch. The length of one inch is 25.4mm.

Example of thread pitch: 1.25mm

Thread pitch 1.25mm			
A	B	70	H
C	D	48	51
E	F	H	72

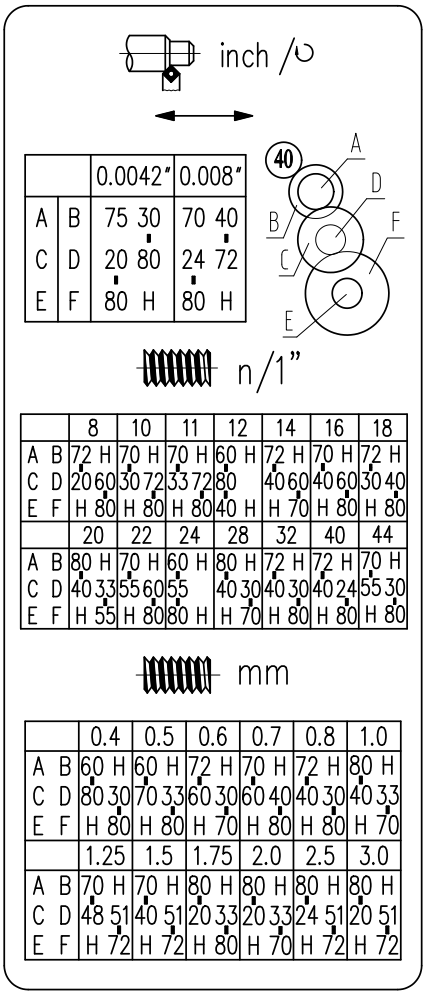


Img.4-10: Order of the pitch 1.25mm

- The toothed wheel of departure with 40 teeth cams in the toothed wheel A
- The toothed wheel A cams in the toothed wheel C
- The toothed wheel D cams in the toothed wheel F

$$i = \frac{25.4}{12\ TPI} \times \frac{40 \times A \times D}{A \times C \times F} =$$

$$\frac{25.4}{12\ TPI} \times \frac{40 \times 70 \times 51}{70 \times 48 \times 72} = 1.25mm\ per\ turn$$



		0.0042"	0.008"
A	B	75 30	70 40
C	D	20 80	24 72
E	F	80 H	80 H

		8	10	11	12	14	16	18
A	B	72 H	70 H	70 H	60 H	72 H	70 H	72 H
C	D	20 60	30 72	33 72	80	40 60	40 60	30 40
E	F	H 80	H 80	H 80	40 H	H 70	H 80	H 80

		20	22	24	28	32	40	44
A	B	80 H	70 H	60 H	80 H	72 H	72 H	70 H
C	D	40 33	55 60	55	40 30	40 30	40 24	55 30
E	F	H 55	H 80	80 H	H 70	H 80	H 80	H 80

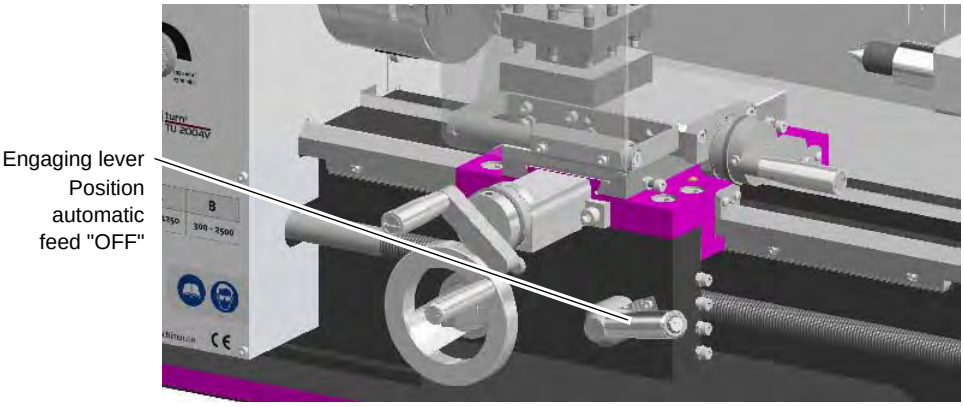
		0.4	0.5	0.6	0.7	0.8	1.0
A	B	60 H	60 H	72 H	70 H	72 H	80 H
C	D	80 30	70 33	60 30	60 40	40 30	40 33
E	F	H 80	H 80	H 70	H 80	H 80	H 70

		1.25	1.5	1.75	2.0	2.5	3.0
A	B	70 H	70 H	80 H	80 H	80 H	80 H
C	D	48 51	40 51	20 33	20 33	24 51	20 51
E	F	H 72	H 72	H 80	H 70	H 72	H 72

4.4.1 Switching on the feed

CAUTION!

By switching on the lathe with high speed setting and activated engaging lever, the lathe saddle will move with high speed.



Img. 4-11: engaging lever feed "OFF"

CAUTION!

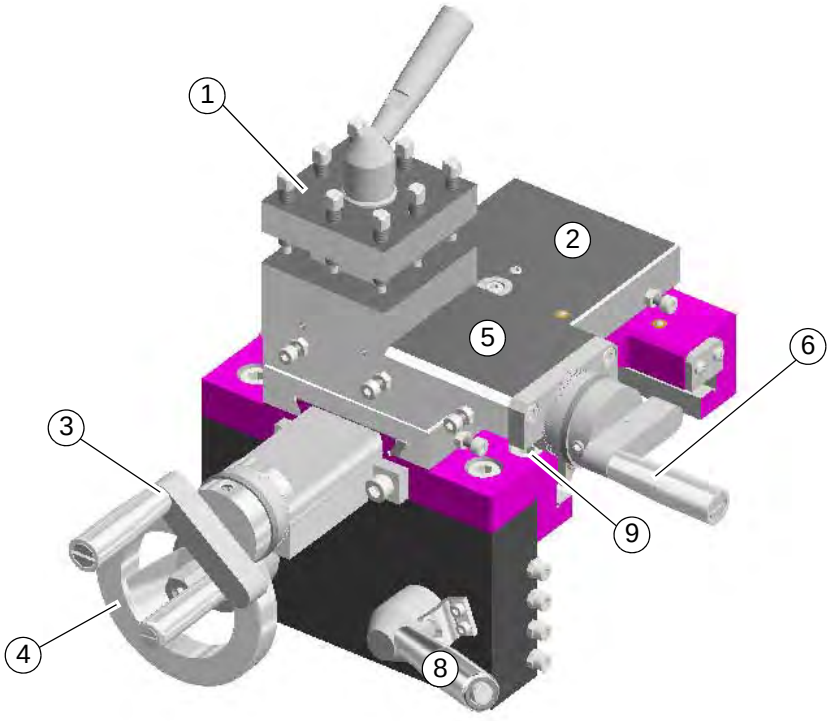
If you switch on the lathe for instance at full speed of 2500 rpm with the order of the toothed wheels for thread pitch 8/1", the lathe saddle will travel a distance of 5.2" within one second.

Threads are always cut with the least possible speed.

ATTENTION!

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

4.5 Lathe saddle



Pos.	Designation	Pos.	Designation
1	Quadruplicate tool holder	2	Cross slide
3	Handwheel cross slide	4	Handwheel lathe saddle
5	Compound slide	6	Handwheel compound slide
7	Lathe saddle	8	Feed activation lever
9	Tightening screw lathe saddle		

The handwheel (4) is used to traverse the lathe saddle manually.

The cross slide (2) can be advanced and returned by turning the cross slide handwheel (3).

The compound slide (5) supports the quadruple tool holder. The compound slide handwheel (6) is used to traverse the compound slide manually.

The automatic longitudinal feed and the feed for thread-cutting are activated and deactivated using thefeed activation lever (8). The feed is transmitted via the lead screw nut.

➜ Pull the spring-loaded handle out and push the feed activation lever down. The leadscrew nut is engaged and the automatic longitudinal feed is activated.

➜ Pull the feed activation lever up to stop the automatic longitudinal feed.

INFORMATION

Move the hand wheel (4) of the lathe saddle a little in order to facilitate the locking of the feed activation lever (8).

ATTENTION!

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

➜ Secure the lathe saddle using the tightening screw (9).

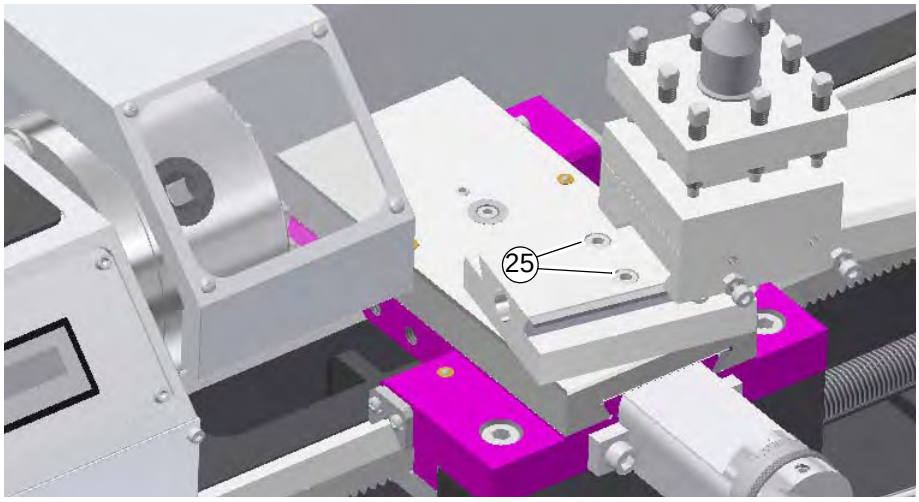
4.5.1 Turning short tapers with the compound slide

With the compound slide short cone can be rotated. The scaling is performed up to 60° degree of angle. It is also possible to adjust the compound slide over the 60°- angular mark.

➜ Loosen the hexagon socket screws (25) on the compound slide.

➜ Swivel the compound slide.

➜ Clamp the compound slide again.



4.5.2 Turning tapers with the tailstock

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

➜ Loosen the locking nut of the tailstock.

➜ Unscrew the locking screw approximately half a turn.

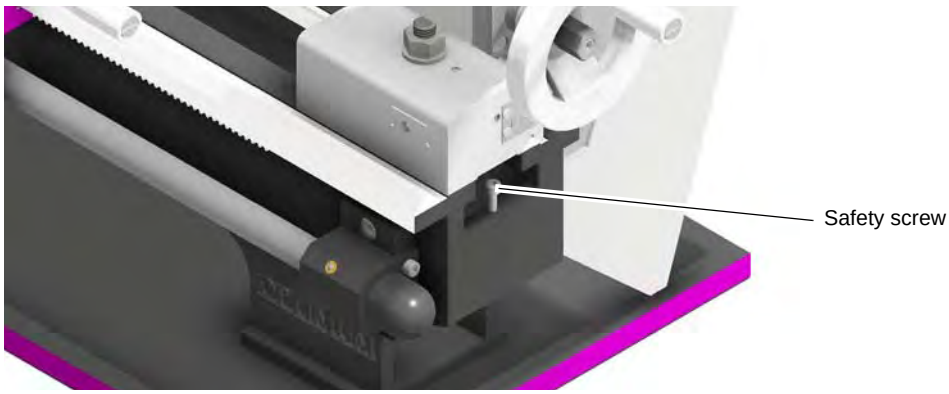
By alternately loosening and tightening the two (front and rear) adjusting screws, the tailstock is moved out of the central position. The desired cross-adjustment can be read off the scale.

➜ First retighten the locking screw and then the two (front and rear) adjusting screws. Re-tighten the adjusting screws of the tailstock.

ATTENTION!

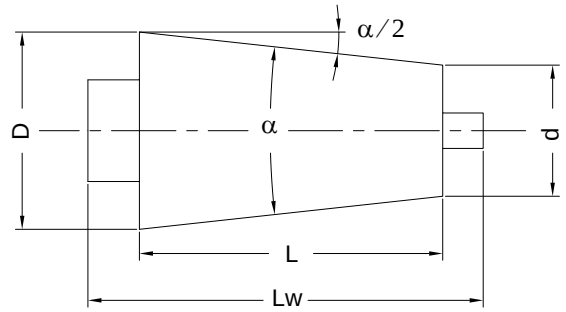
Check clamping of the tailstock and the sleeve, respectively for the turning jobs between the centres!

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.



Img. 4-12: Lathe bed

4.5.3 Turning of cones with high precision



Img. 4-13: Designation on the cone

D = large diameter

d = small diameter

L = cone length

Lw = workpiece length

α = cone angle

$\alpha/2$ = setting angle

Kv = cone proportion

Vr = tailstock offset

Vd = measure change

Vo = twist measure of compound slide

There are different possibilities to machine a cone on a common small lathe:

1. By twisting the compound slide by setting the setting-angle with the angular scale. But there the graduation of the scale is too inaccurate. For chamfers and conic passings the graduation of the angular scale is sufficient.
2. By a simple calculation, a stop measure of 4" length (of your own production) and a gauge with stand.

Calculation

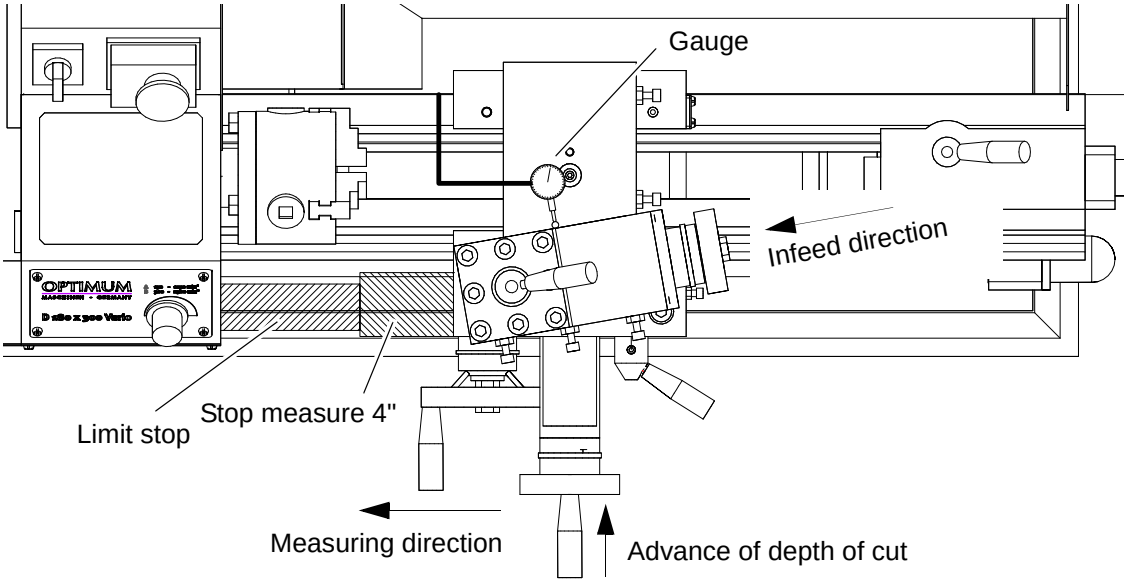
of the offset of the compound slide relating to the stop measure with a length of 4"

Step by step		
$Kv = \frac{L}{D - d}$	$Vd = \frac{4"}{Kv}$	$Vo = \frac{Vd}{2}$

by one calculation step (summary)
$Vo = \frac{4" \times (D-d)}{2 \times L}$
Example: D = 1.5" ; d = 1" ; L = 8"
$Vo = \frac{4" \times (1.5" - 1")}{2 \times 8"} = \frac{4" \times 0.5"}{16"} = 0.125"$

The stop measure (4") is to be put between a fixed unit stop and the bed slide. Put the gauge with stand on the lathe bed and horizontally align the test prod with the test prod with the compound slide (90° to the compound slide). The twisting measure is calculated with the above mentioned formula.
The compound slide is twisted by this value (then set the gauge to zero). After removing the stop measure, the bedslide will be aligned to the limit stop. The gauge must indicate the calculated value "Vo" Then the workpiece and the tool are clamped and positioned (the bed slide is

fixed). The infeed is performed with the handwheel of the compound slide. The depth of cut is advanced with the handwheel of the cross slide.

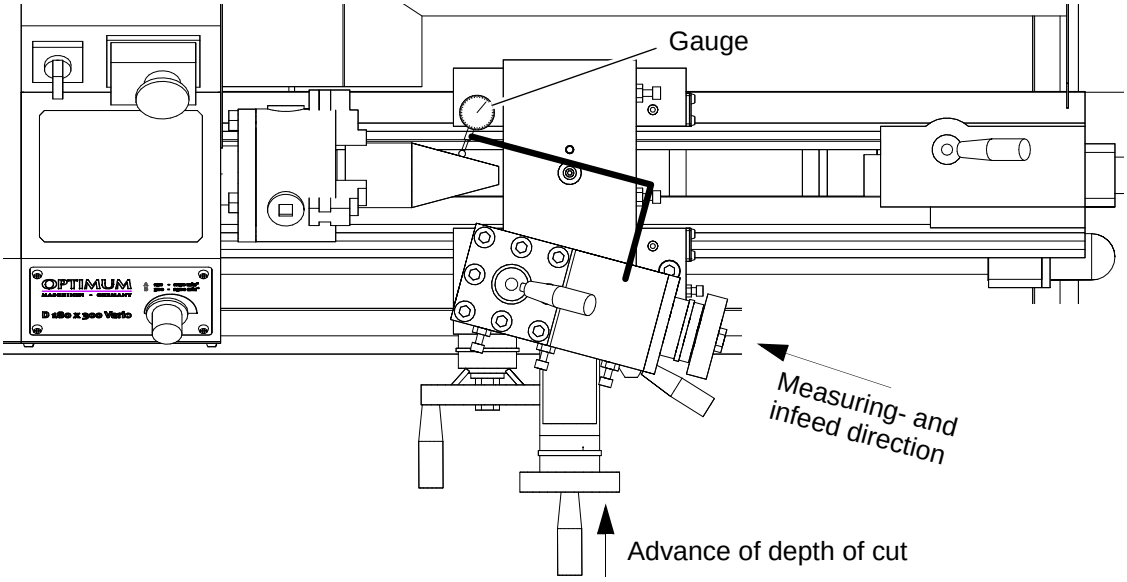


Img. 4-14: cone setting with stop measure

3. By measuring an existing cone with gauge and stand.

The stand is put on the compound slide. The gauge is aligned horizontally and 90° to the compound slide. The compound slide is approximately adjusted to the cone angle and the test prodbrought in contact with the cone surface (fix the bedslide). Now the compound slide is twisted in a way that the gauge does not indicate any travel of the pointer over the whole length of the cone (offset over the handwheel of the compound slide).

Then you may start reaming the lathe as described under point 2. The workpiece might be a flange for lathe chucks or a face plate.



Img. 4-15: cone setting with stop measure

4. By offsetting the tailstock as the cone length is larger than the adjustable stroke of the compound slide.

The workpiece is clamped between two points, therefore center holes are required on the face. They are to be drilled before removing the lathe chuck. The slaving of the workpiece is performed by a pulling pin and a lathe carrier.

The calculated value "Vr" is the offset measure of the tailstock. The offset is monitored with the gauge (also the return travel).

☞ "Designation on the cone“ on page 40

For this type of cone machining the lowest speed is used !

Annotation:

In order to check the position of the tailstock axis to the rotation axis, a shaft with two centeringsis clamped between the points. The stand with the gauge is put on the bedslide. The gauge is aligned 90° to the rotation axis and horizontally brought into contact with the shaft. The gauge will pass along the shaft with the bedslide. There must not be any travel of the pointer along the whole length of the shaft. If a deviation is being shown, the tailstock is to be corrected.

Calculation

$$Vr = \frac{Lw}{2 \times Kv} \quad \text{or} \quad Vr = \frac{D - d}{2 \times L} \times Lw$$

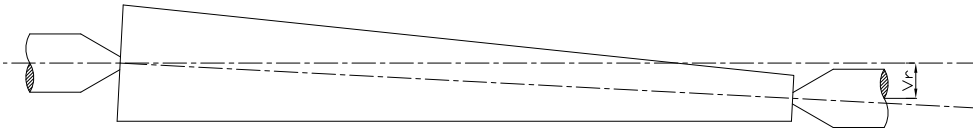
$$Vr_{max} = \frac{Lw}{50}$$

The tailstock offset must not exceed the value Vr_{max} as the workpiece tumbles!

Example:

Kv = 1 : 40 ; Lw = 2" ; L = 4"

$$Vr = \frac{2"}{2 \times 40} = 0.025" \qquad Vr_{max} = \frac{2"}{50} = 0.04"$$



Img. 4-16: Workpiece between points: Tailstock offset Vr

4.6 Tailstock sleeve

The tailstock sleeve is used to hold the tools (bits, lathe centres, etc.)

The sleeve of the tailstock can a drill chuck used for the recording of drilling and countersinking tools are set.

➜ Clamp the required tool in the tailstock sleeve.

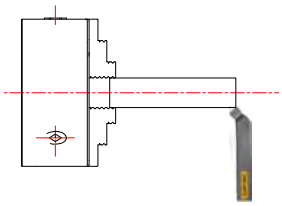
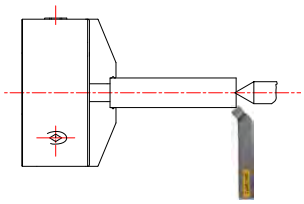
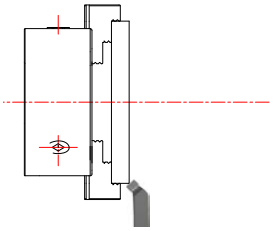
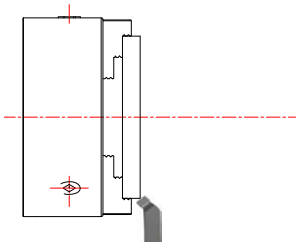
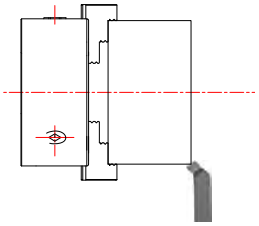
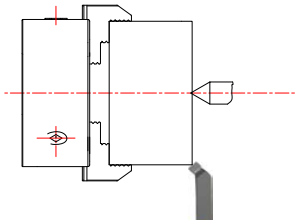
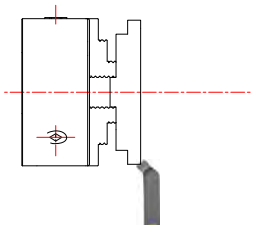
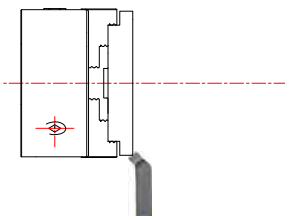
➜ Use the hand wheel to move the sleeve back and forth.

➜ Clamp the sleeve with the clamping lever.

➜ Use the adjustment and / or setting the [mm] - scale on the sleeve.

4.7 Clamping a workpiece into the three jaw chuck

When the workpiece is being clamped unprofessionally, there is a risk of injury as the workpiece may fly off or the jaws may break. The following examples do not show all possible situations of danger.

incorrect		**correct**	
	Clamping length too long, overhang too long.		Additional support over center.
	Clamping diameter too large.		Use larger lathe.
	Workpiece is too heavy and clamping grade too short.		Support over center, enlarges clamping grade. Enlarged clamping grades are not available for this three-jaw chuck. Possibly use larger lathe.
	Clamping diameter too short.		Clamp on the largest clamping diameter possible.

4.8 Turning Speeds & Feeds

There are rules and principles of cutting speeds and RPM (revolutions per minute) calculations that apply to all metal cutting operations. The operating speed for all metal cutting operations is based on the cutting tool material and the hardness of the material to be cut. The hardness of the work material has a great deal to do with the recommended cutting speed. The harder the work material, the slower the cutting speed. The softer the work material, the faster the recommended cutting speed Fig. 4-17: “Recommended cutting speed“ on page 44.

Fig. 4-17: Recommended cutting speed

The hardness of the cutting tool material influences recommended cutting speed as well. The harder the cutting tool material, the faster the cutting speed. The softer the cutting tool material, the slower the recommended cutting speed Fig. 4-18: “Recommended cutting speed“ on page 44.

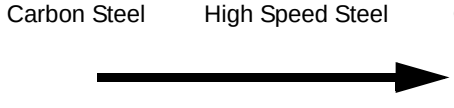


Fig. 4-18: Recommended cutting speed

The depth of the cut and the feed rate will also affect the cutting speed, but not to as great as the workpiece hardness. These three factors, cutting speed, feed rate and depth of cut, are known as cutting conditions. Cutting conditions are determined by the machinability rating. Machinability is the comparing of materials on their ability to be machined. From machinability ratings you can derive recommended cutting speeds. Recommended cutting speeds are given in charts. These charts can be found in your Machinery's Handbook or in a chart given to you by your tool salesperson. In Table 3 you will find a typical recommended cutting speed chart.

4.9 Recommended Cutting Speeds in Feet per Minute for Turning Ferrous and Nonferrous Metals*

Material	Condition	Hardness HB	Cutting Speed, fpm	
			High-Speed Steel	Carbide
Free Machining, Plain Carbon Steels (Resulphurized) AISI B1111, B1112, B1113, 1113, 1119, 1212, 1213	HR, A CD	100 to 150 150 to 200	160 180	500 600
AISI 1108, 1115, 1118, 1120, 1126	HR, A CD	100 to 150 150 to 200	140 150	450 500
AISI 1132, 1137, 1140, 1145, 1151	HR, A, N, CD Q & T Q & T Q & T	175 to 225 275 to 325 325 to 375 375 to 425	130 90 50 30	500 250 175 140
Plain Carbon Steels AISI 1012, 1015, 1018, 1019, 1020, 1022, 1024, 1025	HR, A, N, CD HR, A, N, CD HR, A, N, CD CD	100 to 125 125 to 175 175 to 225 225 to 275	140 120 100 70	500 400 350 300

Material	Condition	Hardness HB	Cutting Speed, fpm	
			High-Speed Steel	Carbide
AISI 1027, 1029, 1030, 1032, 1035, 1037, 1040, 1043, 1045, 1047, 1050	HR, N, A, CD HR, N, A, CD N, CD, Q & T, N, Q & T Q & T Q & T	125 to 175 175 to 225 225 to 275 275 to 325 325 to 375 375 to 425	120 100 70 60 50 40	400 350 300 240 200 175
AISI 1055, 1060, 1065, 1070, 1074, 1080, 1085, 1090, 1095	HR, N, A, CD HR, N, A, CD N, CD, Q & T, N, Q & T Q & T Q & T	125 to 175 175 to 225 225 to 275 275 to 325 325 to 375 375 to 425	100 90 65 55 45 30	375 325 275 225 180 150
Free Machining Alloy Steels (Resulphurized) AISI 3140, 4140, 4150, 8640	HR, N, A, CD HR, N, A, CD Q & T Q & T Q & T	175 to 200 200 to 250 250 to 300 300 to 375 375 to 425	125 100 70 60 40	450 400 325 225 150
Alloy Steels AISI 1320, 2317, 2512, 2517, 3115, 3120, 3125, 3310, 3316, 4012, 4017, 4023, 4028, 4320, 4615, 4620, 4720, 4815, 4820, 5015, 5020, 5024, 5120, 6118, 6120, 6317, 6325, 6415, 8115, 8615, 8620, 8625, 8720, 8822, 9310, 9315	HR, A, CD HR, A, N, CD CD, N, Q & T N, Q & T N, Q & T Q & T	150 to 175 175 to 220 220 to 275 275 to 325 325 to 375 375 to 425	110 80 70 60 50 40	400 350 300 250 200 175

* Based upon a feed of 0.012 inch per revolution and a depth of cut 0.125 inch.

Material Condition: HR - Hot Rolled, A - Annealed, N - Normalized, CD - Cold Drawn or Cold Rolled, Q & T - Quenched and Tempered, AC - As Cast, ST & A - Solution Treated and Aged.

The lathe RPM must be set so that the cutting tool will be operating at the correct cutting speed. To set the proper speed, you need to calculate the proper revolution per minute or RPM setting.

4.10 Calculating RPM

The RPM setting depends on the cutting speed and the diameter of the part. The RPM setting will change with the diameter of the part. As the diameter of the part gets smaller, the RPM must increase to maintain the recommended surface feed. Conversely, as the diameter of the part gets larger, the RPM must decrease. Therefore, to maintain the recommended cutting speed, larger diameter parts must be run at slower speeds than a smaller diameter part.

To calculate the proper RPM for the tool and the workpiece, the following formula should be used:

$$\frac{\textbf{Cutting Speed (Cs) x 4}}{\textbf{Part Diameter (D)}}$$

This simplified version of the RPM formula can be used for other machining operations as well.

Let's use this formula to work in calculating the RPM for the machining example below. Use the recommended cutting speed charts ☞ "Recommended Cutting Speeds in Feet per Minute for Turning Ferrous and Nonferrous Metals*“ on page 44.

A cut is to be made with a high-speed steel (HSS) tool on a 2-inch diameter piece of 1018 steel with a Brinnel Hardness of 150 HB. Calculate the RPM setting to perform this cut.

Cutting Speed (CS) = 120 fpm
Diameter of part (D) = 2”

$$\textbf{RPM} = \frac{\textbf{Cs x 4}}{\textbf{D}} = \frac{\textbf{120 x 4}}{\textbf{2}} = \frac{\textbf{480}}{\textbf{2}} = \textbf{240 RPM}$$

Since the available spindle speed settings are generally not infinitely variable, the machine cannot be set precisely to the calculated RPM setting. Some judgment must be made in selecting the speed to use. Try to get to the speed which is nearest to the calculated RPM, but if you can't, consider these conditions. Are you roughing or finishing? If you are roughing, go slower. If you are finishing, go faster. What is your depth of cut? If it is a deep cut, go to the slower RPM setting. Is the setup very rigid? Go slower for setups that lack a great deal of rigidity. Are you using coolant? You may be able to go to the faster of the two settings if you are using coolant.

The greatest indicator of cutting speed is the color of the chip. When using a high-speed steel cutter the chips should never be turning brown or blue. Straw-colored chips indicate that you are on the maximum edge of the cutting speed for your cutting conditions. When using carbide, chip colors can range from amber to blue, but never black. A dark purple color will indicate that you are on the maximum edge of your cutting conditions.

Let's try some other examples:

A cut is to be taken with a (HSS) turning tool on a 1/2 inch piece of 1045 steel with a Brinnel Hardness of 250 HB. Calculate the RPM setting to perform this cut.

Cutting Speed (CS) = 70 fpm

Diameter of part (D) = 0.5"

$$\textbf{RPM} = \frac{\textbf{Cs x 4}}{\textbf{D}} = \frac{\textbf{70 x 4}}{\textbf{0.5}} = \frac{\textbf{280}}{\textbf{0.5}} = \textbf{560 RPM}$$

A 3/8-inch (HSS) drill is used on a 4-inch diameter piece of 1012 steel with a hardness of 100 HB. Calculate the RPM setting to perform this drilling operation.

Cutting Speed (CS) = 140 fpm

Diameter of the drill (D) = 0.375"

$$\textbf{RPM} = \frac{\textbf{Cs x 4}}{\textbf{D}} = \frac{\textbf{140 x 4}}{\textbf{0.375}} = \frac{\textbf{560}}{\textbf{0.375}} = \textbf{1493 RPM}$$

Note that the diameter of the drill and not the workpiece was used for RPM calculation. This was done because the cutting takes place at the diameter of the drill, not on the outside diameter of the workpiece.

A turning operation is to be done on a 3.00-inch piece of 4140-alloy steel with a hardness of 200 HB. A carbide turning tool is to be used. Calculate the RPM setting to perform this cut.

Cutting Speed = 400 fpm
Diameter of part = 3”

$$\textbf{RPM} = \frac{\textbf{Cs x 4}}{\textbf{D}} = \frac{\textbf{400 x 4}}{\textbf{3}} = \frac{\textbf{1600}}{\textbf{3}} = \textbf{533 RPM}$$

4.10.1 Selecting Feed per Revolution

There are three factors that make up cutting conditions; cutting speed, depth of cut, and feed rate. The feed rate for turning is given in terms of inches per revolution (IPR). Inches per revolution is the rate at which the tool will advance for every revolution of the workpiece Fig. 4-19: “Feed per revolution“ on page 47. The feed rate is determined by the size of the chip that the tool can withstand. The feed rate in inches per tooth is also known as chip load. Because turning tools have only one cutting edge, the chip load is expressed as inch per revolution.

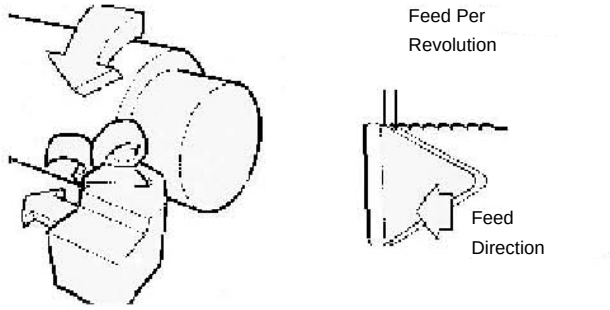


Fig. 4-19: Feed per revolution

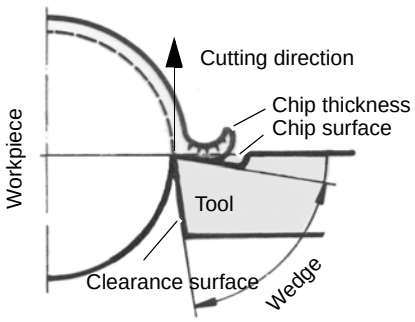
The recommended values for chip load are based on the cutting tool material and the hardness or machinability rating of the workpiece material. The recommended values for IPR (chip load) can be found in charts in the Machinery's Handbook and charts given to you by your turning tool salesperson. A typical feed in inches per revolution is shown ☞ "Recommended Feed Rate Selection in Inches Per Revolution for Turning“ on page 47.

4.10.2 Recommended Feed Rate Selection in Inches Per Revolution for Turning

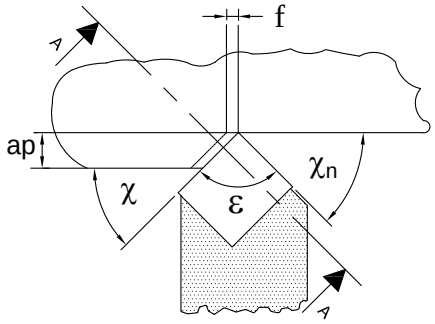
Material	High-Speed Steel		Carbide	
	Roughing	Finishing	Roughing	Finishing
Low Carbon Steel	0.010 to 0.020	0.002 to 0.008	0.008 to 0.035	0.006 to 0.010
Med. Carbon Steel	0.008 to 0.018	0.002 to 0.008	0.008 to 0.030	0.006 to 0.010
High Carbon Steel	0.008 to 0.015	0.002 to 0.008	0.008 to 0.030	0.006 to 0.010
Cast Iron	0.010 to 0.025	0.003 to 0.010	0.010 to 0.040	0.008 to 0.012
Bronze	0.015 to 0.025	0.003 to 0.010	0.010 to 0.040	0.008 to 0.012
Aluminum	0.015 to 0.030	0.003 to 0.012	0.015 to 0.045	0.008 to 0.012

While the recommended feed rates found in these charts represent good fundamental machining practice, they are only recommended values. Deviations from these values may be necessary due to certain circumstances, such as long, small diameter workpieces. The feed rate used on small diameter workpieces may need to be reduced. The work-holding technique has a great deal to do with the feed rate selection. Setups, which lack rigidity, may require a slower feed rate. The distance that the unsupported part sticks out of the work-holding mechanism must be kept to a minimum to assure proper rigidity. The required workpiece finish will also affect the feed rate selection. Finer finish requirement will require a slower feed rate selection. When using carbide-turning tools, the available horsepower and the rigidity of the spindle bearings could influence the feed rate as well.

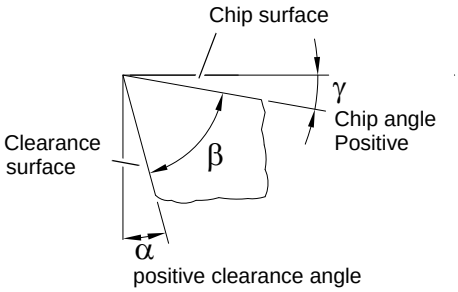
4.11 Terms for the lathe tool



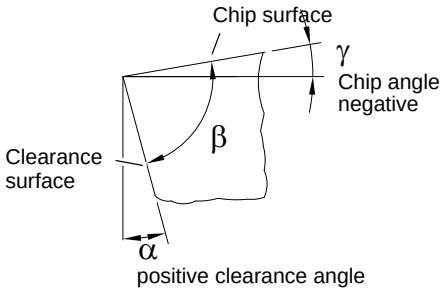
Img.4-20: Geometrically determined cutter for the separation process



Img.4-21: Cut and chip size



Img.4-22: Cut A - A, positive cutter



Img.4-23: Cut A - A, negative cutter

Wedge angle	β	The following factors influence the chip break when turning	
Chip angle	γ	Setting angle	χ
Clearance angle	α	Corner radius	r
Clearance angle minor cutting edge	α_n	Cutting edge geometry	
Setting angle	χ	Cutting speed:	Cs
Setting angle minor cutting edge	χ_n	Depth of cut:	ap
Point angle	ε	Feed	fpm
Depth of cut:	ap		
Feed	fpm		

In most cases the setting angle is depending on the work piece. A setting angle of 45° to 75° is suitable for roughing. setting angle of 90° to 95° (no tendency to chattering) is suitable for planing.

The corner angle serves as passing from the major cutting edge to the minor cutting edge. Together with the infeed it determines the surface quality. The corner radius must not be selected too large as this might result in vibrations.

4.11.1 Cutting edge geometry for turning tools

	High-speed steel		Hard metal	
	Clearance angle	Chip angle	Clearance angle	Chip angle
Steel	+5° to +7°	+5° to +6°	+5° to +11°	+5° to +7°
Cast non	+5° to +7°	+5° to +6°	+5° to +11°	+5° to +7°
non-ferrous metal	+5° to +7°	+6° to +12°	+5° to +11°	+5° to +12°
aluminium alloys	+5° to +7°	+6° to +24°	+5° to +11°	+5° to +24°

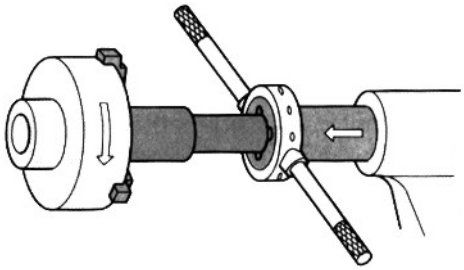
4.12 Tapping of external and internal threads

Threads with smaller diameters and standard thread pitches should be tapped manually on the lathe with screw-taps or dies by turning the clamping chuck as this is more simple to produce.

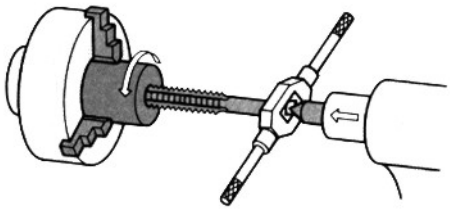
CAUTION!

Pull off the mains plug of the lathe if you want to tap a thread as described above.

Bolts and nuts with large thread diameters, deviating thread pitches or special types of thread,

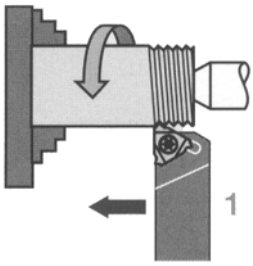


Img. 4-24: die

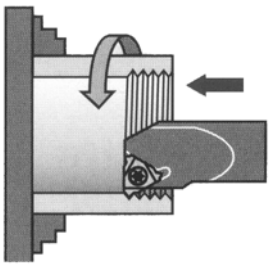


Img. 4-25: screw tap

right-handed and left-handed threads may be produced by threading. For this manufacturing there are as well tool holders and drill rods with exchangeable indexable inserts (one-edged or multiple-edged).



Img. 4-26: tap external thread



Img. 4-27: tap internal thread

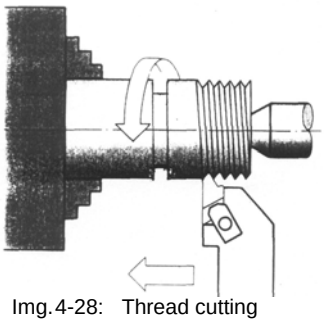
4.12.1 Examples for thread cutting

As an example, a metric external thread M30 x 1.0 mm made of brass is being machined.

➜ Steel sheets are to be laid under the complete tool holder or turning tool to achieve exactly the turning center.

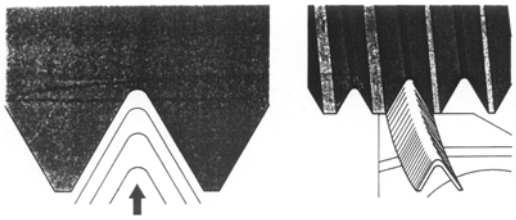
➜ The lowest spindle speed is set so that the lathe will not coast too long !

➜ Mount gear pairing for pitch 1.0mm in the change gear !



Img.4-28: Thread cutting

The outer diameter had been turned to 30.0mm and the tool holder is clamped in the quadruple holder for threading aligned angular to the rotation axis. The height of centres is checked (as described).



Img.4-29: radial infeed

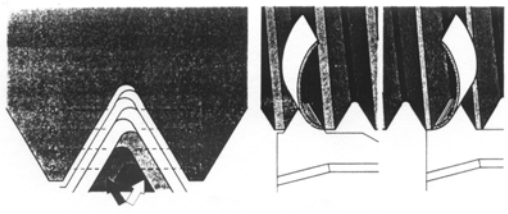
The depth of thread is manufactured in various passes. The infeed is to be reduced after each pass.

The first pass takes place with an infeed of 0.1 - 0.15 mm per turn.

For the last pass the infeed shall not be below 0,04mm per turn.

For pitches up to 1.5mm the infeed may be radial.

For our example 5 to 7 passes are being determined.



Img.4-30: Alternate infeed

For larger pitches the alternate flank infeed is selected. The compound slide is from the 2nd passage in each case 0.05 - 0.10 mm adjusted alternately to the left and right. The last two passes are performed without lateral offset. When the depth of thread is achieved, two passes are performed without infeed.

To machine internal threads, about 2 passes shall be selected additionally for the infeed (drill rods are more instable).

The cutting point is slit slightly by turning the handwheel of the cross slide the scale is turned to zero. This is the point of departure for the infeed of the depth of thread.

The scale of the compound slide is also set to zero (this is important for the lateral offset when-turning threads with larger pitches).

The cutting point is set just in front of the starting point of the start of the thread by actuating thehandwheel of the bedslide.

The cutting point is set just in front of the starting point of the start of the thread by actuating thehandwheel of the bedslide. With this connection, the adjusted thread pitch is transferred to the bedslide and to the tool holder.

ATTENTION!

This connection must not be disconnected until the thread is finished!

Starting the threading:

- Radial infeed over the handwheel of the cross slide.
- Turn the change-over, switch to the right
- Start the machine and have the first cutting process run.

ATTENTION!

Always have the thumb ready on the OFF-switch in order to prevent a collision with the workpiece or with the clamping chuck !

- Immediately turn off the machine at the run out of the thread and cam the cutter out by turning the handwheel of the cross slide.
- Turn the change-over, switch to the left.
- Turn the machine on and return the bedslide to the starting point and switch the machine off.
- Radial infeed over the handwheel of the cross slide.
- Turn the change-over, switch to the right
- Switch the machine on and have the second cutting process run.
- Repeat this procedure as often as necessary until the depth of thread is achieved.
- To check the thread you may use a thread gauge or a workpiece with an internal thread M30 x 1.0
- If the thread is having the exact size, the thread cutting process may be terminated. Now you may again shift the operating lever of the lead-screw nut in standstill. In this way, the connection between the lead spindle and the bedslide is interrupted.
- Now the toothed wheels for the longitudinal feed are to be mounted again!

4.13 General working advice - coolant

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 edge life of the cutting tool.

INFORMATION

Use a water-soluble and non-pollutant emulsion as a cooling agent. This can be acquired from authorised distributors.

Make sure that the cooling agent is properly retrieved. Respect the environment when disposing of any lubricants and coolants. Follow the manufacturer’s disposal instructions.

5 Maintenance

In this chapter you will find important information about

- Inspection
- Maintenance
- Repairs

of the lathe.

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.

5.1 Safety

WARNING!

The consequences of incorrect maintenance and repair work may include:

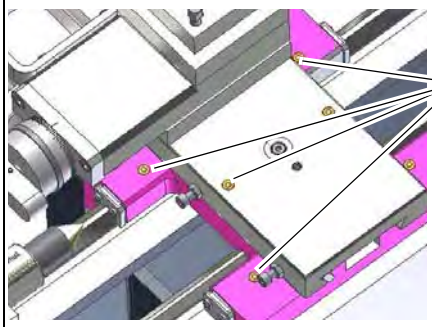
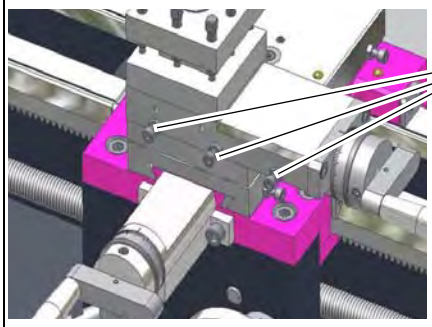
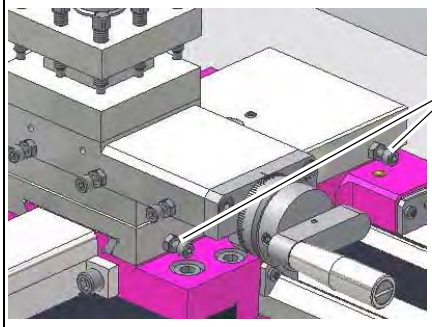
- **Very serious injury to personnel working on the lathe,**
- **Damage to the lathe.**

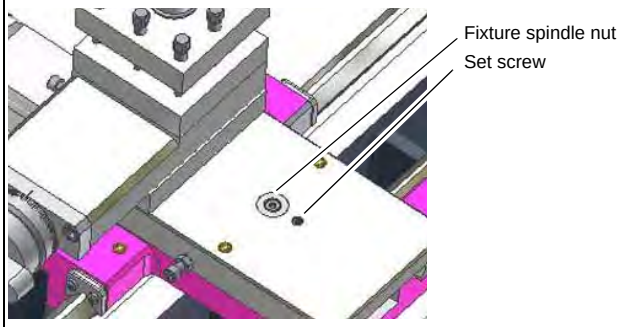
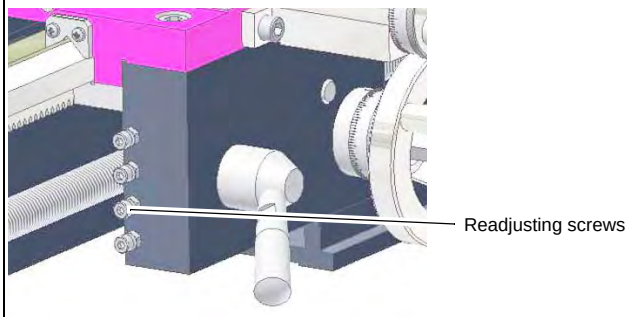
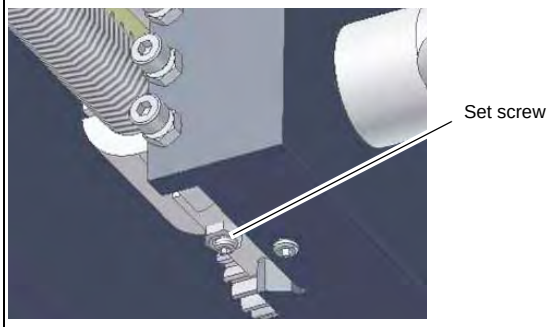
Only qualified personnel should carry out maintenance and repair work on the lathe.

5.2 Inspection and maintenance

The type and level of wear depends to a large extent on the individual usage and operating conditions. For this reason, all the intervals are only valid for the authorised conditions.

Interval	Where?	What?	How?
every week	**Machine bed**	Lubricate	Oil all blank machine parts using an acid-free lubricating oil. ☞ "Operating material“ on page 18
	Spindle stock	Testing	Make sure the tension of the synchronous belt is correct. Img. 4-6: “V-belt position change“ on page 34
		Lubricating	Slightly lubricate the change wheels and the lead screw with a lithium grease.

Interval	Where?	What?	How?
every week	**Lathe saddle**	Lubricating	Lubricate the lubricating nipples on the lathe saddle.  Abb.5-1: Lathe saddle
half-yearly	**Spindle stock**	Visual inspection	Control if the synchronous belts are porous or worn.
as required	**Compound slide**	Readjusting	Readjust the guide clearance of the compound slide.  Abb.5-2: Lathe saddle
as required	**Cross slide**	Readjusting	Readjust the guide clearance of the cross slide.  Abb.5-3: Lathe saddle

Interval	Where?	What?	How?
as required	**Spindle nut of the cross slide**	Readjusting	The set screw widens the flanks of screw thread of the spindle nut. If required, turn the set screw only slightly. A too widened set screw will lead to excessive wear.  Abb.5-4: Lathe saddle
as required	**Lead- screw nut**	Readjusting	The clearance of the lead-screw nut for opening and closing may be readjusted.  Abb.5-5: Lathe saddle
as required	**Lead- screw nut**	Readjusting	The locking split of the lead-screw nut may only be adjusted when it is closed. If the locking split is too small or too large this will lead to excessive wear.  Abb.5-6: Lathe saddle

INFORMATION

The work spindle bearing is pre lubricated. It is not necessary to lubricate it again.

5.3 Repairs

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 C.H.HANSON Industries at 1-630-785-6437

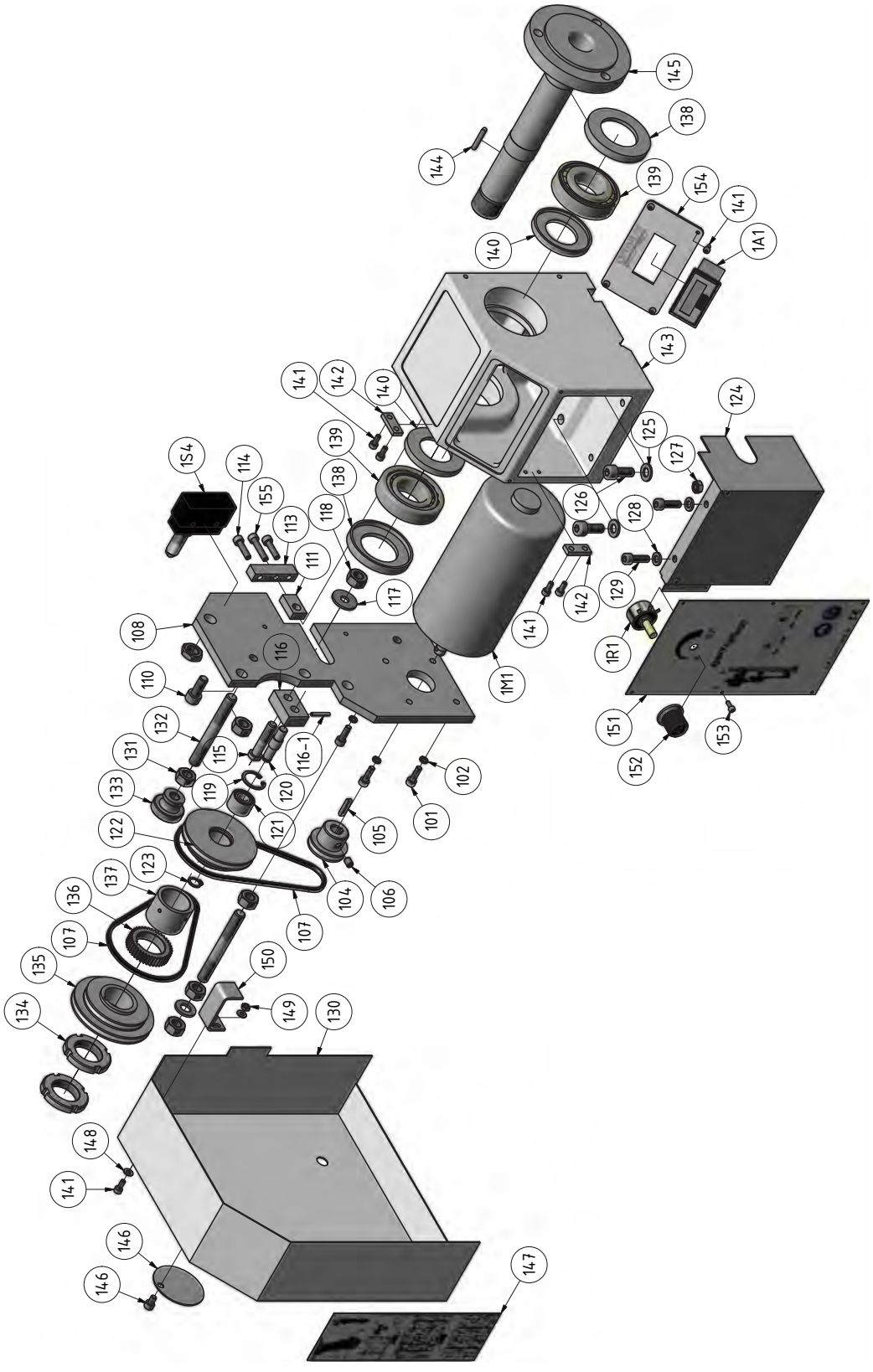
Company and C.H.HANSON Industries are not liable for, nor do they warranty against, damage or operating malfunctions resulting from alteration, abuse, lack of maintenance or this product's use for other than its intended purpose. Failure to read and follow this operating manual is not covered.

For repairs only use

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

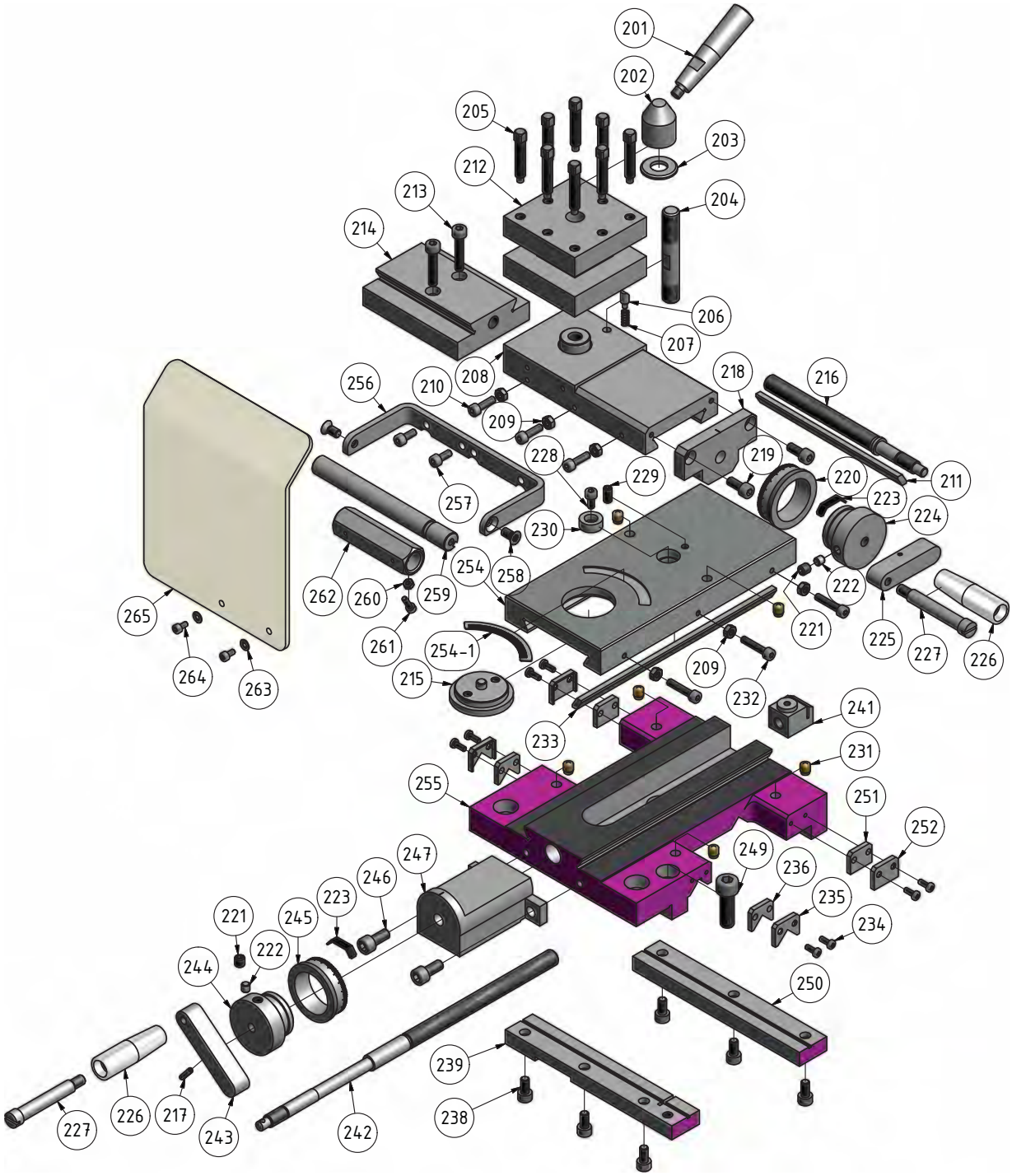
6 Spare parts - TU2004V

6.1 Drive



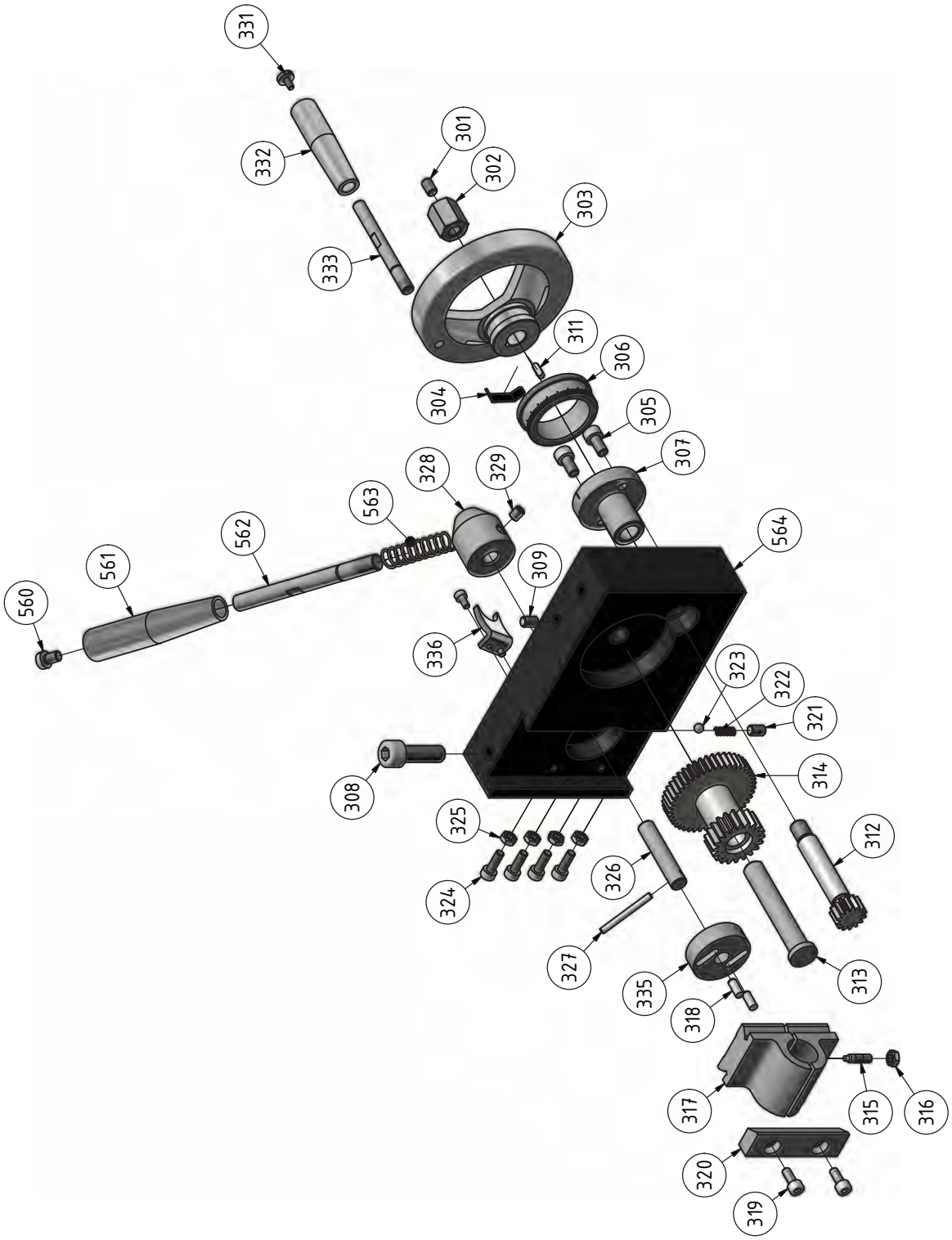
Img. 6-1: Drive

6.2 Compound slide and cross slide



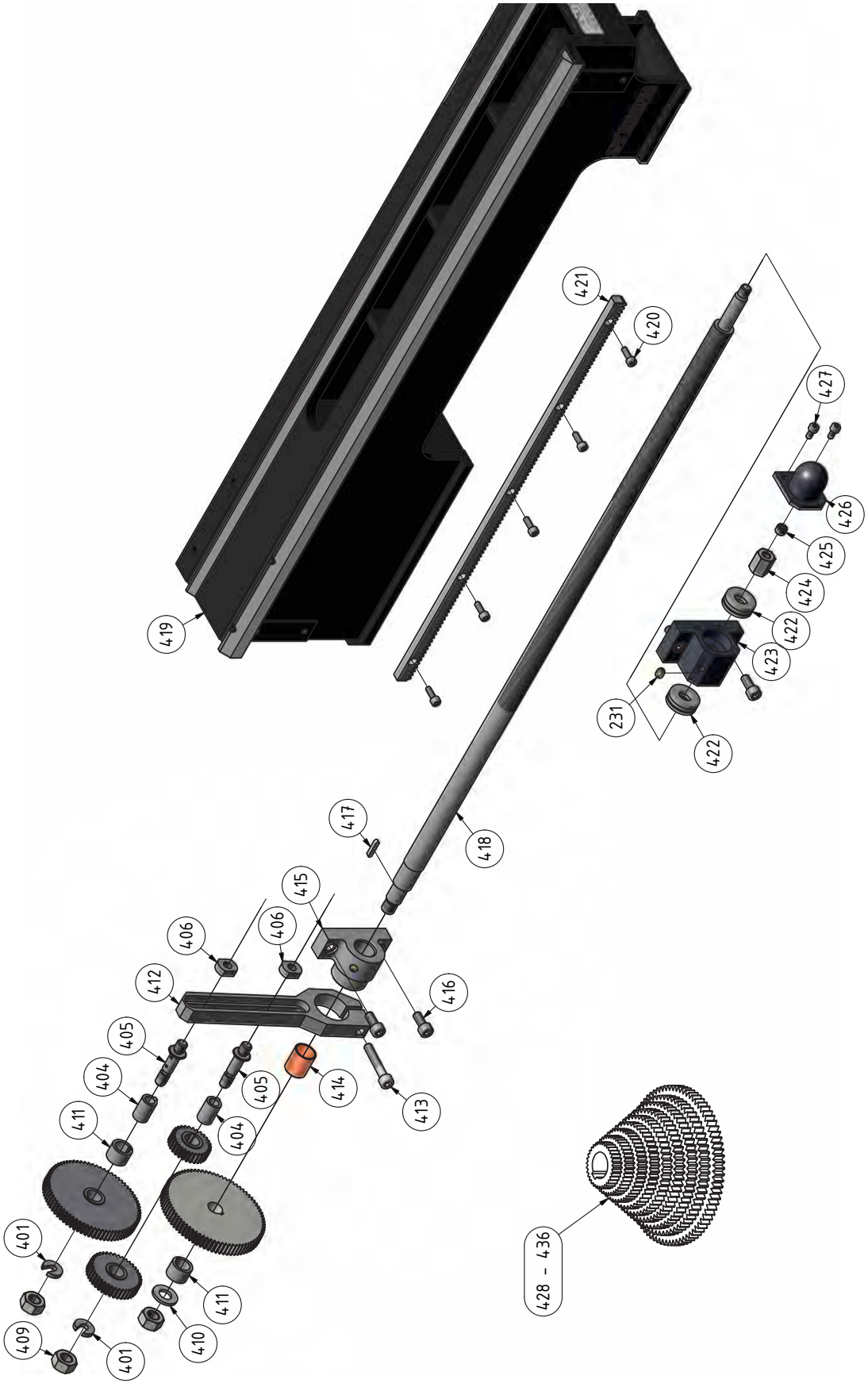
Img. 6-2: compound slide and cross slide

6.3 Lathe saddle



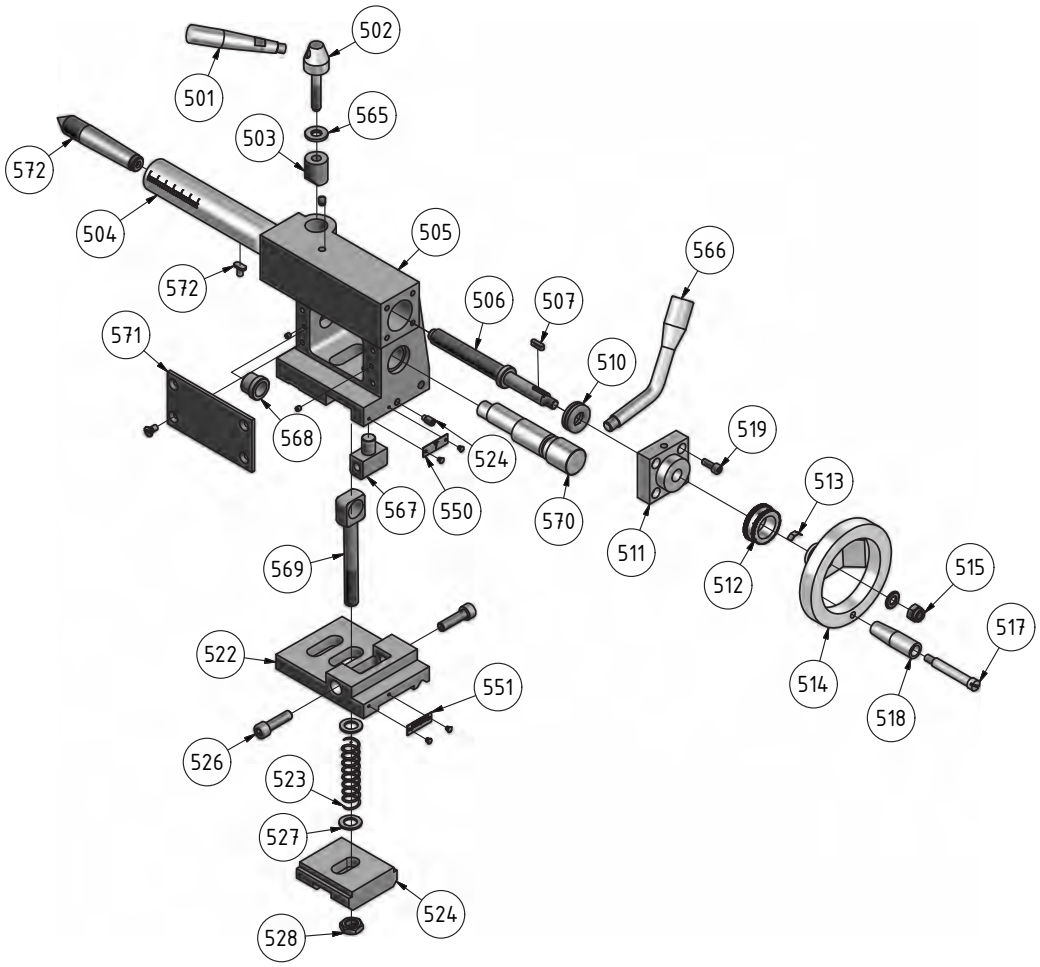
Img.6-3: Lathe saddle

6.4 Lathe bed



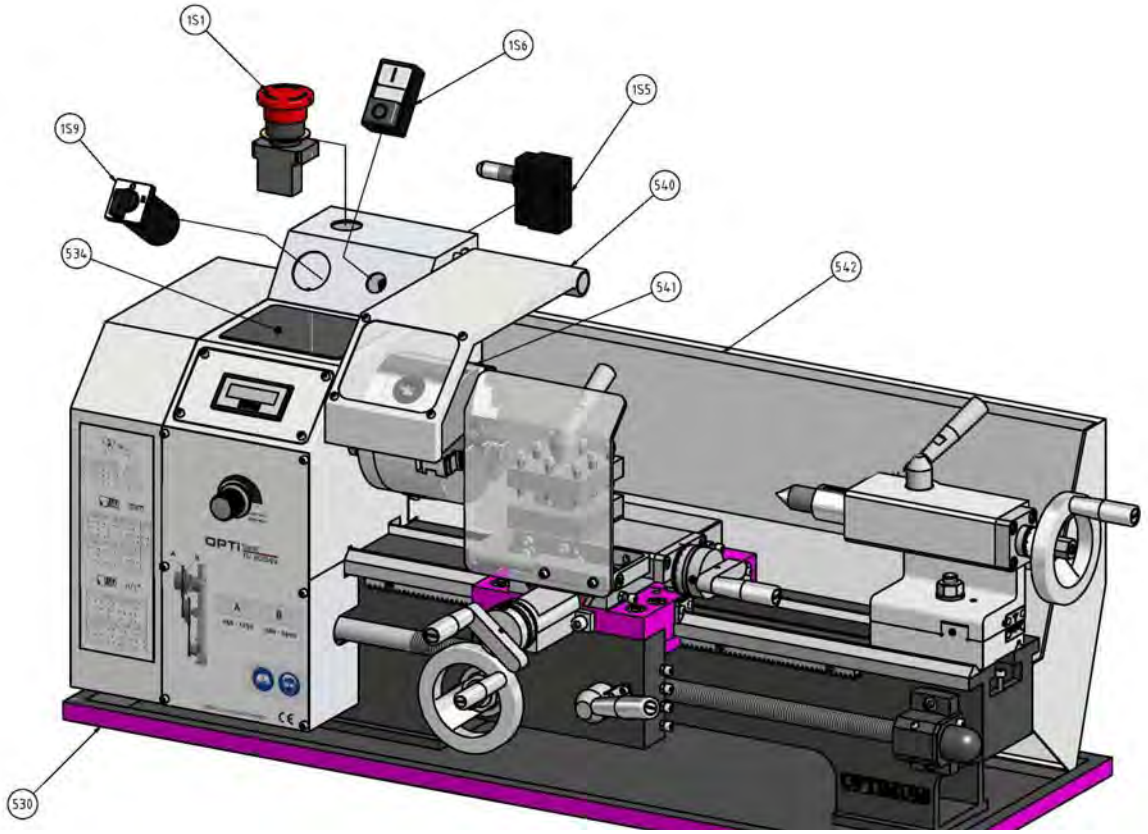
Img. 6-4: Lathe bed

6.5 Tailstock

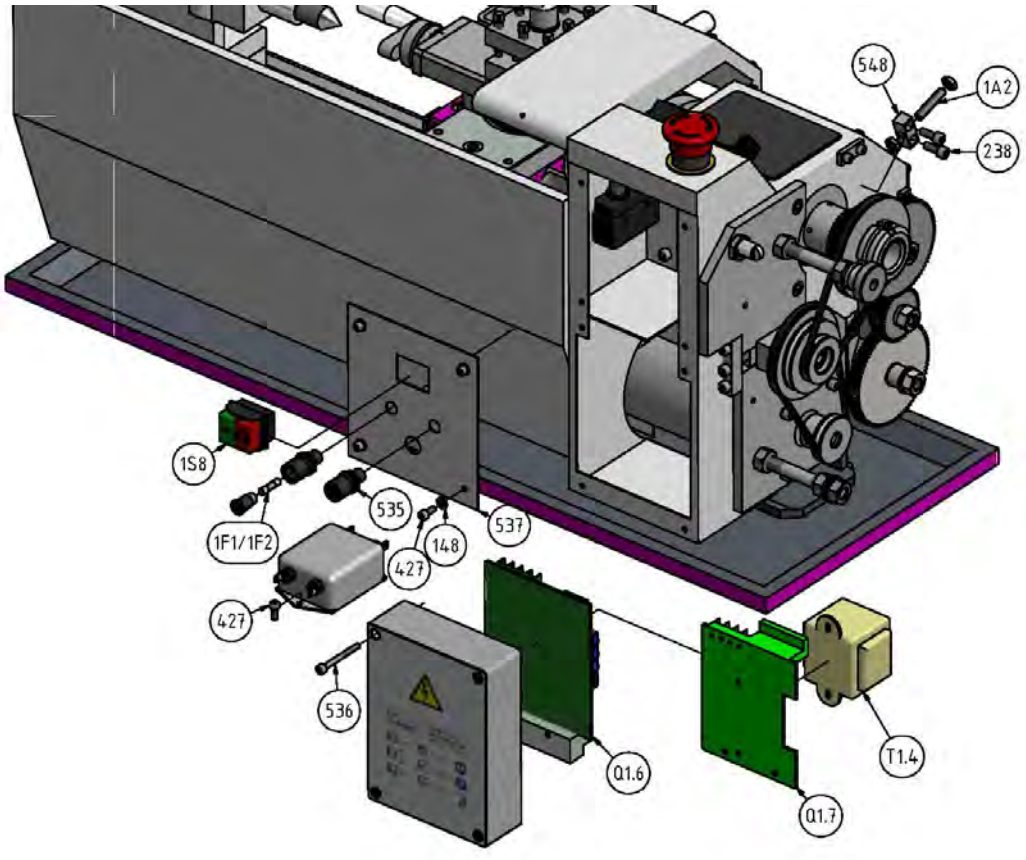


Img. 6-5: Tailstock

6.6 Accessory

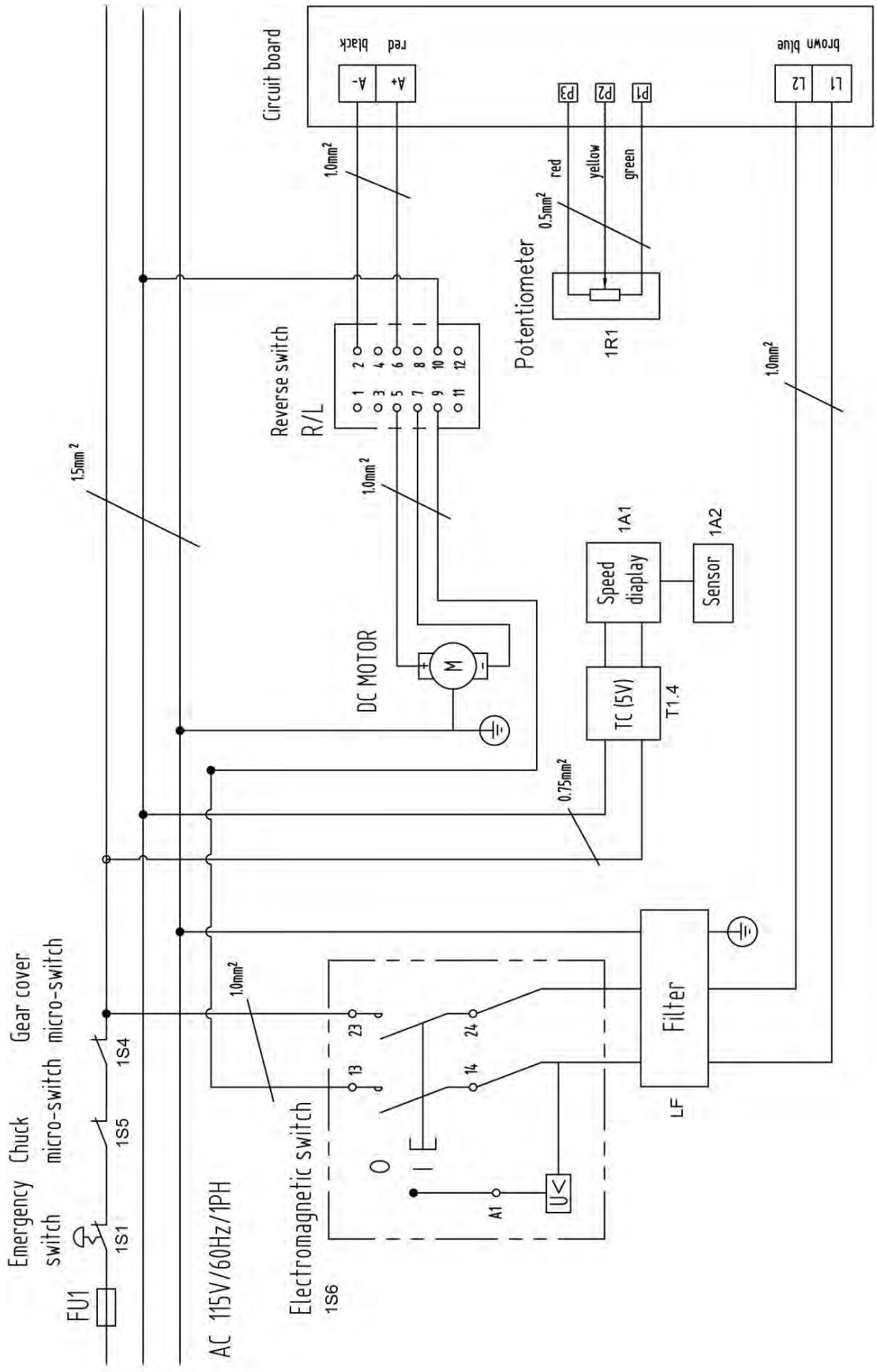


Img.6-6: Front view



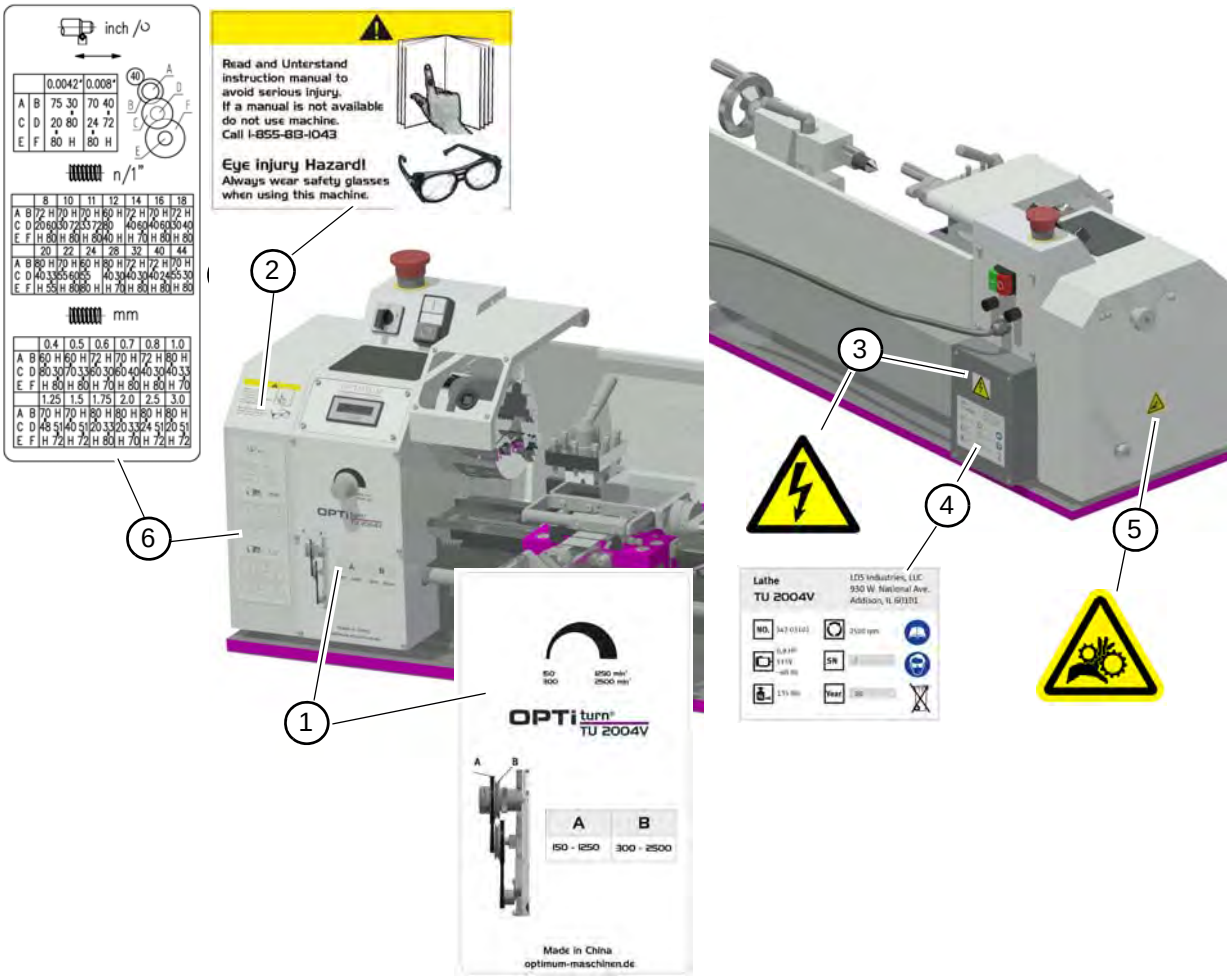
Img.6-7: rear view

6.7 Wiring diagram



Img.6-8: Wiring diagram

6.8 Machine labels



Img. 6-9: Machine labels

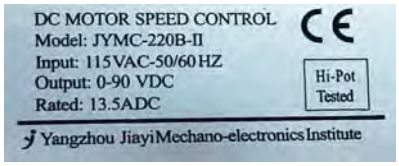
Pos.	Description	Quantity	Note	Item no.
1	Front label	1	Made in China	034203101L01
2	Instruction label	1	USA	034203101L02
3	Safety label	1	Electric	034203101L03
4	Type plate	1	LDS	034203101L04
5	Safety label	1	USA style	034203101L05
6	Feed & thread table	1	12 TPI lead screw	034203101L06

6.8.1 Spare parts list

Pos.	Description	Qty.	Size	Item no.
101	Hexagon socket screw	4	DIN 912 M5×25	
102	Split washer	4	DIN 127 5	03420310102
104	Motor pulley	1		03420310104
105	Key	1	DIN 6885-A4x4x20	03420310105
106	Set screw	1	DIN 915 M6×8	
107	Drive belt	2	Gates 5M-365	03420310107
108	Supporting plate	1		03420310108
109	Washer	3	8	
110	Hexagon socket screw	3	DIN 912 M8×20	
111	Sliding nut	1		03420310111
112	Hexagon socket screw	1	DIN 912 M6 x 30	
113	Thrust bearing	1		03420310113
114	Hexagon socket screw	2	DIN 912 M6 x 20	
115	Axis	1		03420310115
116	Bearing block	1		03420310116
116-1	Alignment pin	1	4x22	034203101161
117	Washer	1	8	
118	Hexagon nut	3	M8	
119	Locking ring	1	DIN 471-8 x 0.8	03420310119
120	Countershaft	1		03420310120
121	Deep groove ball bearing	2	608-RZ	040608.2R
122	Pulley countershaft	1		03420310122
123	Locking ring	1	DIN 471-22 x 1	03420310123
124	Bottom cover	1		03420310124
125	Washer	4	M8	
126	Screw	4	M8x25	
127	Nut	2	M5	
128	Washer	2	5	
129	Hexagon socket screw	2	DIN912/M5x25	
130	Pulley cover	1		03420310130
131	Nut	2	M10	
132	Threaded bolt	2	M10×80	03420310132
133	Knurled nut	2	M10	03420310133
134	Groove nut	2	DIN 1804-M27x1-w	03420310134
135	Drive pulley	1		03420310135
136	Toothed wheel	1	40 theeth	03420310136
137	Bushing	1		03420310137
138	Bearing cover	2		03420310138
139	Taper roller bearing	2	30206/P5	04030206
140	Bearing cover	2		03420310140
141	Hexagon socket screw	4	DIN 912 M4 x 10	
142	Fixing plate	2		03420310142
143	Headstock housing	1		03420310143
144	Key	1	DIN 6885-A3x3x15	03420310144
145	Spindle	1		03420310145
146	Hexagon socket screw	1	DIN 912 M4 x 10	
148	Washer	4	DIN 125/4	
149	Sechskantmutter	2	ISO 4032/M4	
150	Angle	1		03420310150
152	Knob	1		03420310152
153	Hexagon socket screw	6	DIN 912 M3 x 8	
155	Hexagon socket screw	1	DIN 912 M5 x 25	
201	Handle	1		03420310201
202	Clamping nut	1		03420310202
203	Washer	1		03420310203
204	Threaded bolt	1		03420310204
205	Hexagon socket screw	8	DIN 912 M6 x 25	
206	Stop bolt	1		03420310206
207	Spring	1	∅5x10x ∅l	03420310207
208	Compound slide	1		03420310208
209	Nut	12	M4	
210	Hexagon socket screw	3	DIN 912 M4×14	
211	Gib	1		03420310211
212	Tool holder	1		03420310212
213	Hexagon socket screw	2	DIN 912 M5 x 30	
214	Dovetail guide	1	20 TPI Ø 3/8"	034203101214
215	Swivel	1		03420310215
216	Spindle	1	20 TPI Ø 3/8"	034203101216

Pos.	Description	Qty.	Size	Item no.
217	Dowel pin	2	3x12	03420310217
218	Bearing block	1		03420310218
219	Hexagon socket screw	2	DIN 912 M5 x 12	
220	Scale ring	1	0.05"dial / 0.001"	034203101220
221	Set screw	2	DIN 915 M6 x 6	
222	Pin	2		03420310222
223	Spring steel sheet	2		03420310223
224	Guiding disk	2		03420310224
225	Lever	1		03420310225
226	Handle	2		03420310226
227	Fixing screw	2		03420310227
228	Hexagon socket screw	1	DIN 912 M4×8	
229	Set screw	1	DIN 914 M5 x 10	
230	Bushing	1		03420310230
231	Oiler	6	D=6mm	03420310231
232	Hexagon socket screw	3	DIN 912 M4×20	
233	Gib	1		03420310233
234	Tallow-drop screw	8	M3 x 8	
235	Holder stripper	2		03420310235
236	Stripper	2		03420310236
238	Hexagon socket screw	6	DIN 912 M5×10	
239	Fastening gib	1		03420310239
240	Hexagon socket screw	6	M4 x 10	
241	Spindle nut	1	20 TPI Ø 3/8"	034203101241
242	Spindle	1	20 TPI Ø 3/8"	034203101242
243	Lever	1		03420310243
244	Guide disk	1		03420310244
245	Scale ring	1	0.1"dial / 0.002"	034203101245
246	Hexagon socket screw	2	DIN 912 M6×50	
247	Bearing block	1		03420310247
249	Hexagon socket screw	1	DIN 912 M8×25	
250	Fixing gib	1		03420310250
251	Stripper	2		03420310251
252	Holder stripper	2		03420310252
254	Cross slide	1		03420310254
254-1	Scale	1		034203102541
255	Bed slide	1		03420310255
256	Holder	1		03420310256
257	Hexagonal socket screw	2	GB70-85/M4x10	
258	Screw	2	M5x10	
259	Shaft	1		03420310259
260	Hexagonal nut	1	GB6170-86/M3	
261	Hexagonal socket screw	1	GB70-85/M3x10	
262	Hexagonal case	1		03420310262
263	Washer	2	GB77.1-85/3	
264	Hexagonal socket screw	2	GB70-85/M3x6	
265	Splinter shield	1		03420310265
301	Set screw	1	DIN 9124 M8 x 8	
302	Fixing nut handwheel	1	M8 H=16mm	
303	Handwheel	1		03420310303
304	Spring steel sheet	1		03420310304
305	Hexagon socket screw	2	DIN 914 M5×10	
306	Scale ring	1	0.98"dial / 0.01"	034203101306
307	Track bed shaft	1		03420310307
308	Hexagon socket screw	2	DIN 912 M8×25	
309	Set screw	1	DIN 914 M5×8	
311	Key	1	DIN 6885-A3x3x8	03420310311
312	Gear shaft	1	14 theeth, module 1	03420310312
313	Shaft	1		03420310313
314	Gear combination	1	44/21 theeth, module 1 / 1,25	03420310314
315	Set screw	1	DIN 914 M4×35	
316	Nut	1	M4	
317	Apron nut	1	12 TPI Ø 5/8"	034203101317
318	Alignment pin	2	∅4 x 10	
319	Hexagon socket screw	2	DIN 912 M4×10	
320	Gib	1		03420310320
321	Set screw	1	DIN 913 M6×8	
322	Spring	1	∅0.6× ∅3.5×12	03420310322

Pos.	Description	Qty.	Size	Item no.
323	Steel ball	1	∅ 4.5	03420310323
324	Hexagon socket screw	4	DIN 912 M4×12	
325	Nut	4	M4	
326	Shaft	1		03420310326
327	Dowel pin	1	DIN 1481 3×30	03420310327
328	Turning knob	1		03420310328
329	Set screw	1	DIN 914 M5×6	
331	Screw	1		03420310331
332	Sleeve	1		03420310332
333	Shaft	1		03420310333
334	Retaining ring	1		03420310334
335	Washer	1		03420310335
336	Locking plate	1		03420310336
401	Locking wahser	2		03420310401
404	Bushing	2		03420310404
405	Axle shaft	2		03420310405
406	Nut stone	2	M8	03420310406
409	Nut	1	M10	
410	Disk	1	10	
411	Bushing	1		03420310411
412	Change gear shear	1		03420310412
413	Hexagon socket screw	1	DIN 912 M6×35	
414	Slide bearing	1		03420310414
415	Bearing block	1		03420310415
416	Screw	4	M6×14	
417	Key	1	DIN 6885-A3x3x16	03420310417
418	Lead screw		12 TPI Ø 5/8"	034203101418
419	Bed	1		03420310419
420	Hexagon socket screw	5	DIN 912 M4×12	
421	Rack	1		03420310421
422	Axial deep groove ball bearing	2	51100	04051100
423	Bearing block	1		03420310423
424	Fixing nut	1		03420310424
425	Adjusting screw set screw	1	DIN 915 M8×6	
426	Protective cover	1		03420310426
427	Hexagon socket screw	2	DIN 912 M4×10	
428 -436	Gear	2	80 teeth, module 1	0342031080Zmodule1
	Gear	1	72 teeth, module 1	0342031072Zmodule1
	Gear	1	70teeth, module 1	0342031070Zmodule1
	Gear	2	60 teeth, module 1	0342031060Zmodule1
	Gear	1	55 teeth, module 1	0342031055Zmodule1
	Gear	1	51teeth, module 1	0342031051Zmodule1
	Gear	1	48 teeth, module 1	0342031048Zmodule1
	Gear	1	40 teeth, module 1	0342031040Zmodule1
	Gear	1	33 teeth, module 1	0342031033Zmodule1
	Gear	1	30 teeth, module 1	0342031030Zmodule1
	Gear	1	24 teeth, module 1	0342031024Zmodule1
	Gear	1	20 teeth, module 1	0342031020Zmodule1
501	Clamping lever	1		03420310501
502	Clamping screw	1		03420310502
503	Clamping bushing	1		03420310503
504	Quill	1	inch scale	034203101504
505	Tailstock housing	1		03420310505
506	Tailstock spindle	1	20 TPI Ø 3/8"	034203101506
507	Key	1	DIN 6885-A3x3x8	03420310507
510	Axial deep groove ball bearing	1	51100	04051100
511	Bearing block	1		03420310511
512	Scale ring	1	0.05"dial / 0.002"	034203101512
513	Spring steel sheet	1		03420310513
514	Handwheel	1		03420310514
515	Fixing nut	1	M8 H=16mm	
517	Fixing screw	1		03420310517
518	Grip	1		03420310518
521	Set screw	2	DIN 915 M6×12	
522	Tailstock bottom part	1		03420310522
523	Spring	1	1×12×L	03420310523
524	Clamping plate	1		03420310524
526	Set screw	2	DIN 915 M6×16	
527	Washer	1	10	
528	Nut	1	M10	

Pos.	Description	Qty.	Size	Item no.
529	Revolving centre	1		03420310529
530	Chip tray	1		03420310997
534	Rubber place for tools	1		03420310631
535	Fuse housing	2		03420310535
536	Hexagon socket screw	4	DIN 912 M4×45	
537	Cover	1		03420310537
540	Protection lathe chuck	1		0342031000
541	3-jaw chuck	1		03420310639
542	Rear splash guard	1		03420310998
545	Cover	1		03420310545
548	Holder	1		03420310548
549	E-Box	1		03420310549
550	Scale top			03420310550
551	Scale below			03420310551
560	Slotted cheese head screw	1		03420310560
561	Handle engaging lever	1		03420310561
562	Shaft engaging lever	1		03420310562
563	Spring	1		03420310563
564	Apron handwheel left hand	1		03420310564
565	Washer	1		03420310565
566	Clamping lever	1		03420310566
567	Block	1		03420310567
568	Bushing	1		03420310568
569	Screw	1		03420310569
570	Bolt	1		03420310570
571	Cover	1		03420310571
572	Centering piece	1		03420310572
Spare parts electrical				
1A1	Rotation speed indicator	1		03020245167
1A2	Rotation speed sensor	1		03338120279
1S1	Emergency stop button	1		03338120S1.2
1S4	Cover safety switch	1		0460015
1S5	Protector chuck safety switch	1		0460015
1S6	On-Off switch	1	KJD17B/120V	0342025108-120V
R/L	Reverse switch	1		0460009
	Board, DC Motor speed control 	1	115VAC -50/60Hz Output 0-90 VDC	JYMC-220B-II
1R1	Potentiometer	1		03338120R1.5
		2	6A fast acting	034203101F1
LF	Line filter	1		03420310LF
M	DC Motor	1	115V ~ 60Hz Type: 83ZYT005A	83ZYT005A
T1.4	Transformer	1	120VAC/5VDC	034203101T1.4-USA
Parts without illustration				
	Key for lathe chucks	1		0340200
	Accessory box cpl.	1		034203101000
	Compound slide cpl.	1		034203101999
	Change gear set cpl.	1	Pos. 428 -436	034203101437
	Tailstock cpl.	1	inch	034203101996

7 Malfunctions

7.1 Malfunctions on the lathe

Malfunction	Cause/ possible effects	Solution
Surface of workpiece too rough	• Tool blunt • Tool springs • Feed too high • Radius at the tool tip too small	• Resharpen tool • Clamp tool with less overhang • Reduce feed • Increase radius
Workpiece becomes conical	• Compound slide is not exactly set to zero (when turning with the compound slide)	• Set compound slide to exact zero position
Lathe is chattering	• Feed too high • Main bearings have clearance	• Reduce feed • Have the main bearings readjusted
Center runs hot	• Workpiece has expanded	• Loosen tailstock center
Tool has a short edge life	• Hard casting skin • Cutting speed to high • Crossfeed to high • Insufficient cooling	• First break casting skin • 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 buildup) • Grinding cracks 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. If necessary, replace the tapered roller bearings.
Cut thread is wrong	• Tool is clamped incorrectly or has been started grinding the wrong way • Wrong pitch • Wrong diameter	• Adjust tool to the center • Grind angle correctly • Adjust right pitch • Turn the workpiece to the correct diameter

8 Appendix

8.1 LIMITED WARRANTY

COMPANY ONE-YEAR LIMITED WARRANTY*. COMPANY, MODELS COVERED IN THIS MANUAL, ARE WARRANTED BY COMPANY 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 COMPANY DESIGNATES, SHIPPING COSTS PREPAID, WILL BE, AS THE EXCLUSIVE REMEDY, REPAIRED OR REPLACED AT COMPANY. 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, COMPANY LIABILITY FOR CONSEQUENTIAL AND INCIDENTAL DAMAGES IS EXPRESSLY DISCLAIMED. COMPANY 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 COMPANY.*

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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 company products comply with such codes, company 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 company 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.*

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8.2 Copyright

8.3 Terminology/Glossary

Term	Explanation
Spindle stock	Housing for the feed gear and the synchronous belt pulleys.
Lathe chuck	Clamping tool for holding the workpiece.
Drill chuck	Drill bit chuck
Lathe saddle	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.
Compound slide	Swivelling slide on the cross slide.
Taper mandrel	Taper of the bid, the drill chuck or the center.
Tool	Cutting tool, 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 centers.

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