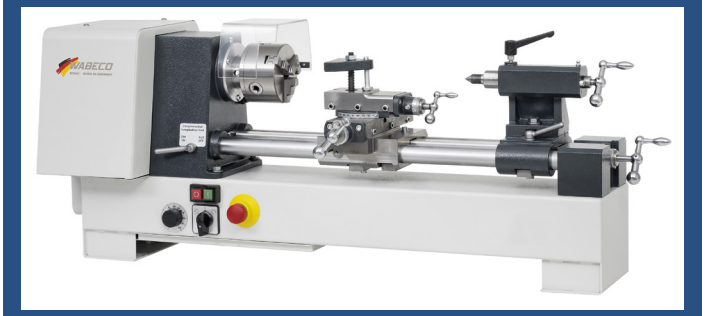

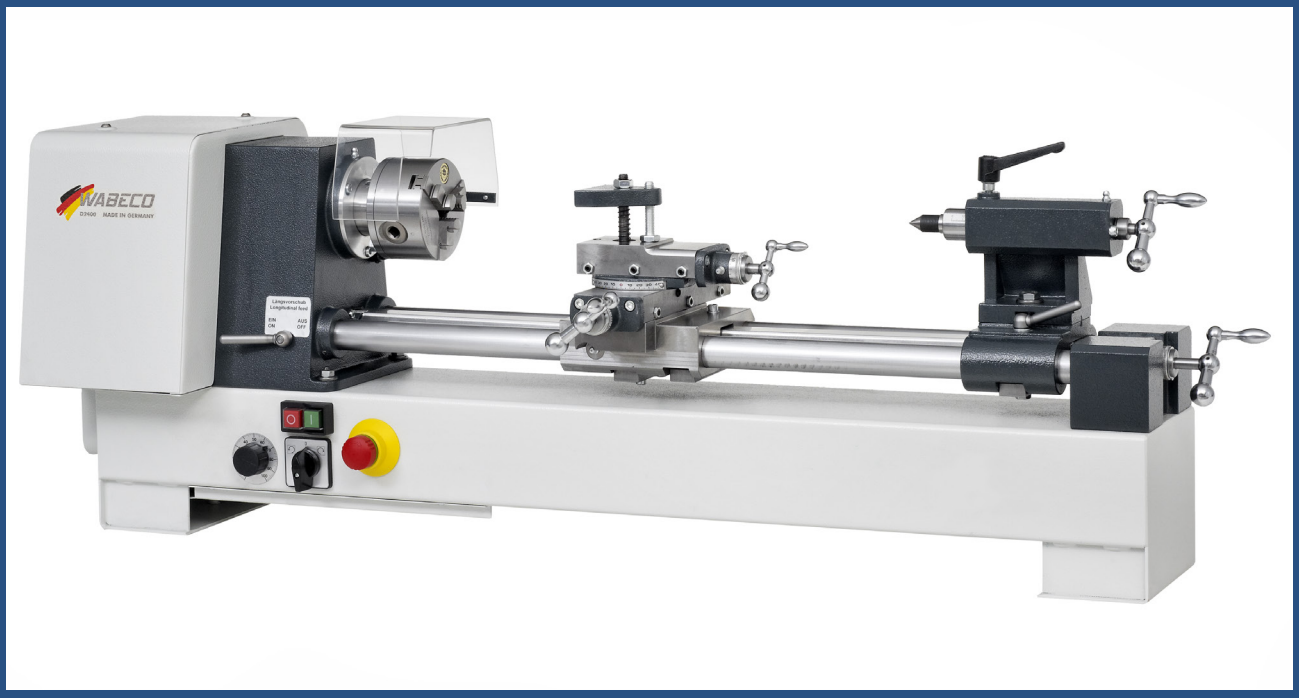

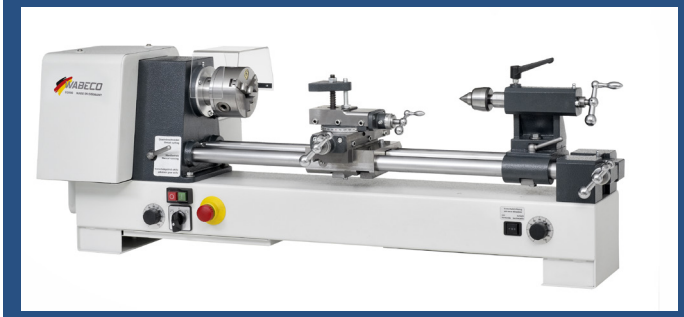

Operating Instructions

Lathes

with cylindrical guideways

D2000 D2400 D3000

WABECO

MASCHINENMANUFAKTUR seit 1885

Please read before putting into operation for the first time!

Every person that operates the machine, maintains or repairs it, must have read the operating instructions, and in particular, the safety notes prior to putting the machine into operation. Please store these documents for subsequent use.

Original version in German/translation in English
Status at 06/2018

Dear Customer!

With the purchase of the **WABECO machine** you have decided in favour of a quality tool. This machine has been manufactured with the greatest of care and subject to precise quality controls.

These operating instructions are designed to help you to use your new machine safely and correctly. For this reason, we ask you to read the appropriate notes through attentively and to take care to observe them.

After unpacking the tool, check whether any transportation damages have occurred. Complaints, whatever their nature, should be communicated immediately. Subsequent claims **cannot** be recognised.

For all queries and replacement part orders, **please always specify the machine number** (see type plate).

Disposing of the machine

The transportation and protective packaging is made of the following materials:

- Corrugated card
- Polystyrene without Freon
- Polyethylene foil
- Timber as single-use pallet (untreated)
- Euro pallet (multiple use packaging)

If you no longer need the items, or you do not want to reuse them, dispose of these items at the officially recognised recycling points.

The machine is manufactured in such a way that 98% of the used materials that can be recycled, for example, steel, cast iron, aluminum and only 2% are chemical materials, e.g. cable sleeves of electrical cables, PCBs.

If you have any difficulties in disposing of these parts properly, we would be happy to help: with prior agreement we will take back the machine in full and dispose of it. You must, however, cover the costs of sending it to us.

Walter Blombach GmbH
42899 Remscheid
Am Blaffertsberg 13
Germany

Phone +49 2191 597-0
Fax +49 2191 597-42
E-Mail info@wabeco-remscheid.de

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Declaration of conformity

We hereby declare, in the name of the manufacturer

Walter Blombach GmbH

Werkzeug- und Maschinenfabrik
with headquarters in Remscheid and Neuerburg

D-42871 Remscheid	Postfach 12 01 61	Telefon: (02191) 597-0	Fax: (02191) 597-42
D-54673 Neuerburg	WABECO Str. 1-10	Telefon: (06564) 9697-0	Fax: (06564) 9697-25

that the following named

Universal lathe

Type:

D2000

in the serial version, meets the following relevant regulations

- **Machinery Directive 2006/42 EG**
- **EMC Directive 2014/30/EU**
- **Low Voltage Directive 2014/35/EU**

In order to fulfil/implement the requirements of the directives named above, the already published and applicable standards were drawn upon:

EN ISO 12100:2010
DIN EN 60204-1:2007
DIN EN ISO 23125:2015

Proxy for the compilation of the technical documentation is the operational head of the above named manufacturer, Mr Christoph Schneider.

D-54673 Neuerburg 2018

Place and date of issue

Operational head Christoph Schneider

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Werkzeug- und Maschinenfabrik
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D-54673 Neuerburg	WABECO Str. 1-10	Telefon: (06564) 9697-0	Fax: (06564) 9697-25

that the following named

Universal lathe

Type:

D2400

in the serial version, meets the following relevant regulations

- **Machinery Directive 2006/42 EG**
- **EMC Directive 2014/30/EU**
- **Low Voltage Directive 2014/35/EU**

In order to fulfil/implement the requirements of the directives named above, the already published and applicable standards were drawn upon:

EN ISO 12100:2010
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D-54673 Neuerburg 2018

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D-54673 Neuerburg	WABECO Str. 1-10	Telefon: (06564) 9697-0	Fax: (06564) 9697-25

that the following named

Universal lathe

Type:

D3000

in the serial version, meets the following relevant regulations

- **Machinery Directive 2006/42 EG**
- **EMC Directive 2014/30/EU**
- **EU Low Voltage Directive 2014/35/EU**

In order to fulfil/implement the requirements of the directives named above, the already published and applicable standards were drawn upon:

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D-54673 Neuerburg 2018

Place and date of issue

Operational head Christoph Schneider

1. Important safety notes

1.1 Intended use

The lathes described in these operating instructions are designed for the processing of metal, plastic and timber only.

To ensure safe operation of the lathes, the regulations set out in the chapter: „Safety regulations“ must be observed.

1.2 Improper and incorrect use

The lathes described in these operating instructions have been developed and manufactured for the purpose named above. Walter Blombach GmbH accepts no responsibility for property damage and personal injury caused as a result of not intended and incorrect use of the lathes.

1.3 Modifications to the machine

For reasons of safety, it is forbidden for the user to make modifications of any type to the lathe.

Walter Blombach GmbH accepts no responsibility for property damage and personal injury caused as a result of any modifications to the lathe by the user that have not expressly been authorised by the company.

1.4 Safety regulations for proper use

The machine may represent a source of danger if it is not used correctly. For this reason, it is important that the following safety regulations are read attentively and observed carefully.

Every person that operates the machine, maintains or repairs it, must have read the operating instructions, and in particular, the safety notes prior to putting the machine into operation.

In order to fulfil these requirements, these operating instructions must accompany the machine throughout its entire lifetime and be available for research.

In the event that the machine changes owners, the operating instructions must thus be passed on to the new owner along with the machine.

1. Important safety notes

1.4 Safety regulations for proper use

1. Only specially trained persons may operate the machine. The guarantee and warranty are voided if damages are caused by improper operation.
2. We remind you that no liability will be accepted for damages caused by not observing these operating instructions.
3. The operator of the machine is to ensure that at least one copy of the operating instructions is stored in the immediate vicinity of the machine and available to the people who work with the machine.
4. The operator is to ensure that the safety and danger notifications on the machine are observed and that the signs are kept in a legible state.
5. Do not work without goggles.
6. Wear close fitting clothing and, if you have long hair, wear a hair net. Do not wear loose fitting or loose items (ties, shirt sleeves, jewellery etc.).
7. Gloves may not be worn.
8. In the event of an emission noise level as of 80 dB (A) at the workplace, ear defenders must be worn.
9. The machine may not operate without supervision.
10. Secure your machine in such a way that it cannot be switched on by children. Persons who have not been trained may not operate the machine.
11. Before using the machine, make sure it is in good working condition. Pay special attention to any damage to the grounded plug or the electrical connections. Never operate the machine with a defective, crushed or exposed cable.
12. Plug the grounded plug into a suitable socket for the machine. The cable for the machine may only be connected to a safety socket or a connection box. Have the safety socket or connection box checked by an electrical specialist before hand.
13. The safety socket or connection box must be close enough to the machine that the power cable is not under strain.
14. When carrying out maintenance and cleaning work, the machine must be switched off and the grounded plug pulled out.
15. Set-up work is only to be carried out with the machine switched off.
16. Do not reach into the operating machine.
17. Always switch the machine off when you are not using it.
18. Remain with the machine until it has come to a standstill.

1. Important safety notes

1.4 Safety regulations for proper use

19. Only have repairs carried out by a qualified specialist! Repair work may only be carried out by persons who are qualified for the relevant repairs and who are familiar with the appropriate health and safety requirements.
20. Protect the machine from damp.
21. Constantly check the machine for damages. Replace damaged parts only with original parts and have these replaced by a specialist. The guarantee and warranty is voided if accessories and replacement parts are use that are not designed for the machine.
22. To avoid insufficient lighting, we recommend setting up a light source that provides a value of at least 500 Lux at the tool‘s cutting edge.
23. Do not remove the generated shavings with your hand. Use the appropriate tools (hand-held sweeper, hook, brush).
24. Tools and workpieces may never be changed when the machine is running.
25. Do not brake workpieces and bush using your hand or another object.
26. Never leave the chuck key fitted (even when not in operation).
27. Pay attention to the spread of the lathe chuck.
28. The maximum revolution range specified on the lathe chuck may not be exceeded.
29. The machine only operates when the chuck protection hood is folded over the lathe chuck. For safety reasons, it is not possible to switch the machine on when the chuck protection hood is up.
30. The generated shavings must be caught by the user with the help of a shaving protection device.
31. Always keep the gear cover hood closed.
32. The gear cover hood may only be opened by a trained person with a special key and when the grounded plug has been pulled out of the socket.
33. Turning steels must be firmly tensioned, at the correct height and as short as possible.
34. Do not measure at the rotating workpiece (risk of accident, measuring tools will be damaged).
35. When working between the tips, check the locking lever of the tailstock for firm seating.
36. Despite the existing safety clutch, you should avoid reaching into the rotating hand wheel when the automatic feed is switched on.
37. When working with the automatic feed, always pay attention to ensure that the tool slide does not come up against the lathe chuck or the tailstock.
38. When wood turning use a lathe center point instead of the lathe chuck to carry the workpiece.

1. Important safety notes

1.5 Safety features

In order to enable you to work safely with our machines, we have incorporated the following safety mechanisms. These meet the relevant European safety requirements.

- **Chuck protection hood**

  The main spindle of the machine operates only with the chuck protection hood closed. For safety reasons, if the chuck protection hood is open, the machine cannot be switched on.

- **Gear cover hood**

  Always keep the gear cover hood closed. The gear cover hood may only be opened by a trained person with a special key and when the grounded plug has been pulled out of the socket.

- **ON/OFF switch with under-voltage trigger**

  The ON/OFF switch is fitted with an under-voltage trigger, thus, in the event of a power failure, the machine does not switch itself back on automatically. This prevents risks caused by the unexpected motion of the spindle.

- **Emergency off switch**

  The emergency off switch acts to quickly stop the machine.

- **Overload protection**

  The machine is fitted with an overload protection feature. This overload protection feature switches the main drive motor off automatically when the machine is overloaded. The machine can only then be switched on after a waiting period.

1.6 Explanations of the symbols

With a measured noise level of 80 dB (A) at the work-place the operator should wear Ear Protection.

Caution:
Always pull the power plug prior to any maintenance work!
Read the operating instructions prior to initial operation or maintenance work!

Caution:
Dangerous electric voltage!

2. Delivery and set up

The machine is packed with care at the factory.

The following should be checked after delivery:

1. Whether the packaging shows damages to be reported or
2. Whether the machine shows transportation damages to be reported If this is the case, we ask you to communicate this information immediately. Subsequent claims cannot be recognised.

The machine must be set up on a suitable, even and firm surface.

Suitable surfaces are, for example:

- A machine base cabinet (available optionally).
- A separate workbench with a level surface (spirit level) that is strong enough to carry the weight of the lathe without bending.
- A steel plate with a level surface (spirit level).

The machine must be screwed securely to the surface it is set up on. There are holes in the base of the machine that are designed for this purpose. **Good working results and low-vibration operation can only be ensured when the prerequisites for fixture as set out above are maintained.**

The place of set up should be selected in such a way that

- there is sufficient lighting.
- the electrical power supply with safety socket and earth are installed close enough to the machine that the power cable is not subject to any strain.
- the power cable should also be dimensioned in such a way that a multiple socket can be used, for example, to power a coolant unit.

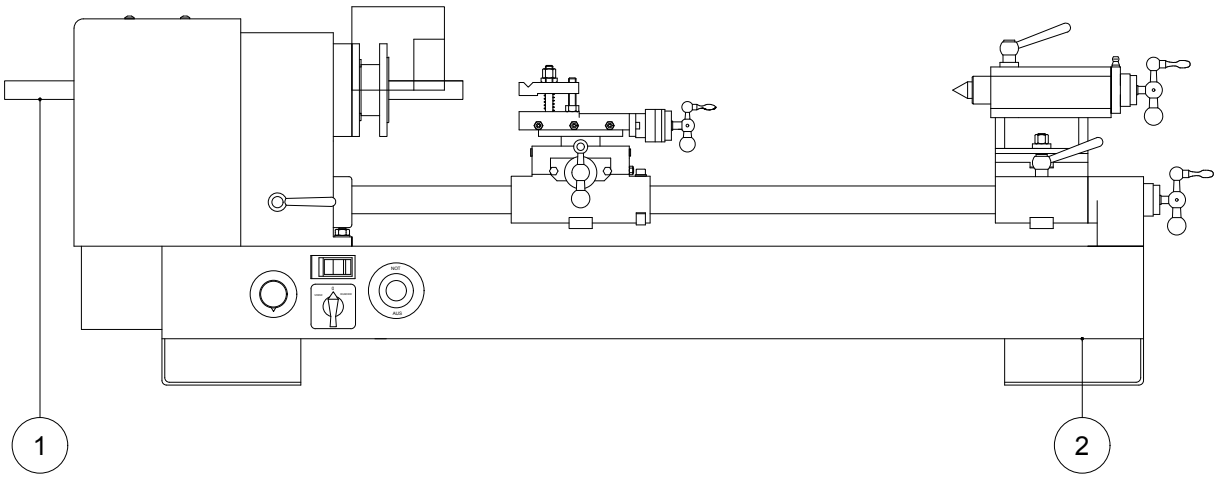
2. Delivery and set up

2.1 Transporting the machine

We recommend two people to lift the machine, using the positions shown (1). To do this, a sufficiently dimensioned, at least Ø 20 mm steel rod is pushed through the main spindle. The machine should be carried and balanced by one person at the steel rod and by the other person, at the shown position on the opposite underside of the bed.

When lifting, pay attention to an ergonomic stance and sufficient safety!

In the delivered state, the machine feet have two transport straps attached. These secure the machine to the transportation pallet. They must be removed before setting the machine up.



3. Putting into operation

- Use a dry cloth to remove the corrosion protection that was applied to all exposed parts for transport.
- In the event of marine impregnation of exposed parts, it is recommended you spray them with oil, allow it to work, and then remove the impregnation with a dry cloth.
- Once set up properly (see the section on delivery and set up) connect the grounded plug directly to a safety socket and the 230 V 50/60 Hz (optional 110 V 60 Hz) mains power supply.
- Provision of sufficient coolant for the operation of a coolant unit (optional).
- Release the axis clamps and check the individual feed spindles for easy operation.
- Check all electronic control elements, for example, ON/OFF switch, emergency off switch, potentiometer, bush protection hood, etc. for functionality.

4. Specifications regarding the machine

4.1 Identification of the model

The precise model designation of your machine can be found on the type plate attached to the machine.

4.2 D2000

4.2.1 Declaration of noise levels

Declaration of noise levels in accordance with DIN EN ISO 3744
Emission values in idle

Emission sound pressure level at the workplace	
at 50 %	= 60.8 dB (A
at 100 %	= 72.0 dB (A)
Sound power level	
at 50 %	= 70.4 dB (A)
at 100 %	= 81.9 dB (A)

At an emission sound pressure level from 80 dB (A) and above at the workplace ear protection is required.

4. Specifications regarding the machine

4.2 D2000

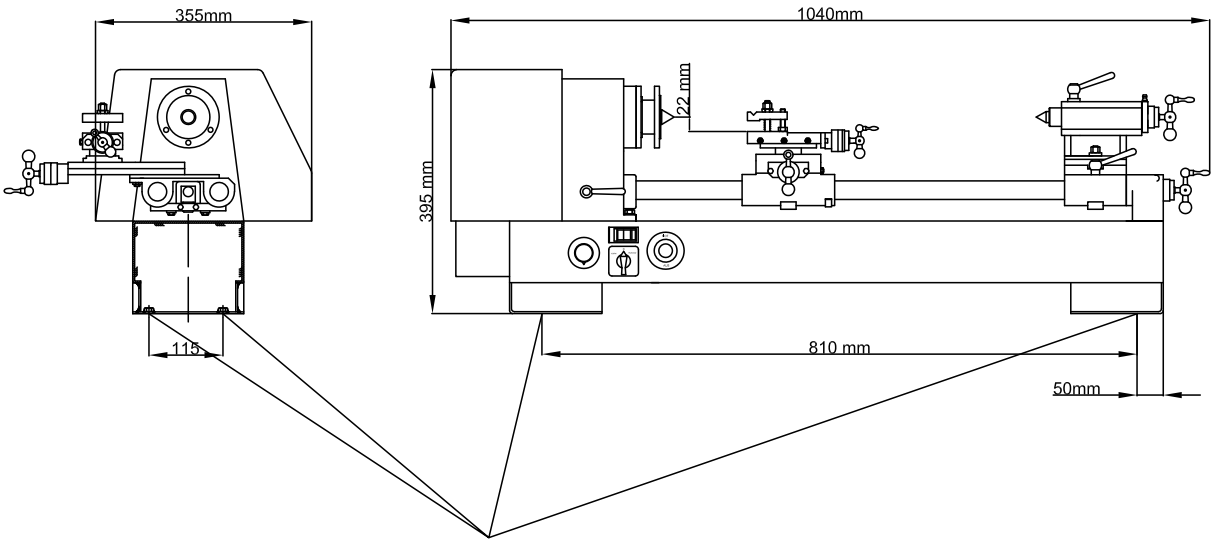
4.2.2 Technical data

Working range	
Center distance	350 mm
Center height	110 mm
Turning Ø above cross slide	126 mm
Turning Ø above the guideways	220 mm
Main drive motor	
Nominal voltage	230 V
Nominal frequency	50/60 Hz
Nominal performance of the spindle motor	1.4 kW
Spindle revolutions, infinite	30 - 2300 rpm
Machine accuracy	
True running accuracy of the spindle nose	0.005 mm
Cylindrical turning to 100 mm cantilevered	0.01 mm
Cylindrical turning with a finishing cut to 300 mm between the centers	0.015 mm
Headstock	
Main spindle bore	Ø 20 mm
Taper in main spindle	MT3
Main spindle nose	according to DIN 6350
Tool slide	
Travel of cross slide	110 mm
Travel of longitudinal slide	58 mm
Longitudinal slide can be swiveled through	360°
Max. height of turning tools	20 mm
Tailstock with quick adjustment	
Lateral adjustability of tailstock upper part	± 10 mm
Tailstock sleeve	with inner morse taper MT2
Travel of tailstock sleeve	65 mm
Scale	1 mm
Thread cutting (prepared)	
With lead screw drive and change gear quadrant	right-hand thread
Automatic longitudinal feed rate	0.085 rpm
Optional Change gear set for thread cutting	metric 0.25 - 6.0 mm - inch 10 - 36 TPI automatic longitudinal feeds 0.16 rpm

4. Specifications regarding the machine

4.2 D2000

4.2.3 Dimensions



4.3 D2400

4.3.1 Declaration of noise levels

Declaration of noise levels in accordance with DIN EN ISO 3744
Emission values in idle

Emission sound pressure level at the workplace	
at 50 %	= 60.8 dB (A
at 100 %	= 72.0 dB (A)
Sound power level	
at 50 %	= 70.4 dB (A)
at 100 %	= 81.9 dB (A)

At an emission sound pressure level from 80 dB (A) and above at the workplace ear protection is required.

4. Specifications regarding the machine

4.3 D2400

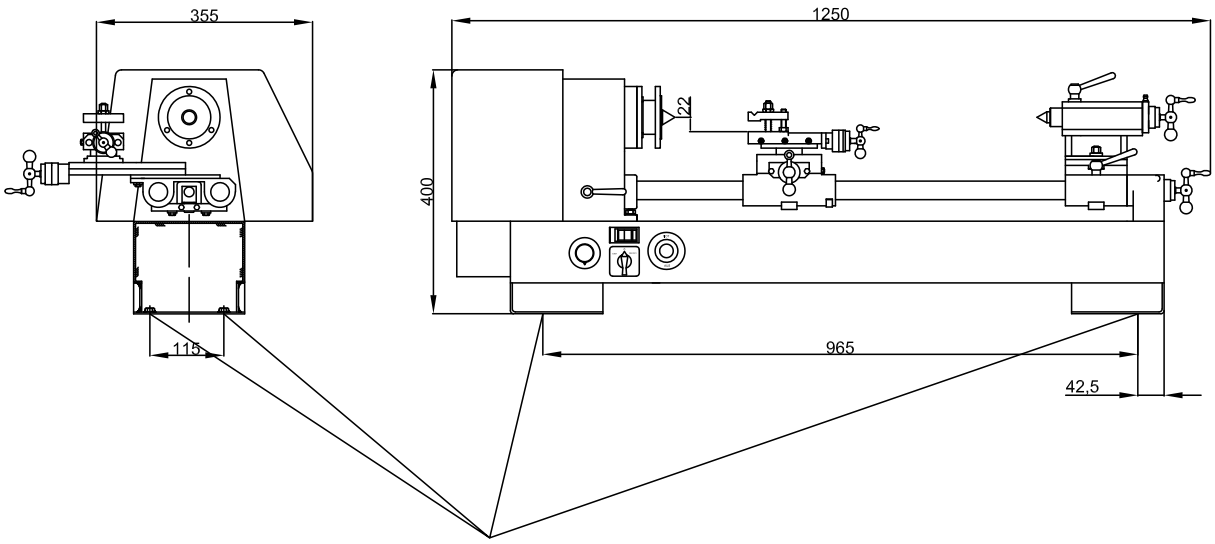
4.3.2 Technical data

Working range	
Center distance	500 mm
Center height	110 mm
Turning Ø above cross slide	126 mm
Turning Ø above the guideways	220 mm
Main drive motor	
Nominal voltage	230 V
Nominal frequency	50/60 Hz
Nominal performance of the spindle motor	1.4 kW
Spindle revolutions, infinite	30 - 2300 rpm
Machine accuracy	
True running accuracy of the spindle nose	0.005 mm
Cylindrical turning to 100 mm cantilevered	0.01 mm
Cylindrical turning with a finishing cut to 300 mm between the centers	0.015 mm
Headstock	
Main spindle bore	Ø 20 mm
Taper in main spindle	MT3
Main spindle nose	according to DIN 6350
Tool slide	
Travel of cross slide	110 mm
Travel of longitudinal slide	58 mm
Longitudinal slide can be swiveled through	360°
Max. height of turning tools	20 mm
Tailstock with quick adjustment	
Lateral adjustability of tailstock upper part	± 10 mm
Tailstock sleeve	with inner morse taper MT2
Travel of tailstock sleeve	65 mm
Scale	1 mm
Thread cutting (prepared)	
With lead screw drive and change gear quadrant	right-hand thread
Automatic longitudinal feed rate	0.085 rpm
Optional Change gear set for thread cutting	metric 0.25 – 6.0 mm - inch 10 - 36 TPI automatic longitudinal feeds 0.16 rpm

4. Specifications regarding the machine

4.3 D2400

4.3.3 Dimensions



4.4 D3000

4.4.1 Declaration of noise levels

Declaration of noise levels in accordance with DIN EN ISO 3744
Emission values in idle

Emission sound pressure level at the workplace	
at 50 %	= 60.8 dB (A
at 100 %	= 72.0 dB (A)
Sound power level	
at 50 %	= 70.4 dB (A)
at 100 %	= 81.9 dB (A)

At an emission sound pressure level from 80 dB (A) and above at the workplace ear protection is required.

4. Specifications regarding the machine

4.4 D3000

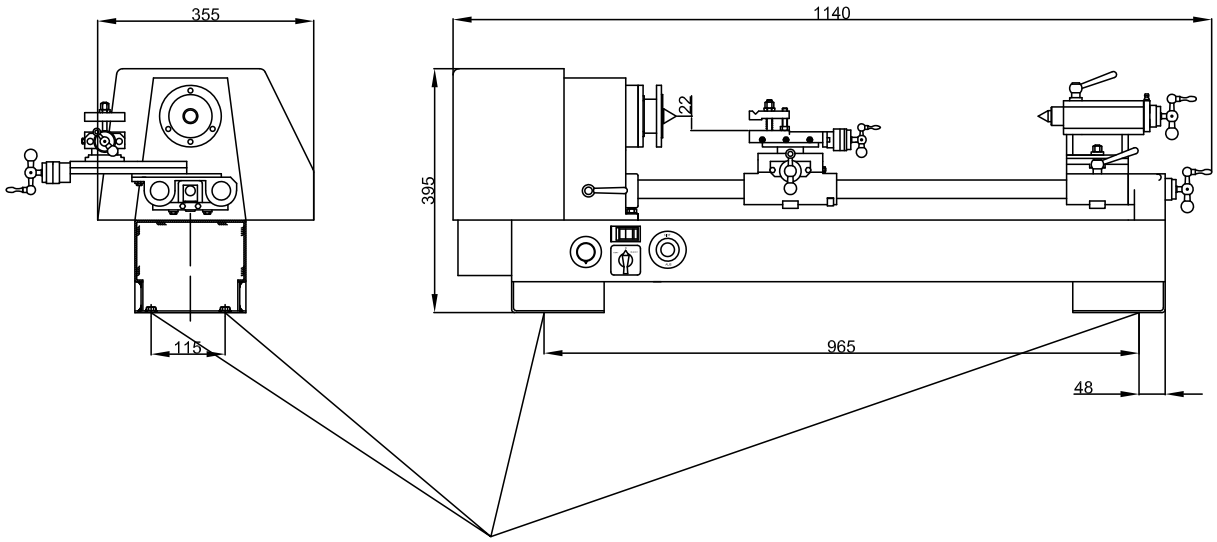
4.4.2 Technical data

Working range	
Center distance	500 mm
Center height	110 mm
Turning Ø above cross slide	126 mm
Turning Ø above the guideways	220 mm
Main drive motor	
Nominal voltage	230 V
Nominal frequency	50/60 Hz
Nominal performance of the spindle motor	1.4 kW
Spindle revolutions, infinite	30 - 2300 rpm
Machine accuracy	
True running accuracy of the spindle nose	0.005 mm
Cylindrical turning to 100 mm cantilevered	0.01 mm
Cylindrical turning with a finishing cut to 300 mm between the centers	0.015 mm
Headstock	
Main spindle bore	Ø 20 mm
Taper in main spindle	MT3
Main spindle nose	according to DIN 6350
Tool slide	
Travel of cross slide	110 mm
Travel of longitudinal slide	58 mm
Longitudinal slide can be swiveled through	360°
Max. height of turning tools	20 mm
Tailstock with quick adjustment	
Lateral adjustability of tailstock upper part	± 10 mm
Tailstock sleeve	with inner morse taper MT2
Travel of tailstock sleeve	65 mm
Scale	1 mm
Thread cutting	
With lead screw drive and change gear quadrant	right-hand thread
Automatic longitudinal feed rate	0 – 250 mm/min
Change gear set for thread cutting	metric 0.25 - 6.0 mm - inch 10 - 36 TPI

4. Specifications regarding the machine

4.4 D3000

4.4.3 Dimensions



4.5 Revolution selection

Select the spindle revolutions according to the material type of workpiece diameter:

Small workpiece diameter ⇒ Relatively high revolutions
Large workpiece diameter ⇒ Low revolutions

Revolutions and diameter give the cutting speed.

In the event of a specified cutting speed, the required spindle revolutions can be calculated as follows:

$$\text{Revolutions (n)} = \frac{\text{Cutting speed (V) x 1000}}{\text{Workpiece diameter (d) x 3.14}}$$

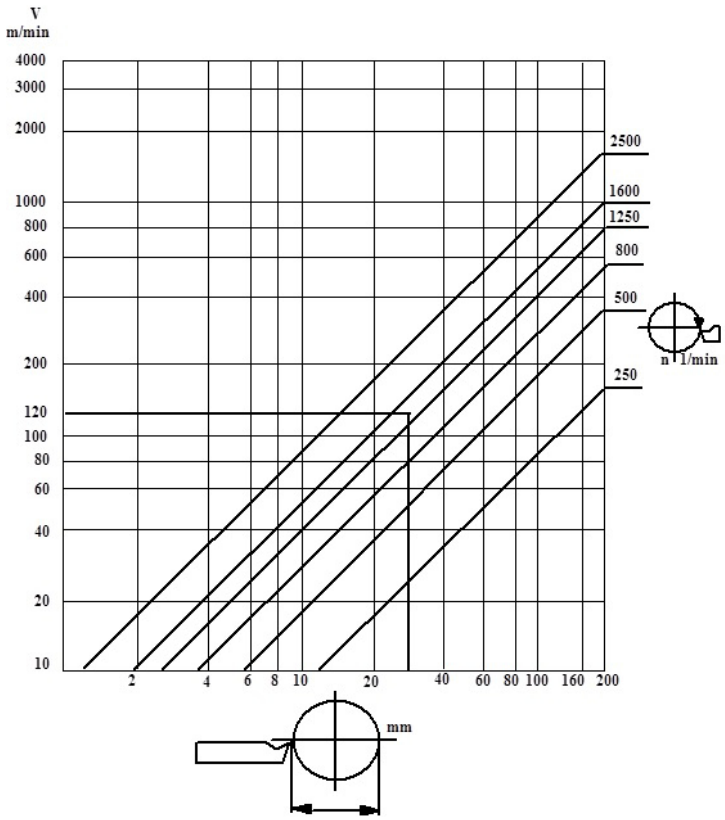
Application example:
Thus, an aluminum workpiece with a Ø of 20 mm is to be turned with a cutting speed of 100 m/min.

$$\frac{100 \text{ x } 1.000}{20 \text{ x } 3.14} = \frac{100.000}{62.8} = 1592 \text{ rpm}$$

Now, select from the potential revolutions, the one that comes closest to the ideal of 1592 rpm.

4. Specifications regarding the machine

4.6 Diagram for reading off the revolutions



4.7 Revolution changer

The potentiometer can be used to infinitely adjust the revolutions of the working spindle from 150-2300 rpm (2nd setting = preset at the factory).

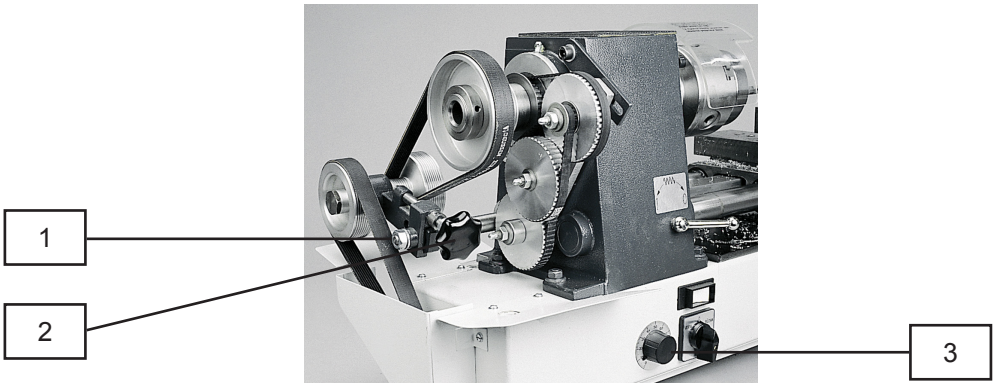
If the lower revolutions of 30-490 rpm (1st setting) are required, the drive belt must be applied. To do this, proceed as follows:

1. Open the gear cover hood by undoing the safety screw with the supplied special key.
2. Undo clamping nut (1) and this loosen the drive belt.
3. Turn the nut (2) clockwise in such a way that the drive belt can be apportioned.
4. To tension the drive belt this process is to be completed reversed.
5. Close the drive cover hood again and secure with the safety screw.

4. Specifications regarding the machine

4.7 Revolution changer

Setting on the potentiometer	1st setting rpm	2nd setting rpm
10%	30	200
20%	105	350
30%	175	740
40%	260	1050
50%	325	1440
60%	360	1650
70%	400	1860
80%	460	2120
90%	490	2160
100%	500	2300



4.8 Electrical equipment

The main drive motor (single phase series-wound motor) is supplied already installed.

- The main spindle drive has an ON/OFF switch with under-voltage trigger.
- In order for the machine to start, the turn switch for forwards-reverse must be set to the required direction of rotation.
- Then switch on at the ON/OFF switch.
- The ON/OFF switch must also be switched on again after the power is interrupted.
- To change the direction of rotation of the main drive motor, the turn switch must briefly rest at the 0 position to allow the relays on the control board enough time to switch.
- In the event of the main drive motor being overloaded, it will switch itself off automatically. The main drive motor can only be switched back on again after a short waiting period.

5. Achieving optimum results and avoiding incorrect usage

- Use of suitable processing tools.
- Adaptation of revolution setting and feed to the material, workpiece and tool.
- Tension tools as far into the tool holder as possible (short projecting length).
- Tension turning element as far into the chuck as possible (short projecting length).
- Support length pieces with a tailstock or stay.
- The use of coolant and lubrication to increase the durability of the tool, improve surface quality and accuracy.
- Clamp processing tools and turning elements on a clean clamping surface.
- Lubricate machine sufficiently.
- Set the bearing clearance and guides correctly.

Longitudinal turning

- For longitudinal turning, the turning steel moves parallel to the axis of the workpiece.
- To rough, it is advantageous to use straight or curved turning steels.
- To finish, use sharp or wide turning steels.

Face turning

- The processing of end planes is referred to as face turning.
- When face turning, the turning steel is moved at right angles to the rotating axis of the turning element. The tool slide should be locked when doing so.
- The main cutting edge of the turning steel is to be set precisely to the center so that the turning element center has no nose.
- The curved turning steel is used for face turning.

5. Achieving optimum results and avoiding incorrect usage

Curved lathe chisel right (2) and left (1)

- For longitudinal and face turning.
- This is designed to remove as much material as possible in a short time (without paying attention to the surface created on the workpiece).

Offset lateral lathe chisel (3)

- For longitudinal and face turning.
- Is used for finishing (creating a clean surface).

External thread lathe chisel (4)

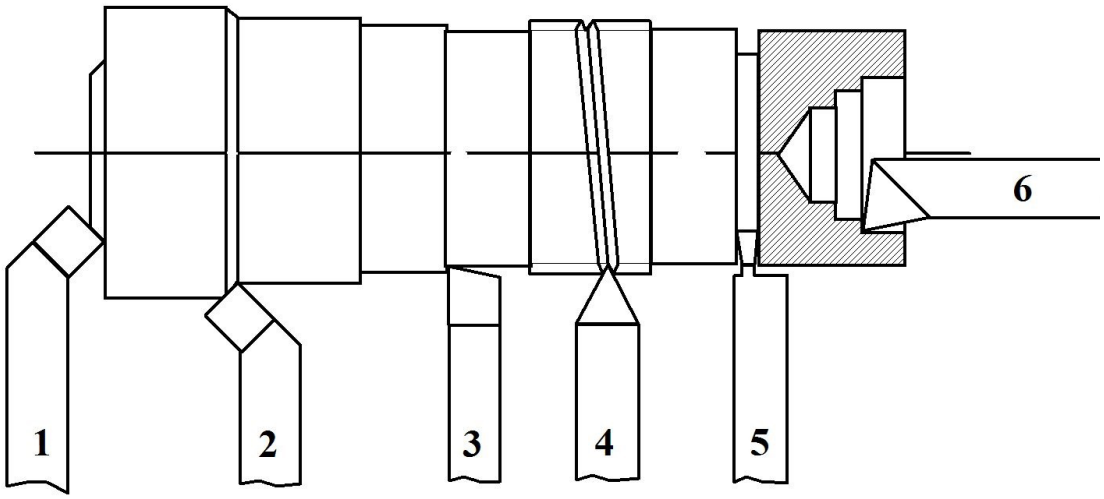
- Is used for cutting external threads.

Narrow square-nose cutting tool (5)

- Is used to cut grooves and cut off workpieces.
- Attention should be paid to the precise height of the center of the turning steel.
- Work with low revolutions and cool the tool (cooling via drilling oil or emulsion: acts as lubrication and removal of shavings).
- The cutting steel is to be tensioned as short as possible and at a right angle to the rotational axis.

Inner lathe chisel (6)

- Is used for hollowing out drilled holes.
- Tension as short as possible to prevent the occurrence of turning steel vibrations (untidy surface).
- As a result of the forces exerted on the turning steel, the steel must be short and secured firmly.
- If the lever arm is too long, the lathe chisel will bend and spring back.
- The cutting edge will penetrate the workpiece unevenly and result in a bumpy surface.
- The turning steel is to be aligned with the center of the turning element.
- The checking of the height to the center of the workpiece is carried out with the help of the turning center point in the tailstock. The height position of the turning steel is achieved by adding even sheets.

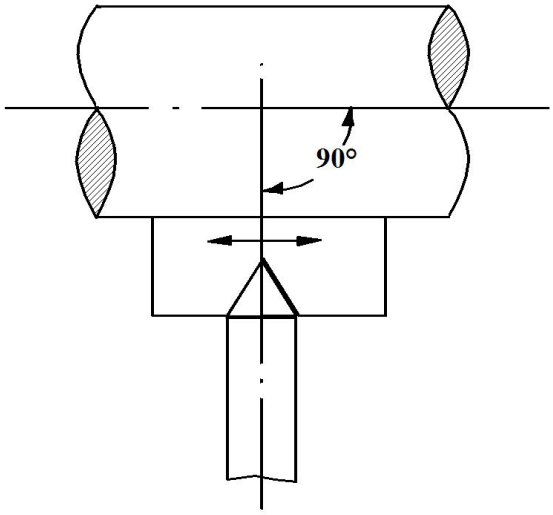


6. Thread cutting and automatic feed

6.1 Thread cutting

- The thread turning steel is a moulded turning steel with the profile of the thread to be cut.
- It is ground according to templates (Figure 1) and must be set precisely to the center of the workpiece otherwise there will be a distortion in the thread profile.
- In order to obtain the correct position of thread flanks to the workpiece axis, place the grinding gauge up against the workpiece and use it to set the turning steel (Figure 1). To do this, push the gauge up to both flanks of the turning steel, one after another.

Figure 1: Setting the thread turning steel



Change gears (optional for lathes D2000 and D2400)

- The change gears belonging to the accessories create the connection between the feed drives and the lead screw.
- By fitting different toothed wheel combinations, it is possible to cut metric and inch right- and left-hand threads.
- The different axis intervals of the toothed wheels can be set by swiveling the quadrant and adjusting the quadrant bolt.

Feed:

- The feed is switched on using the switch lever on the lock plate.
- The feed must always be switched on in order for the turning steel to return to the same position when carrying out multiple cutting procedures.
- After completing the cut, bring the turning steel with the cross slide out of the inroad otherwise the flanks and cutting edges will be damaged.
- Then return the turning steel to the starting position by changing the direction of rotation of the motor via the turn switch for forwards-reverse.
- It is good if the thread end has a 4-5 mm wide clearance milled in order to better remove the thread steel out of the way.

In the event of a long thread diameter, the turning center point should always be used to prevent the workpiece from pushing away.

6. Thread cutting and automatic feed

6.2 Use of change gears

For automatic longitudinal turning, there are two feeds available with 0.085 and 0.16 mm per revolution (the wheels are set at the factory for feed with 0.085 mm per revolution).

Fitting various toothed wheel combinations enables metric thread cutting from 0.25-6 mm and inch threads with gradients of 10Z/1“-36Z/1“.

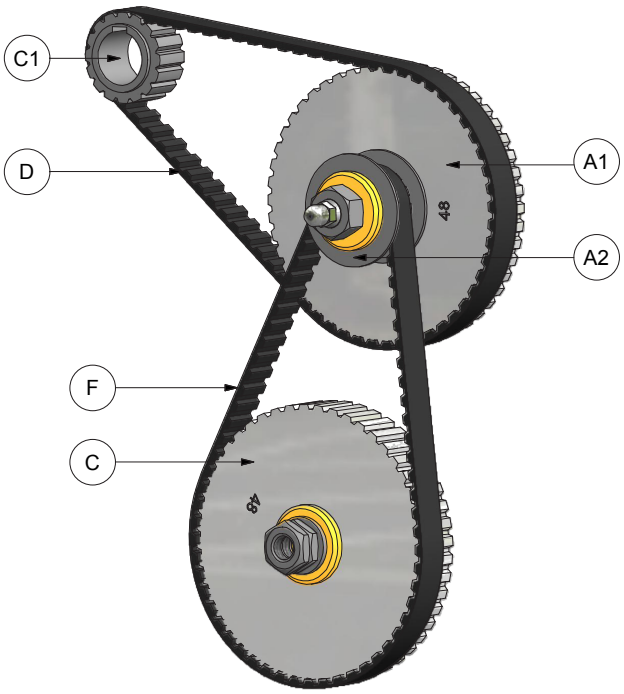


Table for thread cutting * = Special accessories

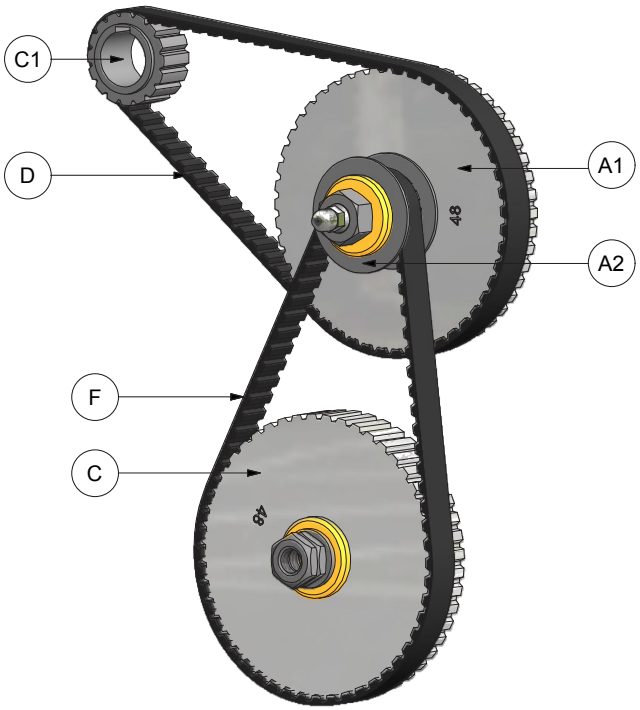
The toothed wheels that belong to the scope of delivery are identified according to the number of teeth, e.g. 48 stands for 48 teeth

mm	0.35	0.4	0.5	0.7	0.75	0.8	1.0	1.25	1.5	1.75
A1	40	48	48	48	48	48	48	48	48	48
A2	14	16	20	14	18	16	14	20	36	28
C	48	40	40	20	24	20	14	16	24	16
C1	32	32	32	32	32	32	32	32	32	32
D	140	140	140	140	140	140	140	140	140	140
F	140	120	120	120	120	120	120	120	120	120

mm	2.0	2.5	3.0	3.5	3.75	4.0	4.25	4.5	5.0	6.0
A1	48	48	48	48	32	24	24	24	24	24
A2	40	40	48	28	40	32	34	36	40	48
C	20	16	16	16	16	16	16	16	16	16
C1	32	32	32	32	32	32	32	32	32	32
D	140	140	140	140	120	120	120	120	120	120
F	120	120	120	120	140	140	140	140	140	120

6. Thread cutting and automatic feed

6.2 Use of change gears



Z/1“	10	11	12	13	14	16	18	19	20
A1	34	34	34	34	34	34	34	34	34
A2	36	36	36	36	36	36	14	34*	18
C	20	22	24	26*	28	32	14	36	20
C1	32	32	32	32	32	32	32	32	32
D	120	120	120	120	120	120	120	120	120
F	140	120	140	140	140	140	120	140	120

Z/1“	22	24	26	28	30	32	34	36
A1	34	34	34	34	34	34	34	34
A2	18	24	18	18	24	18	18	14
C	22	32	26*	28	40	32	34	28
C1	32	32	32	32	32	32	32	32
D	120	120	120	120	120	120	120	120
F	120	140	140	140	140	140	140	140

6. Thread cutting and automatic feed

6.2 Use of change gears

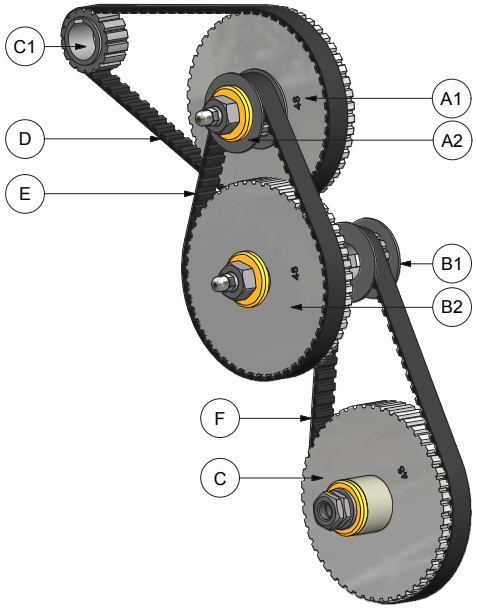


Table for thread cutting for very fine threads with a second change-gear stud

mm	0.12	0.22	0.24	0.25	0.30
A1	48	48	48	48	40
A2	14	24	24	22	22
B1	20	18	18	22*	22*
B2	48	40	36	40	40
C	48	48	48	48	48
C1	32	32	32	32	32
D	140	140	140	140	140
E	120	120	120	120	120
F	120	120	120	120	120

Table for automatic longitudinal feed

mm/σ	0.085	0.16
A1	48	48
A2	14	18
B1	14	20
B2	48	48
C	48	48
C1	32	32
D	140	140
E	120	120
F	120	120

6. Thread cutting and automatic feed

6.2 Use of change gears

Working with the automatic longitudinal feed

1. Turn the control lever upon the longitudinal turning symbol. Turn the lead screw by use of the ball crank, in order to ensure the lock of the clutch disk.

2. Switch on the directional control switch on the right side of the foundation.
   Center position = Off
   Left pressed = Feed to the spindle
   Right pressed = Feed to tailstock
   Adjust the feed speed by using the potentiometer.

3. Turn the directional control switch to the center position after finishing the process of automatic longitudinal turning.

Working with the thread cutting device

Mount the respective change gears in order to attain the preferred thread pitch.

To achieve a thread pitch of 1.5 mm the gear wheels are mounted ex-factory.

During the process of cutting metric threads the toothed wheel Z48 remains most of the time fixed on the change gear bracket.

In the process of cutting inch thread the toothed wheel Z48 is replaced by the toothed wheel Z34.

The toothed wheels A2 (beside Z48) and C (on top of the leadstock) are interchanged in case of the selective lead of thread (v. thread table).

Preselect slowest spindle speed.

Turn the gear lever to the symbol thread cutting. The gear lever needs remain in this position as long as the thread cutting is in process.

In order to be able to full fill more than one cut for the creation of the thread the thread end is stopped through a reversing switch as well as the threading tool is removed from the cutting area at the same time.

Switch the reversing switch to the left in order to have the support moving directional to the tailstock. If the threading tool is positioned almost 5 mm in front of the beginning of the thread, the machine needs to be stopped.

In case the threading tool is positioned about 5 mm in front of the beginning of the thread the machine needs to be stopped again and the cross slide is to be lathed to the front to the same extend as during the former cut as well as the desired removal of goods.

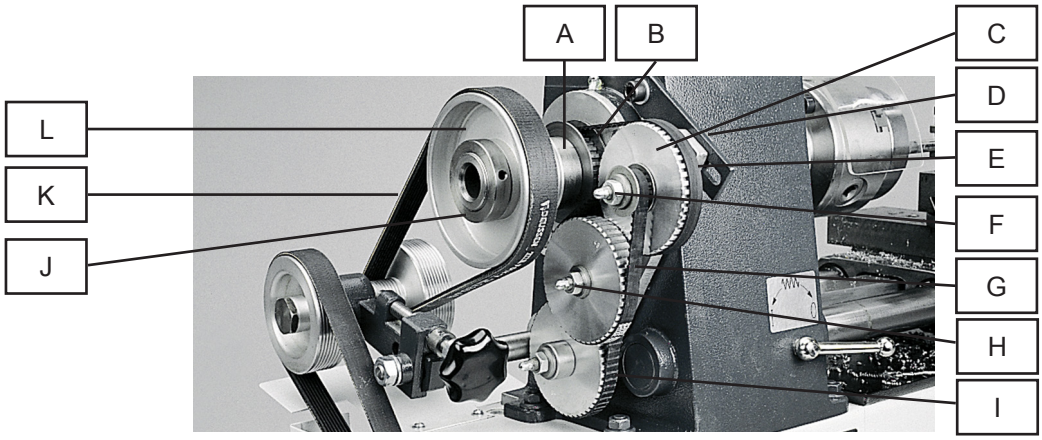
After, turn the reversing switch to the right and proceed with thread cutting. The gear lever is only to be switched off after the thread cutting process is finished.

6. Thread cutting and automatic feed

6.3 Left-hand thread (optional)

In order to cut left-hand thread the toothed belt wheel on top of bolt (F) is to be interchanged with the toothed wheel Z 75 and the toothed belt wheel (B) on top of the main spindle is to be interchanged with the toothed belt wheel Z 50.

- Pull the main plug, loosen the lock screw on top of the cover cap and afterwards open the cover cap.
- Loosen the drive belt (K) (v. revolution changer) and remove it from the main spindle.
- Undo the lock screw (D) of the quadrant. Undo slightly the bolts (F) and (H) on the quadrant and remove the toothed belt (E) and (G)
- In order to be able to demount the toothed belt wheel the bolt (F) needs to be moved upwards and the bolt (H) downwards.
- Undo nut and washer of bolt (F) and put them aside. Pull both toothed belt wheels (Z48 and Z14) including the bronze bearing off bolt (F).
- Pull the toothed belt wheel Z48 off the bronze bush and position afterwards the gear wheel Z75 in place.
- Position again the bronze bearing with both gear wheels on top of the bolt (F) (Z75 first) and secure this with the washer and hexagon nut.
- Undo the headless pin through the adjustment nut (J) on top of the main spindle and remove the adjustment nut from the main spindle.
- Pull the grooved pulley (L), the bearing spacer (A) and toothed belt wheel (B) off the main spindle.
- Position in the following order gear wheel Z 50, bearing space (A) and grooved pulley (L) on the main spindle and secure this process with the adjustment nut (J).
- Watch for a correct adjustment of the ball bearings (v. re-adjustment main spindle).
- Stretch the cog belt (I) through the movement of bolt (H) and afterwards tighten up bolt (H).
- Switch cog belt from belt (F) to belt (H) and tension through the movement of bolt (F), afterwards tightening bolt (F).
- Mesh gear wheel Z 75 with gear wheel Z 50 through panning of the quadrant; afterwards tighten clamping screw (D).
- Put the V belt (K) upon the main spindle and strain the same. Close the cover cap and secure the same with the locket screw.



7. Maintenance

A long lifetime of the machine will depend on the appropriate care and maintenance.

- **All maintenance and repair tasks may only be carried out with the grounded plug pulled.**
- The machine must be cleaned after each use.
- If the machine is set up in a wet room, all exposed parts must be oiled after each use to prevent corrosion.
- Always lubricate all moving parts well.
- In the event of bearing or skid play, immediately adjust in order to prevent it from destroying the bearing or skid guide.

Approximately every 100 operating hours

- clean the carbon brushes and collector of the drive motor (1.4 kW) with a piece of coarse sandpaper. Remove approximately 0.1 mm from the carbon brushes, then smooth out the contact surface with fine sandpaper.
- Check the tension of the poly V and gear belt and adjust if necessary.
- Check the play in the guides and feed spindles and set if necessary.

8. Lubrication of the machine

The lubrication process:

- Reduces wear and friction.
- Increases the lifetime.
- Protects metal surfaces from corrosion.

We recommend:

- A class 2NLGI multi-purpose grease for lubrication.
- A lubrication oil with a viscosity of 100 mm ²/s for oiling.

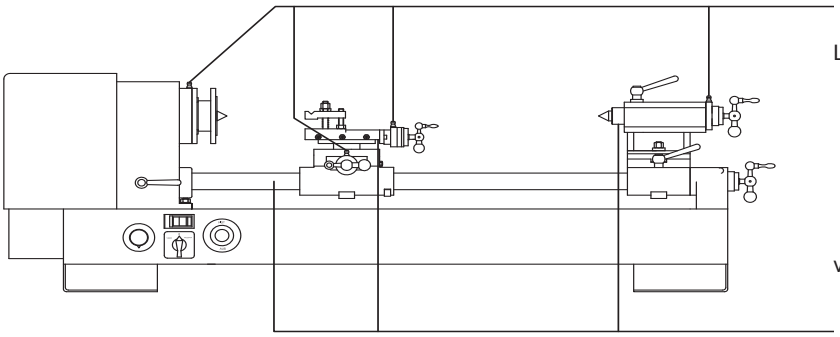
The lathe is to be lubricated every 8 hours of operation in accordance with the lubrication plan. The lubrication points

- Both guide rods
- The 2 dovetail guides of the tool slide (bring the skids of the tool slide in the back most position)
- The from the bottom reachable screw spindle
- The feed screw
- The tailstock sleeve (bring tailstock sleeve in front position). The lubrication of the tailstock spindle is achieved through the hollow drilling within the sleeve.

are lubricated with the help of an oil can and an ordinary lubrication oil by moving the skid or sleeve backwards and forwards.

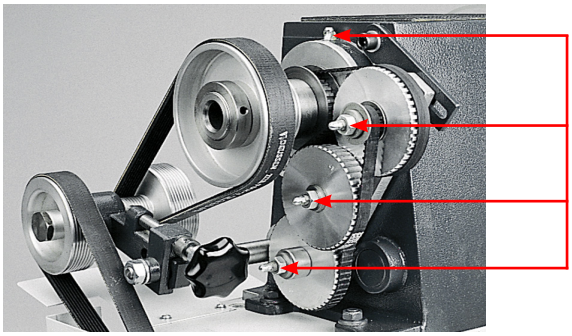
8. Lubrication of the machine

All other lubrication points are lubricated with a grease press at the designated lubrication nipples.



Lubricate prior to any use with grease

vor jedem Gebrauch mit Maschinenöl schmieren



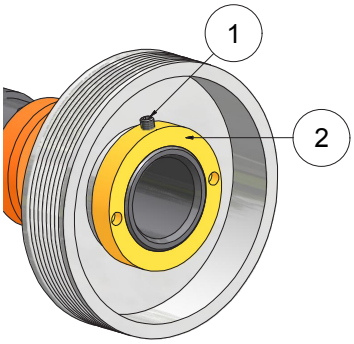
Lubricate prior to
any use with grease

9. Re-adjusting the main spindle

The headstock is screwed to the lathe bed. The headstock contains the main spindle with two adjustable precision tapered roller bearings.

If adjustment is required, proceed as follows:

1. Open the gear cover hood by undoing the safety screw with the supplied special key.
2. Undo the stud screw (1) in the setting nut (2).
3. The setting nut (2) is located at the rear end of the main spindle.
4. Rotate the setting nut (2) clockwise until the bearings run free again (it must be possible to rotate the main spindle by hand easily).
5. Tighten the stud screw (1) back up again.
6. **If the tapered roller bearings are set too tightly they will quickly become unusable.**
7. Close the gear cover hood by tightening the safety screw with the supplied special key.

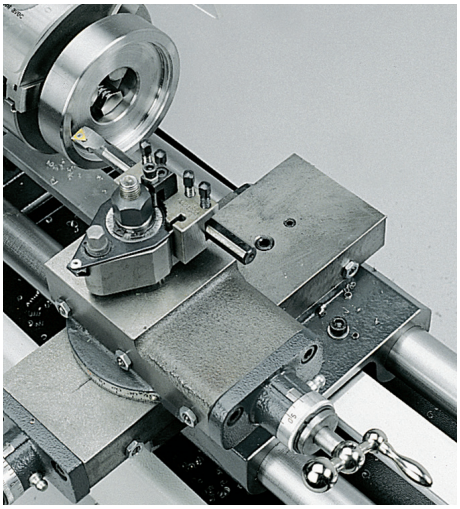


10. Re-adjusting the tool slide

The tool slide consists of the longitudinal- and cross slide. The corresponding dovetail guides are adjustable constructed.

If adjustment is required, please proceed as follows:

1. Undo counter nuts.
2. Using a pin wrench tighten the regulating screw in such a way that the skid is still able to move easily.
3. After setting, tighten the counter nuts back up again.



Longitudinal slide:

- The longitudinal slide is constructed upon the cross slide.
- The same can be panned 360 degree.
- This enables the longitudinal slide to **lathe cones.**
- To adjust, an Allen key of the size 4 is used to undo the screws positioned on both outsides of the cross slide.
- The altitude of the longitudinal slide is referred by the mark upon the cross slide.
- Upon the longitudinal slide a degree scale can be found.
- The distance between scale mark to scale mark equals to 1 degree.

Scale ring:

- To adjusting the lathe tools the support spindles have scale rings with scale marks.
- One mark on the scale corresponds to an adjustment of **0.05 mm.**
- At the cross slide this corresponds to a chip dismounting of 0.1 mm upon the workpiece.
- At the longitudinal slide this corresponds to a chip dismounting of 0.05 mm.
- If the tool slide shall be mounted onto the guide rods (such as during the process of surfacing) then the Allen screw is to be used in order to tighten the clamp which is positioned on the bottom of cross slide onto both guide rods.

11. Tailstock

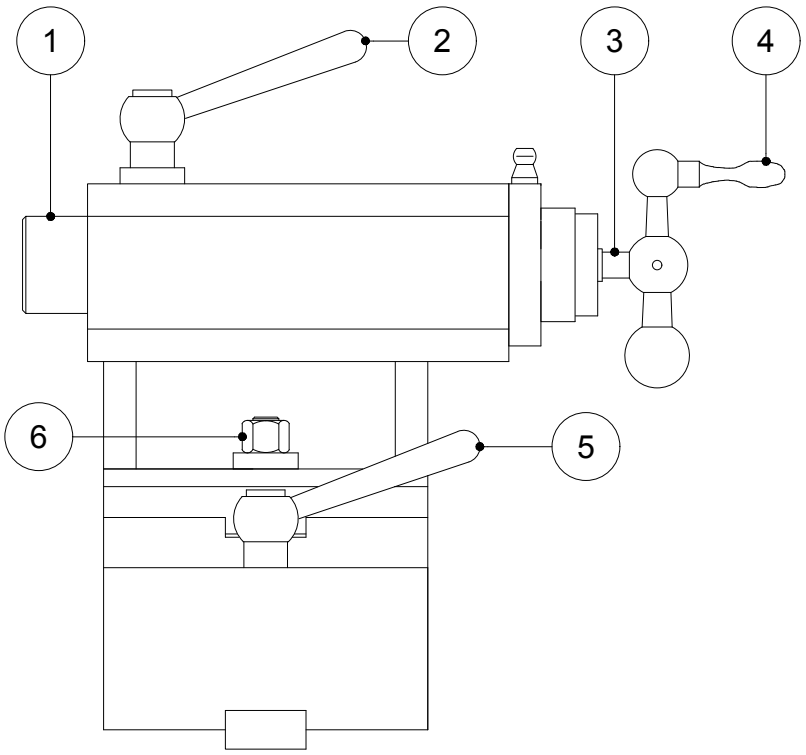
- The tailstock can be moved on the guide rods.
- By moving the clamping lever (5), the tailstock can easily be secured in any position.
- The tailstock is made up of an upper and lower section.
- The top part can be moved 10 mm to both sides by undoing the hexagon screw (6) and is therefore usable **for lathe slim cones.**
- The tailstock has to be postponed into the primary position after the cone work is done.
- The central position of the tailstock is shown by the scale mark.
- Turn a sample to see whether the workpiece is cylindrical, correct the tailstock setting if necessary.

Tailstock sleeve:

- The solid tailstock sleeve (1) has a millimetre scale.
- Center point, drill or drill chuck are **automatically ejected** when turning back.

Tool holder:

- There is an inside cone MT2 which is designed to hold tools and is incorporated in the sleeve.
- Tightening the clamping lever (2) ensures that the sleeve may be easily clamped in any position.
- The sleeve is moved axially by the hand crank (5) by way of the threaded spindle (4).



12. 3- and 4-jaw lathe chuck

The 3-jaw lathe chuck

Is used to tension circular, three and six edged workpiece centrally to the spindle axis.

The 4-jaw lathe chuck

Is used to tension square workpieces centrally to the spindle axis.

Risk of accidents

- **Do not attempt to clamp workpieces that are over the permitted clamping range. The clamping force is thus too low and the jaws may come undone.**
- **The maximum revolution range specified on the lathe chuck may not be exceeded.**

Mounting the jaws:

1. The jaws and guides are numbered from 1 - 3 or 1 - 4.
2. Open the lathe chuck with the key in such a way that the drilling jaws are released (sequence: 3, 2, 1 or 4, 3, 2, 1).
3. Insert turning jaw 1 into guide.
4. Push turning jaw 1 in the direction of the chuck center point and, at the same time, turn the chuck key clockwise.
5. When the coil has caught turning jaw 1, insert turning jaw 2 into guide 2.
6. Repeat the procedure with jaws 2, 3 and 4 (for a four jaw lathe chuck).
7. Then visually check the positions of the jaws. These must meet centrally.

Mounting the drilling jaws:

1. If you wish to use the drilling jaws again, the process is the repeated in the same order.
2. Three jaw lathe chuck: First jaw 1, then 2, then 3
3. Four jaw lathe chuck: First jaw 1, then 2, then 3, then 4

13. Operational faults and the elimination of such

Operational faults	Possible cause	Remedy
Machine cannot be switched on	230V voltage is not present	Plug is not fitted correctly
		Check the fuse for the socket
	The chuck protection hood is not closed	Close the chuck protection hood
	Emergency off switch not unlocked	Unlock the emergency off switch
	Direction of rotation has not been selected	Select the direction of rotation at the turn switch
	Vibrations (e.g. by transportation) have caused the plugged contacts of the drive motor (1.4 kW) board to come undone	Pull the power plug! Remove the cover sheet of the electronic housing and check all plugged contacts.
Main spindle motor no longer starts after the unlocking of the emergency off switch	Motor controller must be unlocked	For machines with a 1.4 kW drive motor, the motor must be switched on again using the ON/OFF switch after the emergency off switch is unlocked. After unlocking, wait approximately 5 seconds before switching the machine on.
The drive motor (1.4 kW) experiences „skips“ during operation	Carbon brushes and collector of the drive motor are contaminated	Clean the carbon brushes and collector of the drive motor with a piece of coarse sandpaper (See „Maintenance“ section)
	Carbon brushes are worn	Replace carbon brushes with new ones
Tool slide cannot be moved or can only be moved with considerable force	Clamping of the tool slide is on	Open the clamping

13. Operational faults and the elimination of such

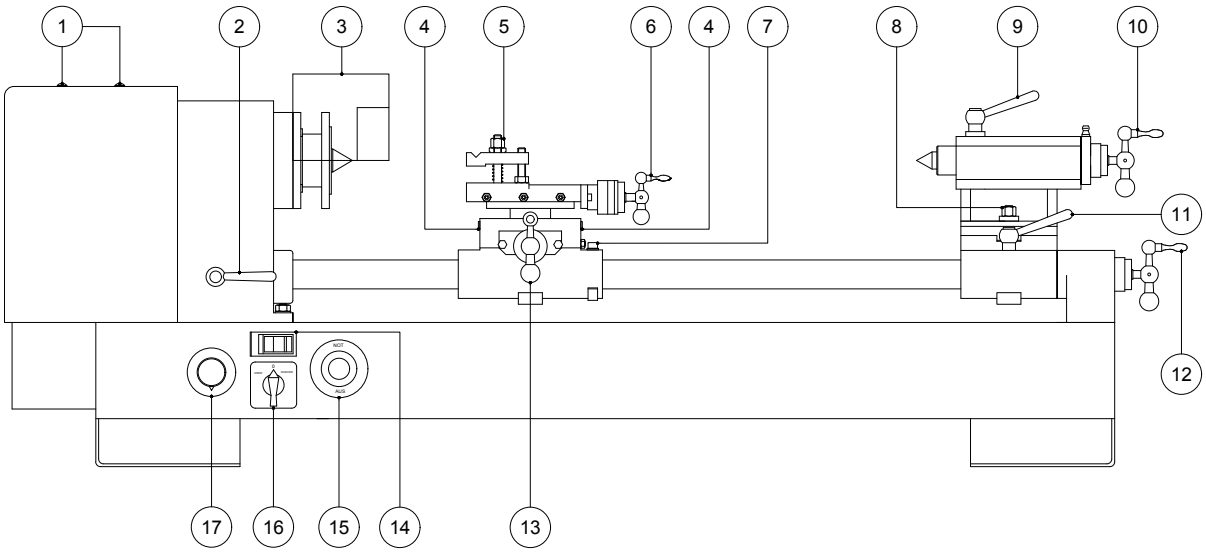
Operational faults	Possible cause	Remedy
Transverse or longitudinal slide cannot be moved or can only be moved with considerable force	Guide play is set too narrowly	Adapt the guide play
Rust on workpieces of machine parts when using coolant lubrication	Wrong coolant set	Check the mixing ratio of the coolant and correct if required (never cool with water alone!)
Tool holder cannot be inserted into the main spindle	An incorrect tool taper of the tool holder has been used	Only use the appropriate tool holders for the machine
	Inner core of the reducing sleeve or outer cone of the tool holder is contaminated	Clean the relevant cone
Tool cannot be removed from the tailstock sleeve	Tailstock sleeve is not fully cranked back	Fully crank back the tailstock sleeve to automatically eject tools with ejector lugs
	Use tool without ejector lugs	Place a soft and sufficient wide inlay between the tool and tailstock front. Now crank the tailstock sleeve back to push the tool out. (Use of tools without ejector lugs is possible by screwing a suitable threaded pin into place which extends the length of the tool backwards)

13. Operational faults and the elimination of such

Operational faults	Possible cause	Remedy
Tool overheated	Revolutions too high	Reduce the revolutions
	Feed too high	Reduce the feed
	Working without coolant	Use coolant
	Insufficient coolant feed at the cutting edge	Align the coolant hose correctly
	Tool blunt	Sharpen tool or use a new tool
	Increased friction caused by shaving build up in the tensioning groove of the tool (drilling work)	Remove the shavings from the hole more frequently (withdraw)
		Use a coated tool
		Wash the processing area with coolant
	Unsuitable tool chosen for the material to be processed	Only use the suitable tool for the relevant material

14. Control elements

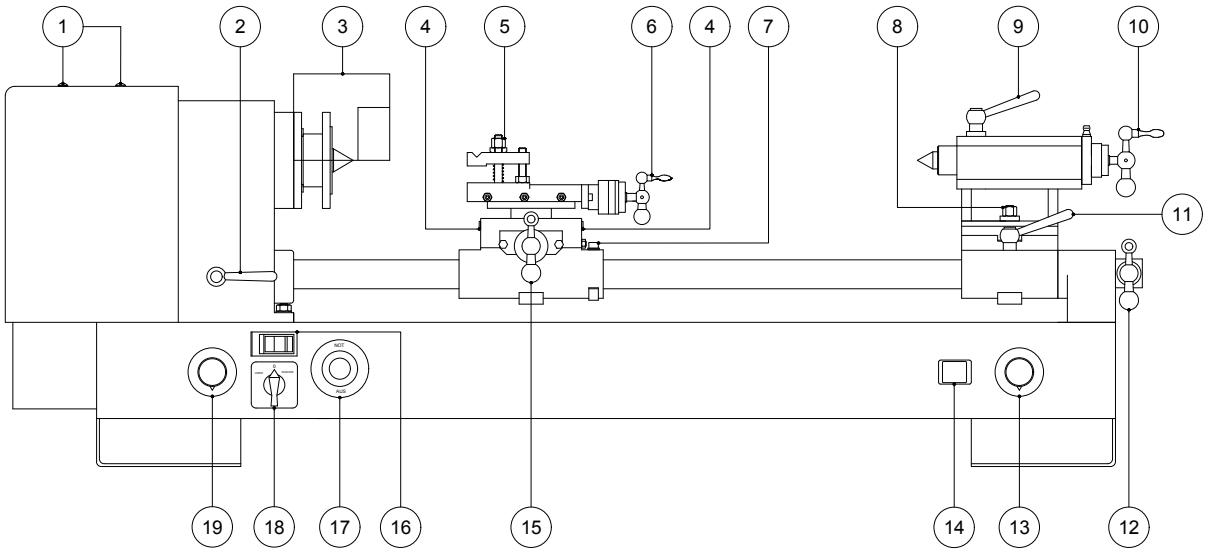
14.1 D2000 and D2400 lathes



1. Safety screw for the drive protection hood
2. Switch lever for the automatic along feed
3. Chuck protection hood
4. Holding screw for longitudinal slide
5. Tensioning nut for tool clamping plate
6. Ball crank for adjusting the longitudinal slide
7. Clamping screw for clamping the tool slide
8. Tensioning nut for securing the lateral adjuster of the tailstock
9. Clamping lever for securing the tailstock sleeve
10. Ball crank for adjusting the tailstock sleeve
11. Lever for securing the tailstock to the guides
12. Ball crank for adjusting the tool slide
13. Ball crank for adjusting the longitudinal slide
14. ON/OFF switch with low voltage trigger
15. Emergency off switch
16. Turn switch for forwards-reverse - main spindle
17. Potentiometer rotating knob for speed selection of the electrical drive motor

14. Control elements

14.2 D3000 lathe



1. Safety screw for the drive protection hood
2. Switch lever for the automatic along feed
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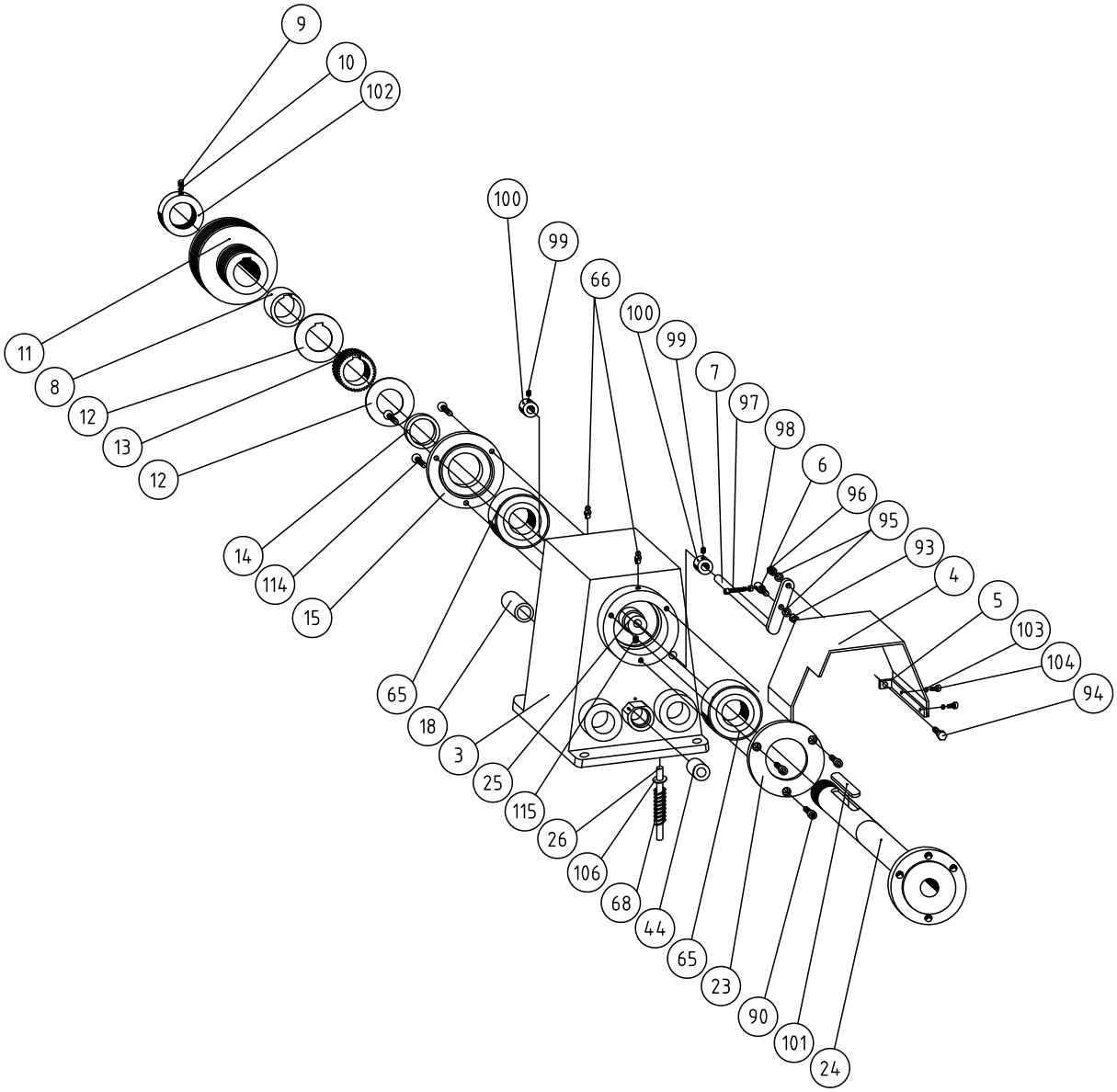
5. Tensioning nut for tool clamping plate
6. Ball crank for adjusting the longitudinal slide
7. Clamping screw for clamping the tool slide
8. Tensioning nut for securing the lateral adjuster of the tailstock
9. Clamping lever for securing the tailstock sleeve
10. Ball crank for adjusting the tailstock sleeve
11. Lever for securing the tailstock to the guides
12. Ball crank for adjusting the tool slide
13. Potentiometer rotating knob for speed selection of infinitely variable along feed
14. Direction switch for the feed direction Right-Left
15. Ball crank for adjusting the cross slide
16. ON/OFF switch with low voltage trigger
17. Emergency off switch
18. Turn switch for forwards-reverse - main spindle
19. Potentiometer rotating knob for speed selection of the electrical drive motor

15. Drawings and legends

15.1 Headstock



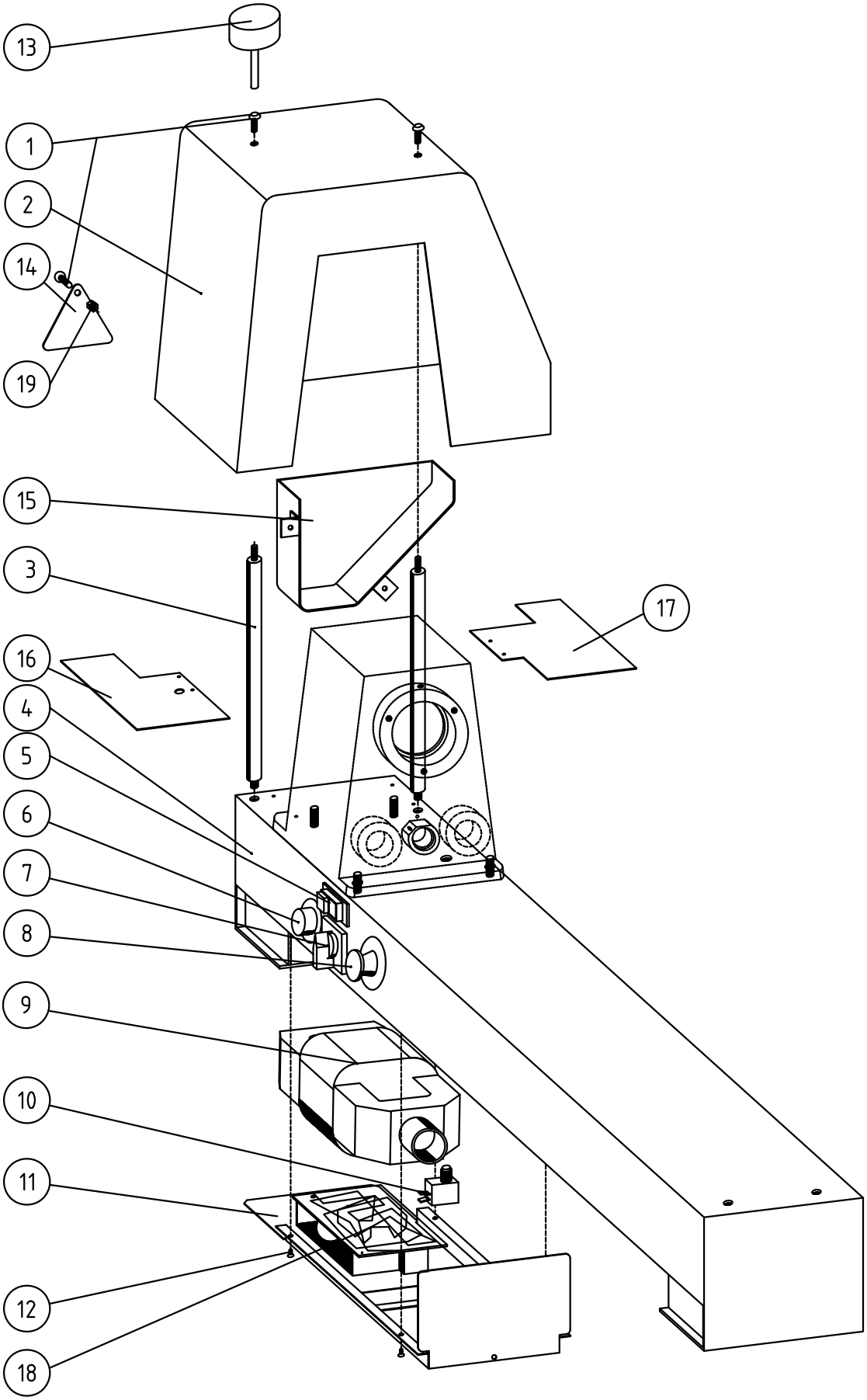
15. Drawings and legends

15.1 Headstock

Part No.	Items	Order No.	Description
3	1	51006831-0036	Headstock
4	1	51400283-0002	Acrylic- chuck protection hood
5	1	51400222-0001	Bracket
6	1	51004010-0025	Fence
7	1	51400221-0001	Butt strap with axis
8	1	51004045-0012	Spacer
9	1	16091300006006	Threaded pin
10	1	51007250-0001	Push piece
11	1	51006605-0004	Belt pulley
12	2	51400212-0001	Thrust washer
13	1	51006555-0006	Toothed belt wheel
14	1	51004045-0013	Spacer
15	1	51006600-0003	Bearing cap
18	1	51007026-0001	Red brass sleeve
23	1	51006600-0004	Bearing cap
24	1	51007451-00011	Spindle with flange
25	1	51004030-0005	Cam
26	1	51004008-0009	Pin
44	1	51007023-0001	Bronze bushing
65	2	51502108	Tapered roller bearing
66	2	51502517	Lubrication nipple
68	1	51502010	Pressure spring
90	3	16191200006016	Screw
93	1	16193400006000	Nut
94	1	16191200006016	Screw
95	2	16112500006001	Washer
96	1	16198500006000	Nut
97	1	16191200004025	Screw
98	1	16193400004000	Nut
99	1	160705A0010000	Adjusting ring
100	1	16191300005006	Threaded pin
101	1	1606885A100660	Parallel key
102	1	51004055-0002	Setting nut
103	2	16112500004000	Washer
104	2	16191200004010	Screw
106	1	16147100008000	Lock ring
114	3	16196500006014	Screw
115	1	16091400006012	Threaded pin

15. Drawings and legends

15.2 Foundation with motor and cover cap for D2000/D2400



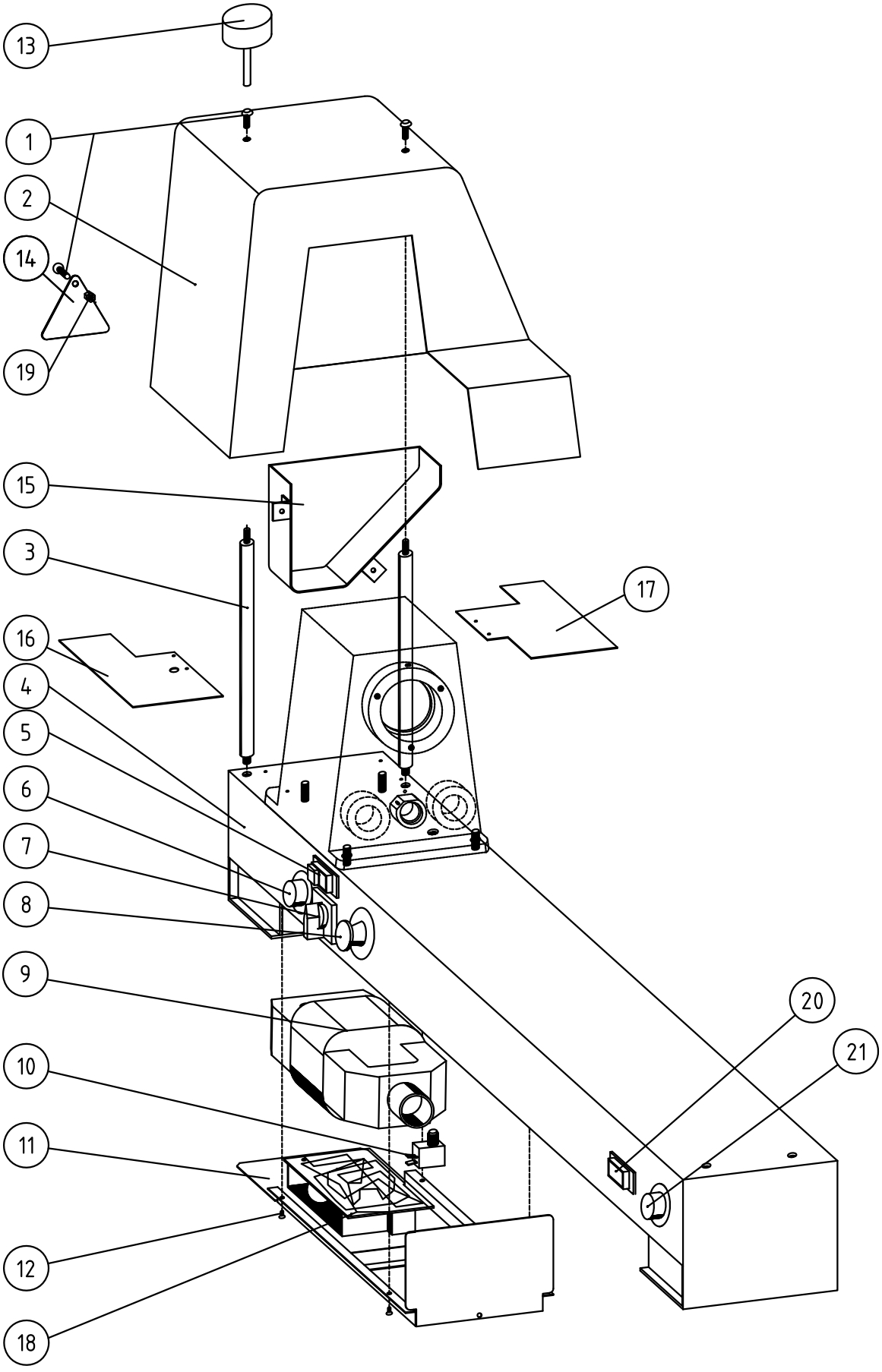
15. Drawings and legends

15.2 Foundation with motor and cover cap for D2000/D2400

Part No.	Items	Order No.	Description
1	3	16173800006012	Safety screw
2	1	51400206-0001	Cover hood
3	2	51004015-0001	Stud bolt
5	1	51500606	On-Off switch
6	1	51500807-0001	Potentiometer complete
7	1	51500608	Turn switch
8	1	51500624-0001	Emergency off switch complete
9	1	51500102-0002	Engine
10	1	51500619	End switch
11	1	51400207-0001	Engine cover
12	10	16179810003095	Screw
13	1	51508001	Wrench SW4
14	1	51400485-0001	Protective plate spindle aperture
15	1	51400203-0001	Belt guard
16	1	51400204-0001	Finger guard front
17	1	51400205-0001	Finger guard back
18	1	51501402	Board
19	1	16193400006000	Nut
			for D2000
4	1	51400104-0001	Foundation
			for D2400
4	1	51400208-0001	Foundation

15. Drawings and legends

15.3 Foundation with motor and cover hood for D3000



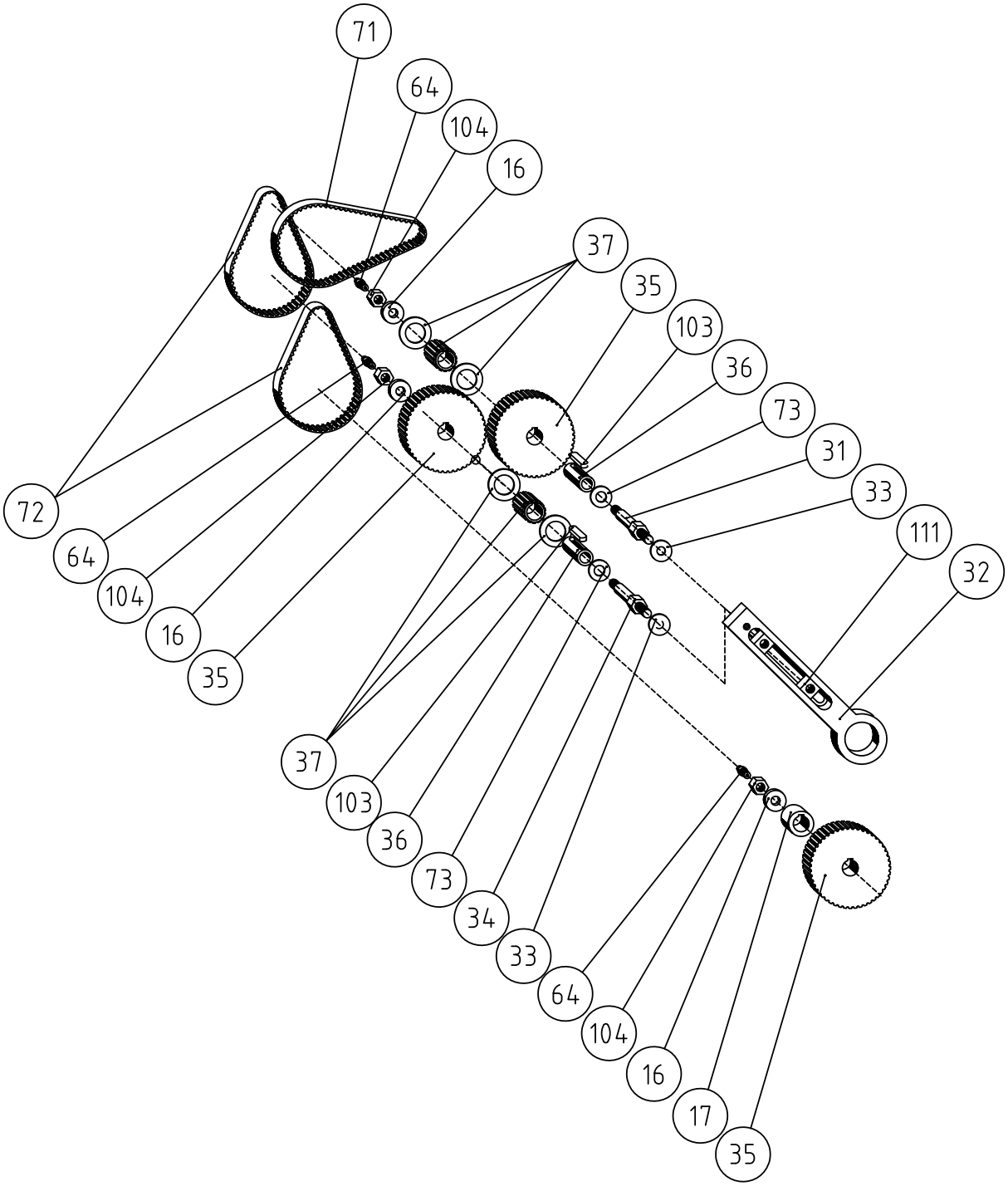
15. Drawings and legends

15.3 Foundation with motor and cover hood for D3000

Part No.	Items	Order No.	Description
1	3	16173800006012	Safety screw
2	1	51400302-0001	Cover hood
3	2	51004015-0001	Stud bolt
4	1	51400305-0001	Foundation
5	1	51500606	On-Off switch
6	1	51500807-0001	Potentiometer complete
7	1	51500608	Turn switch
8	1	51500624-0001	Emergency off switch complete
9	1	51500102-0002	Engine
10	1	51500619	End switch
11	1	51400207-0001	Engine cover
12	10	16179810003095	Screw
13	1	51508001	Wrench SW4
14	1	51400485-0001	Protective plate spindle-transmitting
15	1	51400203-0001	Belt guard
16	1	51400204-0001	Finger guard front
17	1	51400205-0001	Finger guard back
18	1	51501402	Board
19	1	16193400006000	Nut
20	1	51500602	Rocker switch
21	1	51500801	Potentiometer
			Not depicted
22	1	51500802	Feed board
23	2	51001020-0003	Bracket for feed board
24	1	51400308-0001	Cover platter for electronic feed
25	1	51501206	Electrolytic tantalum capacitor
26	1	51500502	Single-phase – isolating transformer

15. Drawings and legends

15.4 Change gear quadrant for D2000/D2400/D3000



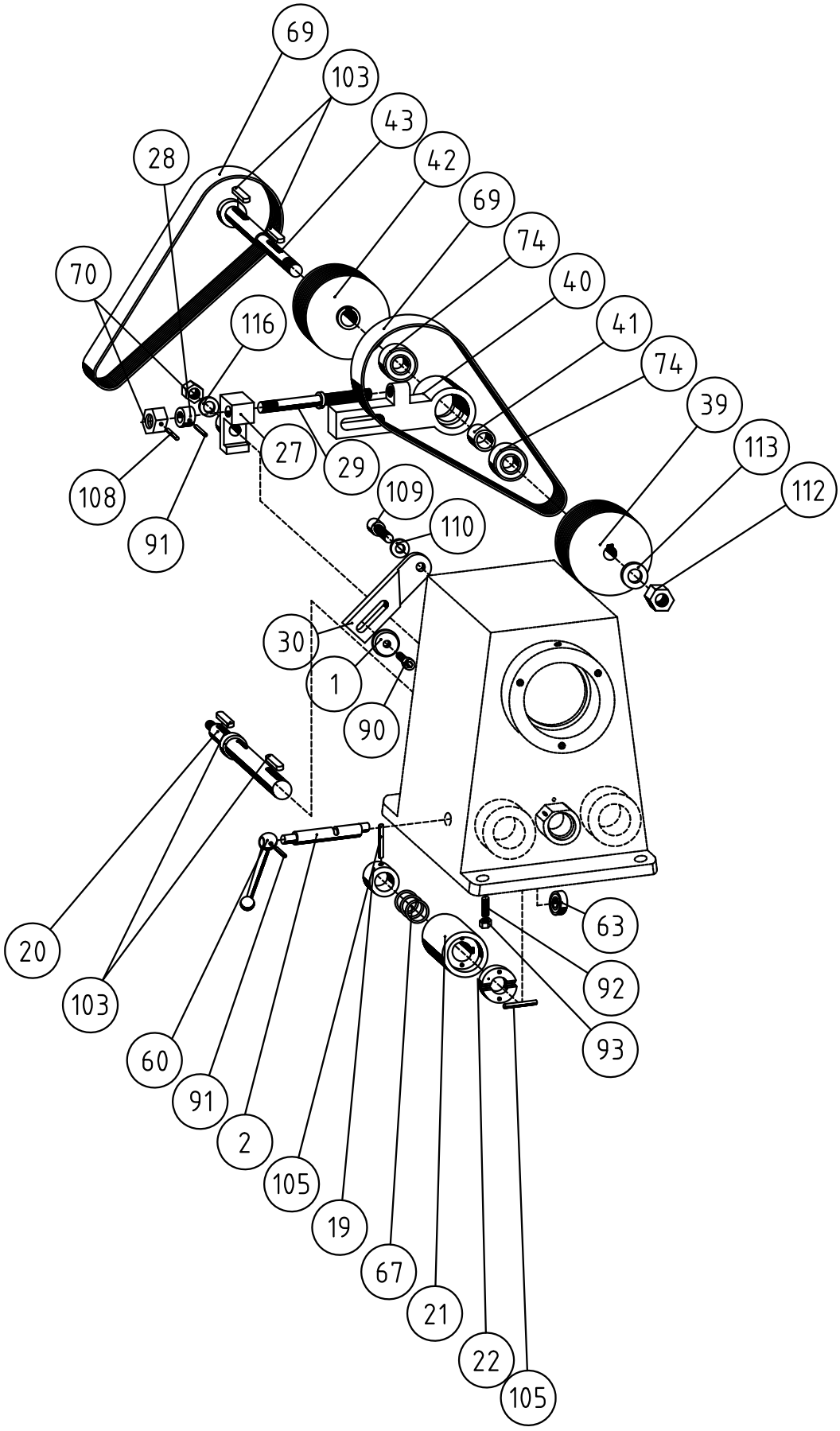
15. Drawings and legends

15.4 Change gear quadrant for D2000/D2400/D3000

Part No.	Items	Order No.	Description
16	3	51004020-0010	Washer
17	1	51004025-0008	Sleeve
31	1	51004633-0004	Wheel bolts alternately short
32	1	51006831-0013	Change gear quadrant
33	2	51004020-0009	Washer
34	1	51004633-0003	Wheel bolts alternately long
35	3	51006580-0004	Toothed belt wheel Z48
36	2	51007016-0001	Change gear sleeve
37	2	51006525-00011	Toothed belt wheel Z14
64	3	51502518	Lubrication nipple
71	1	51502323	Gear belt 140
72	2	51502320	Gear belt 120
73	2	16000000010201	Distance washer
103	3	1606885A050325	Parallel key
104	3	16193400008000	Nut
111	2	16155700008000	Square nut

15. Drawings and legends

15.5 Transmission and lead screw drive for D2000/2400/D3000



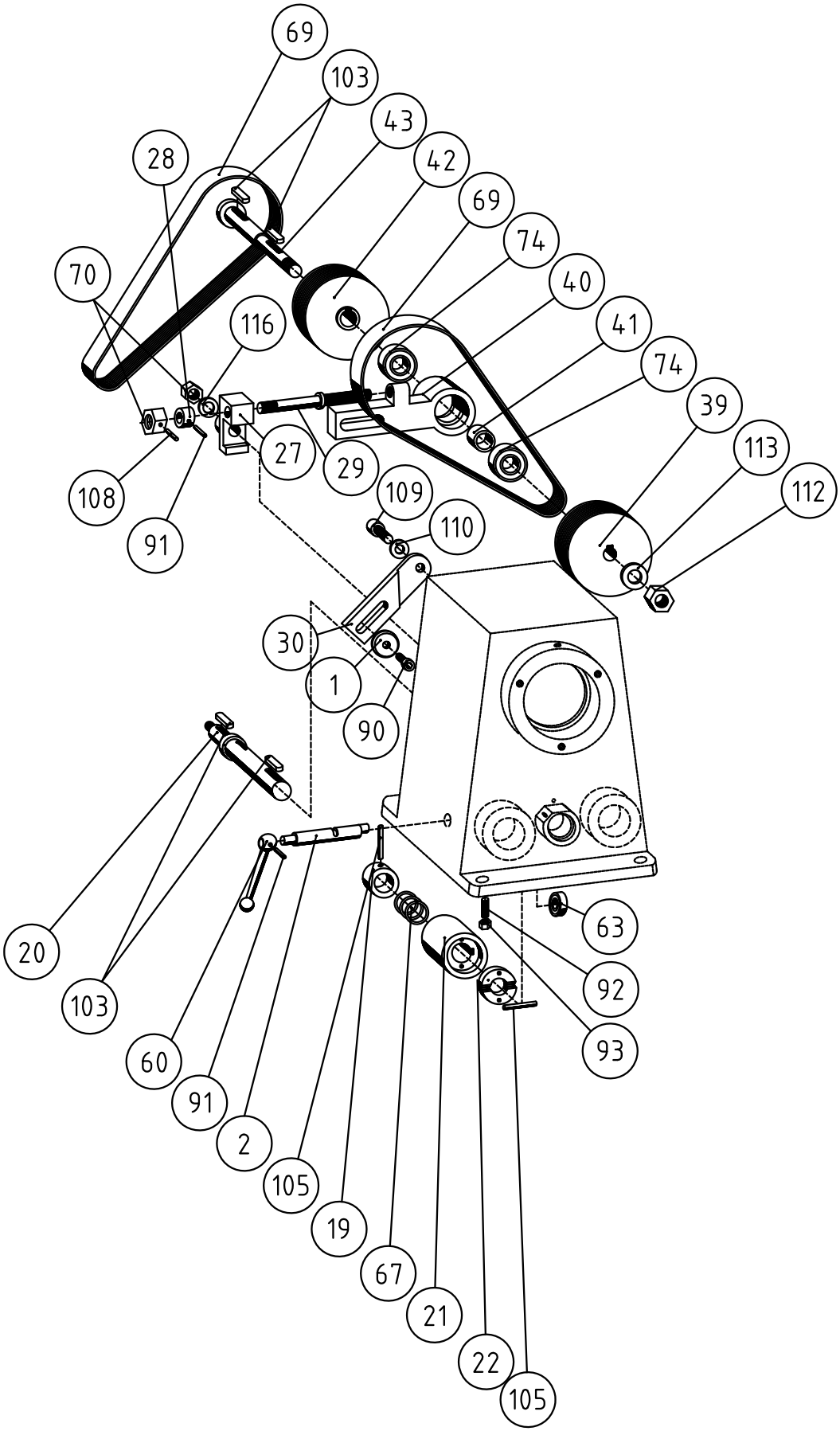
15. Drawings and legends

15.5 Transmission and lead screw drive for D2000/2400/D3000

Part No.	Items	Order No.	Description
1	1	16173490176530	Washer
27	1	51006831-0015	Spindle guide
28	1	51004018-0001	Adjusting ring transmission
29	1	51004015-0007	Spindle
30	1	51400220-0001	Snip holder
39	1	51006580-0003	Belt washer
40	1	51006831-0014	Clamping piece
41	1	51004020-0008	Spacer
42	1	51006580-0002	Belt washer
43	1	51004025-0006	Axis
69	2	51502315	Drive belt 559
70	2	1619340001000	Nut
74	2	51502113	Ball bearing
90	1	16191200006016	Screw
91	2	16073430003014	Spiral tensioning pin
103	4	1606885A050325	Parallel key
108	1	16073430003018	Spiral tensioning pin
109	1	16191200008020	Screw
110	1	16112500008001	Washer
112	1	16198500012000	Nut
113	1	16112500013000	Washer
116	1	16112500010000	Washer
			for D2000
2	1	51004012-0005	Eccentric shaft
19	1	51004030-0006	Adjusting ring
20	1	51004025-0034	Feed shaft
21	1	51004045-0006	Coupling element
22	1	51003435-0002	Coupling disk
60	1	51507018	Tensioning nut
63	1	51502117	Ball bearing
67	1	51502021	Pressure spring
92	1	16091500006016	Pin screw
93	1	16193400006000	Nut
105	2	16073430004030	Spiral tensioning pin

15. Drawings and legends

15.5 Transmission and lead screw drive for D2000/D2400/D3000



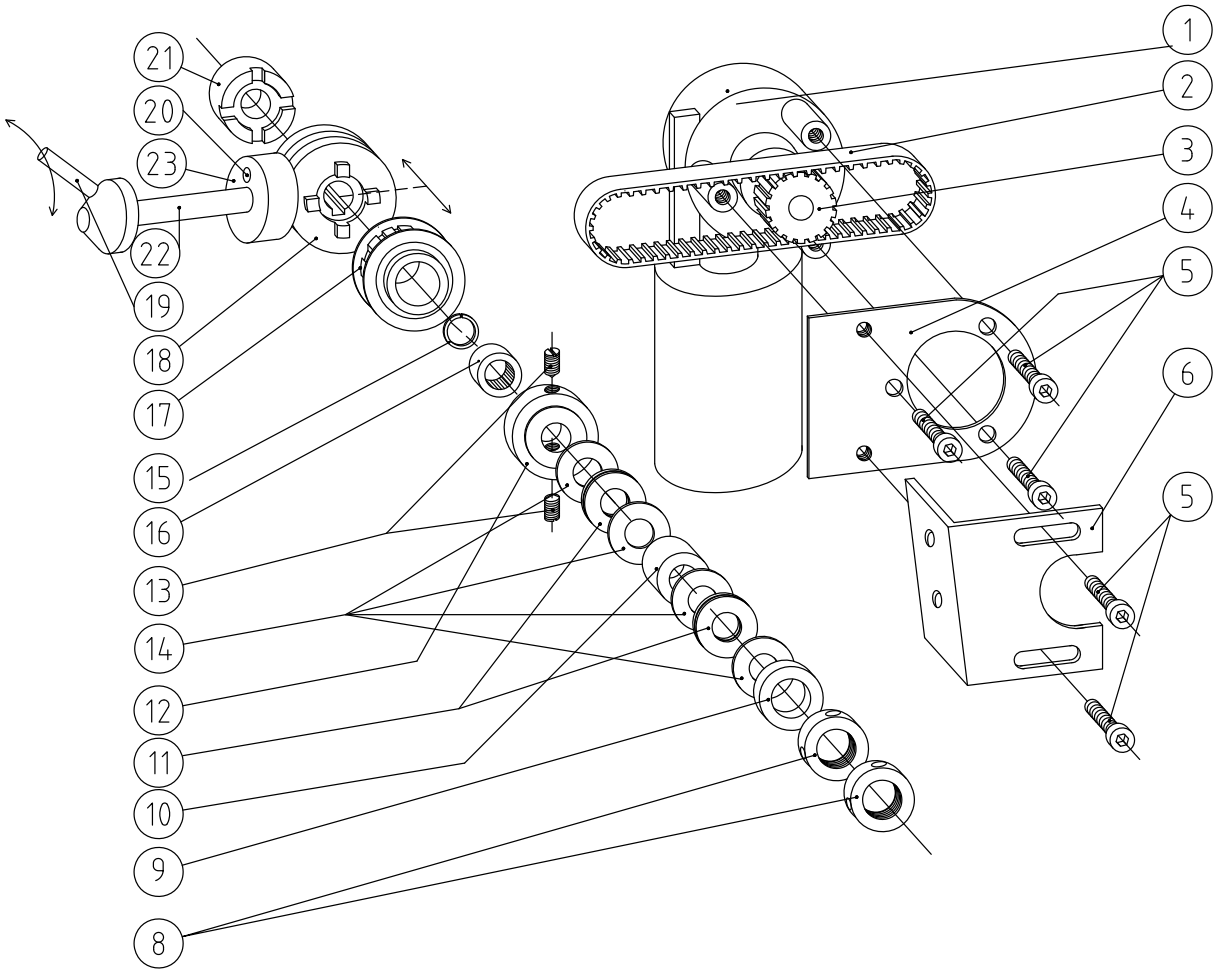
15. Drawings and legends

15.5 Transmission and lead screw drive for D2000/D2400/D3000

Part No.	Items	Order No.	Description
			for D2400
2	1	51004012-0005	Eccentric shaft
19	1	51004030-0006	Adjusting ring
20	1	51004025-0034	Feed shaft
21	1	51004045-0006	Coupling element
22	1	51003435-0002	Coupling disk
60	1	51507018	Tensioning nut
63	1	51502117	Ball bearing
67	1	51502021	Pressure spring
92	1	16091500006016	Pin screw
93	1	16193400006000	Nut
105	2	16073430004030	Spiral tensioning pin
			for D3000
20	1	51004025-0032	Feed shaft

15. Drawings and legends

15.6 Lead screw drive for D3000



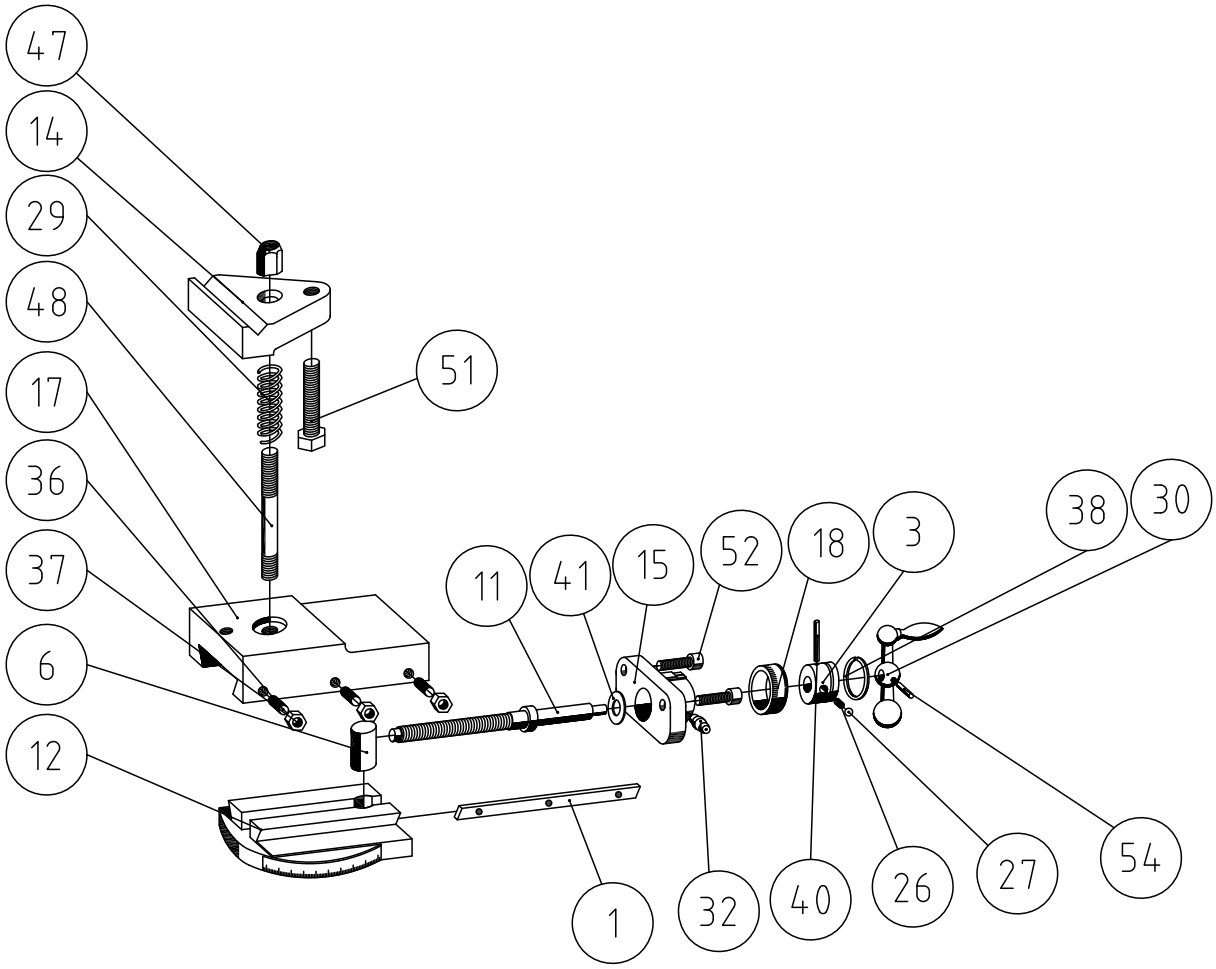
15. Drawings and legends

15.6 Lead screw drive for D3000

Part No.	Items	Order No.	Description
1	1	51500110	DC motor with transmission
2	1	51502326	Gear belt
3	1	51004040-0012	Toothed belt wheel
4	1	51400304-0001	Motor holder
5	5	16191200006016	Screw
6	1	51400303-0001	Mounting bracket
8	2	51004025-0036	Setting nut
9	1	51004025-0040	Washer
10	1	51004025-0008	Sleeve
11	2	51502101	Needle roller thrust bearing
12	1	51004035-0014	Thrust ring
13	2	16091400006012	Threaded pin
14	4	51502105	Counter disk
15	1	16147100012000	Securing ring
16	2	51502123	Needle sleeve
17	1	51004040-00131	Toothed belt wheel Z22
18	1	51004045-0014	Sliding clutch
19	1	51507018-0001	Tensioning nut
20	1	16063250006020	Switching pin
21	1	51004030-0011	Adjusting ring with claw
22	1	51004010-0024	Rocker shaft
23	1	51004035-0013	Switching washer

15. Drawings and legends

15.7 Tool slide – longitudinal slide



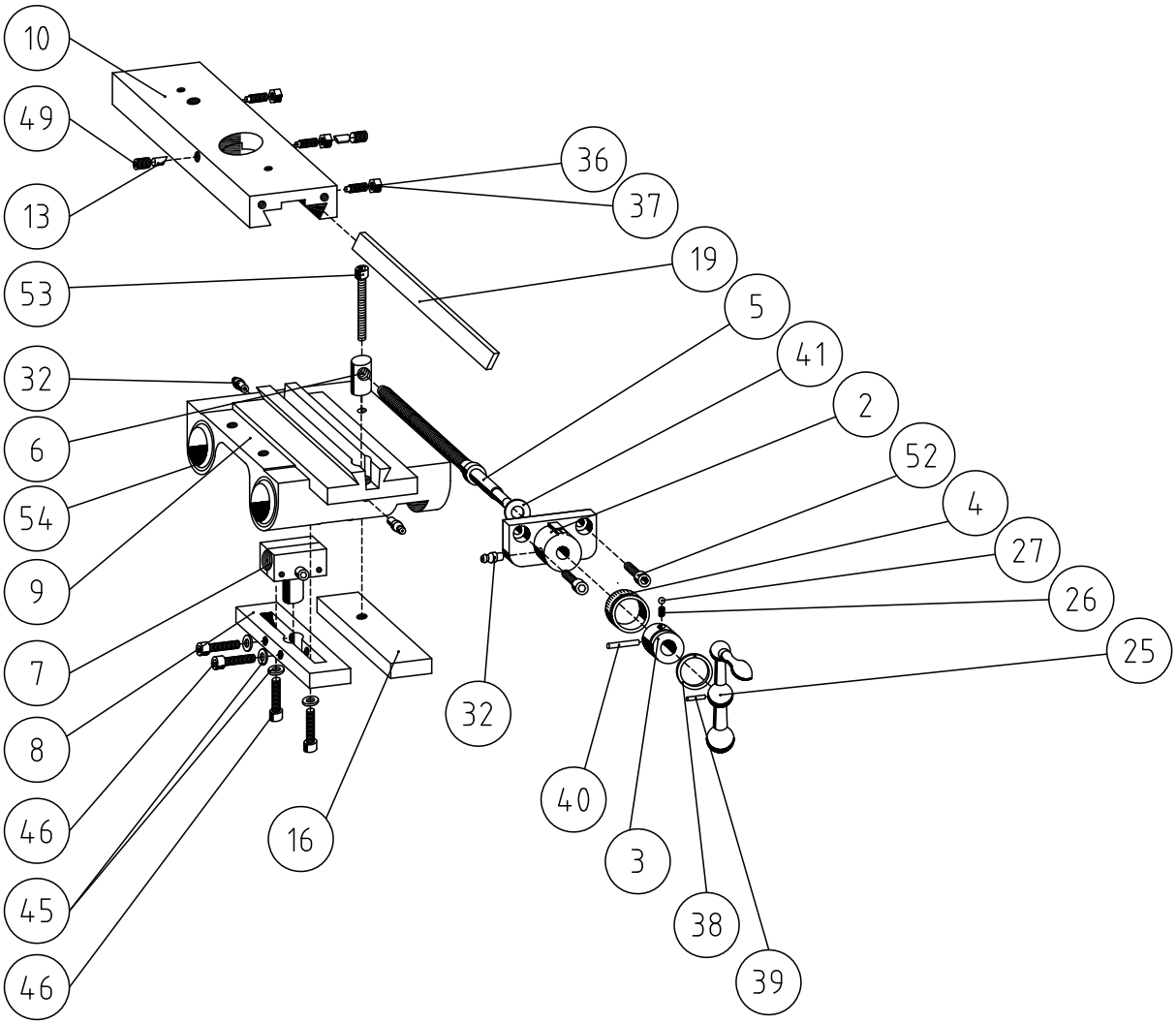
15. Drawings and legends

15.7 Tool slide – longitudinal slide

Part No.	Items	Order No.	Description
1	1	51001016-0006	Adjustment bar
3	1	51004025-0009	Adjusting ring
6	1	51007016-0002	Bronze nut
11	1	51004016-0004	Spindle lengthwise
12	1	51400242-00011	Longitudinal support, under section
14	1	51400253-0001	clamping plate
15	1	51003003-0001	Spindle guide lengthwise
17	1	51003000-0001	Longitudinal support, upper section
18	1	51006731-00021	Scale ring lengthwise
26	1	51502009	Pressure spring
27	1	51502131	Ball
29	1	51502010	Pressure spring
30	1	51507023-0001	Ball crank
32	1	51502517	Lubrication nipple
36	3	16091500006016	Threaded pin
37	3	16143900006000	Nut
38	1	16147100025000	Securing ring
40	1	16073430003024	Spiral tensioning pin
41	2	16020930020005	Disk spring
47	1	16193400010000	Nut
48	1	16093800010070	Pin screw
51	1	16193300010050	Screw
52	2	16191200006012	Screw
54	1	16073430003014	Spiral tensioning pin

15. Drawings and legends

15.8 Tool slide – Cross slide



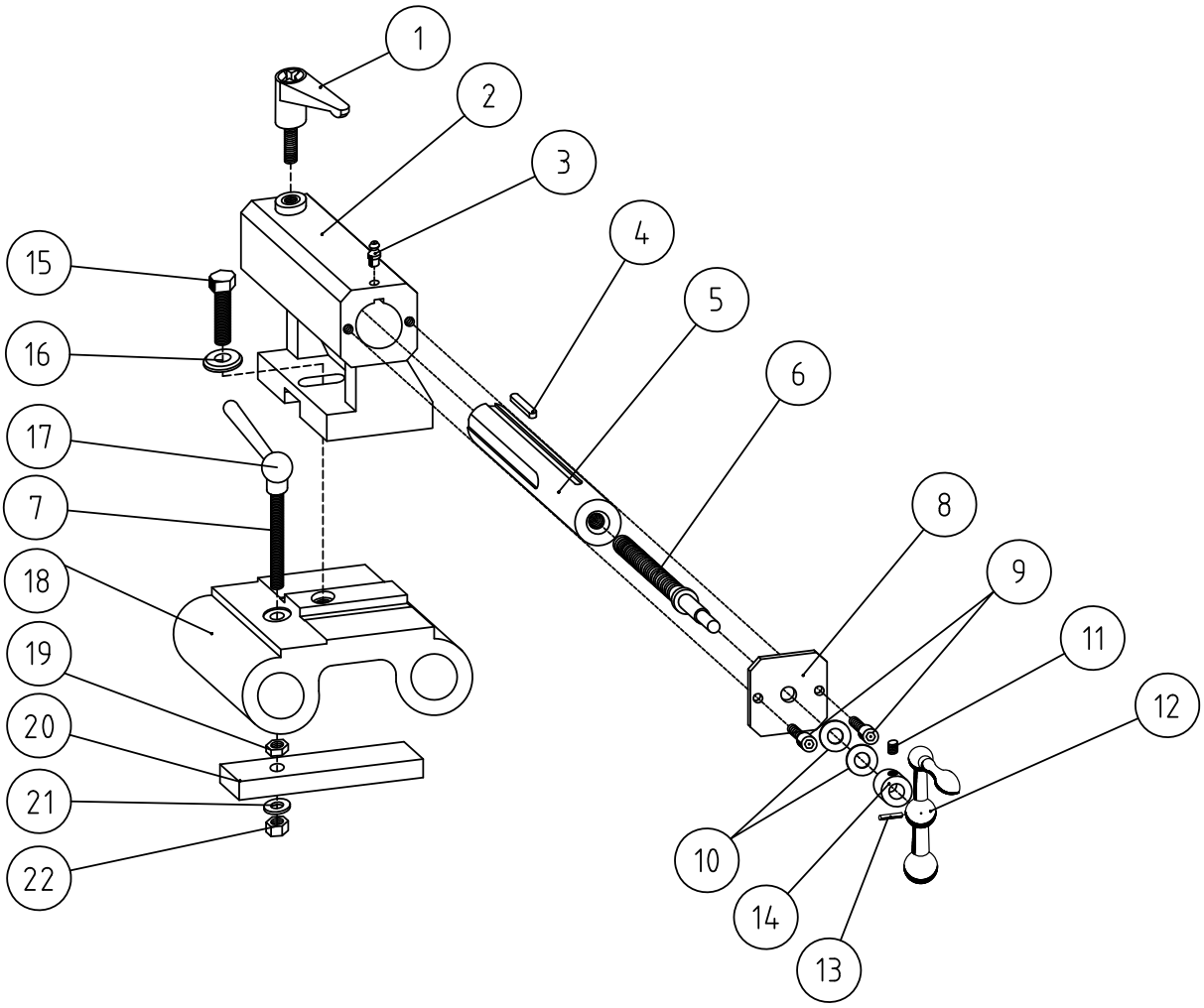
15. Drawings and legends

15.8 Tool slide – Cross slide

Part No.	Items	Order No.	Description
2	1	51003003-0002	Spindle guide transverse
3	1	51004025-0009	Adjusting ring
4	1	51006731-00023	Scale ring transverse
5	1	51004016-0011	Spindle transverse
6	1	51007016-0002	Bronze nut
7	1	51007350-00011	Bronze nut 2-pieces
8	1	51001026-0003	Nut – carrier bracket
9	1	51003001-0001	Transverse support – Under section
10	1	51003000-0002	Transverse support – Upper section
13	2	51004006-0002	Push piece
16	1	51001026-0004	Clamping piece
19	1	51001016-0005	Adjustment bar
25	1	51507022-0001	Ball crank
26	1	51502009	Pressure spring
27	1	51502131	Ball
32	3	51502517	Lubrication nipple
36	3	16091500006016	Thread pin
37	3	16143900006000	Nut
38	1	16147100025000	Securing ring
39	1	16073430003018	Spiral tensioning pin
40	1	16073430003024	Spiral tensioning pin
41	2	16020930020005	Disk spring
45	4	16112500006001	Washer
46	4	16191200006025	Screw
49	2	16091300008010	Threaded pin
52	2	16191200006012	Screw
53	1	16191200006050	Screw
54	2	51502201	Scraper ring

15. Drawings and legends

15.9 Tailstock



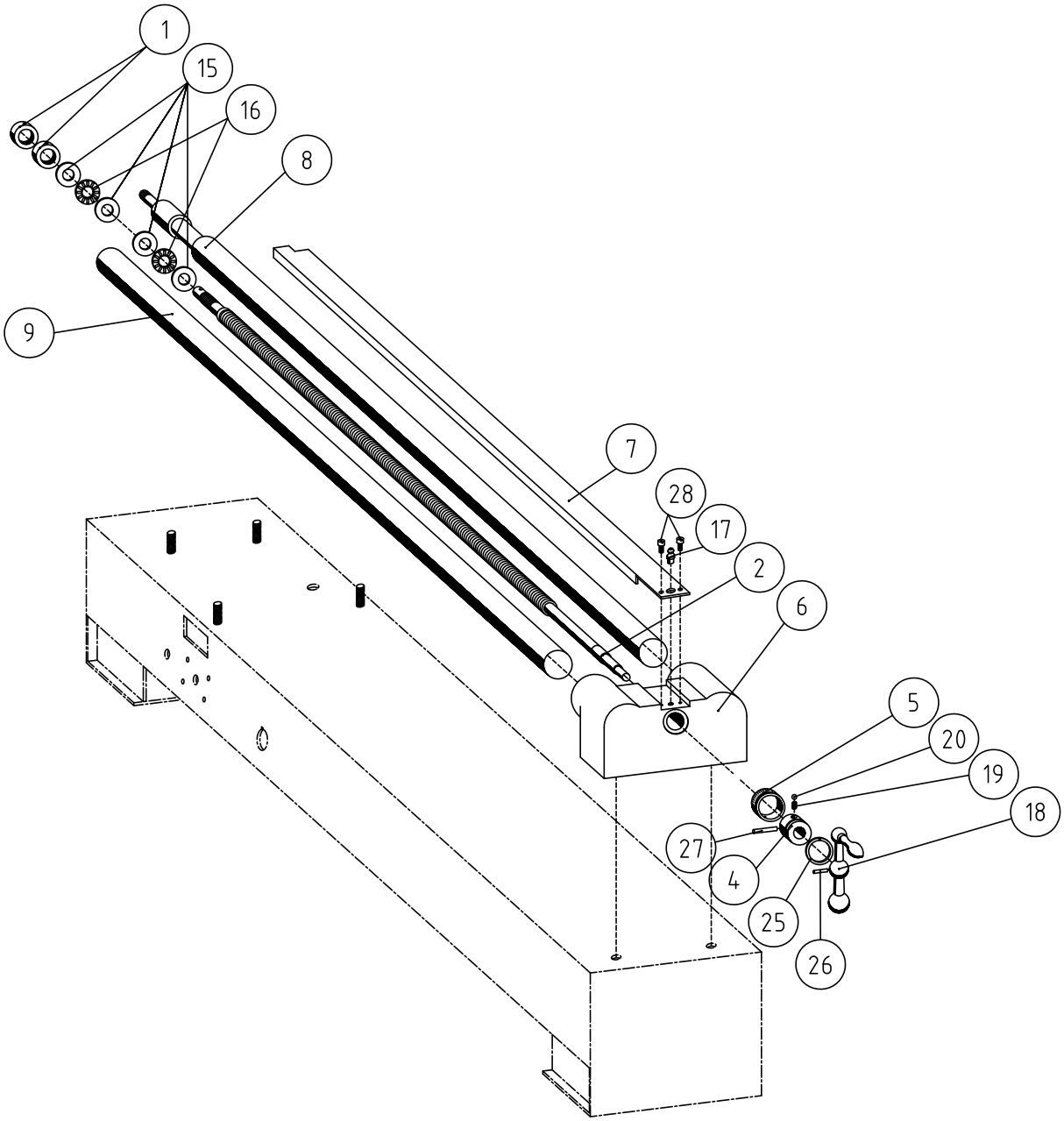
15. Drawings and legends

15.9 Tailstock

Part No.	Items	Order No.	Description
1	1	51507031-0002	Tensioning lever with threaded pin
2	1	51006831-0035	Tailstock upper section
3	1	51502517	Lubrication nipple
4	1	1606885B006032-0001	Parallel key
5	1	51003830-00051	Pinole
6	1	51004016-0001	Spindle
7	1	16093900008065	Pin screw
8	1	51400252	End-plate
9	2	16191200006016	Screw
10	2	16020930020005	Disk spring
11	1	16191300005006	Threaded pin
12	1	51507022-0001	Ball crank
13	1	16073430003018	Spiral tensioning pin
14	1	160705A0010000	Adjusting ring
15	1	16193300010035	Screw
16	1	51004025-0028	Washer
17	1	51507018	Tensioning nut
18	1	51006831-0034	Tailstock lower section
19	1	16143900008000	Nut
20	1	51001026-0002	Clamping piece
21	1	16112500008001	Washer
22	1	16193400008000	Nut

15. Drawings and legends

15.10 Rear bearing with guide rods for D2000/D2400



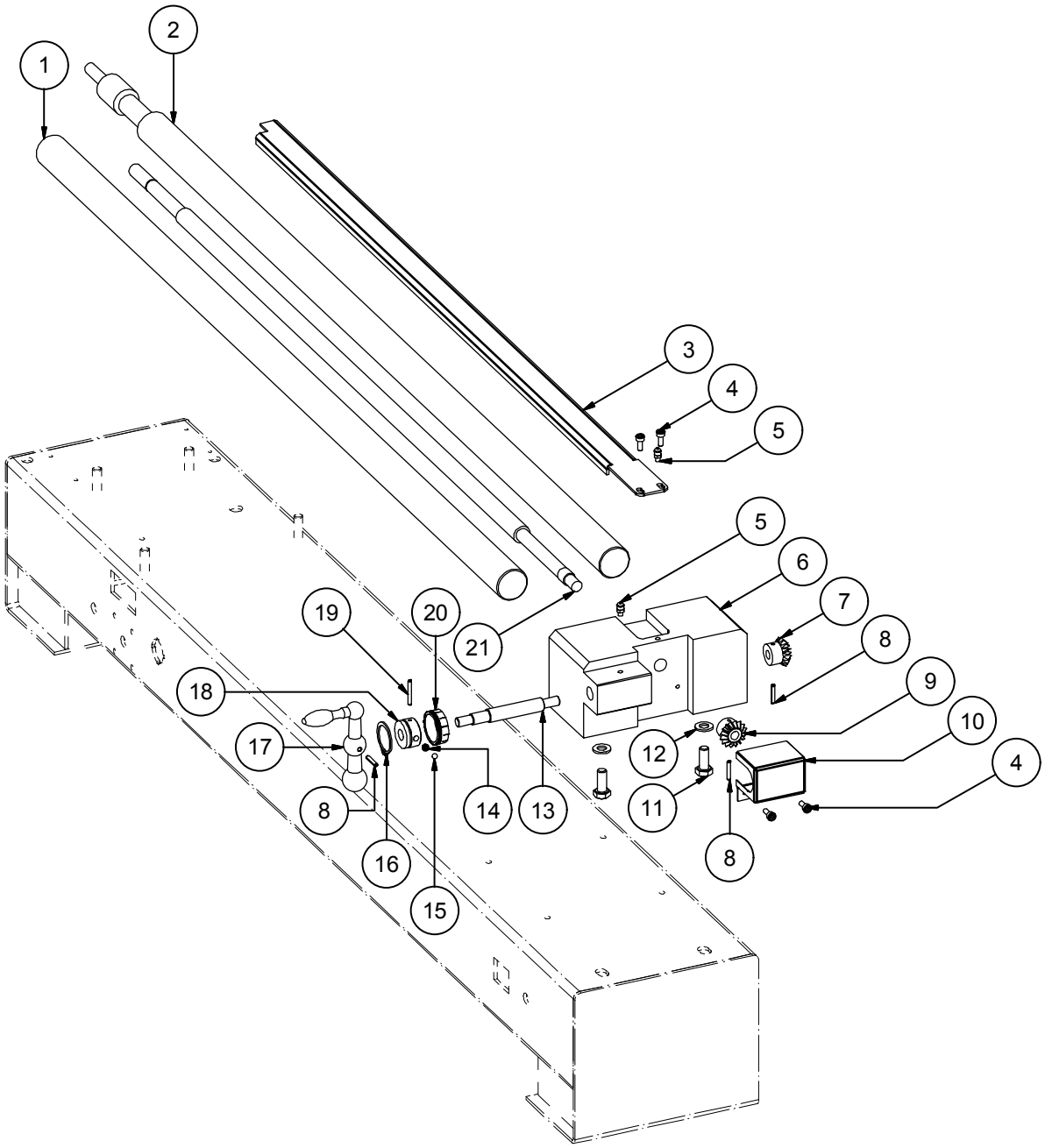
15. Drawings and legends

15.10 Rear bearing with guide rods for D2000/D2400

Part No.	Items	Order No.	Description
1	2	51004025-0025	Setting nut
4	1	51004025-0009	Adjusting ring
5	1	51006731-00022	Scale ring
6	1	51003002-0001	Rear bearing
15	4	51502105	Counter washer
16	2	51502101	Needle bearing
17	1	51502518	Lubrication nipple
18	1	51507022-0001	Ball crank
19	1	51502003	Push spring
20	1	51502131	Ball
25	1	16147100025000	Secure ring
26	1	16073430003018	Spiral tensioning pin
27	1	16073430003024	Spiral tensioning pin
28	2	16191200004010	Screw
			for D2000
2	1	51400281-0001	Feed spindle
7	1	51400105	Cover sheet
8	1	51003830-0001	Guide rod (920mm)
9	1	51003830-0002	Guide rod (790mm)
			for D2400
2	1	51400281-0002	Feed spindle
7	1	51400219	Cover sheet
8	1	51003830-0003	Guide rod (1070mm)
9	1	51003830-0004	Guide rod (940mm)

15. Drawings and legends

15.11 Rear bearing with guide rods for D3000



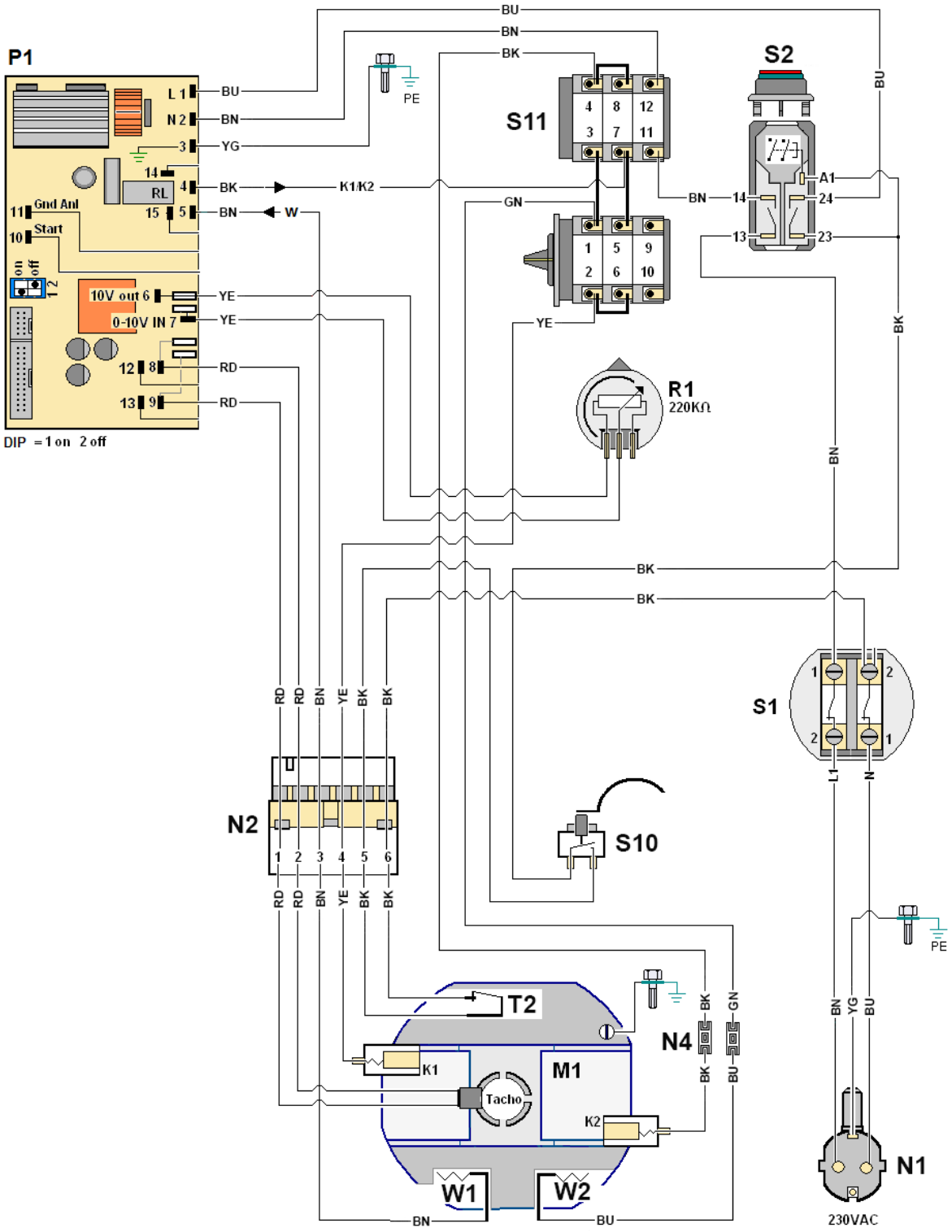
15. Drawings and legends

15.11 Rear bearing with guide rods for D3000

Part No.	Items	Order No.	Description
1	1	51003830-0004	Guide rod (940mm)
2	1	51003830-0003	Guide rod (1070mm)
3	1	51400307	Cover sheet
4	4	16191200004010	Screw
5	2	51502518	Lubrication nipple
6	1	51003002-0002	Rear bearing
7	1	51502401-0002	Bevel gear
8	3	16073430003018	Spiral tensioning pin
9	1	51502401-0003	Bevel gear
10	1	51400301-0001	Protective hood
11	2	16193300008020	Screw
12	2	16112500008001	Washer
13	1	51004012-0007	Shaft
14	1	51502003	Spring
15	1	51502131	Ball
16	1	16147100025000	Secure ring
17	1	51507022-0001	Ball crank
18	1	51004025-0009	Adjusting ring
19	1	16073430003024	Spiral tensioning pin
20	1	51006731-00022	Scale ring
21	1	51400281-0003	Feed spindle

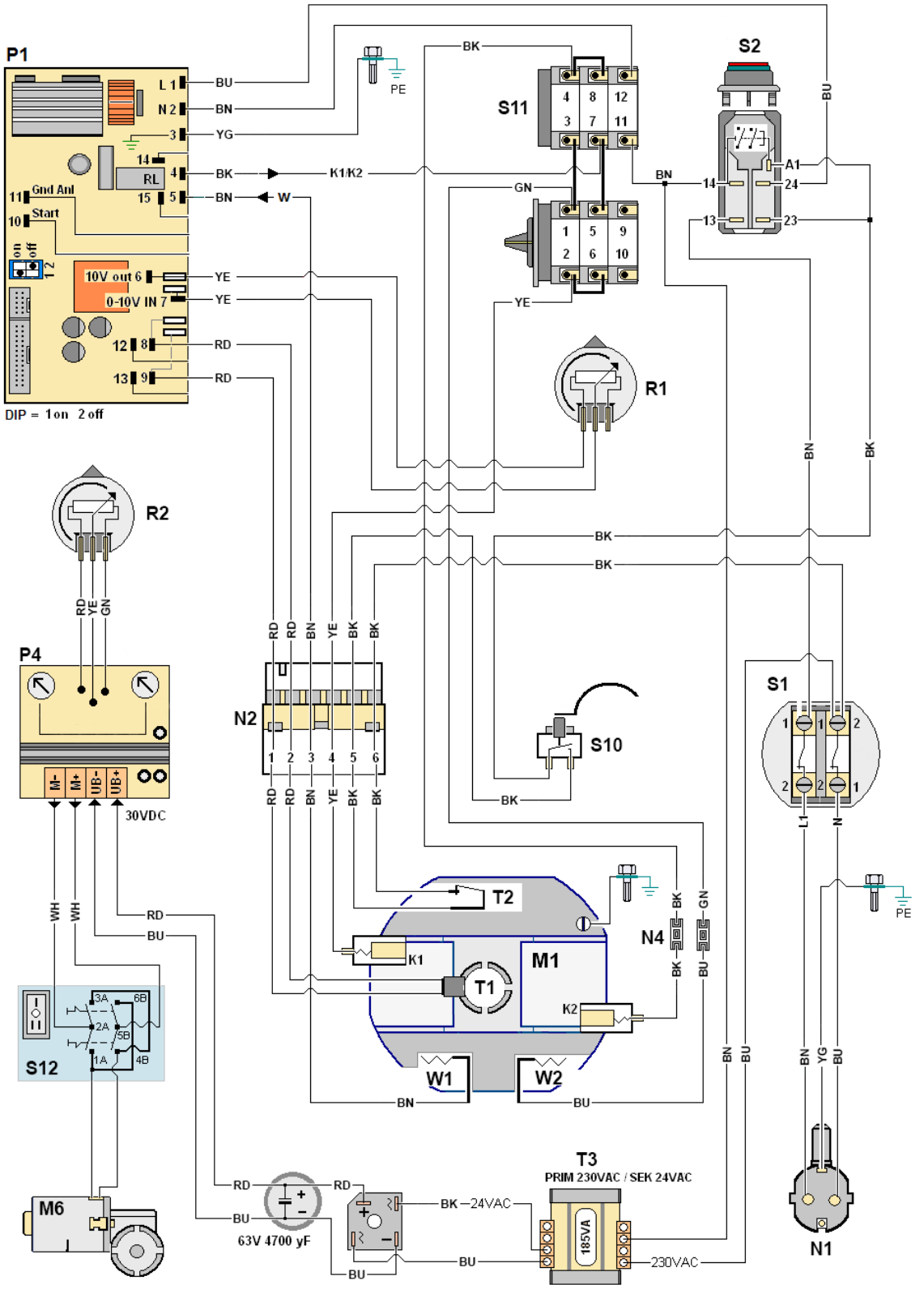
16. Circuit diagram

16.1 For D2000/D2400



16. Circuit diagram

16.2 For D3000



16. Circuit diagram

16.3 Key for circuit diagram

Color-code by IEC 60757

BK	Black	PK	Pink
BN	Brown	RD	Red
BU	Blue	VT	Violet
GN	Green	WH	White
GY	Gray	YE	Yellow
OG	Orange	YG	Green/Yellow

M1	Main spindle motor
M6	Feed motor
N1	Power plug
N2	Motor plug
N4	Clamping bar
P1	Motor control board
P4	Feed board
R1	220 kΩ (ohm) potentiometers spindle speed
R2	10 kΩ (ohm) potentiometers spindle speed
S1	Emergency switch-off
S2	Main switch
S10	End switch chuck -cover
S11	Turn switch spindle right/left
S12	Feed direction
T1	Speedometer
T2	Thermistor
T3	Transformer
W1	Coil 1
W2	Coil 2

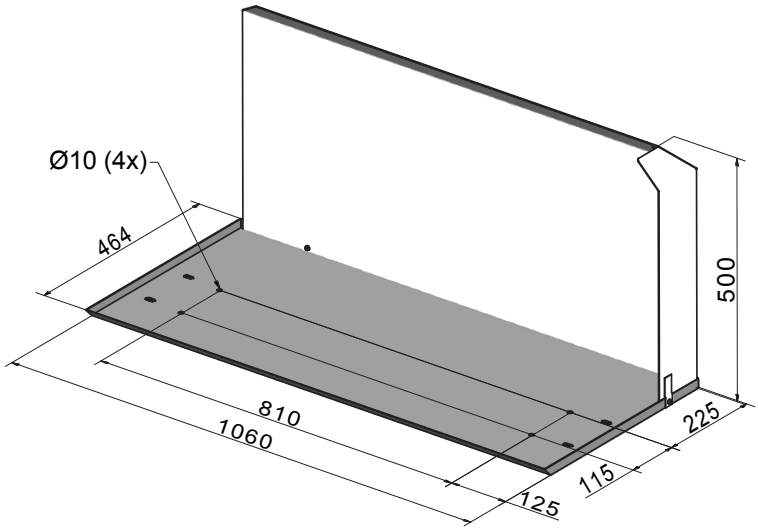
17. Chip tray with splash guard (optional)

17.1 Setting up the chip tray with splash guard

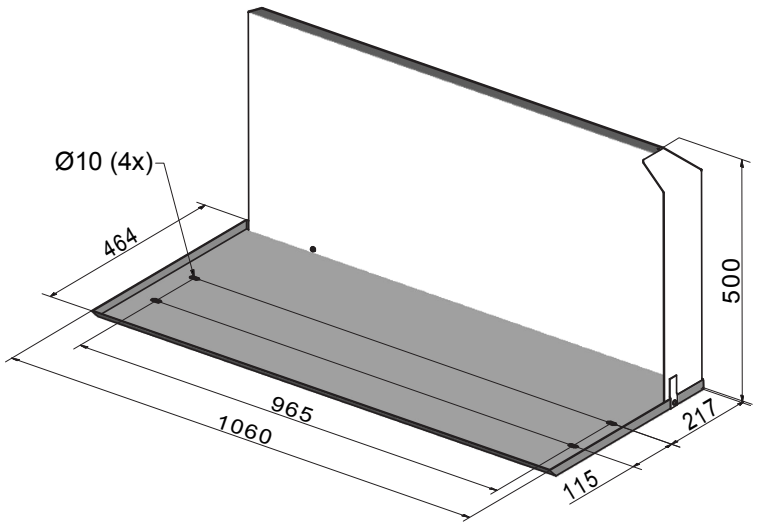
When mounting the chip tray with splash guard to a WABECO machine base cabinet, the appropriate bores are already present. The machine base cabinet ensures a safe base for the lathe or the chip tray with splash guard.

If the chip tray with splash guard is secured to another suitable surface, the four through holes must be bored into the surface by the client. For the positions of the four drilled holes for the lathe or chip tray with splash guard, see the diagram. The diameter of the through holes in the surface must be at least 9 mm.

The supplied fixture screws are designed for the installation on a WABECO machine base cabinet. If the chip tray with splash guard is attached to another, suitable surface, screws suitable for the thickness of the surface must be used.



D2000



D2400 and D3000

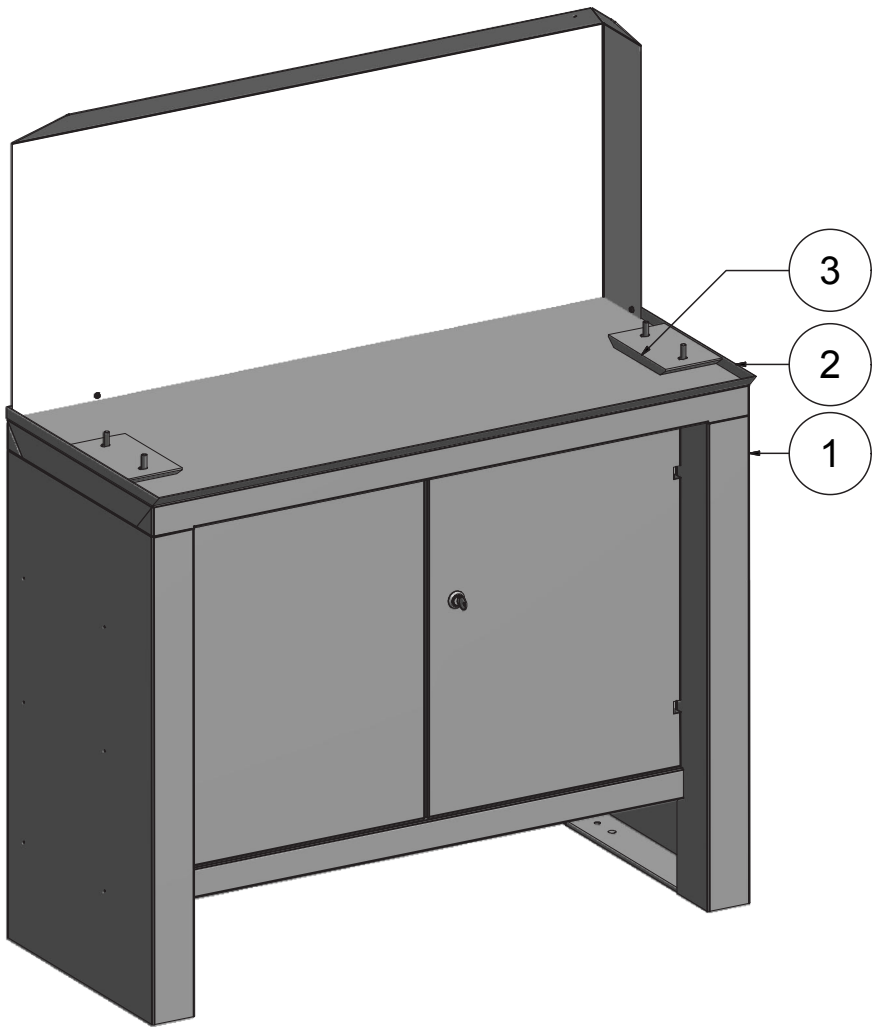
17. Chip tray with splash guard (optional)

17.2 Mounting the chip tray with splash guard on the tool cabinet (optional)

- The chip tray with splash guard (2) is positioned, as shown, on the machine base cabinet (1). The two spacer feet's (3) are not relevant in this stage.
- The screws and washers required for assembly are included in the scope of delivery.

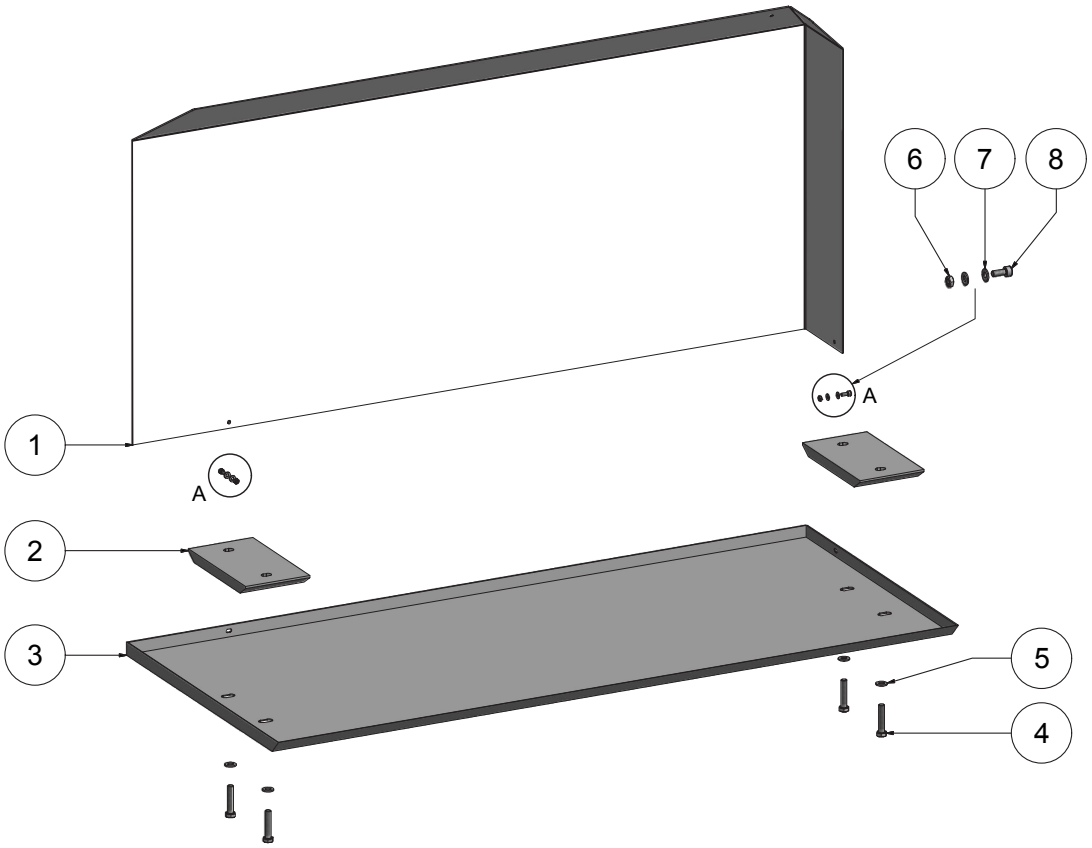
To screw the chip tray with splash guard to the machine base cabinet proceed as follows:

1. Position both spacer feet's as shown upon the chip tray with splash guard and align along the fixing holes of the shavings tank.
2. Place the lathe carefully onto the chip tray with splash guard and align the fixing holes.
3. Combine each screw with a washer.
4. Open the doors of the machine base cabinet.
5. Push the screws from below, through the fixing holes in the machine base cabinet, into the chip tray with splash guard and into the fixture thread on the bed of the lathe and tighten using a size 13 combination wrench.



17. Chip tray with splash guard (optional)

17.3 Drawing and legend



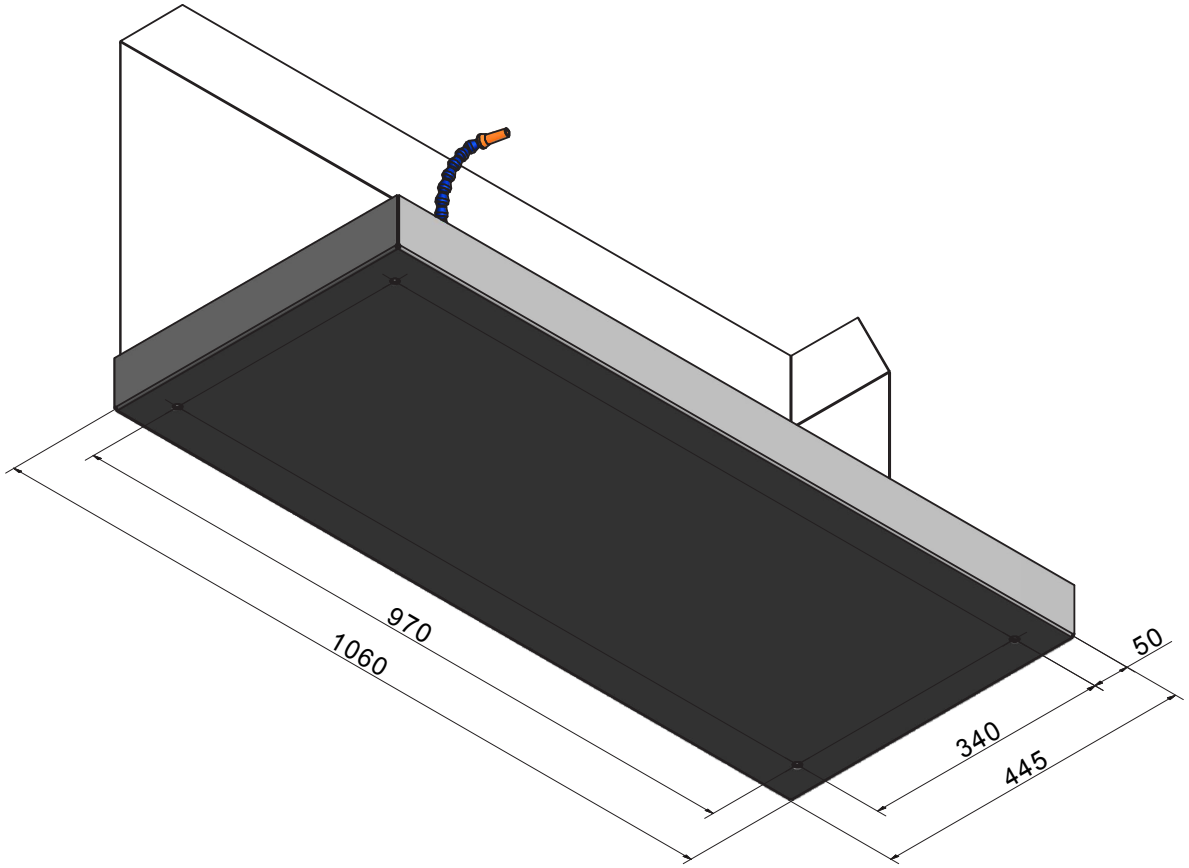
Part No.	Items	Order No.	Description
1	1	51400235-0001	Spray protection wall
2	2	51002115-0001	Spacer feet
3	1	51400484-0001	Shavings tank
4	4	16193300008040	Screw
5	4	16112500008001	Washer
6	2	16193400004000	Nut
7	4	16112500004000	Washer
8	2	16191200004010	Screw

18. Coolant unit (optional)

18.1 Setting up the coolant unit

When mounting the coolant unit to a WABECO machine base cabinet, the appropriate bores are already present. The machine base cabinet ensures a safe base for the lathe or coolant unit.

If the coolant unit is secured to another suitable surface, the four through holes must be bored into the surface by the client. For the positions of the four fixtures threaded sockets (thread M8) of the coolant unit, see diagram. The diameter of the through holes in the surface must be at least 9 mm.



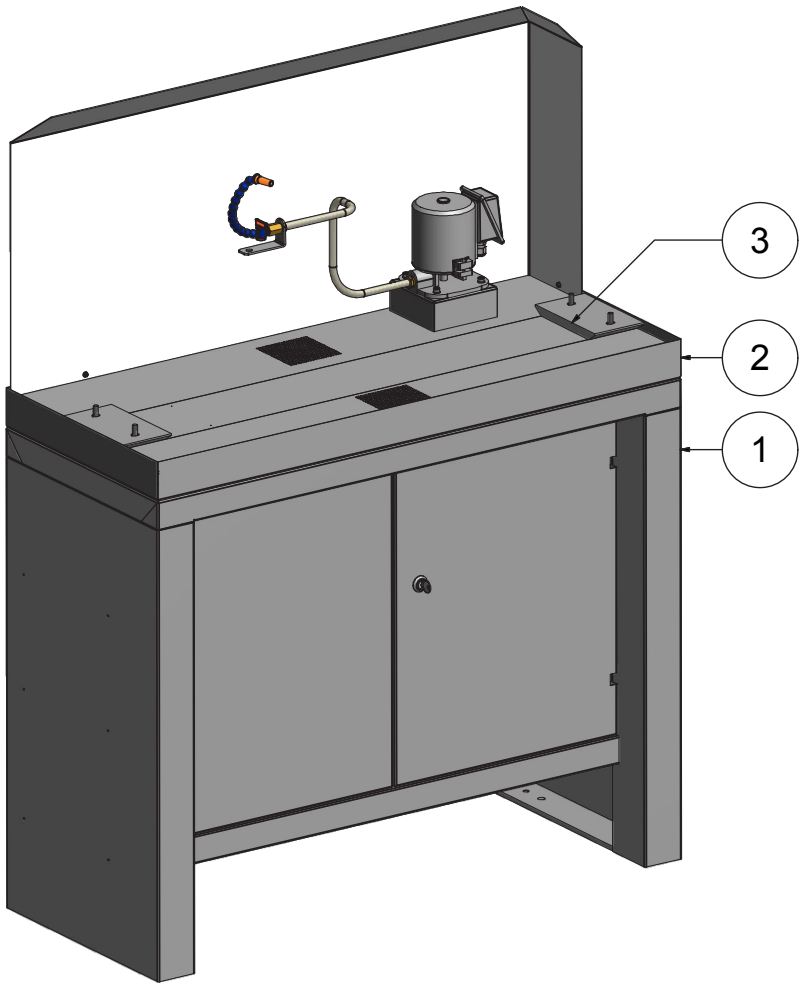
18. Coolant unit (optional)

18.2 Mounting of the coolant unit to the machine base cabinet (optional)

- The coolant unit (2) is positioned, as shown, on the machine base cabinet (1). The two spacer feet's (3) are not relevant in this stage.
- The screws and washers required for assembly are included in the scope of delivery.

To screw the coolant unit to the machine base cabinet proceed as follows:

1. Combine the four shorter Allen screw's (included in the scope of delivery) each with a washer.
2. Open the doors of the machine base cabinet.
3. Push the screws from below, through the bored holes in the machine base cabinet, into the fixture threaded sockets and tighten using an Allen key of size 6.



18. Coolant unit (optional)

18.2 Mounting of the coolant unit to the machine base cabinet (optional)

To screw the coolant unit to the machine base cabinet proceed as follows:

1. Position both spacer feet's (3) as shown upon the coolant unit (2) and align along the fixing holes of the coolant unit.
2. Place the lathe carefully onto the spacer feet's and align the fixing holes.
3. Remove both shelf inserts out of the coolant unit.
4. Combine the four longer Allen screw's (included in the scope of delivery) each with a washer and push these from below, through the bored holes in the coolant unit and spacer feet's, into the fixture threaded sockets of the lathe bed.
5. To finish the whole process, tighten using an Allen key of size 6.

18.3 Safety regulations for the handling of cooling lubricant

1. Pay particular attention to leaked coolant as this can quickly cause people to slip and caused accidents as a result.
2. Secure your coolant unit in such a way that it cannot be switched on by children. Persons who have not been trained may not operate the coolant unit.
3. Ensure you have a clean workplace, dirty areas can quickly lead to accidents.
4. Never use the coolant unit when processing magnesium alloys. In combination with water-mixed coolants, this may result in flammable gas mixtures which may explode under certain circumstances.
5. Avoid longer skin contact with the coolant.
6. Use skin protecting creams when handling coolants.
7. Regularly monitor the concentration of the water-mixed coolant.
8. Regularly monitor the pH value of the coolant.
9. Make sure that the coolant is only disposed of in an environmentally friendly way in accordance with the relevant guidelines. Coolant is a special waste product.

18. Coolant unit (optional)

18.4 Filling the coolant unit

A number of protective measures must be observed and taken in order to ensure that the handling of coolant does not cause health risks or environmental loads.

- Always observe the datasheet and the safety regulations of the coolant being used (can be obtained from the supplier or manufacturer).
- Observe all safety regulations set out in these operating instructions, in particular those that refer to the safe handling of coolants.
- In order to ensure reliable operation of the coolant pump, a minimum coolant filling level is required in the coolant tank.
- The capacity of the coolant unit is approximately 19 liters.
- The maximum filling level should be just below the shelf insert.
- The minimum filling level is approximately 15 mm below that.
- To fill, remove the shelf insert and fill to the maximum filling level with a suitable coolant whilst observing all safety regulations.
- After filling, replace the shelf insert.

18.5 Operating the coolant unit

The switch shown below is located on the mains cable of the coolant pump.

Switch position (0) → Pump switched off

Switch position (I) → Pump switched on

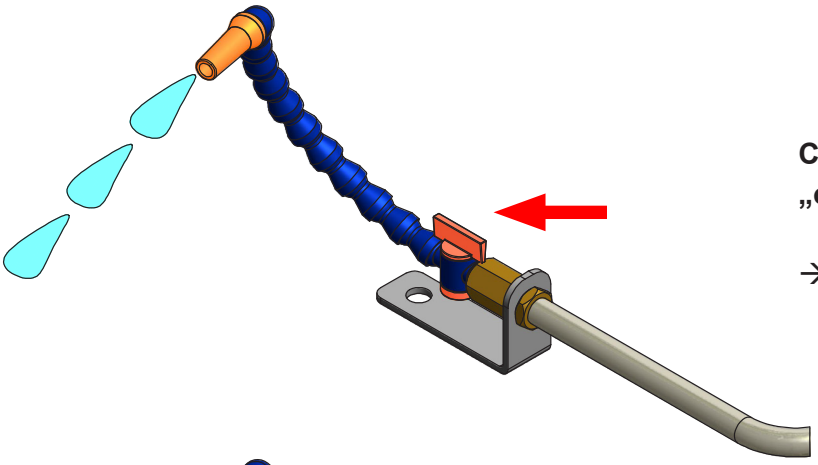
(Caution: Coolant flow is controlled with the coolant shut-off valve)

18. Coolant unit (optional)

18.6 Positioning the segmented coolant hose

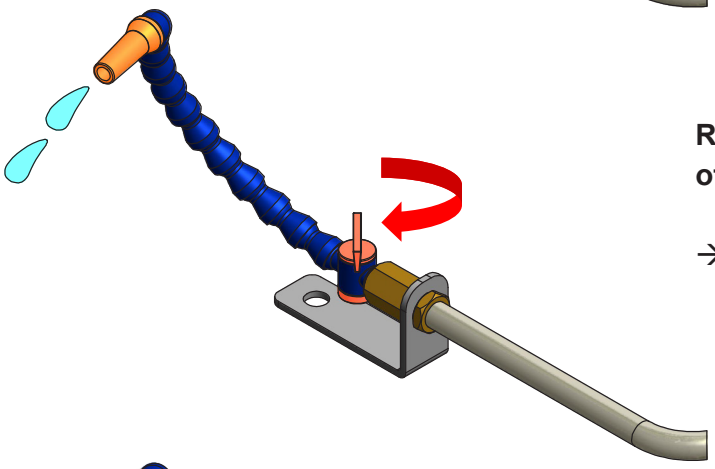
The flexible segmented hose (shown in blue) is made up of individually adjustable elements and can be shaped by hand or set as required. The segmented hose and the nozzle are to be positioned in such a way that the coolant flows as directly as possible onto the blade of the cutting tool of the lathe. Attention should be paid to ensure that the nozzle does not come into contact with the cutting tool.

18.7 Controlling the flow of coolant using the coolant shut-off valve



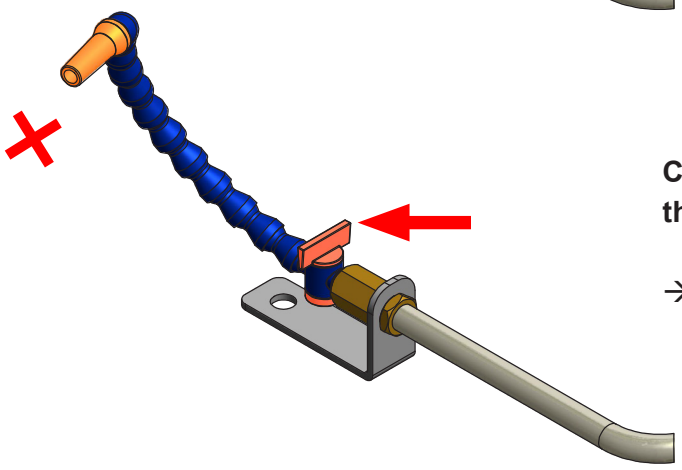
Coolant shut-off valve in the „open“ position

→ Maximum coolant flow



Rotation of the coolant shut-off valve clockwise

→ Flow is reduced

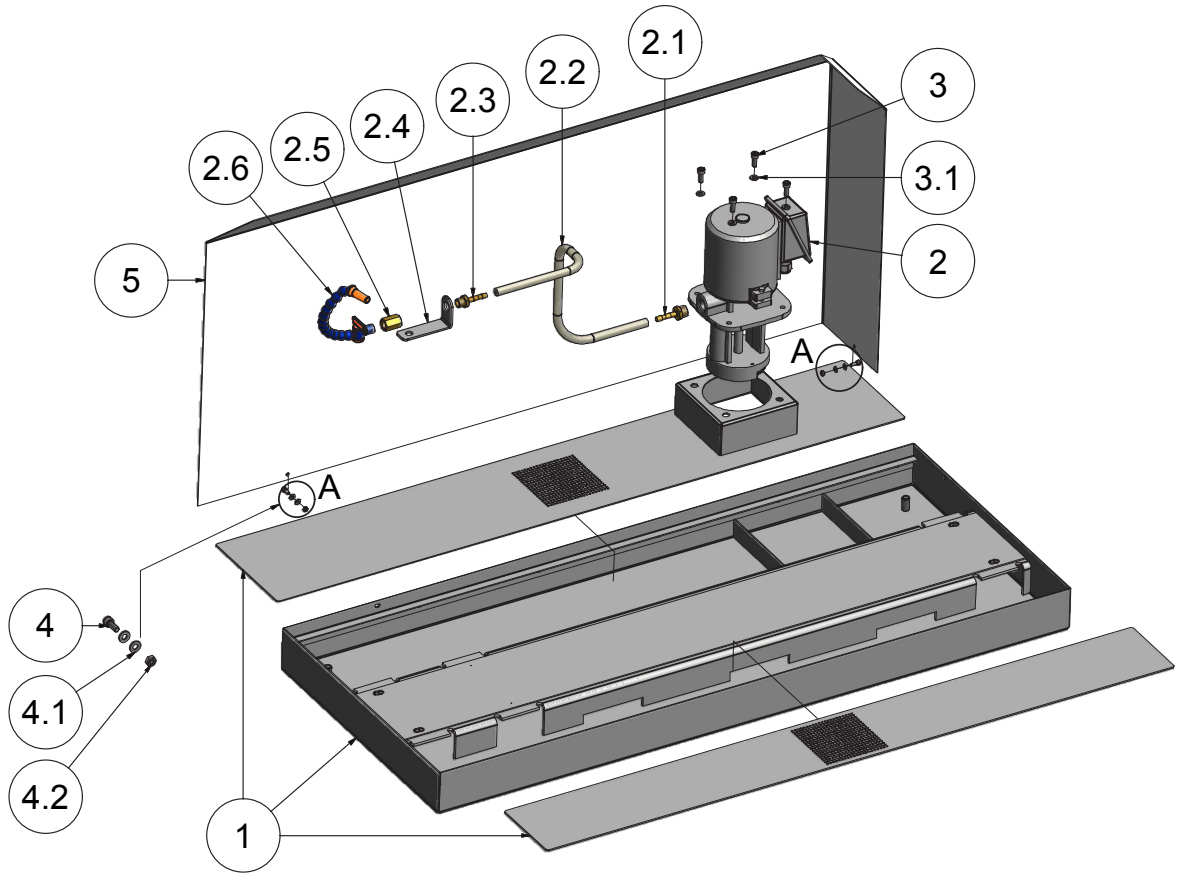


Coolant shut-off valve in the „closed“ position

→ Coolant flow stopped

18. Coolant system (optional)

18.8 Drawing and legend

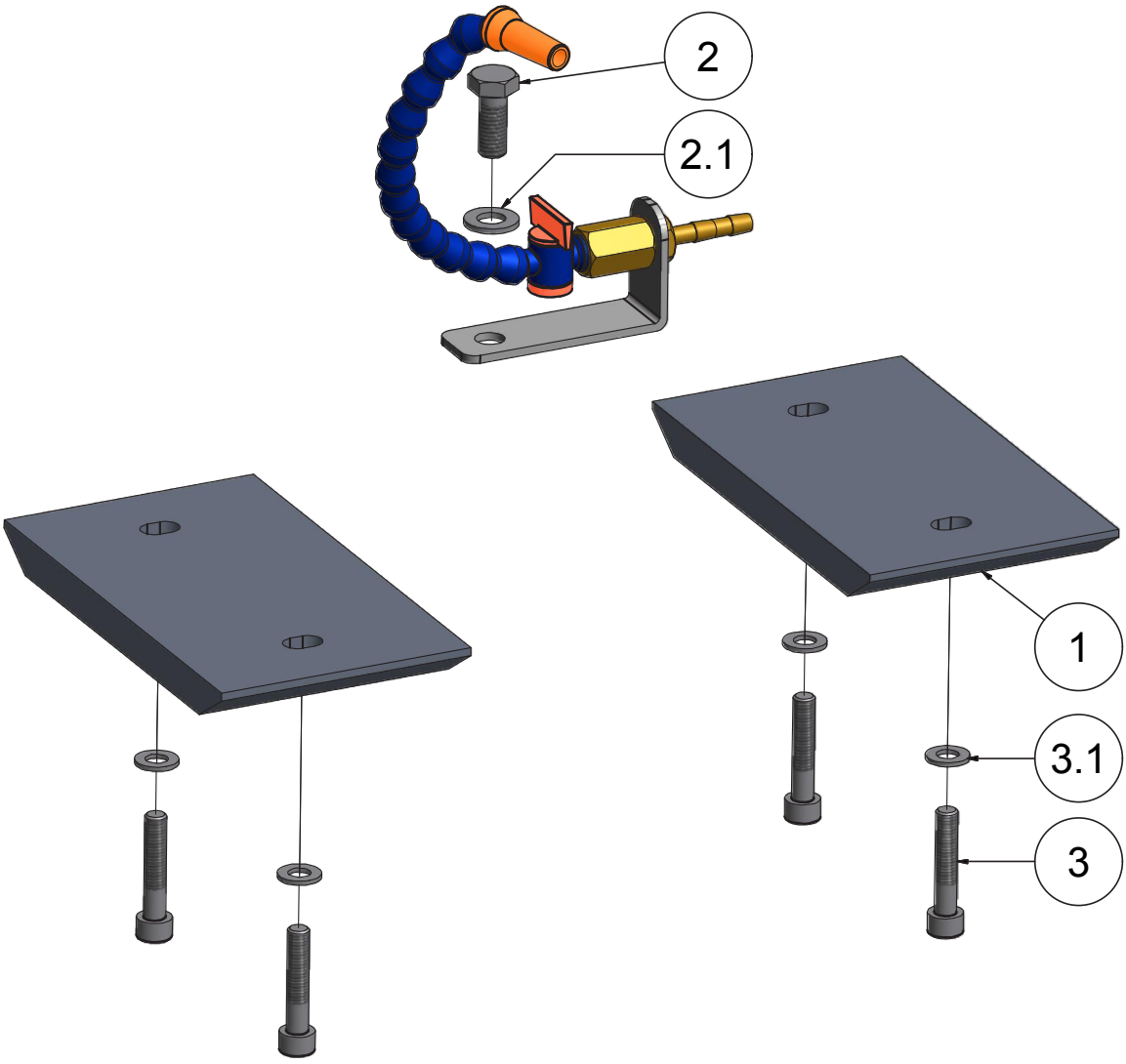


Part No.	Items	Order No.	Description
1	1	51401163-0001	Coolant unit (tank and two shelf inserts)
2	1	51500119	Coolant pump
2.1	1	51504320	Screw-fitted hose bush
2.2	1	51504218	PVC fabric hose
2.3	1	51504318	Screw-fitted hose bush
2.4	1	51400400-0001	Bracket
2.5	1	51504349	Collar
2.6	1	51502507	Coolant hose with shut-off valve
3	4	16191200006016	Screw
3.1	4	16112500006001	Washer
4	2	16191200004010	Screw
4.1	4	16112500004000	Washer
4.2	2	16193400004000	Nut
5	1	51400235-0001	Spray protection wall

18. Coolant unit (optional)

18.8 Drawing and legend

Screws for securing the lathe to the coolant unit and for securing the segmented coolant hose



Part No.	Items	Order No.	Description
1	2	51002115-0001	Spacer feet
2	1	16193300010025	Screw
2.1	1	16112500010000	Washer
3	4	16191200008040	Screw
3.1	4	16112500008001	Washer

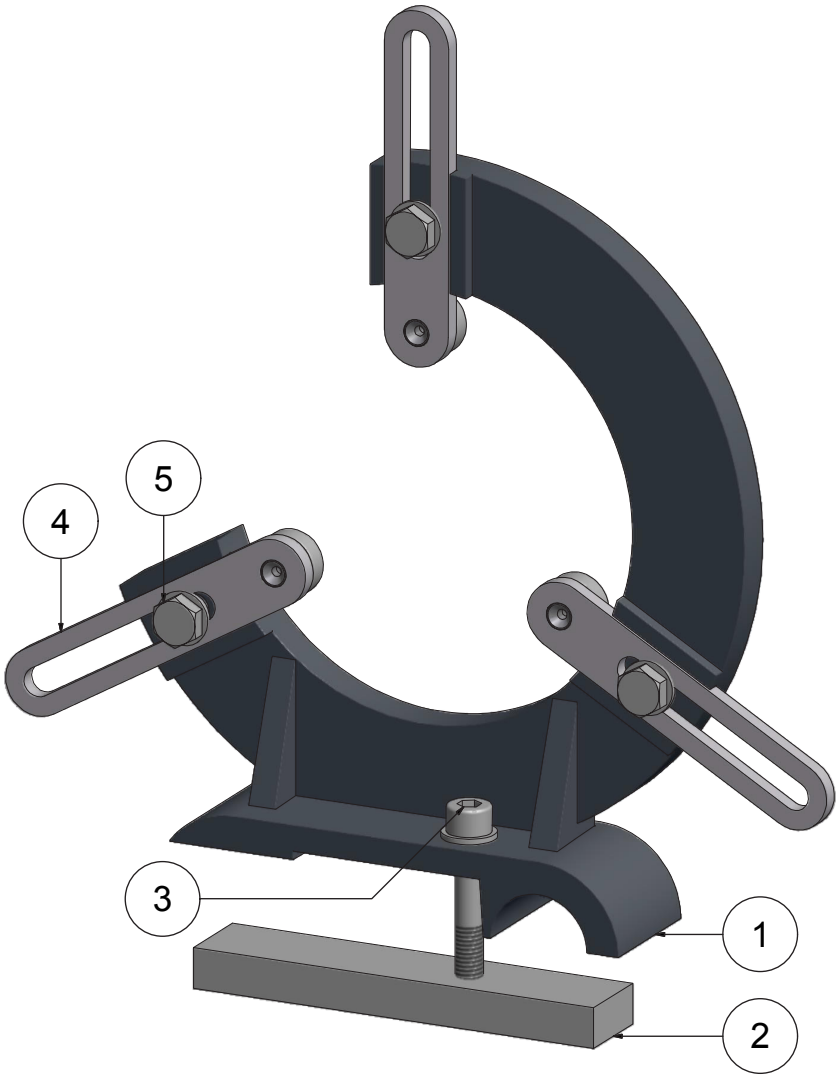
19. Fixed stay (optional)

Stays counteract the bending of longer shafts that is caused by shaving forces. The roll jaws prevent the bending of the turning elements.

They are to be set in such a way that the rotating axis of the workpiece is precisely flush with the rotating axis of the machine. At eth support position, the turning parts must be accurately rounded.

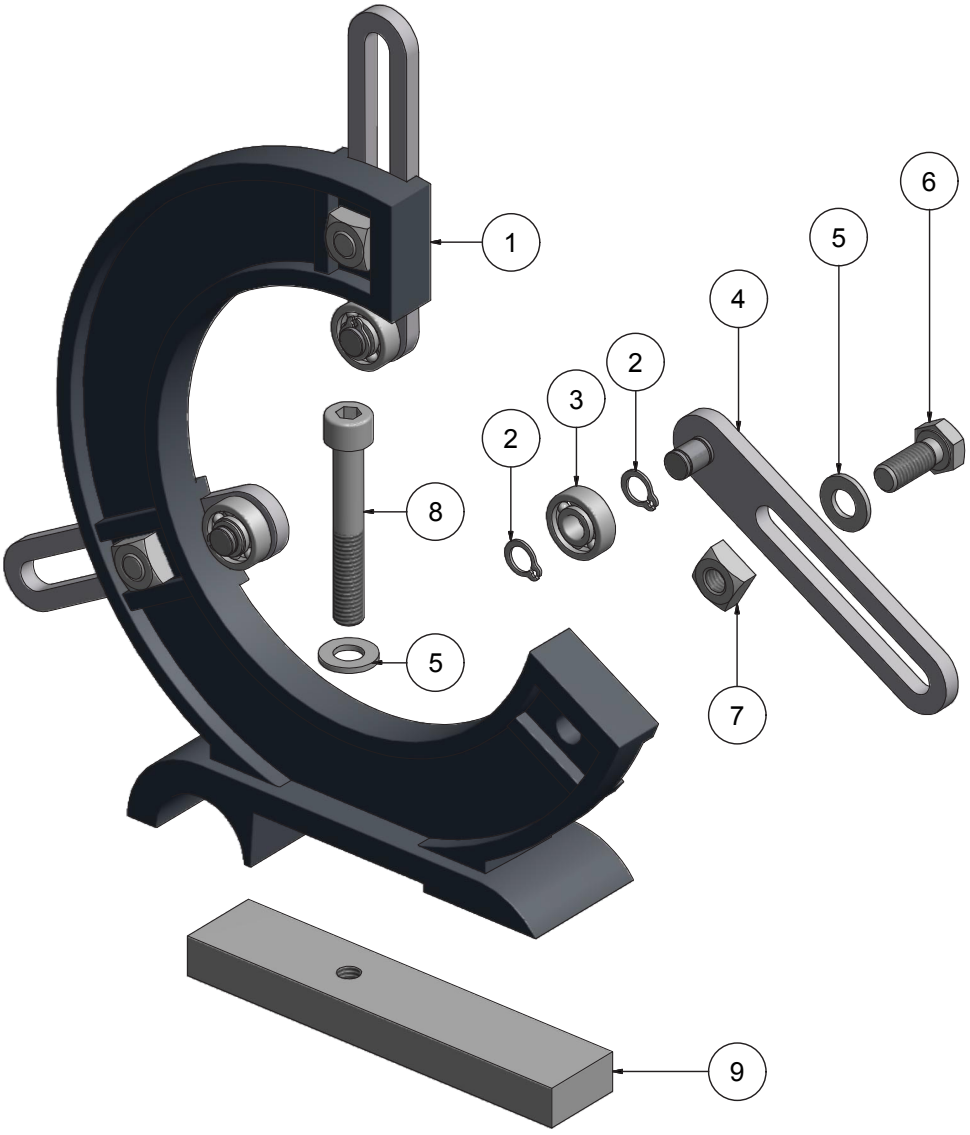
19.1 Operating the fixed stay

1. The fixed stay can be secured at any position on the prismatic bed.
2. The stay (1) is fitted to the prismatic guide.
3. The clamping plate (2) is inserted, from below, into the prismatic bed and secured with the clamping screw (3).
4. The slider (4) can be moved by opening the clamping screws (5), afterwards the clamping screws (5) must be tightened up again.



19. Fixed stay (optional)

19.2 Drawing and legend



Part No.	Items	Order No.	Description
1	1	51006831-0027	Basic body
2	6	16147100008000	Securing ring
3	3	51502117	Ball bearing
4	3	51401533-0001	Slider with axis
5	4	16112500008001	Washer
6	3	16193300008020	Screw
7	3	16155700008000	Nut
8	1	16191200008055	Screw
9	1	51001026-0001	Clamping bar

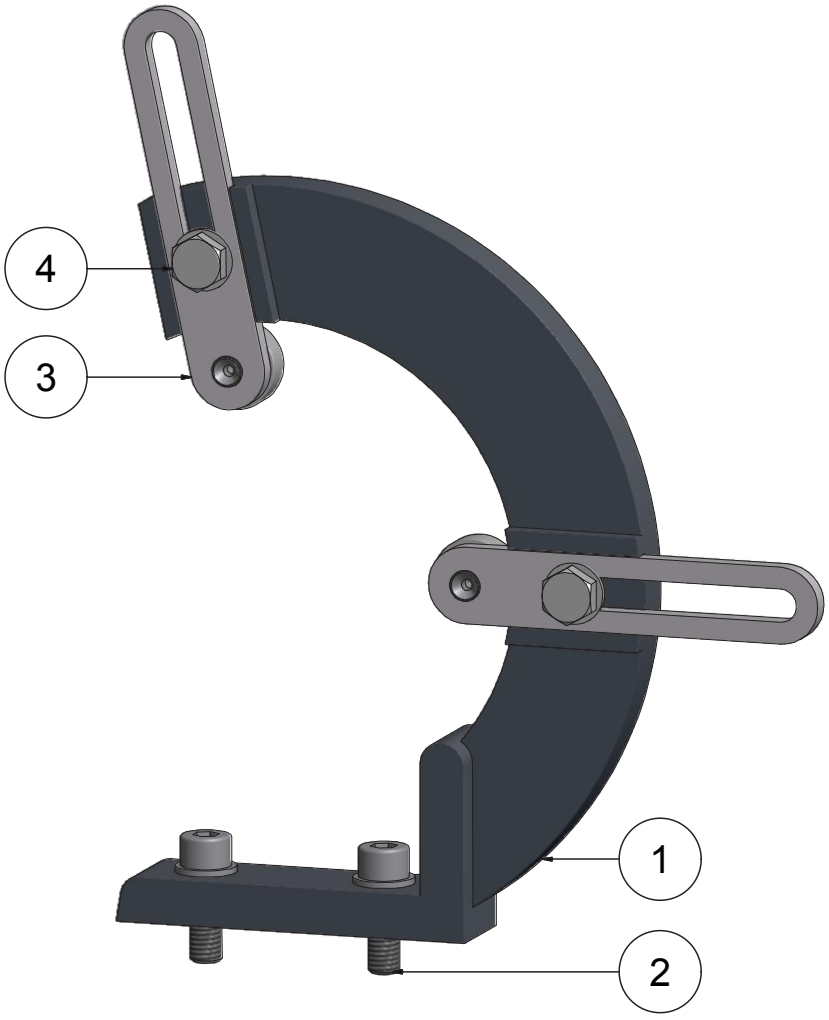
20. Live stay (optional)

Stays counteract the bending of longer shafts that is caused by shaving forces. The roll jaws prevent the bending of the turning elements.

They are to be set in such a way that the rotating axis of the workpiece is precisely flush with the rotating axis of the machine. At eth support position, the turning parts must be accurately rounded.

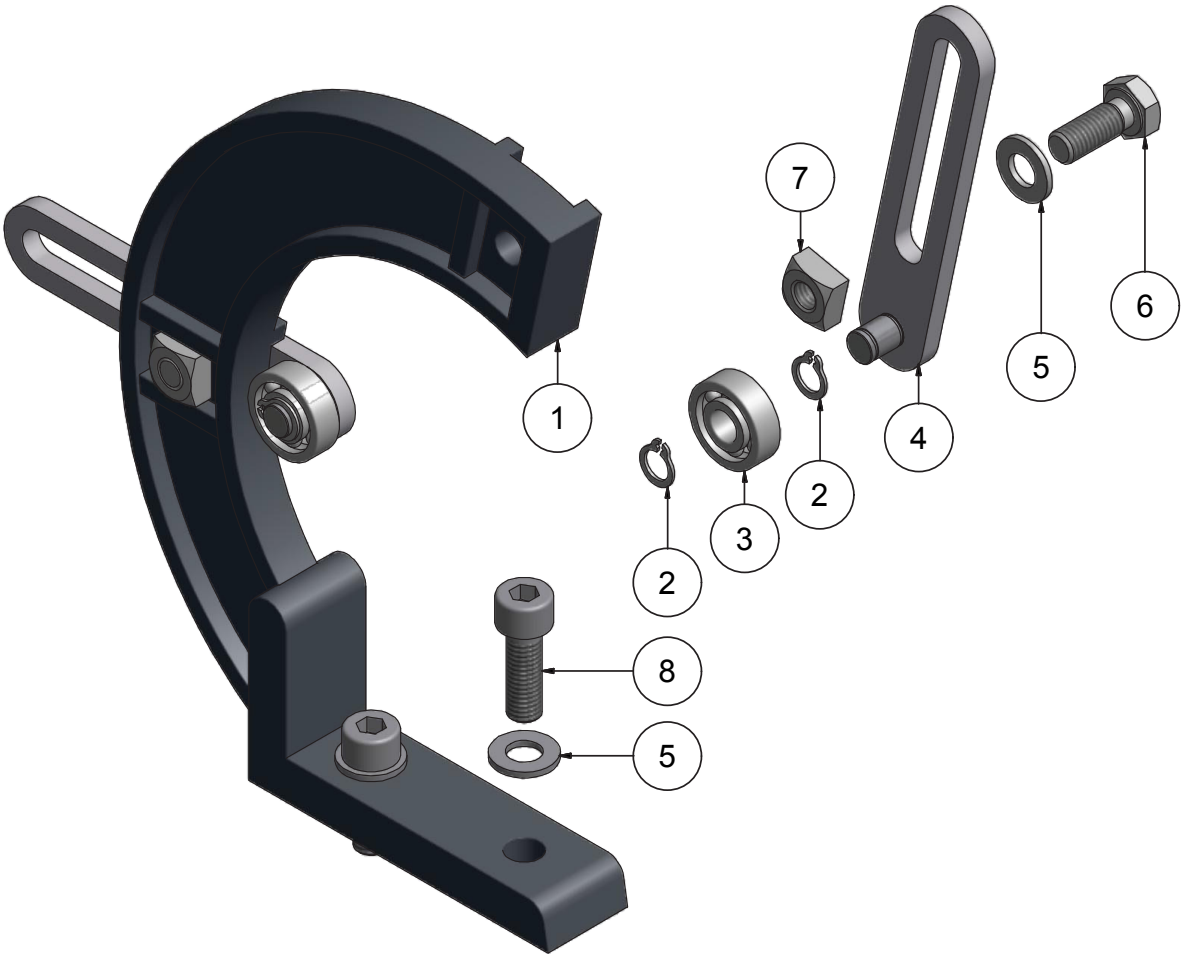
20.1 Operating the live stay

1. The live stay is used, primarily, when turning thin, long shafts and when turning longer threaded spindles.
2. The stay (1) is screwed to the intended threaded holes in the tool slide using the two fixture screws (2).
3. The roll jaws should be as close to the tool cutting edge of the turning chisel as possible to ensure that the workpiece cannot bend.
4. The slider (3) can be moved by opening the clamping screws (4), afterwards the clamping screws (4) must be tightened up again.



20. Live stay (optional)

20.2 Drawing and legend

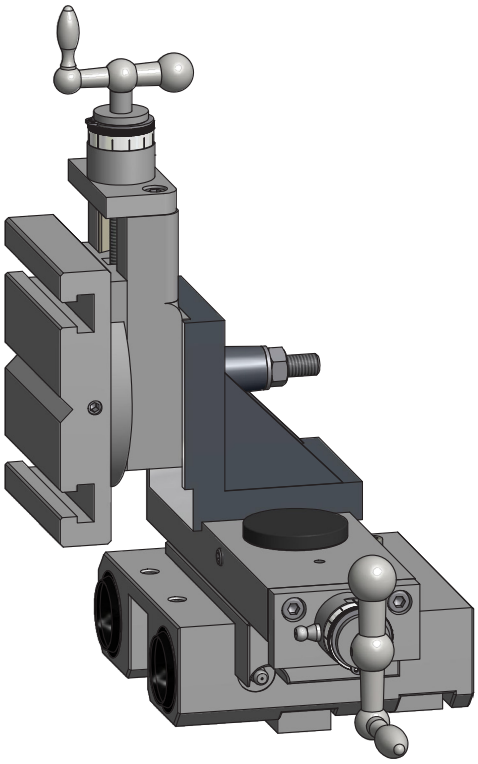


Part No.	Items	Order No.	Description
1	1	51006831-0032	Basic body
2	4	16147100008000	Securing ring
3	2	51502117	Ball bearing
4	2	51401533-0001	Slider with axis
5	4	16112500008001	Washer
6	2	16193300008020	Screw
7	2	16155700008000	Nut
8	2	16191200008025	Screw

21. Clamping angle with milling attachment (optional)

For drilling and milling work

- For creating even surfaces and grooves.
- The feed and return motions are carried out by the workpiece.
- Put the used clamping screws into the T-groove of the clamping plate. It is necessary that the corresponding clamping screw fit to the clamping plate.
- The machine bench vice can also be mounted up on the clamping plate.
- The tool must be clamped as short as possible in the collect (risk of breakage).
- The depth adjustment takes place with the feed shaft in case the tool is firmly clamped.



21.1 Mounting of the clamping angle with milling attachment

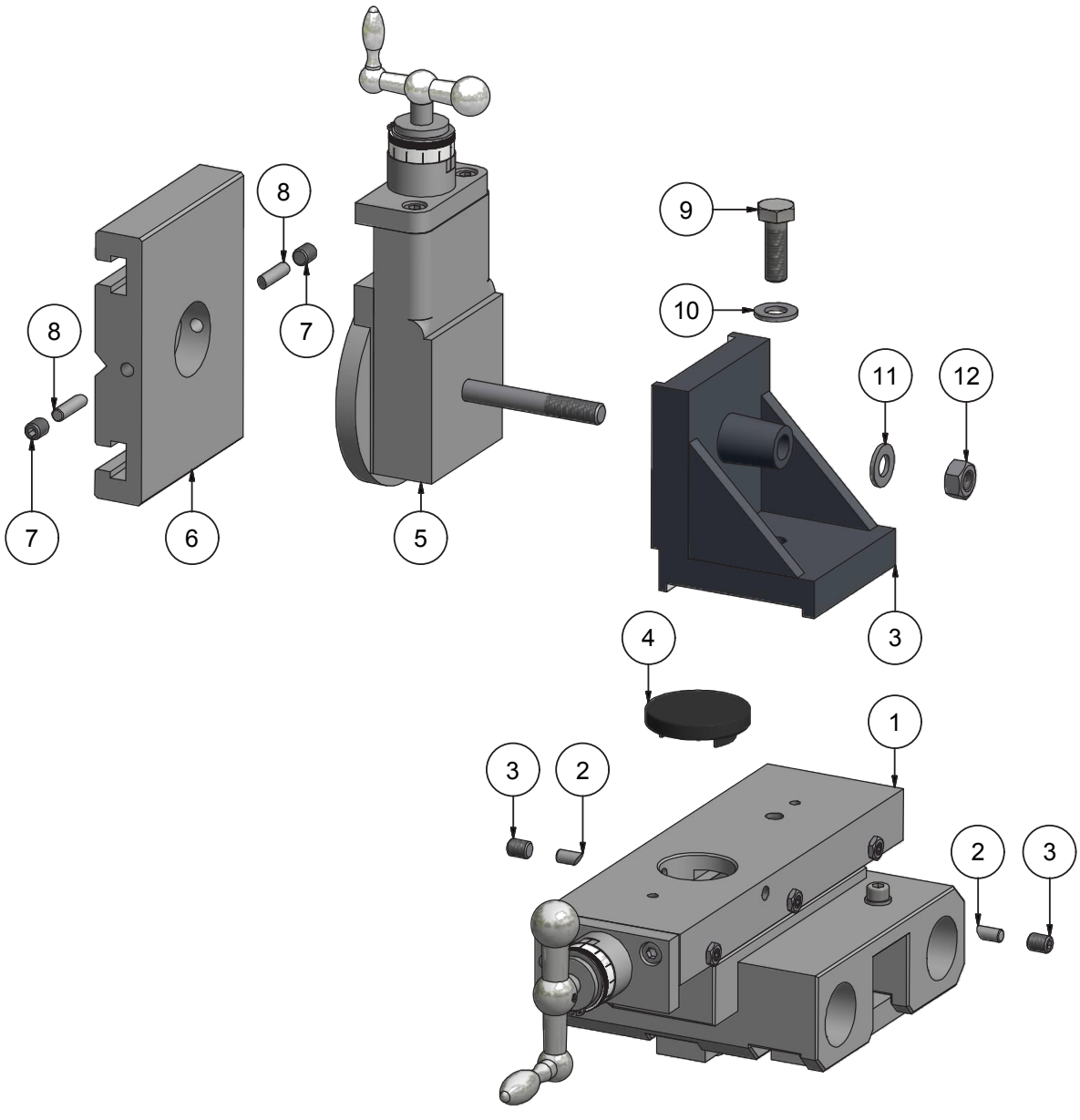
1. Unscrew both screws (3) with an Allen key of size 4 and remove the push pieces (2).
2. Remove the longitudinal slide (5) from the cross slide (1) of the lathe.
3. Clean the cross slide from dirt and shavings to ensure a proper support.
4. Position the clamping bracket (3) as shown upon the cross slide.
5. Combine the washer (10) with the screw (9) and push the screws from below, through the bored holes in the clamping bracket and tighten using an wrench of size 16mm.
6. Remove the clamping plate including the spring (or in some an mounted the rapidly changing switch) from longitudinal slide.
7. Put the longitudinal slide upon the clamping bracket as shown. Combine the nut (12) with the washer (11) and position it upon screw pin of the longitudinal slide and tighten these.

21. Clamping angle with milling attachment (optional)

21.1 Mounting of the clamping angle with milling attachment

8. Tighten the nut (12) through the use of an wrench in size 16mm.
9. Position the milling attachment (6) upon the pivot of the longitudinal slide.
10. Position both push pieces (8) in the lateral bored holes of the milling attachments.
11. Align the milling attachment and arrest the same through tightening both screws (3) using an Allen key of size 4.
12. Plug the included dust cover (4) into the center hole of the cross slide.

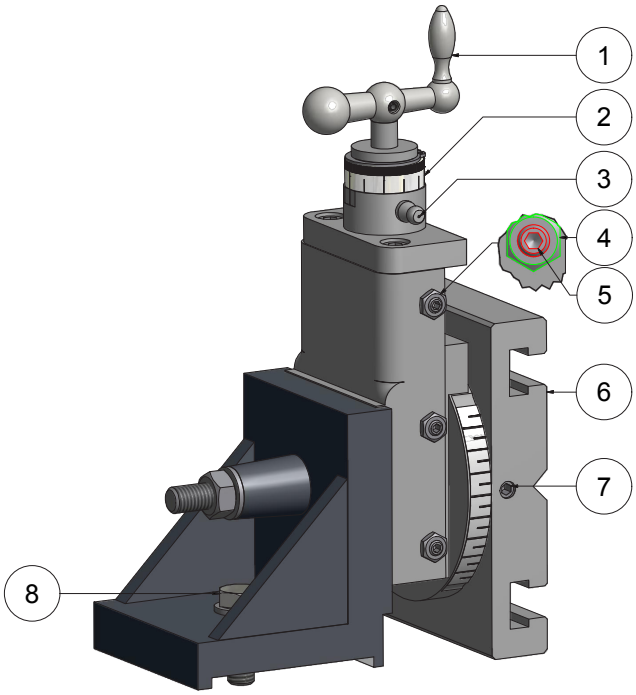
The positions 1, 2, 3, 5, 11 and 12 are not included in the scope of delivery. They belong to the lathe.



21. Clamping angle with milling attachment (optional)

21.2. Control elements

1. Crank for adjustment of the milling attachment in the y axis
2. Scale ring for reading off the travel distance of the y axis
3. Lubrication nipple for greasing the spindle bearing
4. Counter nut for securing the threaded pins (5)
5. Threaded pins for setting the guide play
6. Milling attachment for tensioning workpieces or vices
7. Screws for clamping the milling attachment
8. Screw for connecting the clamping angle with the cross slide



21.3 Feed motion of the milling attachment

- Use the crank (1) to move the milling attachment in the y axis (vertical).
- Use the scale ring (2) to read off the distance of travel.
- One interval on the scale represents a distance of 0.05 mm. One full turn of the hand wheel is the same as a skid distance of 1 mm.
- The distance of travel of the milling attachment in the x axis (horizontal) is carried out by adjusting the cross slide.

21. Clamping angle with milling attachment (optional)

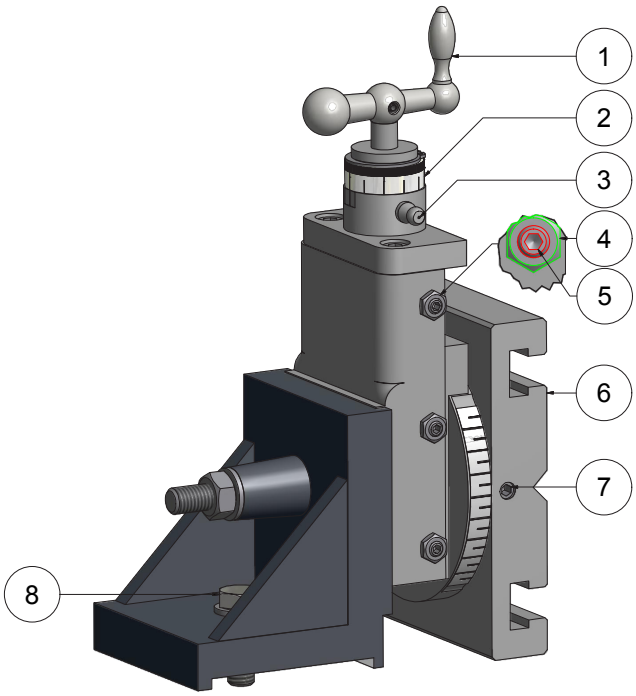
21.4 Adjustment of the dovetail guide

1. Undo the lock nuts (4).
2. Set the adjustment bar using the threaded pins (5) in such a way that the skid is free of play and can be moved with little force. To do this, the skid should be moved during the setting process and checked for play and appropriate ease of movement.
3. When the threaded pins (5) are set correctly, tighten the lock nuts (4) back up again.

Only set the threaded pins (5) if they are in the range of the counter guide! To do this, the skid may need to be moved into this area. Otherwise the dovetail guide may jam and this may cause damages.

21.5 Alignment of the milling attachment

If the milling attachment has been moved unintentionally (angle of T-groove to x axis), this must first be realigned. To do this, open both screws (7) align the table and then tighten both screws up again (7). For the alignment work, always use a dial gauge if you have one.



21.6 Lubrication of the clamping angle with milling attachment

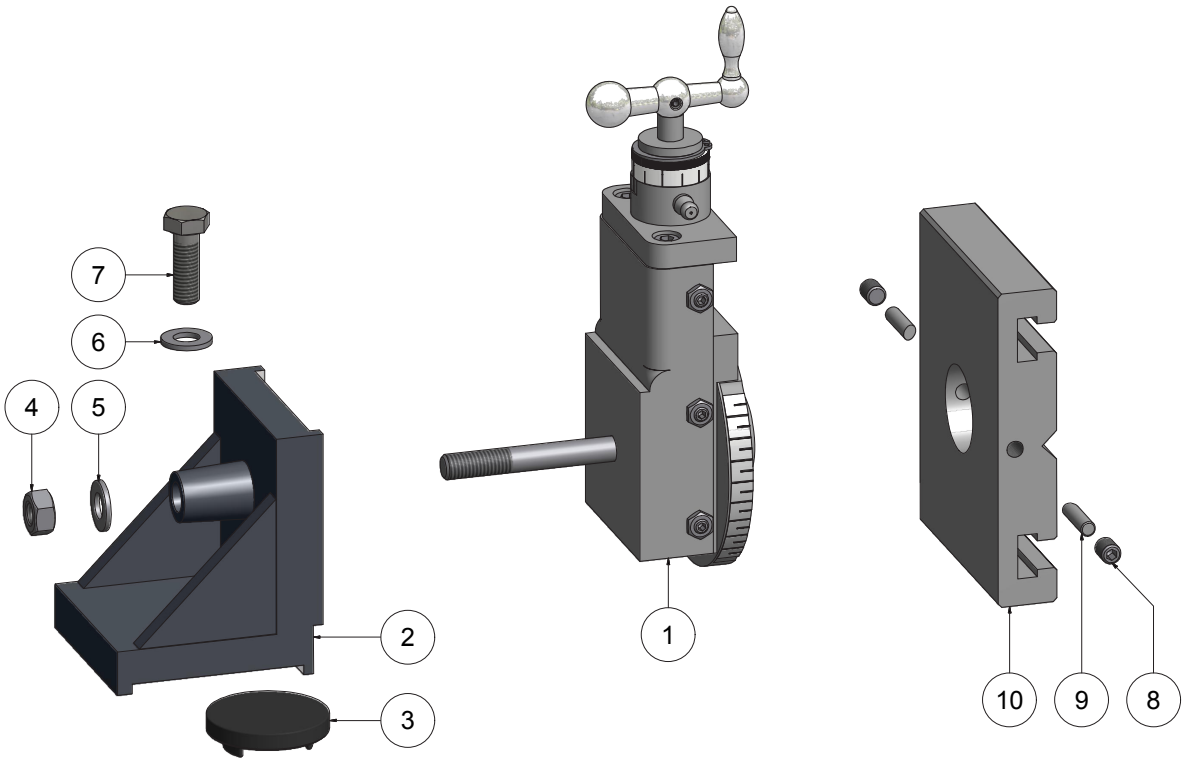
- Use a class 2NLGI multi-purpose grease for lubrication
- Use lubricating oil with a viscosity of 100 mm² /s for lubrication
- Prior to each use: Lubricate the spindle bearing at the lubrication nipple (3) using a grease press

  Grease the feed spindle accessible from the front

  Oil the dovetail guide with lubrication oil using an oil can

21. Clamping angle with milling attachment (optional)

21.7 Drawing and legend



Part No.	Items	Order No.	Description
1	1		Longitudinal slide (included in lathe)
2	1	51006831-00331	Clamping angle
3	1	51508322	Dust protection cover
4	1		Nut (included in lathe)
5	1		Washer (included in lathe)
6	1	16112500010000	Washer
7	1	16193300010030	Screw
8	2	16091300008010	Threaded pin
9	2	51004006-0002	Push piece
10	1	51003790-0001	Milling attachment

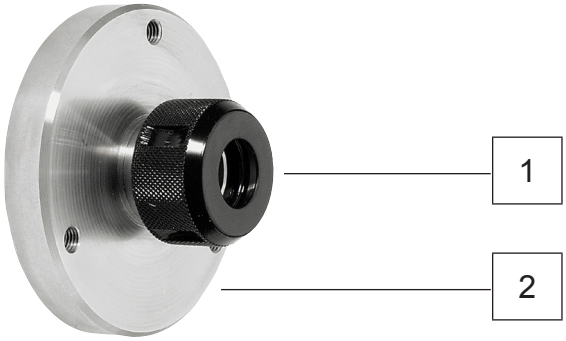
22. Collet chuck (optional)

Only use workpieces that correspond to the nominal diameter of the collet.

22.1 Mounting the collect chuck

1. Remove the lathe chuck from the main spindle. To do this, undo the 3 fixing screws using a wrench.
2. Remove the lathe chuck from the centring flange of the main spindle.
3. Secure the collet chuck in the same way as the lathe chuck.
4. Remove the cap nut (1) from the collet chuck (2).
5. Insert the required collect into the cap nut
   (see installing and removing collets) and screw back onto the collet chuck.
6. Insert the workpiece or tool into the collet.
7. Tighten the cap nut with the appropriate wrench.
8. Permitted **revolution range up to a maximum of 5000 rpm.**

22.2 Drawing and legend



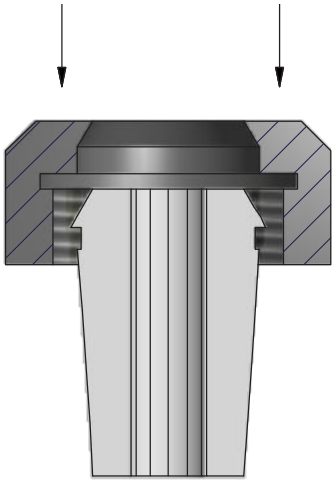
Part No.	Items	Order No.	Description
1	1	11727	Cap nut
2	1	51003505-0002	Collet chuck

22. Collet chuck (optional)

22.3 Installation and removal of collets

Installation

1. Place the collet on a flat surface.
2. Place the tensioning nut on the collet.
3. Press the tensioning nut down against the collet until it „clicks“.
4. The collet can now move freely in the central take-up shoulder and does not fall out when the collet is turned upside down.



Removal

1. Hold the tensioning nut in one hand.
2. Press up against the collet.
3. The lateral pressure on the collet pushes this out of the take-up shoulder of the tensioning nut and it can now be removed from the nut.