



Please read before start-up!

Operating Instructions

Universal Lathes

Version of 09/2009



D6000 and D6000 high speed



CC-D6000 – CC-D6000 CA - CC-D6000 hs – CC-D6000 CA hs

**Walter Blombach GmbH
Tool and Machine Factory**

Dear customer!

Congratulations on choosing the **WABECO Universal Lathe**. We have taken great care in its manufacture and we have given it a thorough quality control test.

These operating instructions are to help you to work with it safely and properly. Therefore, please read the respective instructions carefully and pay attention to them.

After unpacking the machine please check to see if any kind of damage has occurred during transportation. Any complaints must be made immediately. Complaints made at a later date **cannot** be accepted.

If you have any questions or need any spare parts, please **quote the machine number** located on the front of the motor (see nameplate).

Duplications or copies of this document of any kind, or of excerpts, require a written approval by WABECO

Disposal of the lathe

The transport and protective packaging are made up of the following materials:

- corrugated cardboard
- polystyrene free of freon
- polyethylene foil
- non-returnable wooded pallet (untreated)
- Euro pallet (deposit)

If you have no further need of these articles or do not wish to use them again, please dispose of them at the public recycling facilities.

The lathe consists of up to 98% of recyclable materials, i.e. steel, cast iron, aluminium and 2% of chemical materials, e.g. the coating of electrical leads, printed circuits.

If you have trouble disposing of these parts in a proper manner, we would be pleased to help you. Upon mutual agreement we will take the complete machine back and dispose of it. However, the costs for transporting the machine to our plant must be at your expense.

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EC – Conformity Declaration

Version 07.2010

In the name of the manufacturer

Walter Blombach GmbH

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We hereby declare that the universal lathes specified below

Universal lathes type:

D6000

D6000 hs with high speed motor

CC-D6000

CC-D6000 hs with high speed motor

meet the following regulation requirements for standard serie production

- **directive for machines 2006/42 EG**
- **EMV directive 89/336/EWG**

In order to meet / implement the requirements of the above mentioned directives, the following applicable and previously published standards have been adhered to:

EN ISO 12100-1

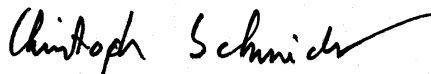
EN ISO 12100-2

EN 12840

EN 60204-1

D-54673 Neuerburg

City

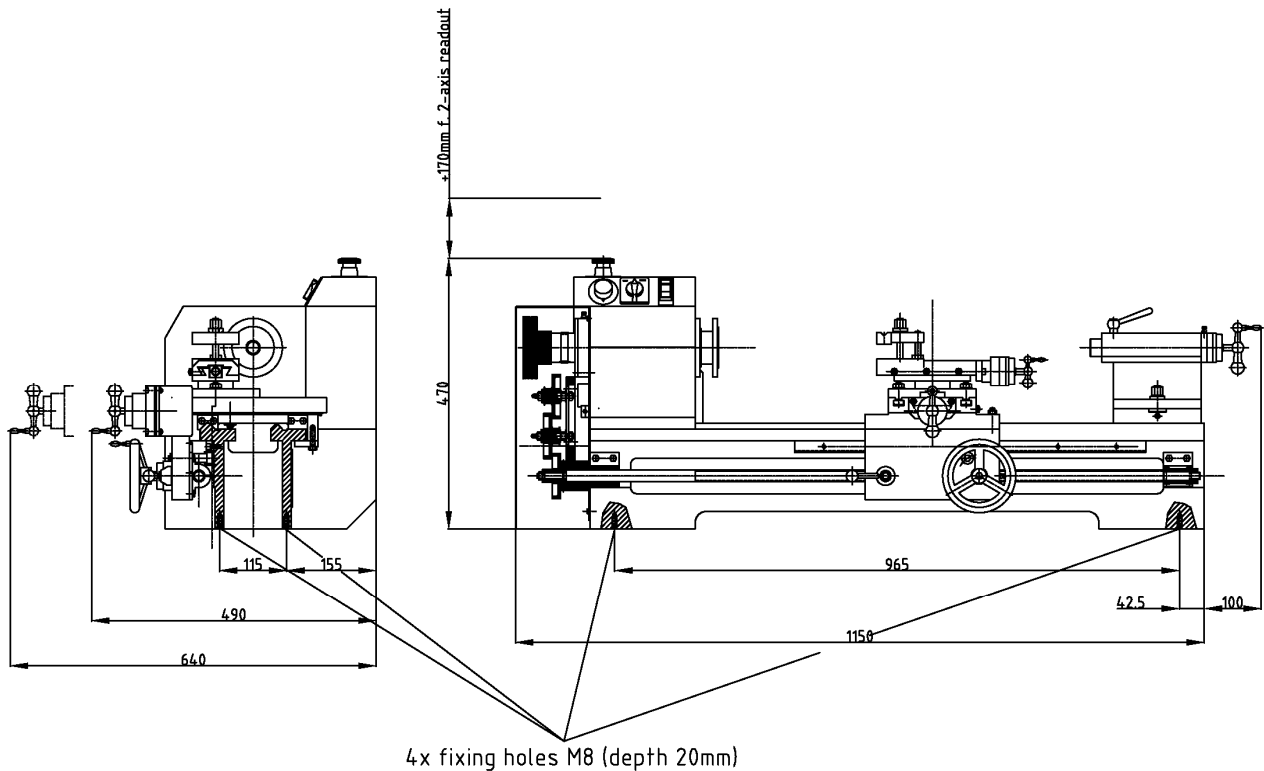


Technical Director

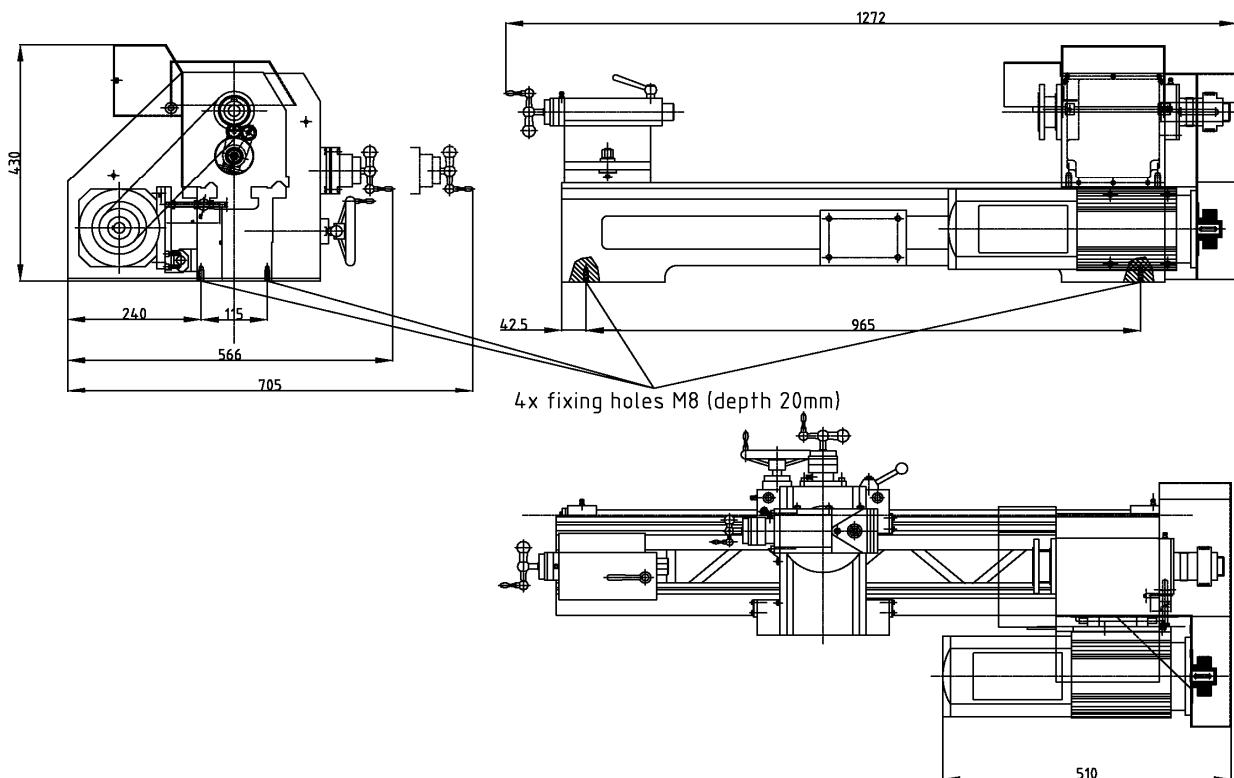


1. Machine dimensions

1.1 D6000

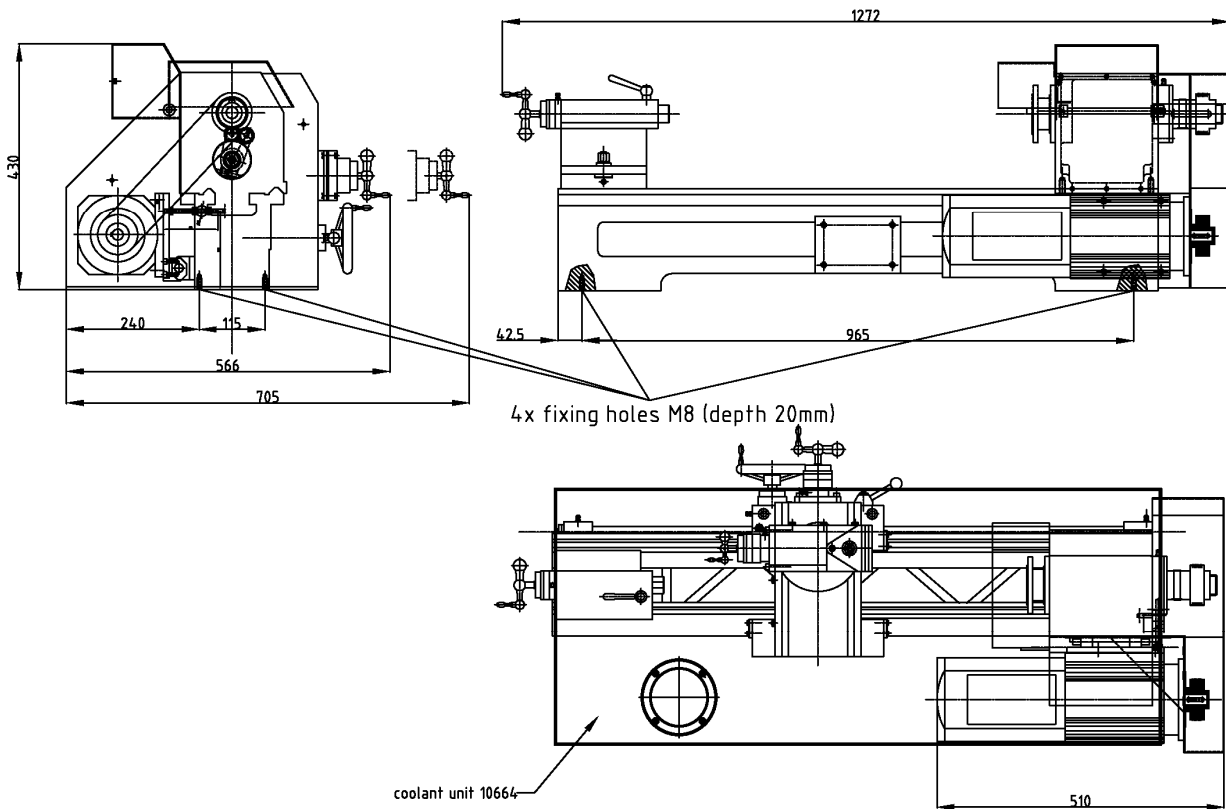


1.2 D6000 hs (high speed)

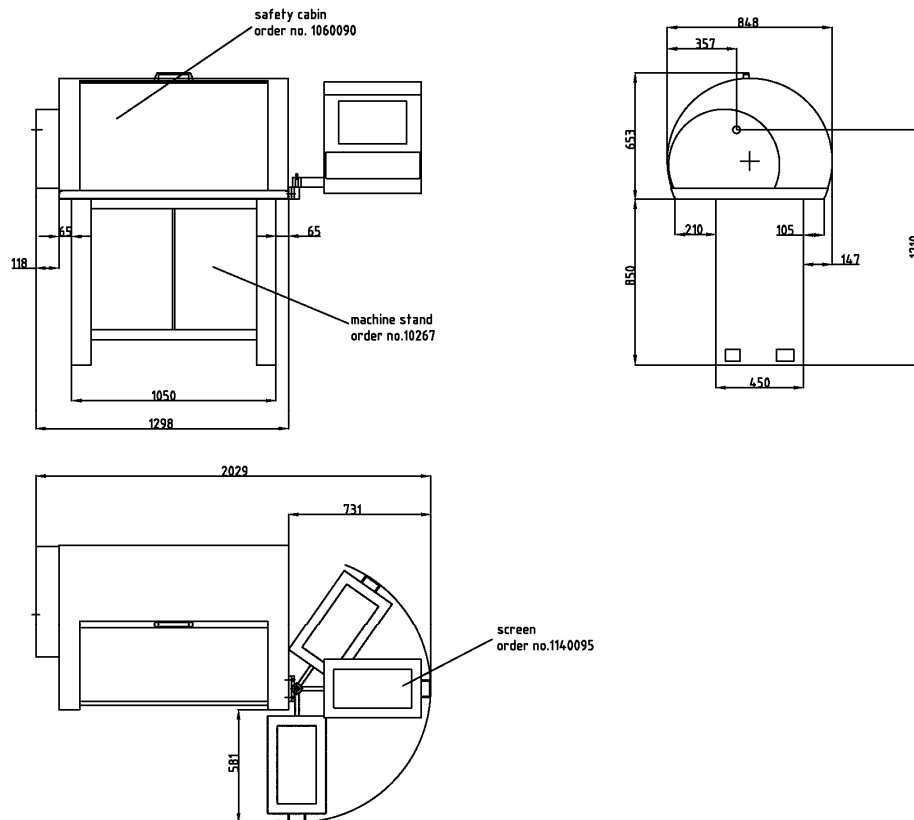


1. Machine dimensions

1.3 D6000 with coolant unit



1.4 CC-D6000



2. Delivery and installation

The lathes are carefully packed in our factory.

Please check the following on delivery:

- 1. whether the packaging has been damaged and/or:**
- 2. whether the drilling and milling machine shows signs of damage in transit or if there is any other reason for complaint. In this case we request your immediate notification. Claims made at a later date cannot be accepted.**

The lathes must be installed on an appropriate, level and firm base.

This would be, for example:

- a base cabinet such as in our accessories programme
- a work bench strong enough to carry the weight of the machine without warping with an even surface (see technical data and check with spirit level).
- a steel plate

The lathe must be firmly screwed to the base. Use the holes in the machine base. **Good results and a minimum of vibration during operation can only be guaranteed if the above mentioned requirements for secure mounting are observed.**

The machine should be installed in a well lighted area and electrical cables with earthed sockets and O-conductors must be installed close to the machine so that the mains cable is not subject to any tension whatsoever. The mains cable should be such that, for example, by means of a multiple socket, a coolant unit can also be connected.

3. Conditions for best results



- Fix the machine to a sturdy, level support.
- Use sharp processing tools.
- Adjust speed setting and feed to fit the material and diameter of the tool.
- Clamp the tools so that the clamping position is as close as possible to the work piece.
- Clamp the work pieces tightly and without vibrations.
- Long pieces are to be supported by the tailstock or a fixed stay.
- Apply coolant and lubricant for better surface quality (finish) and dimensional accuracy.
- Fix processing tools and work pieces on clean clamping surfaces.
- Grease the machine sufficiently.
- Use the correct tools for removing material from the work pieces.
- Set correct bearing clearances and align guides.

4. Safety instructions

1. The feed line for the motor must be connected to a sealed contact socket or junction box. (Have the socket or junction box checked by an electrician beforehand; protection against children).
2. The socket or junction box must be close enough to the equipment, so that the live cable is subject to no stress whatsoever.
3. When maintenance or cleaning work is done, the machine must be shutdown and the mains plug pulled.
4. Do not slow down work pieces or chucks by hand or any other objects.
5. Wear safety goggles when working with the machine.
6. Do not remove the chips with the hand. Use corresponding aids (hand brush, hook, paint brush).
7. Always keep the protective hood of the drive closed.
8. The turning tools must be tightly clamped at the correct height and as short as possible.
9. The turning tools must never be replaced when the machine is running.
10. **Never leave the clamping chuck key in (even when not in operation).**
11. Always pay attention to the clamping width of the lathe chuck. (lathe chucks \varnothing max. 40mm, drill chucks max. 100mm \varnothing).
12. **Never take measurements on work pieces during the lathing process** (risk of accidents and damage to the measuring gauges)
13. Do not wear loose clothing (ties, shirt sleeves, jewellery etc.).
14. When working between centres, always centre well in order to prevent the workpiece from being slung away. In addition, make sure that the locking screw of the tailstock is tightened.
15. When using the automatic feed always take care that the cross support does not get in contact with the chuck or the tailstock.
16. Never leave the machine alone when in operation.
17. **When machining wood, use the lathe centre instead of the lathe chuck to support the work piece.**
18. The machine must be secured so that it cannot be switched on by children. Make sure that other people do not operate the machine.
19. Always keep the machine dry.
20. Frequently check the machine for damage. Any damaged parts must be replaced by original parts and are to be fitted by an expert or by us.

5. Start-up and maintenance

5.1 Maintenance

The longtime serviceability is vitally dependent upon appropriate care. The lathe needs to be cleaned after every turning job.



In case the lathe is to be installed in a moist cellar room, all bare parts need to be oiled after use to avoid corrosion.

An overall and constant lubrication of all moving parts is highly significant.

In case of backlash inside the bearings or inside the guideways of the slides, readjust in time to avoid the bearing or the guideways of the slides being destroyed.



5. Start-up and maintenance

5.2 Start-up

- i** Prior to the initial operation, the machine must once more be cleaned with great care and all lubrication points have to be lubricated with grease. Thoroughly oil the cross support, lead screws, guiding rods and spindle sleeve. Check all spindles by hand in order to ensure they run smoothly. Run in the lathe at the lowest speed. A full load to start with must be avoided.

Please pay attention to the following before putting the machine into operation:

1. Ensure that the machine is free from protective agent (preservative) and all sliding surfaces are clean and oiled. We recommend the use of petroleum or similar to remove protective agent.
2. Lubricate the machine according to the lubricating instructions.
3. Release the longitudinal slide clamp and check the slide travel manually for both axes.
4. Ensure that the protective hoods are closed.
5. Check the condition of the chuck.

5.3 Lubrication of the machine

The lathe should be lubricated every 8 operating hours according to the lubricating schedule (2.1).

Lubricating points (bed guide), (dovetail guide of transversal slide), (dovetail guide of longitudinal slide) and (tailstock sleeve) are lubricated by using an oil can and a standard lubricating oil, moving the slides and the sleeve to and fro while doing so.

All other lubricating points are to be greased at the designated lubricating nipples with a grease gun and standard roller bearing grease.

5.4 Guidelines for the periodical maintenance of the machine

Daily	Grease the lubrication points in compliance with lubricating schedule 2.1
(every 8 operating hours)	Clean the machine and guides.
Every 3 months	Check the tension of the Poly-V and toothed belt and tighten as necessary.
(every 500-600 operating hours)	Check the play inside the guideways and lead screws and adjust. Check the bearing heat of the main spindle and the electric motor.

6. Description of assembly groups

6.1 Design features

- Solid large-dimensioned grey cast iron machine bed.
- Sturdy cross ribbing makes the bed extremely stable and enables you to work without oscillations.
- The wide prismatic guide is ground.
- Transversal and longitudinal support with dovetail guides and adjustable gibs.
- All guides provided with a wiper for chips and dirt.
- Large-dimensioned, pivoting scale rings, reading accuracy 0.05 mm.
- Main spindle is seated in adjustable taper roller bearings.
- Ground main spindle nose.
- Electronically infinitely-adjustable spindle speeds.
- Clear and ergonomically-arranged controls.
- Equipped with Emergency OFF push button.
- Main switch with undervoltage release.
- Motor switchable left-right.
- Tailstock with its own prismatic guides.
- Large torque on main spindle via gear transmission.

6.2 Headstock

6.2.1 Main spindle

The headstock is firmly screwed to the machine bed. Inside the headstock, the main spindle is seated on two adjustable precision tapered roller bearings.

If readjustment of the bearings is required, please proceed in the following manner:

1. Loosen the locking screw in the adjustment nut. The adjustment nut is located at the rear end of the work spindle.
2. Turn the adjustment nut in clockwise direction until the bearings run free of play again (the main spindle can easily be turned by hand).
3. Re-tighten the locking screw.

Roller bearings adjusted too tightly become useless after a short period.

The spindle bore (capacity) is 20 mm.

For safety reasons the whole drive is completely covered with a protective hood and is fixed on to the headstock.

6. Description of assembly groups

6.2.2 Electrical equipment

All the electrical equipment is housed in the box situated at the rear side of the headstock.

The AC motor is supplied already installed. The sealed contact plug can be connected directly to the 220 V mains supply via a sealed contact socket.

All 230V machines are fitted with a main switch with undervoltage release, i.e. this switch must be switched on before the machine can be switched on via the reserving switch. The main switch must also be switched on again following a power failure.

If you wish to change the sense of rotation of the motor by means of a reversing switch in the case of Electronic Lathe 10600 the reversing switch must remain in the O position for about one second so that the relay on the controller board has enough time to switch over.

Before connecting the machine to the mains supply the earthing has to be checked.

6.2.3 Speed regulation (for 1.4 kW motor)

The rotational speed of the work spindle can be adjusted infinitely variable from 380-2300 min⁻¹ by means of the potentiometer located at the front of the machine. Should you require the lower rotation level with a minimum speed of 30 min⁻¹, the drive belt must be relocated.

Proceed as follows: (see headstock)

After removing the protective cover, release the driving belt. For this, release the nut (14) and loosen the screw (51) as far as is necessary to put the drive belt on the other gear ratio (39 and 17) easily.

For tensioning the belt, tighten the screw as firmly, that the belts cannot slip from the pulleys.

Finally, re-tighten the nut (14).

6.2.4 Speed regulation (for 2.0 kW motor)

The rotational speed of the work spindle can be adjusted infinitely variable from 0-5000 min⁻¹ by means of the potentiometer located at the front of the machine.

6.2.5 Speed transmission from main spindle to lead screw

The toothed wheel (37) on the main spindle drives the two intermediate gears (47) on the tumbler gear. On the centre of motion of the tumbler gear there is a toothed wheel with a toothed belt wheel. The toothed wheel is driven by the intermediate gears and the toothed belt wheel assumes the drive of the gear combinations on the quadrant.

6. Description of assembly groups

6.2.6 Tumbler gear adjustment

As shown in the diagram (chapter 2.2) the left-hand wheel on the tumbler gear engages with the toothed wheel of the main spindle.

This setting is required for right-hand threads or normal feed, i.e. if the spindle is turning in anti-clockwise direction (looking at the chuck), the tool slide will move towards the chuck.

After loosening the clamping bolt (50), the tumbler gear can be pivoted over to the left, so that the right-hand intermediate wheel engages in the toothed wheel of the main spindle. This setting serves for cutting left-hand threads, or the slide moves away from the chuck towards the tailstock (see chapter 2.4) (while the sense of rotation the main spindle stays the same).

6.2.7 Protective cover for chuck

The main spindle of the machine will only run with the chuck protective hood (24) closed.

For safety reasons it is not possible to switch the machine on if the protective hood is open.

6.3 Bed with lead screw drive

6.3.1 Overload clutch

In order to avoid damage to the drive system of the lead screw an overload clutch is fitted on the lead screw drive side. The clutch becomes effective when the machine is overloaded and also when the machine hits an end stop in longitudinal direction.

The clutch is adjusted with the hexagon nuts (45) and counter screwed.

6.3.2 Setting the bearing play of the lead screw

On the right-hand side the lead screw is seated radially in a bronze bushing (4a) and axially in two axial bearings (6). These two axial bearings allow the lead screw to be adjusted free of play (8).

If the bearing play needs to be readjusted, first of all loosen the outer of the two capstan nuts (7). Then the inner nut is turned against the axial bearing until the lead screw is free of axial play.

Finally lock the outer capstan nut against the inner nut.

6. Description of assembly groups

6.4 Tool slides

6.4.1 Transversal slide

The front part of the transversal slide rests on a V-guide and the rear part on a surface guide. The slide is kept on the bed from below by means of the guide rail (28). The hexagon socket screw (74) can be found at the front, on the right. The clamping piece (76) is clamped to the bottom of the V-guide by using this screw. This clamping version is suitable for face turning and parting.

The dovetail guide of the transversal slide is adjustable. If readjustment is necessary, loosen the hexagon nuts (35). Adjust the threaded pins (59) with the Allen key (not too tight) so that the slide can easily be moved back and forth by using the ball-ended crank (23). Re-tighten the hexagon nuts (35) after completion of the adjustment.

If axial play occurs in spindle (15) please proceed as follows. First of all, loosen the threaded pin (22). Now the scale support (20) can be turned to the right until there is no more axial play. Then re-tighten threaded pin (22).

After making the adjustment the spindle must still be free to turn easily.

For calculating the travel path of the slide there is a large scale ring (17) with graduation marks on scale support (20). One scale mark corresponds to 0.05 mm of adjustment and this corresponds to the same amount chip removal from the work piece, i. e. the actual slide travel amounts to 0.025mm only, whereas the work piece diameter is reduced by 0.05mm.

One revolution of the ball ended crank corresponds to 2 mm, but however, the work piece diameter is changed by 0.4 mm.

6.4.2 Longitudinal slide

The longitudinal slide is clamped to the transversal slide upper part (52) by using the clamping ring (3). After loosening the hexagon nuts (62), the longitudinal slide can be pushed or turned along the transversal slide. This is suitable for lathing short tapered pieces. A scale is engraved on the guide ring (4) so that you can read the exact setting. The zero mark is on the upper part of the transversal slide.

The dovetail guides of the longitudinal slide can be adjusted as described for the transversal slide. The parts have a different numbering in the drawing: hexagon nut (35), threaded pins (34), ball-ended crank (23).

Likewise, as described in the case of the transversal slide, the axial play of the spindle can be adjusted. Here the parts are also numbered differently: spindle (44), spindle bearings (45), threaded pin (51), scale support (49).

6. Description of assembly groups

6.4.2 Longitudinal slide

As described for the longitudinal slide, the longitudinal slide is also provided with a reading scale for its travel path. Here, one scale mark corresponds to a feed motion of 0.05mm. As the diameter is not taken into consideration with the longitudinal slide, the feed motion of 0.05 mm corresponds to the actual path. One revolution of the crank corresponds to a path of 2mm.

6.5 Tailstock

The tailstock can be displaced along the lathe bed and may be locked in any position by tightening the hexagon nut (18). The tailstock consists of an upper and a lower part. The upper part can be displaced up to 10 mm for turning long, slim tapers.

To do so, please proceed as follows:

Loosen the hexagon nut (18) and push the upper part in the desired direction with the help of the two threaded pins (16).

The centre position of the tailstock is indicated by the lateral mark. Find out by doing some trial turning if the work piece is cylindrical and correct the tailstock position if necessary.

Tailstock sleeve:

The solid tailstock sleeve, which is provided with a millimetre scale (19), is designed in such way that the lathe centre, drill barrel or chuck are **automatically ejected** during the backward motion.

Tool holder:

An **inner taper MT 2** is available for holding the tool. It is integrated in the sleeve (4). The sleeve can be clamped easily in any position by tightening the upper clamping lever. The sleeve can be moved axially by the crank (21) to be found at the rear end via the threaded spindle (5).

7. Applications

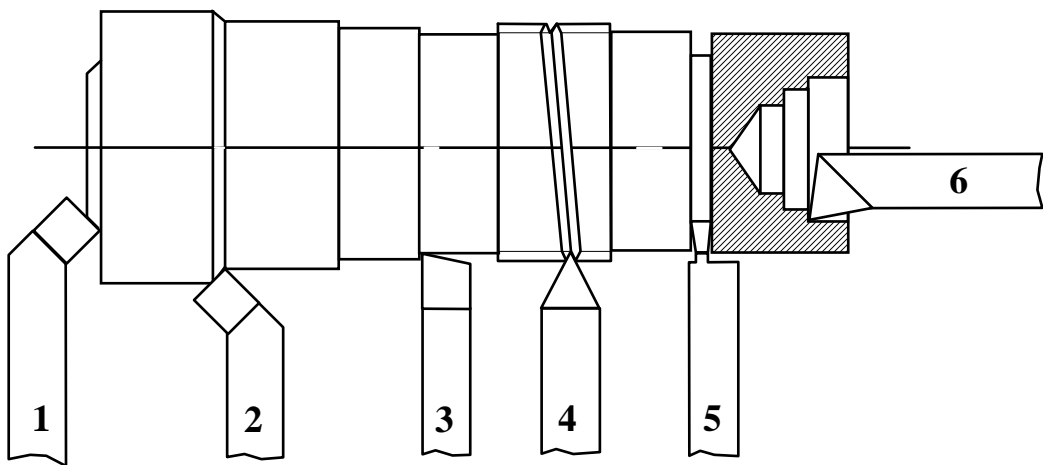
7.1 Longitudinal and transverse turning

Longitudinal turning:

In the case of longitudinal turning the tool moves parallel to the axis of the work piece. For longitudinal rough turning it is recommended to use either a straight or an arcuated turning tool.

Transverse turning:

The machining of the face is known as transverse turning. In the case of transverse turning, the turning tool is moved at 90 degrees to the turning axis of the piece being turned. In so doing the cross support is to be locked. The main cutting lip of the turning tool must be exactly centred so that no lug remains in the work piece centre. The arcuated tool is used for transverse turning.



to 1+2: Roughing tools arcuated to the left and/or to the right: By using them a maximum of material is removed in as short a time as possible (without paying attention to the finish on the surface of the work piece). They can be used for longitudinal and transverse turning.

to 3: Offset side turning tool: Used for finishing (smooth surface) in the case of longitudinal and transverse turning.

to 4: Outside thread turning tool: Used for cutting outside threads.

to 5: Parting tool: Used for the cutting of grooves and slicing of work pieces.

When inserting the parting tool No. 5, pay careful attention to the exactness of the centre height of the turning tool. Work at low rotational speed and cool the tool (use drilling oil or emulsion for cooling: serves for lubricating and for the removal of chips.) The parting tool is to be clamped as short as possible at 90° degrees to the workpiece.

to 6: Inside turning tool: Used for the hollowing-out of boreholes. Clamp as short as possible in order to avoid vibration of the turning tool which might otherwise occur (uneven surface).

7. Applications

7.1 Longitudinal and transverse turning

For the reason of the force effect at the turning chisel take care that the tool is short and tightly clamped. If the lever arm is too long the turning chisel curves and springs back. The cutting part enters uneven into the work piece and is producing a wavy surface.

Take care that the turning chisel is directed to the centre of the work piece.

The height position in the work piece centre is regulated via the live lathe centre inside the tailstock. The height position of the turning tool is achieved by using straight sheet steel.

7.2 Thread cutting and automatic feed

7.2.1 Thread cutting

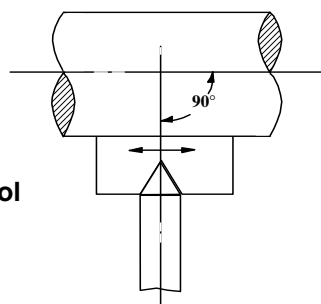
The thread cutting tool is a shape turning tool with the profile of the thread to be cut. It is ground according to jigs (diagram 1) and must be adjusted exactly to the workpiece centre as, otherwise, the profile of the thread would be distorted.

In order to obtain the correct position of the thread flanks relating to the axis of the workpiece, the grinding jig is put against the work piece and the turning tool is adjusted in accordance with it.

For that purpose the jig is put against both flanks of the turning tool. The feed of thread cutting tool is effected via the lead screw and must correspond to the thread pitch. The change gears in the accessories connect the feed drive with the lead screw. Putting on different combinations of toothed wheels allows to cut metric and inch RH and LH threads. The different axis distances of the toothed wheels can be adjusted by pivoting the quadrant and by displacing the quadrant bolts.

The feed is switched on by means of the lever situated on the apron. When cutting threads, please make sure that the feed remains continuously switched on to ensure that the turning tool always returns to the same position if more than one cutting procedure is required. After completion of the cutting procedure, the cross slide disengages the tool because otherwise the flanks and cutting lips would get damaged. The transversal slide is taken back to its home position when changing the sense of rotation of the motor by operating the reversing switch. It is advisable to cut a 4-5 mm wide groove into the thread end in order to facilitate the disengaging of the tool.

In case of long thread diameters, it is advisable to use the live centre to prevent the workpiece from being pushed to one side.



picture 1: Setting the thread cutting tool

7. Applications

7.2.2 Application of change gears

For automatic longitudinal turning there are two feed rates available: 0.085 mm and 0.16 mm/revolution. (The machine is delivered with the gears producing a feed of 0.085 mm/revolution put on).

Putting on different combinations of gears enables you to cut metric threads ranging from 0.25 to 7.0 mm in pitch. The same applies to inch threads ranging from 10 threads/" to 40 threads/" in pitch.

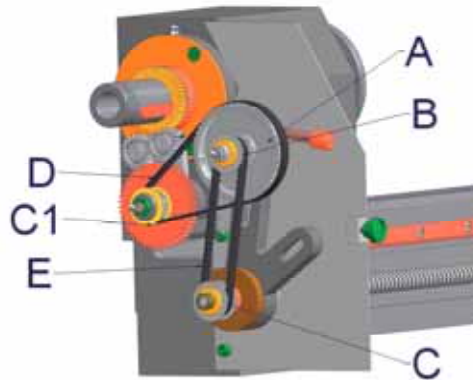


Table on thread cutting

mm	0.4	0.5	0.7	0.75	0.8	1.0	1.25	1.5	1.75	2.0
A	48	48	48	48	48	48	48	48	48	48
B	16	20	14	18	16	14	20	36	28	40
C	40	40	20	24	20	14	16	24	16	20
C1	16	16	16	16	16	16	16	16	16	16
D	140	140	140	140	140	140	140	140	140	140
E	140	140	140	140	140	140	140	140	140	140

mm	2.5	3.0	3.5	4	5	7
A	48	48	24	24	24	24
B	40	48	28	40	40	28
C	16	16	16	20	16	16
C1	16	16	16	16	16	32
D	140	140	120	120	120	120
E	140	140	140	140	140	120

Z/1"	10	11	12	13	14	16	18	19	20	24	28	32	36	40
A	34	34	34	34	34	34	34	34	34	34	34	34	34	34
B	36	36	36	36	36	36	14	34*	18	24	18	18	14	18
C	20	22	24	26*	28	32	14	36	20	32	28	32	28	40
C1	16	16	16	16	16	16	16	16	16	16	16	16	16	16
D	120	120	120	140	140	140	120	140	120	120	120	120	120	120
E	140	140	140	140	140	140	140	140	140	140	140	140	140	140

7. Applications

7.2.2 Application of change gears for D6000

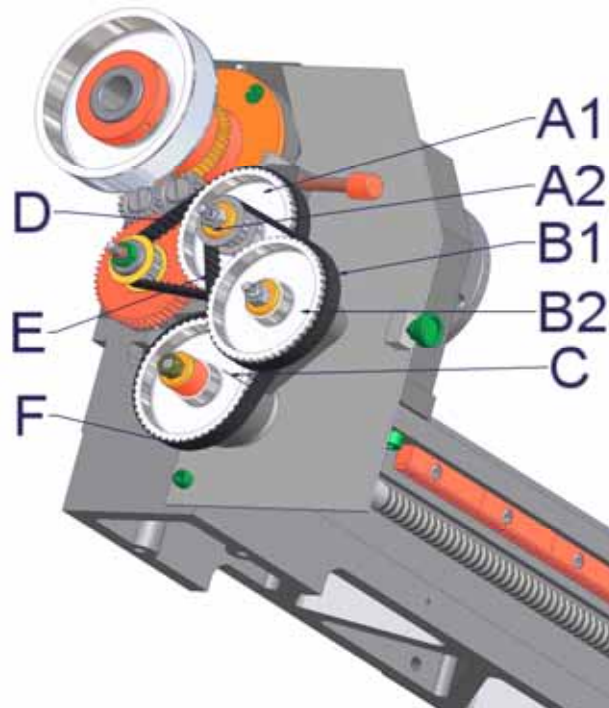


Table for cutting very fine threads with a second change gear bolt

mm	0.25
A1	48
A2	24
B1	18
B2	48
C	36
D	120
E	140
F	110
A2 and B2 front toothed wheel!	
A1 and B1 rear toothed wheel!	

Table for automatic longitudinal feed

mm/ σ	0,085	0.16
A1	48	48
A2	14	18
B1	48	48
B2	14	20
C	48	48

7. Applications

7.2.3 Altering the feeds or thread pitches

When altering the feeds or thread pitches, proceed as follows:

1. Changing the feed from 0,085 mm to 0.16 mm

- a. Loosen set screw D of quadrant. (First loosen the hexagon socket screw at the front of the headstock and open the protective cover.)
- b. Loosen and remove the hexagon nuts and washers from bolts A and B.
- c. Loosen the hexagon bolts A and B. Remove the toothed belt connecting A and B. Unscrew bolt B on the quadrant and the two toothed belt pulleys and remove them. Remove toothed belt between drive wheel and A.
- d. Remove both toothed belt pulleys Z 14 from bolts A and B and replace them by toothed belt pulley Z 18 or toothed belt pulley Z 20, respectively.
- e. Mount bolt B, together with both toothed belt pulleys to the quadrant screwing the bolt into the square nut located behind the quadrant. Put on the toothed belt from B to C, pull bolt B upwards until the toothed belt is stressed. Then, tighten bolt B.
- f. Pull bolt A upwards until the toothed belt is stressed, then tighten bolt A. Pivot to the front until the toothed belt between drive shaft and bolt A is stressed, tighten set screw D, Mount the washers and nuts to A and B and tighten them.
- g. Close the headstock cover and re-tighten hexagon socket screw.

2. Changing the feed from 0.85 mm to a metric pitch of 1.5 mm

- a. - c. Start as already described under pos. 1, a-c, with the exception that the hexagon nut must be removed from the bolt C, too, as described under pos. 1 b.
- d. Remove the bushing and the toothed belt pulley Z48 from bolt C. Then first put the bushing and the toothed belt pulley Z 14 onto bolt C, but make sure that the bushing precedes the tooth belt pulley.
Bolt B with toothed belt is needed for cutting very fine threads.
- e. As toothed belt pulley Z14 is already put on bolt A you do not have to make any changes. Put on the toothed belt between the drive wheel to bolt A and between A and C.
- f. - g. Proceed as described under pos. 1, f-g!

3. Changing the feed from 0.085 mm to thread pitch 12Z/1 "

Proceed exactly as already described. The procedure differs merely in additionally replacing toothed belt pulley Z48 on bolt A by toothed belt pulley Z34.

The feed is switched over via the T-handle on the front side of the apron. When cutting threads please make sure that the feed remains permanently switched on so that the turning tool returns to its home position if more than one cutting procedure is required.

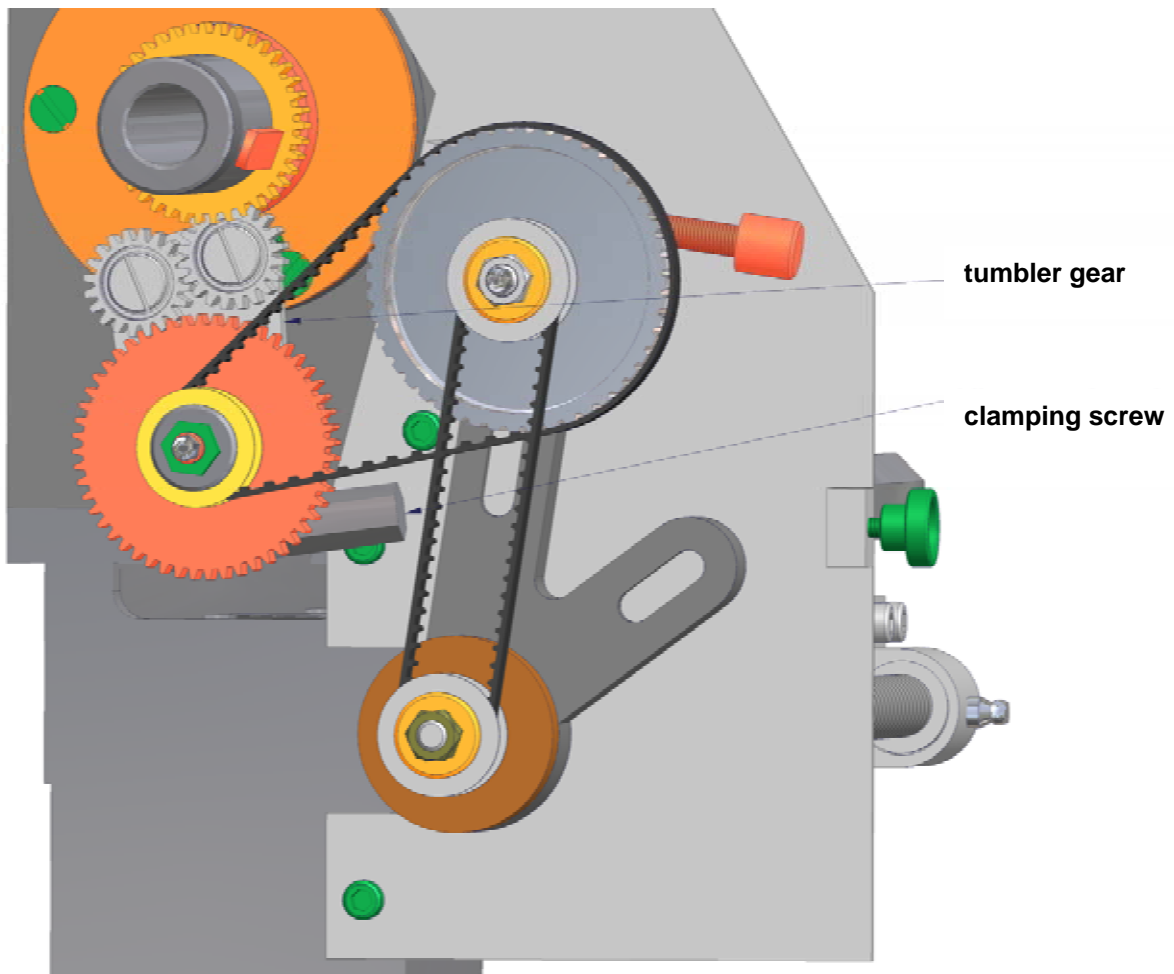
After completion of the cutting procedure, the transversal slide disengages the tool and travels back to its home position when changing the sense of rotation of the motor by operating the reversing switch.

7. Applications

7.2.4 Left-hand thread

To cut an LH thread just mesh the right-hand intermediate gear on the quadrant with the drive wheel on the main spindle.

Figure 9.4 shows the condition for left-hand thread cutting. In order to pivot the tumbler gear all you have to do is loosen the clamping screw.



8. Three-jaw chuck and four-jaw chuck

The three-jaw chuck

serves for clamping circular, triangular and hexagonal work pieces centrically to the spindle axis.

The four-jaw chuck

serves for clamping square work pieces centrically to the spindle axis.

Danger of accident

Do not try to clamp workpieces exceeding the allowable clamping range. The clamping force would be insufficient and the jaws may detach themselves.

Mounting of turning jaws:

The jaws and guides are numbered from 1-3 resp. 1-4. Open the chuck by means of the chuck key until the jaws loosen. (order: 3, 2, 1 resp. 4, 3, 2, 1).

Now, take the jaws beginning with number 1 and insert it into guide number 1. Push the jaw number 1 towards the chuck centre and at the same time turn the chuck key (direction "tighten"). When the transverse spiral has taken hold of number 1, number 2 must be inserted in the guide provided. The same now happens to number 2. Proceed with number 3 and number 4 in the same way. Subsequently, examine the positions of the jaws.

Mounting of drilling jaws:

If you wish to work with drilling jaws afterwards, the process repeats itself in the same order (first jaw 1, then 2, then 3, then 4).

9. Collet chuck



Only those workpieces may be used which accord to the nominal diameter of the collet chuck.

Mounting of the tool holder:

When working with the collet chuck, the concentric chuck must be removed from the work spindle. In order to do this, loosen the three tightening screws by means of the Allan key SW6 included in the accessories. Now, the chuck can be lifted from the concentric flange of the work spindle and the closer can be inserted into the work spindle by gently pushing it.

Subsequently, insert the required collet chuck into the closer and by means of the hand draw-in tube (which is fed in through the hollow work spindle from the gear side) draw the collet chuck into the closer.

10. Lubrication coolant unit

The lubrication coolant unit consists of:

1. Tray with lubrication coolant tank which supplies the feed pump with lubrication coolant. General content of 19 litres.
2. Feed pump with the following electrical data
 - nominal voltage 230 V
 - frequency 50 Hz
 - nominal current input 0.4A
 - nominal output 0.07 kW
 - ON-OFF switch and mains supply with a length of 2 m with earthed plug.
3. Adjustable, flexible pressure hose with stop valve and nozzle for transporting the cooling lubricant to the machining area.

When using lubrication coolant, especially water based emulsions, a number of health and safety measures must be observed, which we would like to recommend:

1. Use concentrated products free of nitrites.
2. Use concentrates without secondary amines.
3. Use products with the lowest possible allergy potential.

When mixing a refill of cooling lubricant, please observe the following:

- clean / rinse the circulation system (tray / filter)
- determine the concentration necessary to meet the technical demands
- (concentrate: water 1:5 – 1:30)
- check the water has a low level of nitrites (< 50 mg NO₃⁻, test strip)

A cleaning plan should determine at what intervals the system should be cleaned of swarf and other waste.

A service plan should determine the following:

- when to check the concentration in use (daily / weekly)
- when to check the pH values (weekly)
- when to check / assess the bacteria count (monthly)
- when to check the nitrate content (weekly)
-

(The information in brackets can be varied according to the production circumstances.)

In order to reduce splashing, we recommend the attachment of a splash guard and / or reducing the amount sprayed from the nozzle.

Since steps to protect the skin must be taken, it is advisable to wear gloves and aprons. The skin should be cleaned with acidic syndets without abrasive ingredients and rich cream should be applied to regenerate the skin.

Please also take note of the enclosed information on the general operating instructions.

11. Declaration of noise levels in accordance with DIN EN 24871 (German Industrial Standard)

Noise levels while running idle

Acoustic capacity level	67 dB (A)
Sound pressure level on operator's ear	63 dB (A)

The stated values reflect emission levels and not necessarily working levels. Although there is a correlation between the level of emission and the level of stress, this cannot be used reliably in order to determine whether additional safety measures are necessary or not.

Other factors which influence the actual stress level of employees are the characteristics of the working area, other sources of noise, i.e. the number of machines and other processes going on nearby and so on. Apart from that, the permitted stress levels may vary from country to country. This information is to allow the user of the machine to assess the dangers and risks more accurately.

Noise levels in accordance with DIN 45635 - part 1

noise level in work area

idle phase	LpA = 63 dB(A)
load phase	LpA = 67 dB(A)

12. Drawing and list of parts

12.1 Diagram for reading the rotational speed

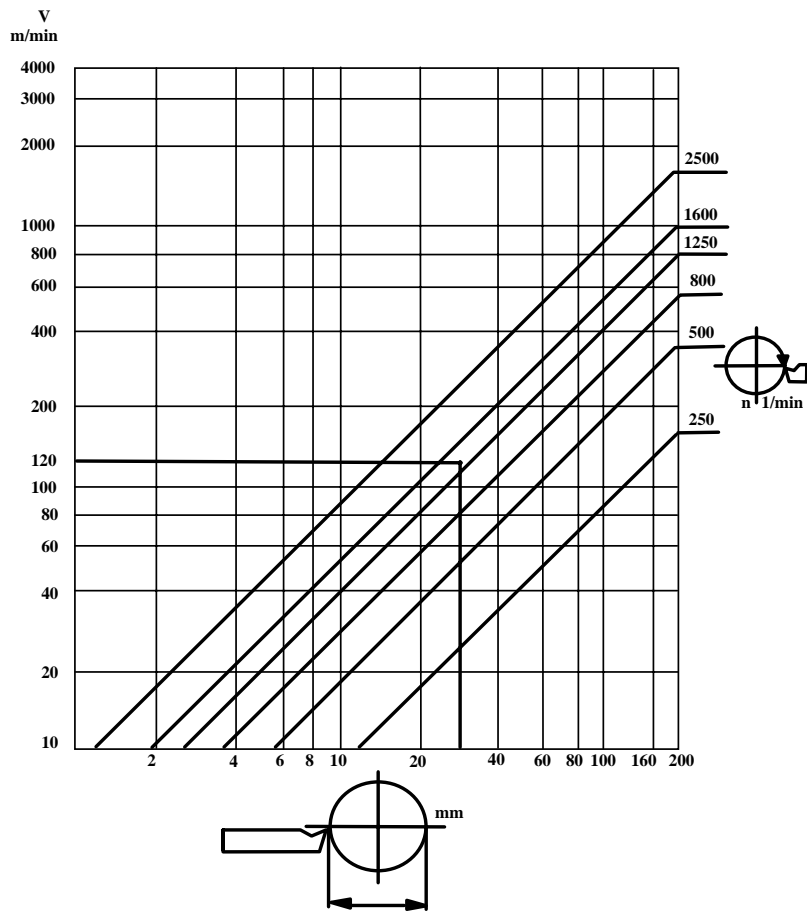
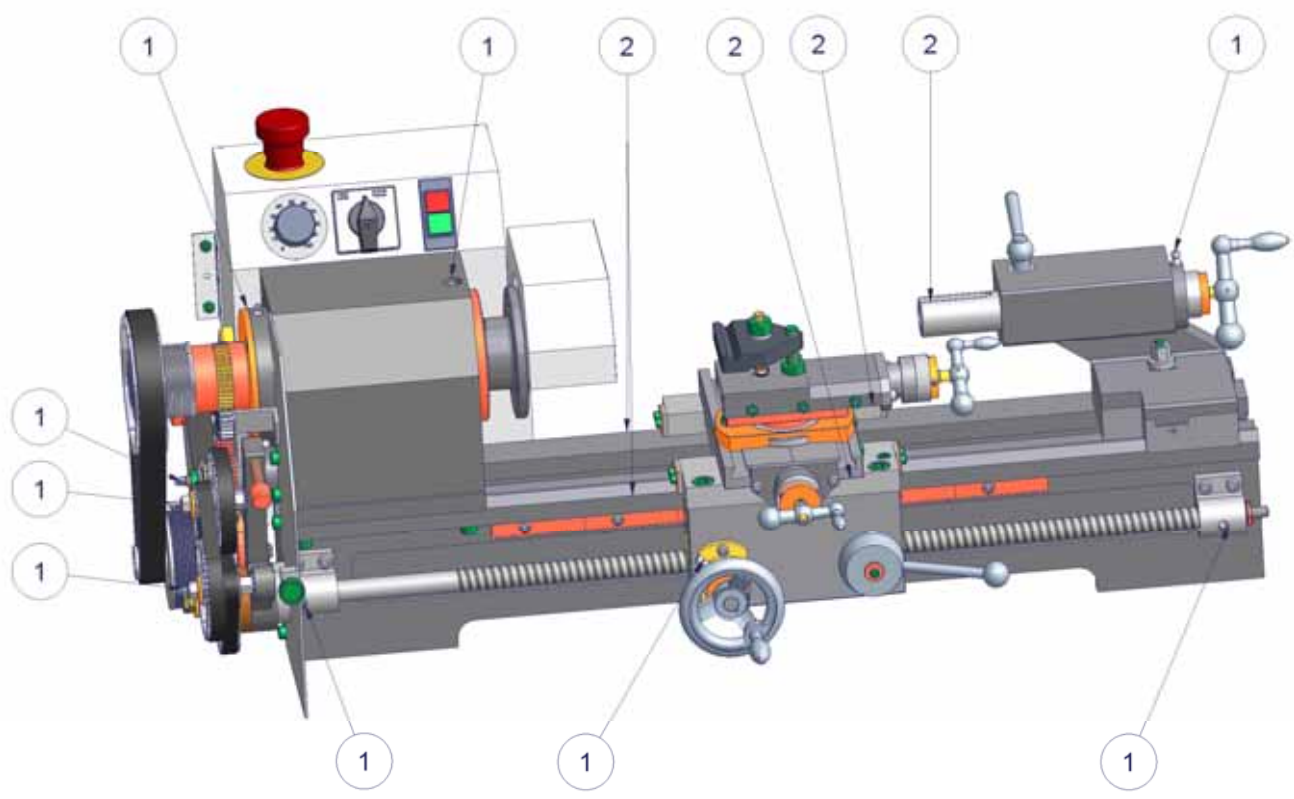


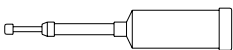
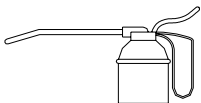
Table 1.4 kW motor		
	I	II
0%	30	150
10%	35	155
20%	50	220
30%	90	450
40%	150	850
50%	200	1050
60%	290	1500
70%	350	1900
80%	400	2050
90%	460	2200
100%	490	2300

Table 2.0 kW motor (high speed)	
	I
0%	0
10%	380
20%	1000
30%	1500
40%	2000
50%	2500
60%	3000
70%	3500
80%	4000
90%	4700
100%	5000

12. Drawing and list of parts

12.2 Lubricating plan

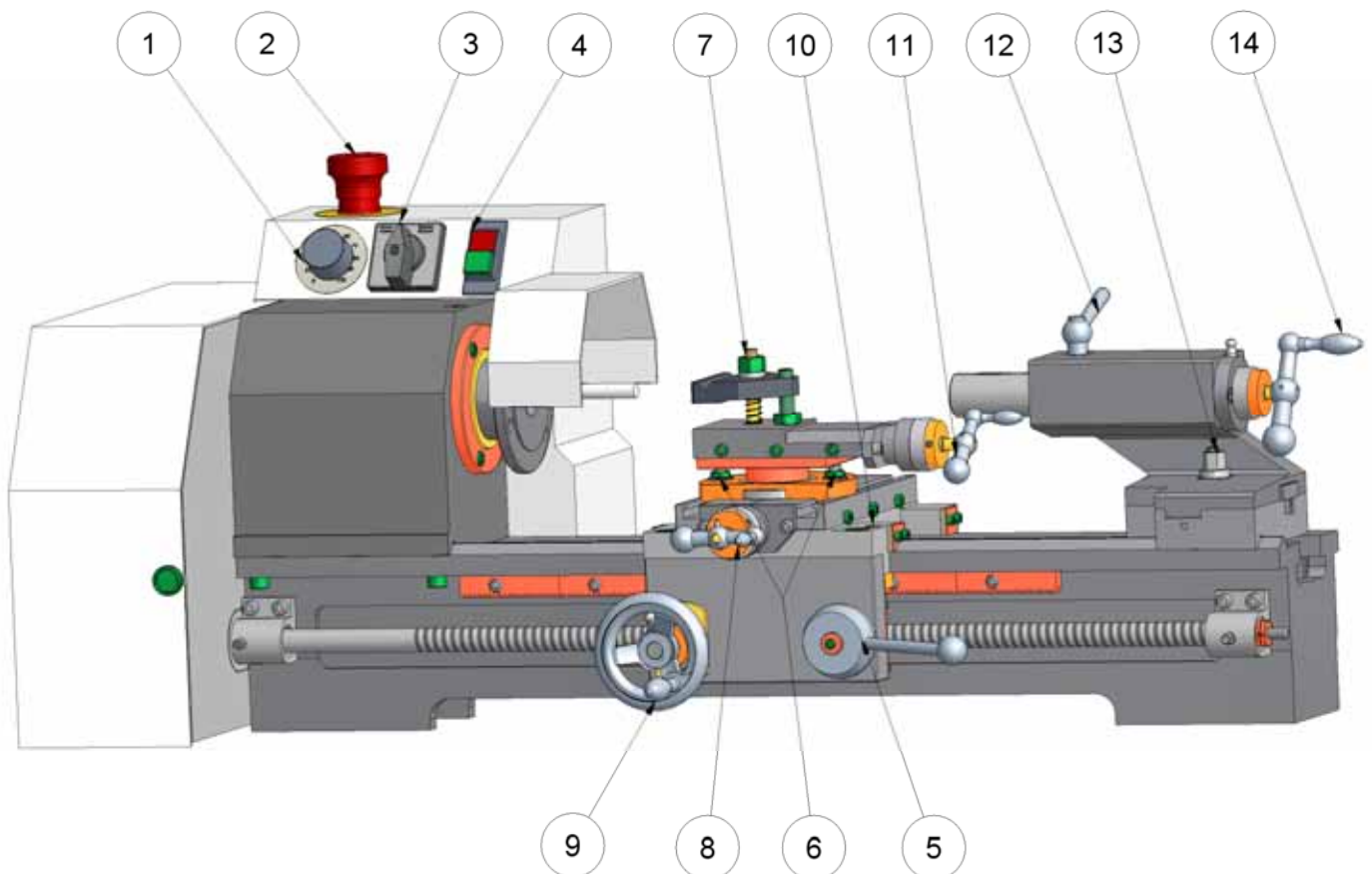


- 1  Every 8 operation hours
- 2  Every 8 operation hours

12. Drawing and list of parts

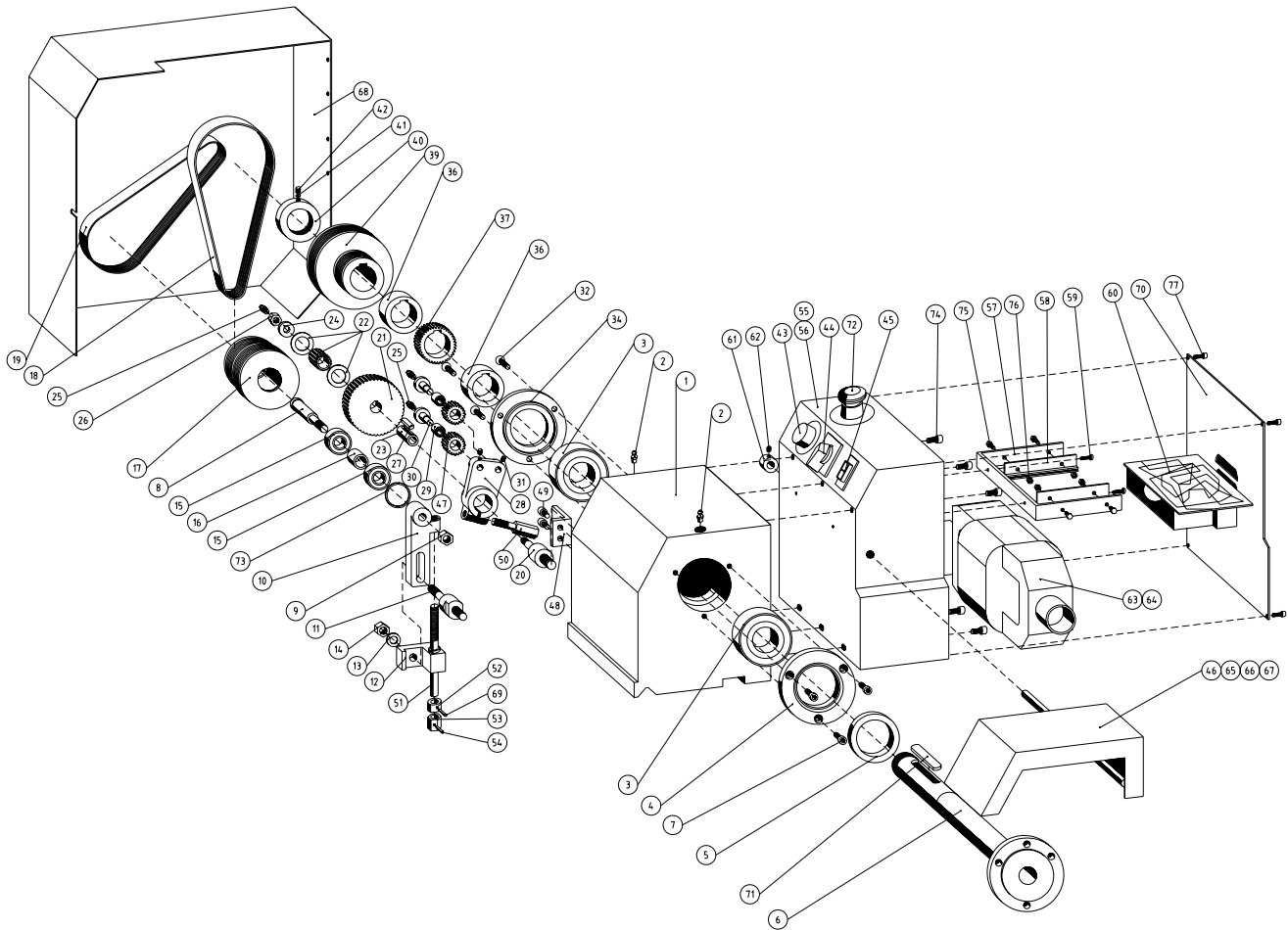
12.3 Operating elements

1. Potentiometer rotary knob for the speed regulation of the electric drive motor
2. Emergency OFF switch
3. Reversing switch for changing the turning direction – main spindle
4. Main switch with undervoltage release
5. Opening and closing of clasp nut
6. Retention screws for longitudinal slide
7. Adjusting nut for tool clamping plate
8. Ball ended crank for transversal slide adjustment
9. Hand wheel for quick adjustment of the tool slide
10. Clamping screw for clamping the tool slide
11. Ball ended crank for longitudinal slide adjustment
12. Clamping lever for locking the tailstock sleeve
13. Adjusting nut for locking the tailstock on the guides
14. Ball ended crank for adjusting the tailstock sleeve



12. Drawing and list of parts

12.4 Headstock



Part no.	Pieces	Order no.	Description
1	1	10600101	Headstock
2	2	11810005	Lubricating nipple
3	2	11810015	Tapered roller bearing
4	1	10600104	Flange
5	1	10600105	Oil wiper ring
6	1	10600106	Main spindle with flange
7	3	11700078	Hexagon socket screw
8	1	11700030	Hexagon nut
9	1	10600109	Transmission axis
10	1	10600110	Transmission lever
11	1	10600111	Axis
12	1	10600112	Shim
13	1	11700029	Washer
14	1	11700030	Hexagon nut
15	2	11810011	Ball bearing
16	1	10600116	Bushing
17	1	10600117	Transmission belt pulley
18	1	11820005	Poly-V-belt
19	1	11820008	Poly-V-belt

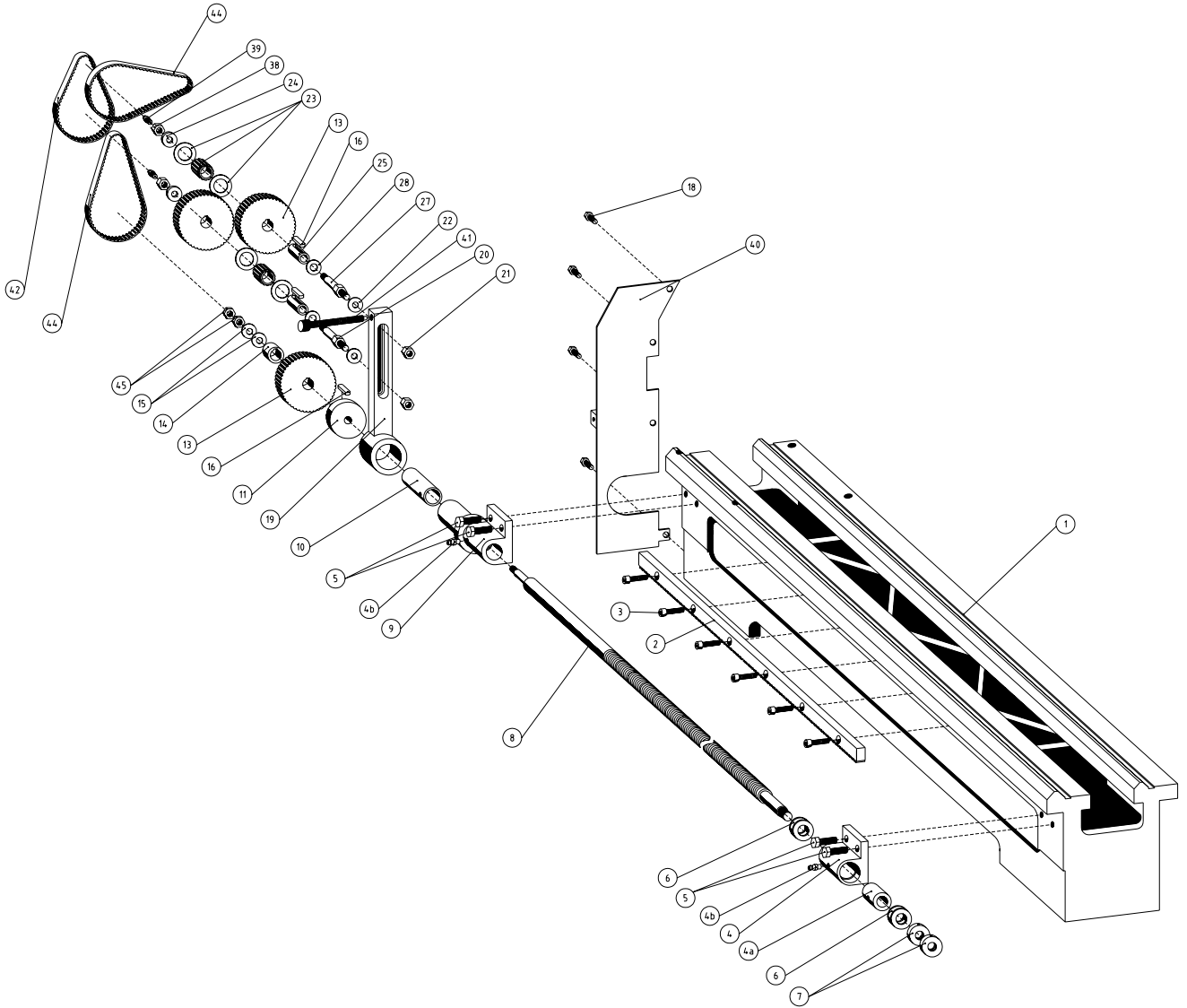
12. Drawing and list of parts

12.4 Headstock

Part no.	Pieces	Order no.	Description
20	1	10600120	Bolt
21	1	10600121	Toothed wheel
22	1	10600122	Toothed belt wheel
23	1	10600123	Bushing
24	1	10600124	Washer
25	3	11810009	Lubricating nipple
26	1	11700053	Hexagon bolt
27	1	11700069	Feather key
28	1	10600128	Lever
29	2	11810016	Needle bearing
30	2	10600130	Bolt
31	2	11700090	Stud bolt
32	3	11700059	Countersunk screw
34	1	10600134	Flange
36	2	10600136	Bushing
37	1	10600137	Toothed wheel
39	1	10600139	Belt pulley
40	1	10600140	Nut
41	1	10600141	Thrust pad
42	1	11700066	Stud bolt
43	1	11800004	Potentiometer, compl.
44	1	11800015	Reversing switch
45	1	11800001	On-OFF switch
46	1	10600146	Chuck protective hood
47	2	10600147	Toothed belt
48	1	10600148	Angle joint
49	2	11700022	Hexagon socket screw
50	1	10600150	Clamping screw
51	1	10600151	Clamping screw
52	1	10600152	Setting ring
53	1	10600153	Hexagonal piece
54	1	11700023	Spiral clamping pin
56	1	10600156	Steel box
57	1	10600157	Steel elbow joint
58	2	10600158	Circuit board holder
59	2	11700001	Steel bolt
60	1	11800005	Control electronics
61	1	11700091	Setting ring
62	1	11700044	Threaded pin
63	2	11700092	Hexagon bolt
64	1	10600164	Motor
65	1	10600165	Eccentric
c	1	11700044	Threaded pin
67	1	11800014	Limit switch
68	1	10600168	Protective hood
69	1	11700023	Spiral clamping pin
70	1	10600170	Cover plate
71	1	10600171	Feather key
72	1	11800008	Emergency OFF push button

12. Drawing and list of parts

12.5 Bed with lead screw drive



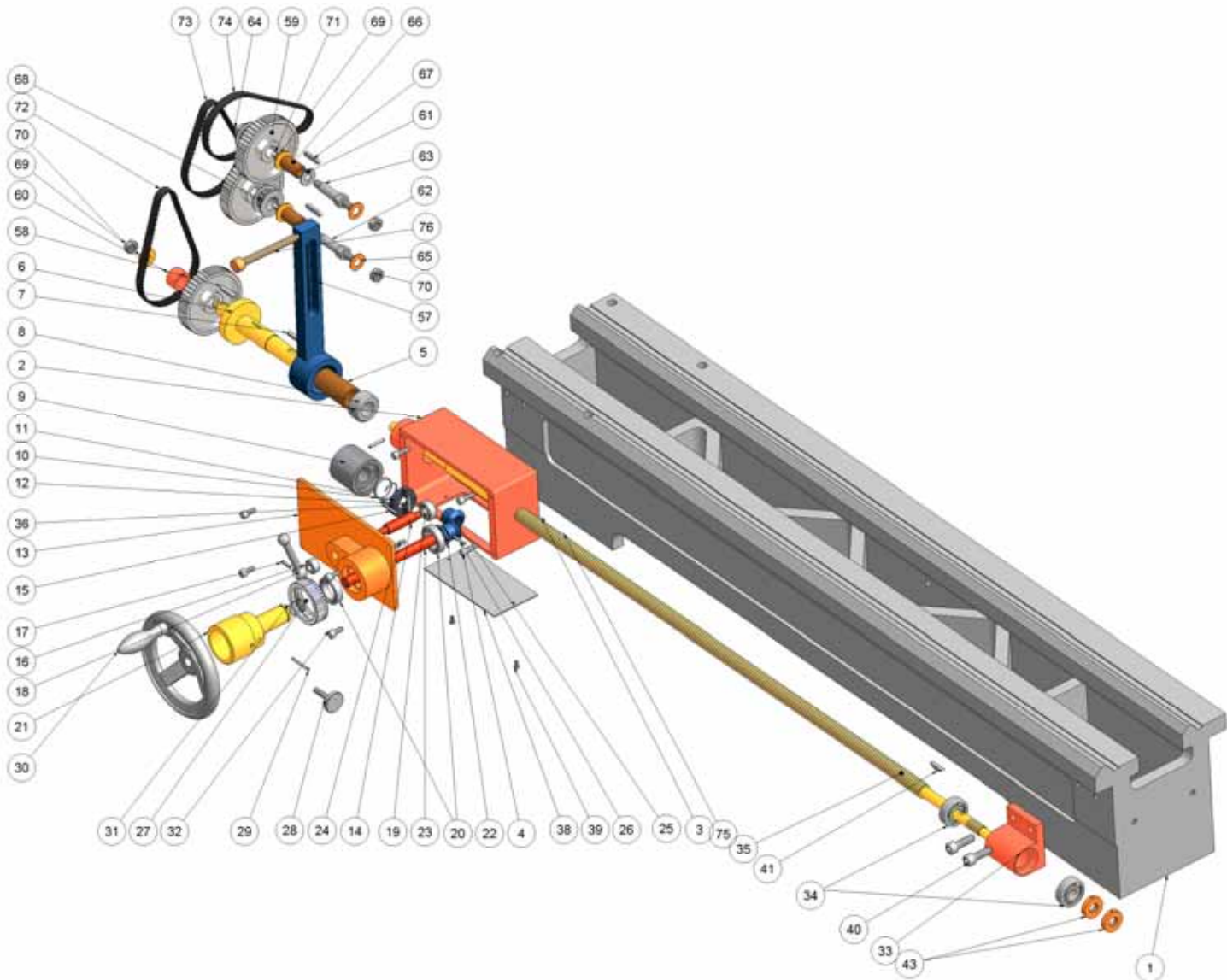
12. Drawing and list of parts

12.5 Bed with lead screw drive

Part no.	Pieces	Order no.	Description
1	1	10600201	Bed
2	5	10600202	Toothed rack
3	1	11700031	Hexagon socket screw
4	1	10600204	Support bearing, rear
4a	4	106002041	Bushing
5	2	11700041	Hexagon bolt
6	2	11810006	Deep groove ball bearing
7	1	11700093	Capstan nut
8	1	10600208	Lead screw
9	1	10600209	Support bearing, front
10	1	10600210	Bushing
11	3	10600211	Shearing bushing
13	1	10600213	Toothed belt pulley
14	1	10600214	Bushing
15	3	10600215	Washer
16	4	11700072	Feather key
18	1	11700094	Hexagon socket screw
19	1	10600219	Change gear quadrant
20	2	10600220	Change gear bolt
21	2	11700054	Square nut
22	2	10600222	Disc
23	2	10600223	Toothed belt wheel
24	2	10600224	Washer
25	1	10600225	Bushing
27	2	10600227	Change gear bolts
28	1	10600228	Disc
30	2	11840007	Knurled screw
38	2	11700053	Hexagon nut
39	1	11810009	Lubricating nipple
40	1	10600240	Cover plate
41	1	10600241	Set screw
42	2	11820004	Toothed belt
44	2	11820003	Toothed belt
45	2	11700053	Hexagon socket screw
47	2	11810005	Lubricating nipples

12. Drawing and list of parts

12.6 Bed with lead screw drive **for ball screw**



Part no.	Pieces	Order no.	Description
1	1	10600601	Bed
2	1	10600602	Support bearing, front
3	2	11700077	Headless pin
4	4	11700070	Hexagon socket screw
5	1	10600603	Bushing
6	1	10600604	Feed shaft
7	1	11700072	Feather key
8	1	11700108	Setting ring
9	1	10600605	Coupling
10	1	10600606	Pressure spring
11	1	10600607	Clutch disc
12	2	11700099	Spiral clamping pin
13	1	10600608	Bearing cover
14	1	10600609	Eccentric shaft

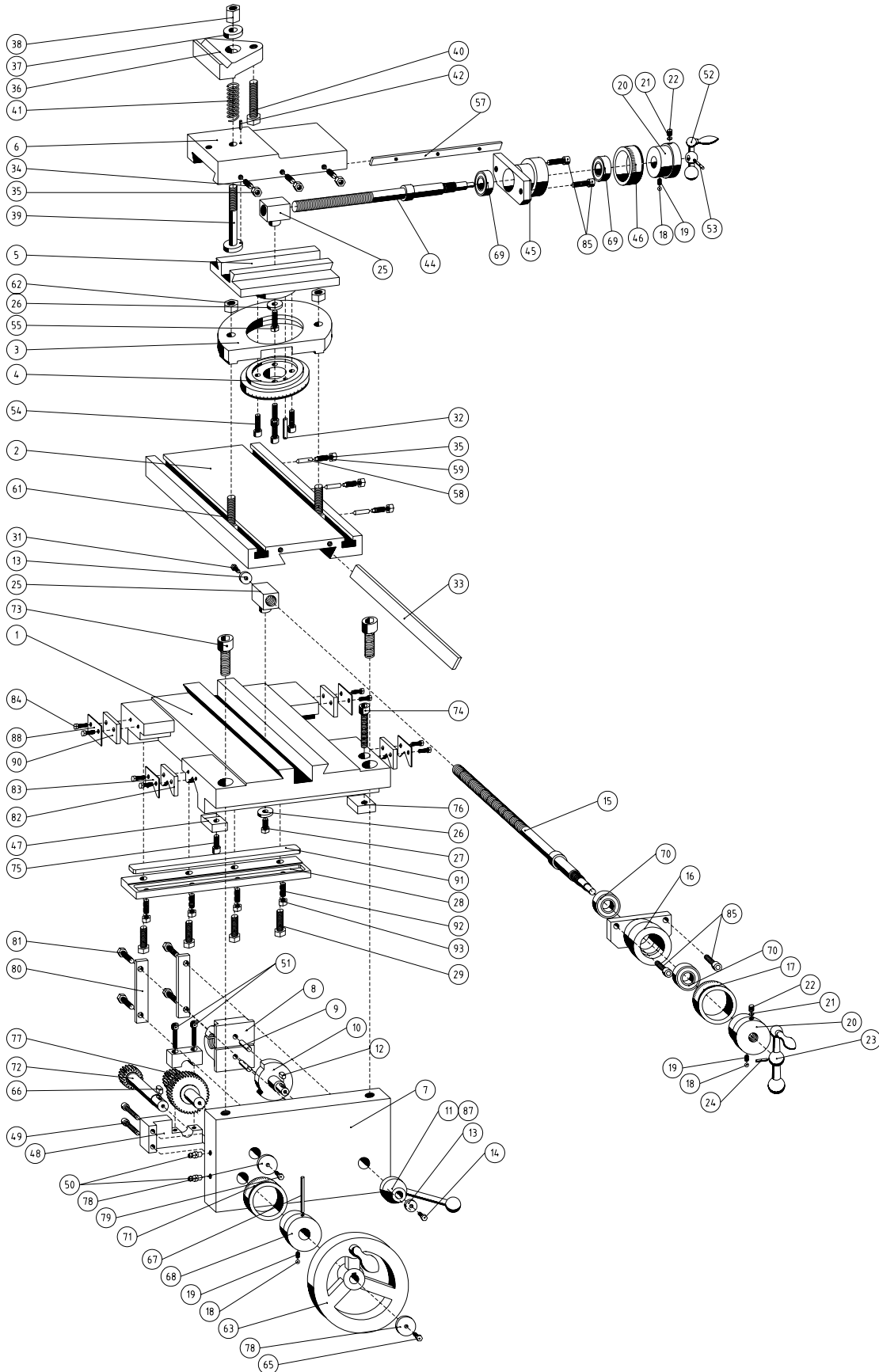
12. Drawing and list of parts

12.6 Bed with lead screw drive **for ball screw**

15	1	11700024	Spiral clamping pin
16	1	11700109	Setting ring
17	2	11700049	Spiral clamping pin
18	1	11840016	Clamping lever
19	1	11810017	Ball bearing
20	2	11810018	Ball bearing
21	1	10600610	Guide bush pinion shaft
22	1	11700012	Circlip
23	1	10600611	Lead screw pinion shaft
24	1	11700110	Feather key
25	1	10600612	Pinion
26	2	11700023	Spiral clamping pin
27	1	10600613	Graduated collar
28	1	11840017	Knurled screw
29	1	11700024	Spiral clamping pin
30	1	11840014	Hand wheel
31	1	10600614	Pressure spring
32	4	11700107	Hexagon socket screw
33	1	10600615	Bearing, rear
34	2	11810019	Ball bearing
35	1	10600615	Lead screw
36	1	11700111	Cylindrical pin
38	1	10600616	Bearing cover
39	2	11700112	Hexagon socket screw
40	4	11700041	Hexagon socket screw
41	1	11700113	Woodruff key
57	1	10600617	Feed lever
58	1	11700072	Feather key
59	3	10600213	Toothed belt pulley
60	1	10600214	Bushing
61	2	10600222	Disc
62	1	10600220	Change gear bolt
63	1	10600227	Change gear bolt
64	2	11700054	Square nut
65	2	10600228	Disc
66	2	10600225	Bushing
67	2	11700072	Feather key
68	2	10600223	Toothed belt wheel
69	3	10600224	Disc
70	3	11700053	Hexagon nut
71	3	11810009	Lubricating nipples
72	1	11820003	Toothed belt
73	1	11820004	Toothed belt
74	1	11820004	Toothed belt
75	1	11810020	Needle bearing
76	1	10600241	Clamping bolt

12. Drawing and list of parts

12.7 Tool slide



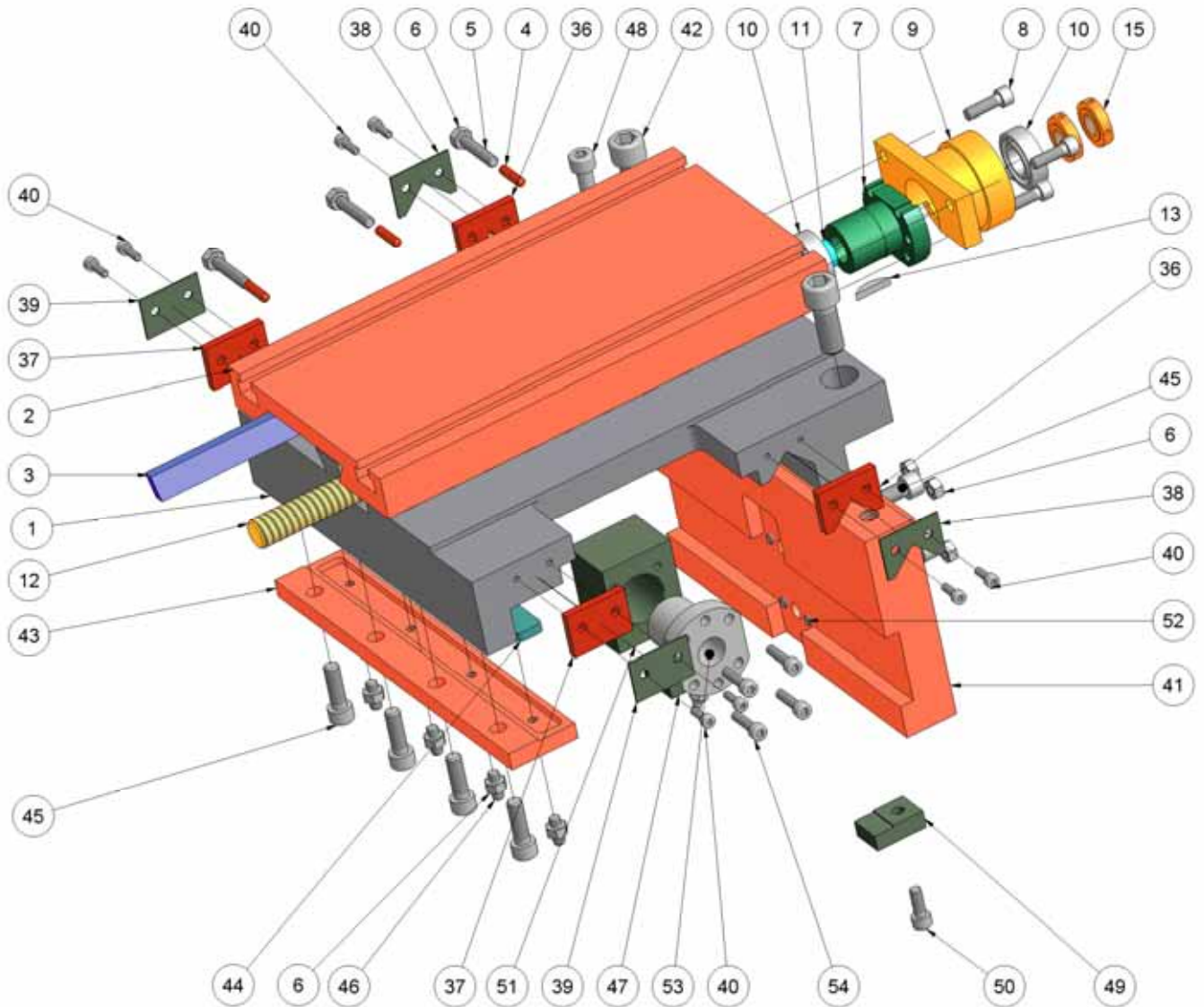
12. Drawing and list of parts

12.7 Tool slide

Part no.	Pieces	Order no.	Description	Part no.	Pieces	Order no.	Description
1	1	10600301	Lower part of transv. slide	54	4	11700078	Hexagon socket screw
2	1	10600302	Upper part of transv. slide	55	1	11700101	Hexagon screw
3	1	10600303	Clamping ring	57	1	10600357	Adjustable gib
4	1	10600304	Guide ring	59	3	11700102	Threaded pin
5	1	10600305	Longit. slide lower part	60	2	11700029	Washer
6	1	10600306	Longit. slide upper part	61	2	11700103	Hexagon screw
7	1	10600307	Lathe apron	62	2	11700030	Hexagon nut
8	1	10600308	Clasp nut	63	1	11840014	Handwheel
9	2	11700095	Cylindrical pin	65	1	11700026	Hexagon socket screw
10	1	10600310	Clasp holder	66	1	11700104	Feather key
11	1	11840013	Switch lever	68	1	10600368	Scale support
12	1	11700096	Feather key	69	2	11810011	Ball bearing
13	1	10600313	Washer	70	2	11810011	Ball bearing
14	1	11700004	Hexagon socket screw	71	1	10600371	Scale ring
15	1	10600315	Spindle cross slide	72	1	10600372	Pinion
16	1	10600316	Spindle bear. cross slide	73	2	11700033	Hexagon socket screw
17	1	10600317	Scale ring cross slide	74	1	11700037	Hexagon socket screw
18	3	11810004	Steel ball	75	1	11700022	Hexagon socket screw
19	3	11850002	Pressure spring	76	1	10600376	Clamping piece
20	2	10600320	Scale holder	77	1	10600377	Intermediate gear
21	6	10400428	Thrust piece	78	2	10600378	Washer
22	6	11700087	Threaded pin	79	1	11700026	Hexagon socket screw
23	1	11840011	Ball ended crank	80	2	10600380	Guide rails
24	1	11700023	Spiral clamping pin	81	4	11700078	Hexagon socket screw
25	2	10600325	Nut	82	2	10600382	Felt
26	3	10600326	Washer	83	2	10600383	Felt clamp
27	2	11700097	Hexagon bolt	84	8	11700026	Hexagon socket screw
28	1	10600328	Guide rail	85	4	11700031	Hexagon socket screw
29	4	11700061	Hexagon bolts	88	2	10600388	Felt clamp
31	1	11700026	Hexagon socket screw	90	2	10600390	Felt
32	1	11700024	Spiral clamping pin	91	1	10600391	Guide rail
33	1	10600333	Adjustable gib	92	4	11700087	Threaded pin
34	3	11700098	Threaded pin	93	4	11700019	Nut
35	6	11700019	Hexagon nuts				
36	1	10600336	Clamping claw				
37	1	10600337	Thrust disc				
38	1	11700081	Hexagon nut				
39	1	10600339	Thread bolt				
40	1	11700028	Hexagon bolt				
41	1	11850005	Pressure spring				
42	1	11700099	Spiral clamping pin				
44	1	10600344	Spindle (longitudinal slide)				
45	1	10600345	Spindle bear. (longit. slide)				
46	1	10600346	Scale ring (longit. slide)				
47	1	10600347	Guide piece				
48	1	10600348	Support bearing				
49	2	11700100	Hexagon socket screw				
50	2	11810005	Lubricating nipples				
51	2	11700100	Hexagon socket screw				
52	1	11840009	Ball ended crank				
53	1	11700049	Spiral clamping pin				

12. Drawing and list of parts

12.8 Lower part of tool slide for ball screw



12. Drawing and list of parts

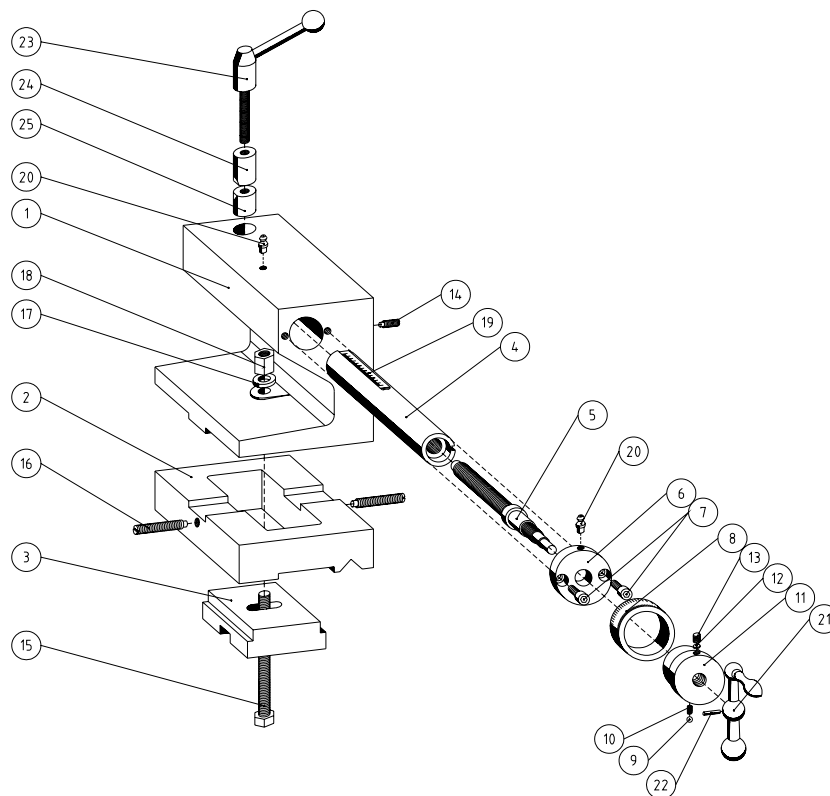
12.8 Lower part of tool slide **for ball screw**

Part no.	Pieces	Order no.	Description
1	1	10600701	Lower part of cross slide
2	1	10600702	Upper part of cross slide
3	1	10600703	Adjustable gib
4	3	10600704	Thrust piece
5	3	11700102	Headless pin
6	15	11700019	Hexagon nut
7	1	10600705	Ball bearing nut
8	4	11700031	Hexagon socket screw
9	1	10600706	Spindle bear. transversal slide
10	2	11810011	Ball bearing
11	1	10600707	Spindle holder
12	1	10600708	Ball screw
13	1	11700113	Woodruff key
15	2	10600709	Adjusting nut
36	2	10600710	Felt
37	2	10600711	Felt
38	2	10600712	Felt clamp
39	2	10600713	Felt clamp
40	8	11700026	Hexagon socket screw
41	1	10600714	lathe apron
42	2	11700033	Hexagon socket screw
43	1	10600715	Guide rail
44	1	10600716	Adjustable gib
45	6	11700041	Hexagon socket screw
46	4	11700087	Threaded pin
47	1	10600717	Clamping piece
48	1	11700037	Hexagon socket screw
49	1	10600718	Guide aid
50	1	11700078	Hexagon socket screw
51	1	10600719	Ball screw nut holder
52	4	11700114	Threaded pin
53	1	10600720	Ball screw nut
54	4	11700039	Hexagon socket screw

12. Drawing and list of parts

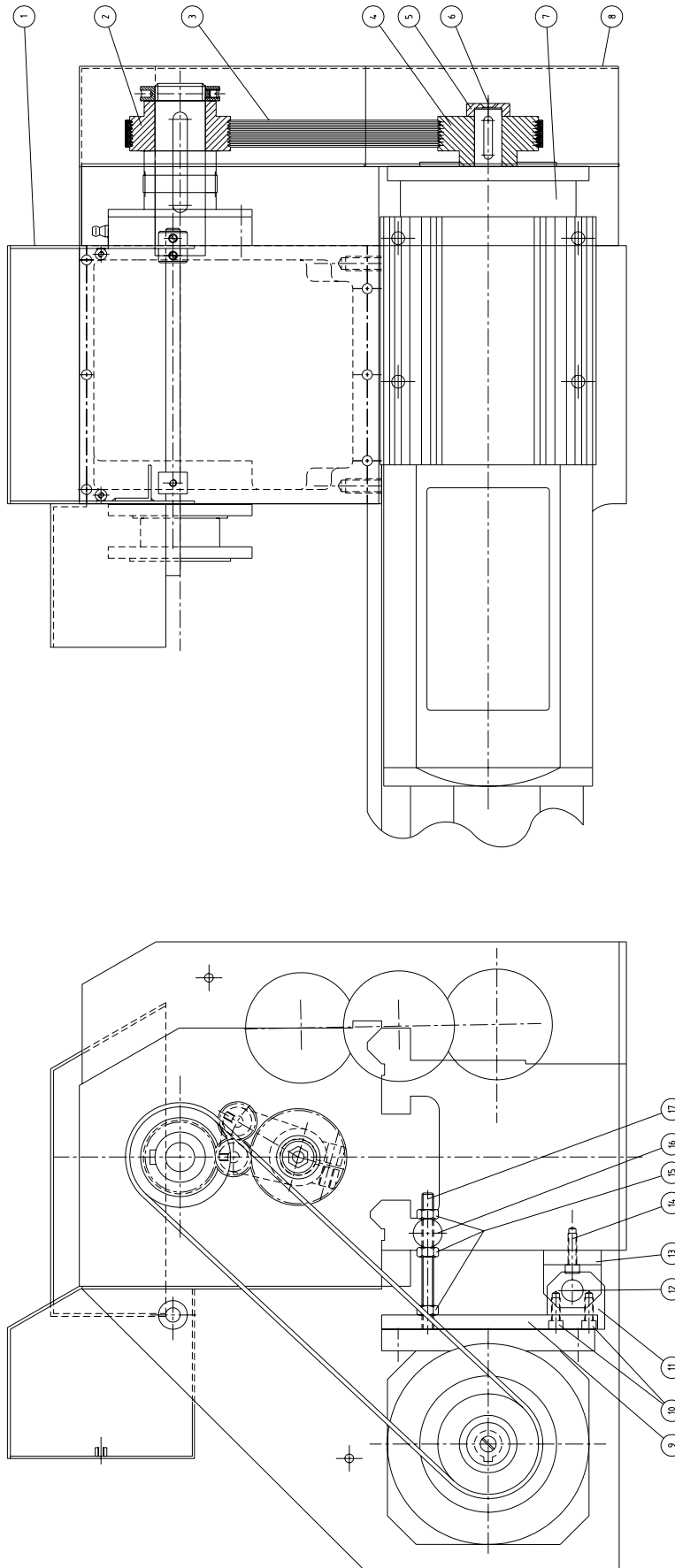
12.9 Tailstock

Part no.	Pieces	Order no.	Description
1	1	10600401	Upper part of tailstock
2	1	10600402	Lower part of tailstock
3	1	10600403	Shim
4	1	10600404	Spindle sleeve
5	1	10600405	Spindle
6	1	10600406	Flange
7	2	11700070	Hexagon socket screw
8	1	10600408	Scale ring
9	1	11810004	Steel ball
10	1	11850002	Pressure spring
11	1	10600411	Scale holder
12	1	10600412	Pressure spring
13	1	11700087	Threaded pin
14	1	11700087	Threaded pin
15	1	11700106	Hexagon bolt
16	2	11700105	Threaded pin
17	1	10600417	Washer
18	1	11700081	Hexagon nut
19	1	10600419	Scale tape
20	2	11810005	Lubricating nipple
21	1	11840011	Ball-ended crank
22	1	11700023	Spiral clamping pin
23	1	11840015	Clamping lever
24	1	10600424	Sleeve shim upper part
25	1	10600425	Sleeve shim lower part



12. Drawing and list of parts

12.10 High speed drive **with 2.0 kW motor**



12. Drawing and list of parts

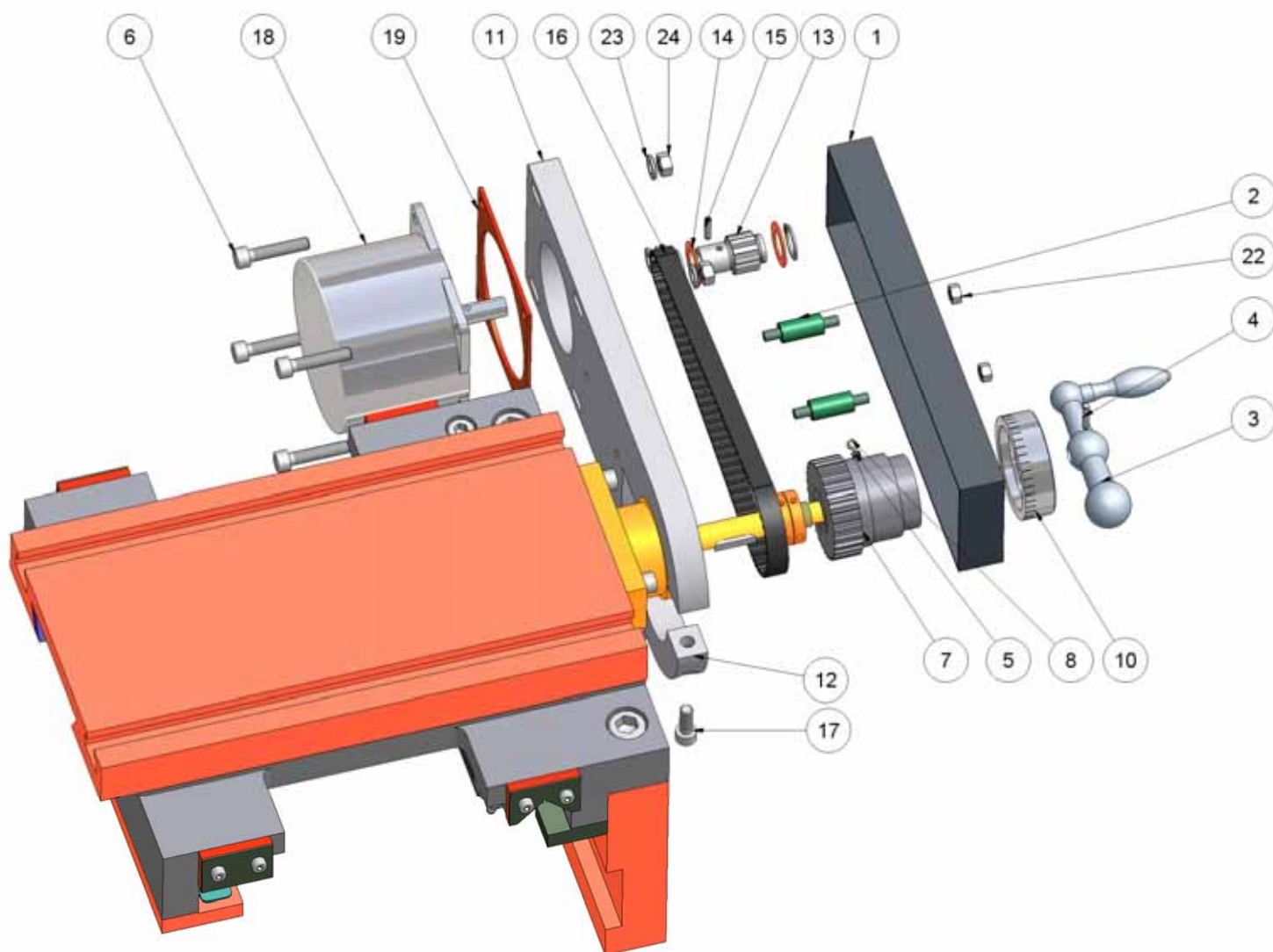
12.10 Drive hs (high speed) with 2.0 kW motor

Part no.	Order no.	Description
1	10600501	Switch box
2	10600502	Belt pulley – main spindle
3	11820009	Drive belt - motor
5	10600504	Belt pulley – motor
5	10600505	Clamping disc
6	11700031	Screw
7	11800018	Motor high speed
8	10600508	Protective cover
9	10600509	Retaining plate
10	11700059	Fastening screw
11	10600511	Retaining plate holder
12	10600512	Shaft
13	10600513	Bearing piece
15	11700103	Fastening screw
15	11700053	Hexagon nut
16	10600516	Stud bolt
17	10600517	Threaded pin

12. Drawing and list of parts

12.11 CNC drive X-axis

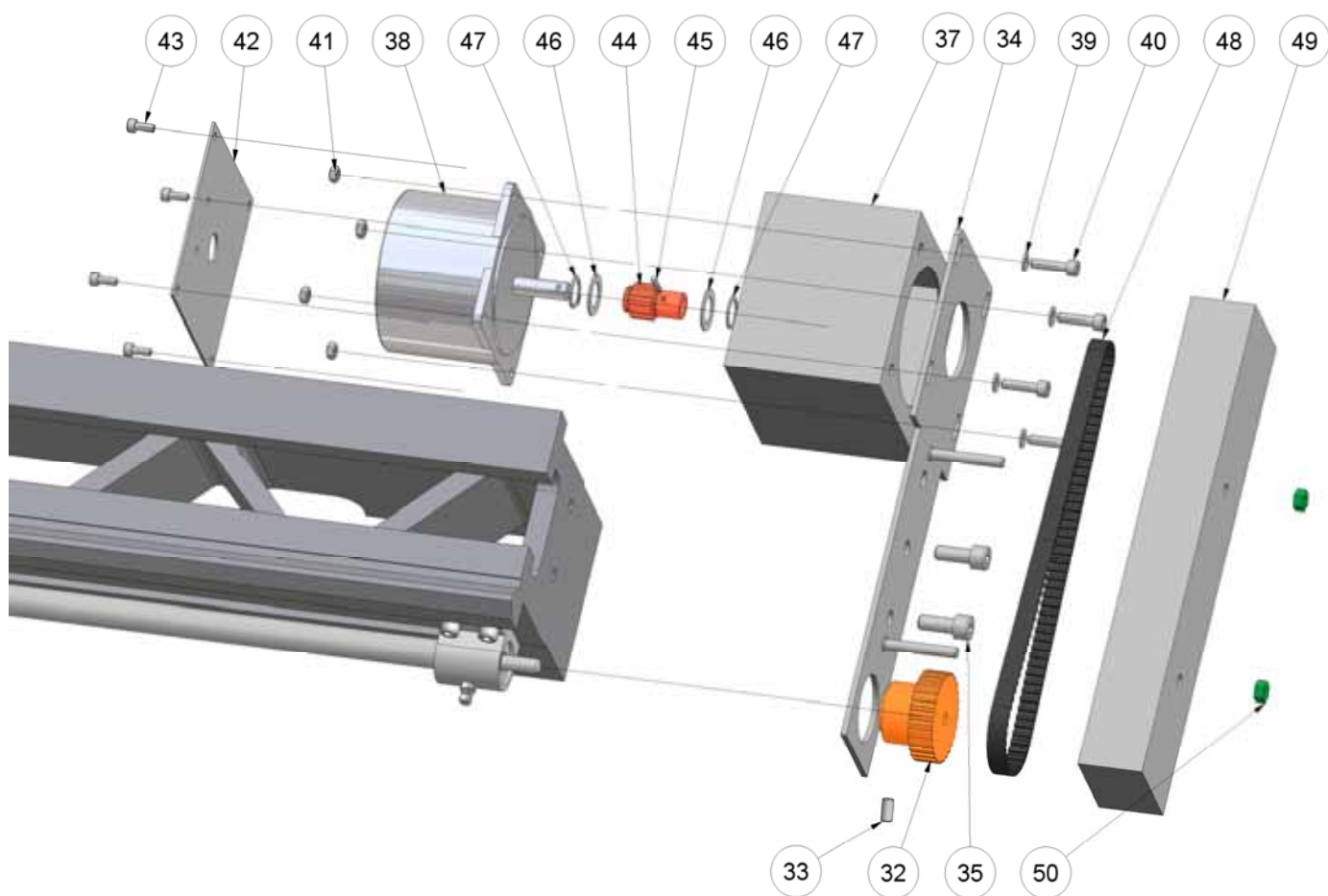
Part no.	Pieces	Order no.	Description
1	1	10600901	Protective cover
2	2	10600902	Spacer
3	1	11840011	Ball-ended crank
4	1	11700023	Spiral clamping pin
5	1	11850002	Spring
6	4	11700046	Hexagon socket screw
7	1	10600903	Belt pulley
8	1	11810004	Ball
10	1	10600904	Graduated collar
11	1	10600905	Motor holding plate
12	1	10600906	Clamping plate
13	1	10600907	Belt pulley
14	2	10600908	Flanged wheel
15	1	11700049	Spiral clamping pin
16	1	11820007	Toothed belt
17	2	11700031	Cylindrical screw
18	1	11800003	Stepping motor
19	1	10600908	Motor distance plate
22	2	11700050	Hexagon nut
23	4	11700018	Washer
24	4	11700019	Hexagon nut



12. Drawing and list of parts

12.12 CNC drive Z-axis

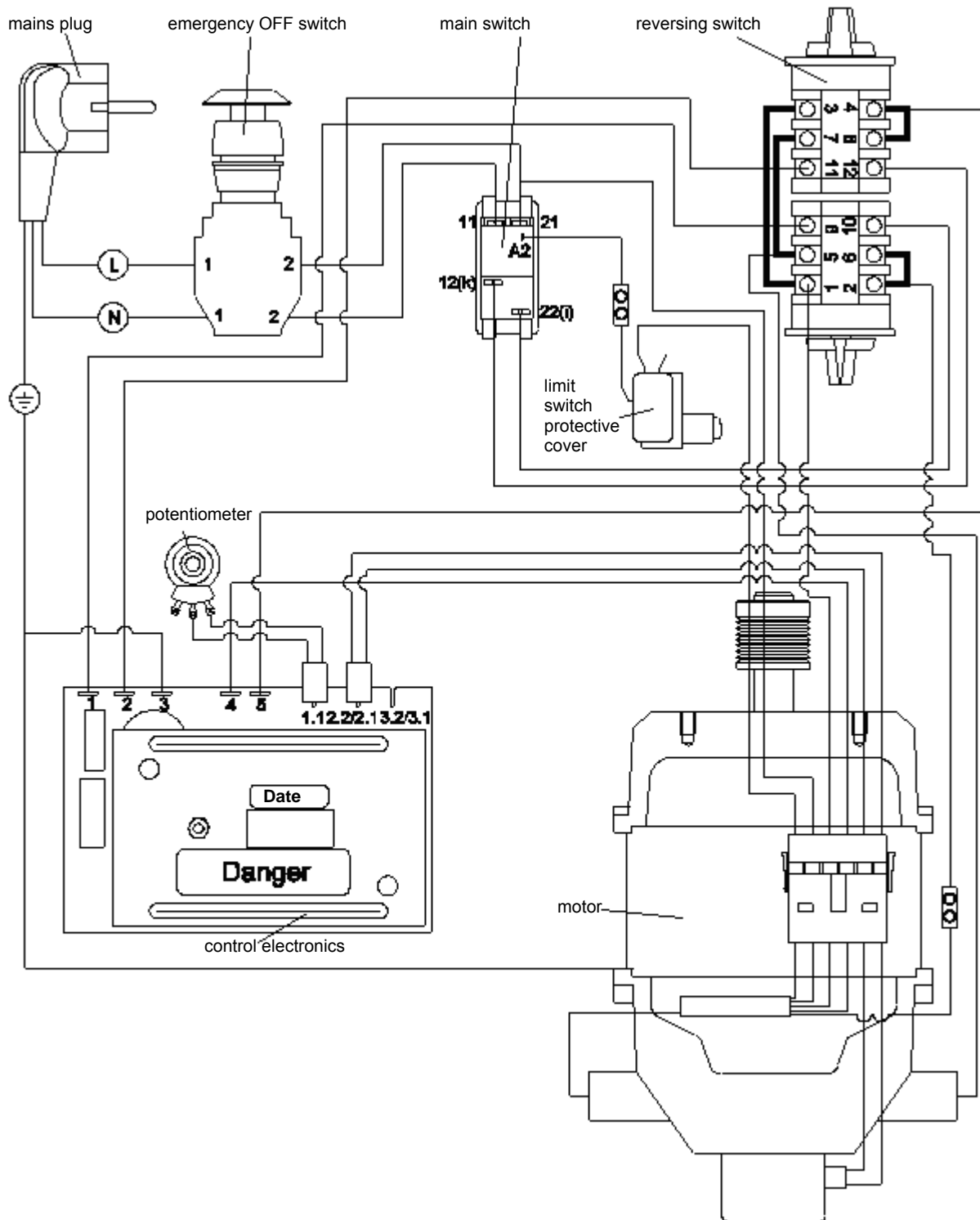
Part no.	Pieces	Order no.	Description
32	1	10600801	Belt pulley Z30 (for ball screw)
32.1	1	106008011	Belt pulley Z24 (for trapezoid)
33	1	11700087	Pin
34	1	10600802	Motor plate
35	2	11700040	Cylinder screw
37	1	10600803	Motor housing
38	1	11800003	Stepper motor
39	4	11700088	Washer
40	4	11700039	Cylinder screw
41	4	11700050	Hexagon nut
42	1	10800804	Cap for motor housing
43	4	11700107	Cylinder screw
44	1	1121021213	Belt pulley Z12
45	1	11700049	Cylinder pin
46	2	1121021212	Washer for toothed wheel Z12
47	2	11700048	Locking pin
48	1	11820006	Toothed belt
49	1	10800805	Protective cover
50	2	11700019	Nut



13. Circuit diagram

13.1 Motor 1.4 kW

This document shows all components of the electrical equipment including the mains connection

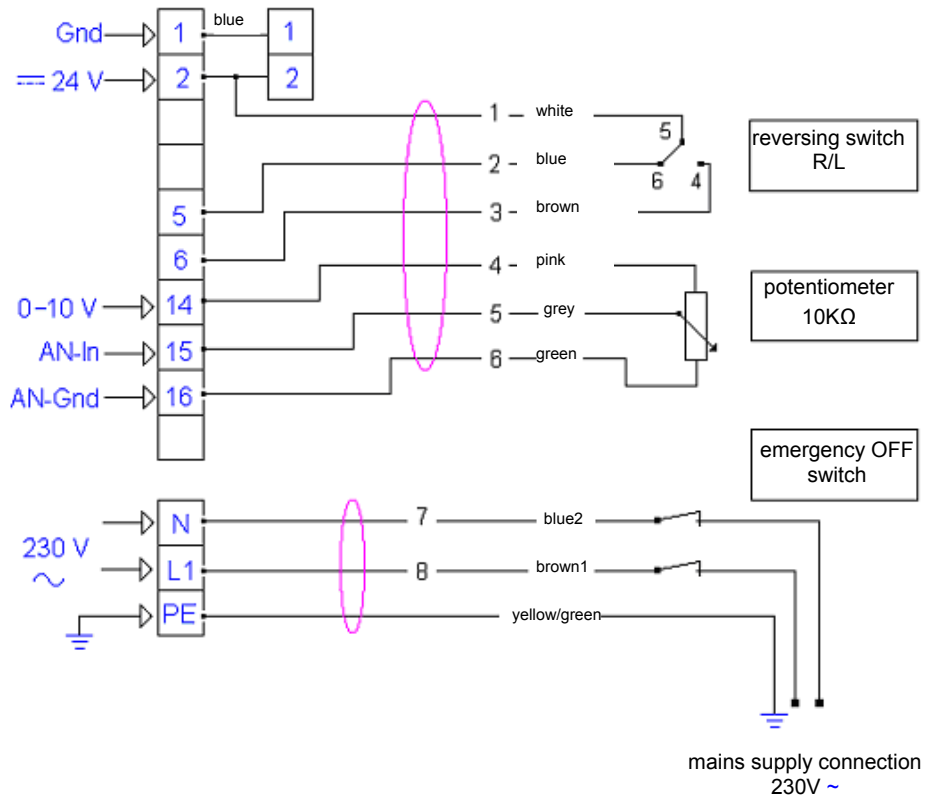


13. Circuit diagram

13.2 High speed motor 2.0 kW

This document shows all components of the electrical equipment including the mains connection

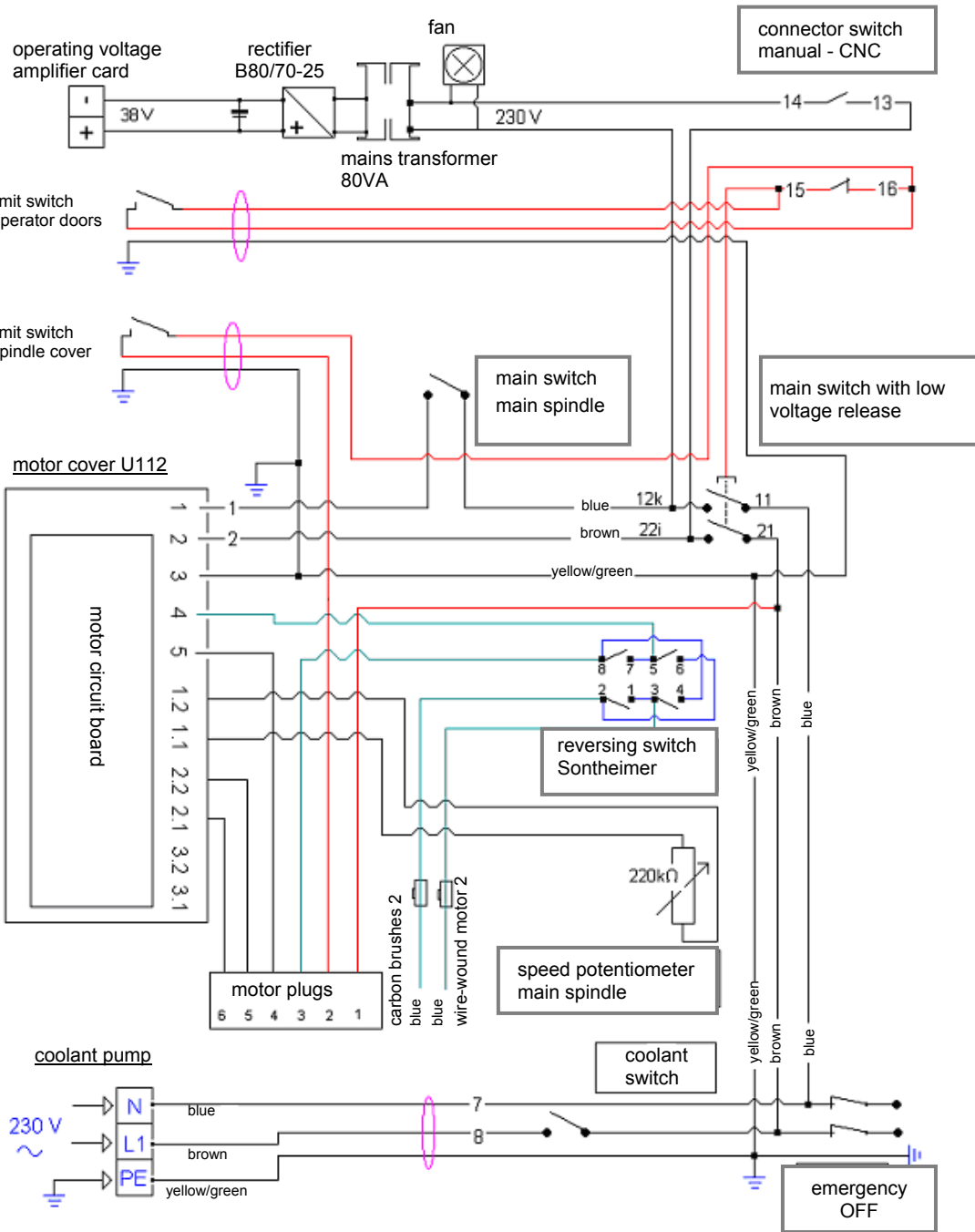
Connection box high speed motor



13. Circuit diagram

13.3 Motor 1.4 kW with safety cabin

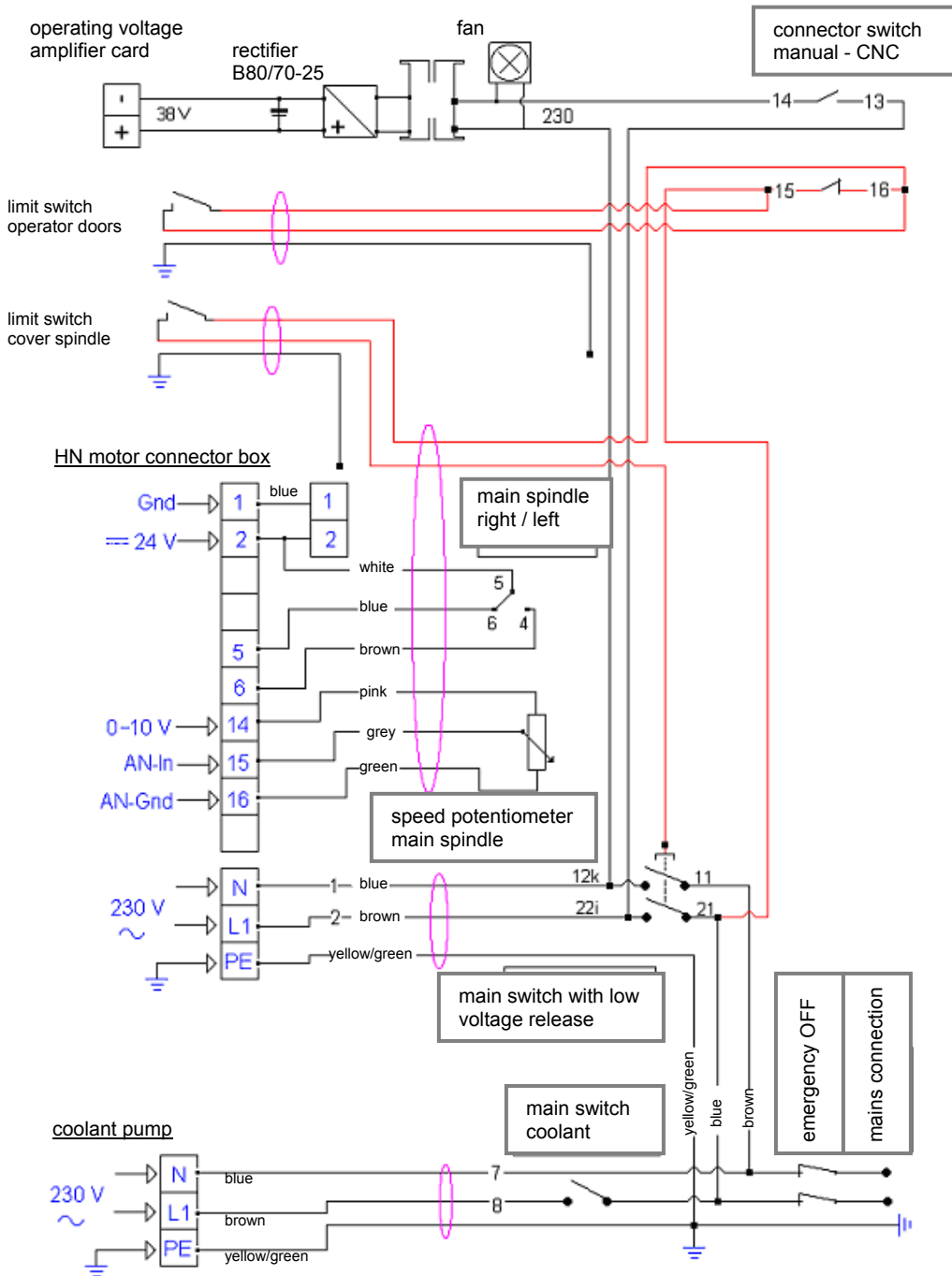
This document shows all components of the electrical equipment including the mains connection



13. Circuit diagram

13.3.1 High speed motor 2.0 kW with safety cabin

This document shows all components of the electrical equipment including the mains connection



13. Circuit diagram

13.4 Drive for CNC control

This document shows all components of the electrical equipment including the mains connection

