Operating Instructions

Universal Lathes

D6000 E and D6000 E high speed

CC-D6000 E and CC-D6000 E high speed

Walter Blombach GmbH
Tool and Machine Factory

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Index

Index

EC – Conformity Declaration

In the name of the manufacturer

Walter Blombach GmbH

Tool and Machine Factory
based in Remscheid and Neuerburg

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We hereby declare that the universal lathes specified below

Universal Lathes Typ:
D6000 E
D6000 E high speed
CC-D6000 E
CC-D6000 E high speed

meet the following regulation requirements for standard serie production

- **EC directive for machines EEC 91/68 and 89/392**
- **EC low voltage directive 72/23/EEC**

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

EN 292-1
EN 292-2
EN292-2 Enclosure I
EN 294
EN 349
EN 418
EN 60204-1

D-54673 Neuerburg

City

Signature

Outlay

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.
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.

Wir können Ihnen wahlweise unsere Bedienungsanleitungen und Prospekte in englischer und französischer Sprache kostenlos zusenden.

We are able to send you free of charge our Operating Instructions and leaflets in French and/or English translation.

Nous avons la possibilité de vous donner nos Instructions de Service et prospectus aussi en traduction francaise et/ou anglaise, sans frais.

1. Technical Data

Machine dimensions

D6000E	1250 x 500mm
D6000E high speed	1215 x 600mm
CC-D6000E	1275 x 500mm
CC-D6000E high speed	1250 x 600mm

Working range

Centre distance	600 mm
Centre height	135 mm
Largest turning diameter over bed	270 mm
Largest turning diameter over slide	170 mm

Work spindle

Spindle bore	20 mm **optional 30 mm**
Cone in spindle nose	cone 3

Cross table

Cross table range of displacement	140 mm
Turning carriage´s range of displacement	60 mm
Swivel-feature of the upper slide rest	360°
Maximum lathe chisel height	22 mm

Guideways

Longitudinal support	Dovetail guide and adjustment rails
Cross support	Dovetail guide and adjustment rails
Chips and dirt stripper	Protection of the guides

Tailstock

Tail spindle´s range of displacement	65 mm
Tail spindle´s hole bore	cone 2
Lateral displacement of the tailstock to both sides	±10 mm

Screw cutting attachment

Advance	0,085 and 0,16 mm/min
Thread pitch	
- metric	0,4 - 3,0 mm
- inch	10 - 32 thread per inch

Electrical equipment (*for D6000E and CC-D6000E)*

Drive	Sigle-phase series commutator motor as a direct current model, infinitiely variable with continuous r.p.m surveillance
Nominal voltage, frequency	230V, 50 Hz
Nominal consumption	6A
Nominal capacity	**1,4 kW**
Tool spindle r.p.m	**30 – 2300 U/min**

1. Technical Data

Electrical equipment (*for D6000E high speed and CC-D6000E high speed)*

Drive.....	Motor with rotary frequency converter infinitely variable with continous r.p.m surveillance and clockwiese/anticlockwise rotation
Nominal voltage, frequency	230V, 50 Hz
Nominal consumption	8,6 A
Nominal capacity.....	**2,0 kW**
Tool spindle r.p.m	**0 - 5000 U/min**

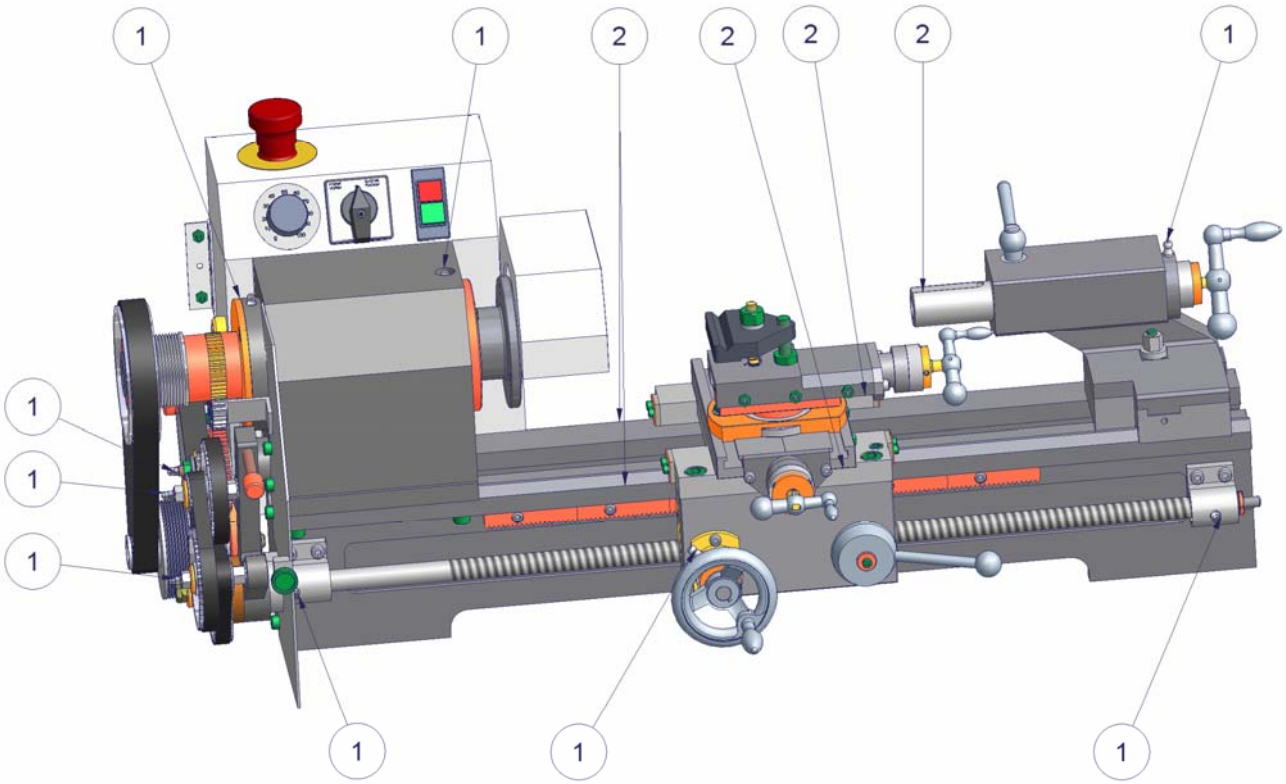
Torque motors (Hybrid step motors)

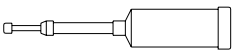
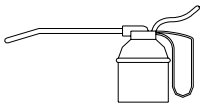
Voltage	2,9 V_{DC}
Current.....	1,7 A
Holding moment ….....	1 Nm
Number of steps / rev.....	200
Step angle.....	1,8°

- Subject to technical alterations -

2. Drawing and list of parts

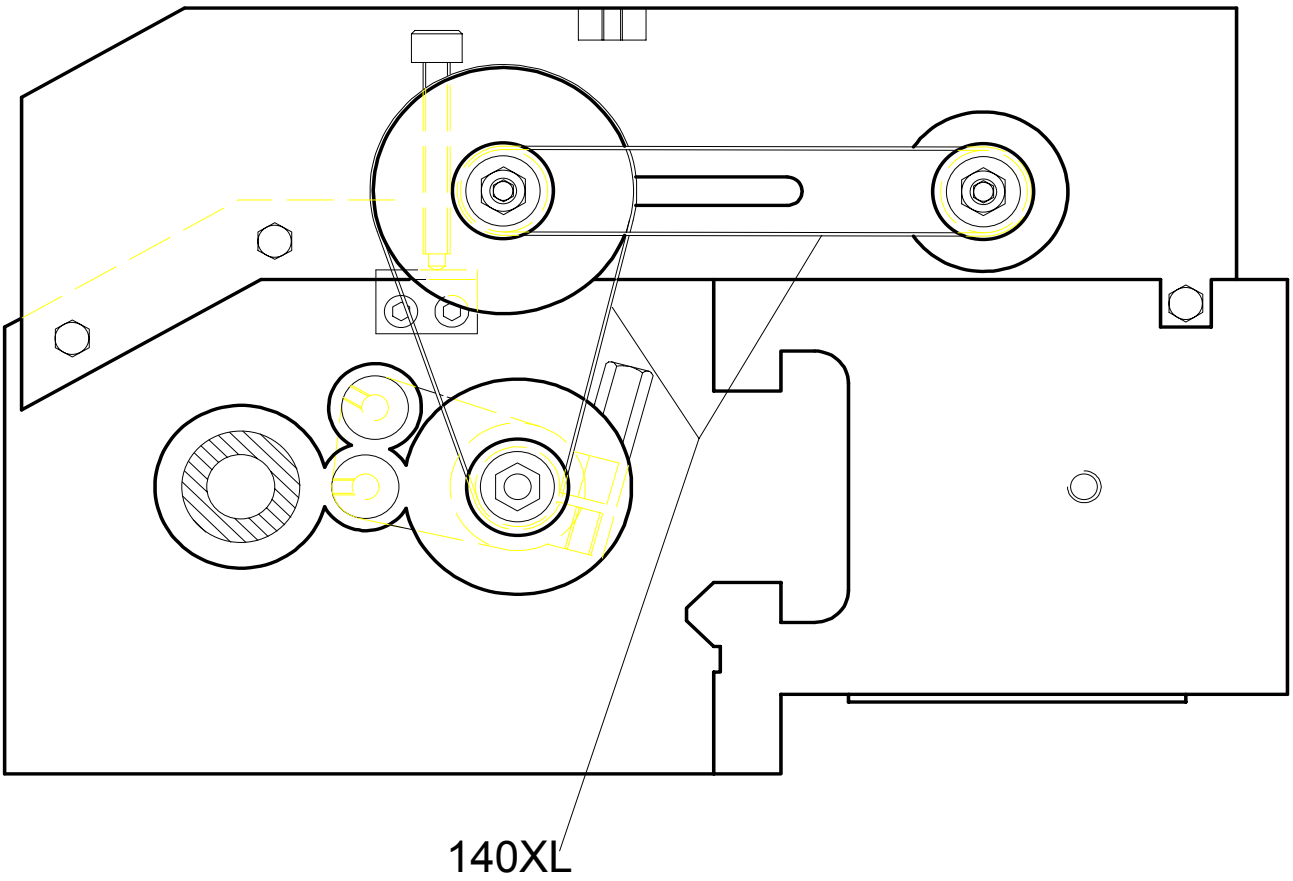
2.1 Lubricating plan

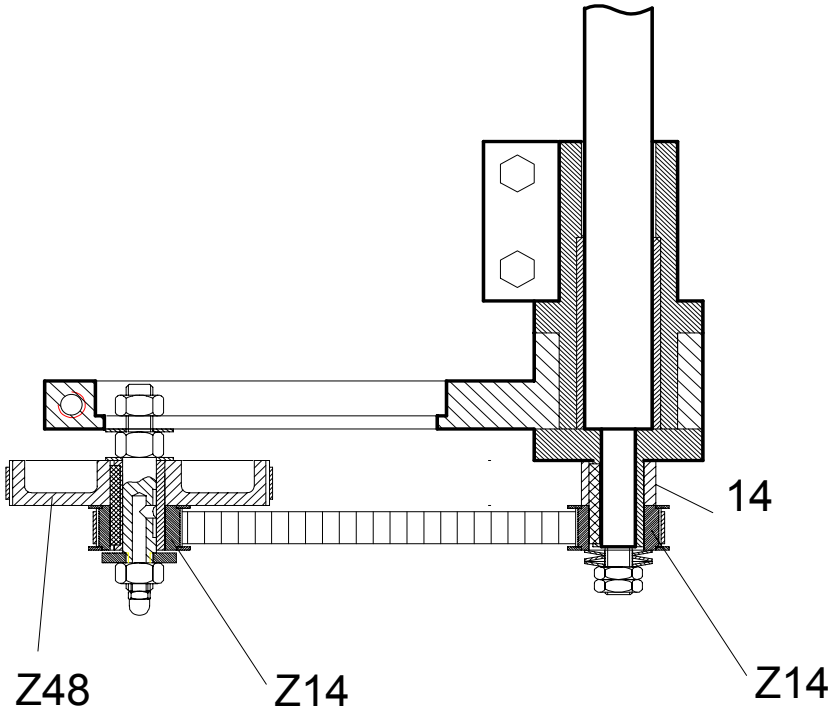


1		Every 8 hours of operation
2		Every 8 hours of operation

2. Drawing and list of parts

2.2 Arrangement of take-up gears for a 1 mm thread pitch (slope)





2. Drawing and list of parts

2.3 Diagram for reading off speed

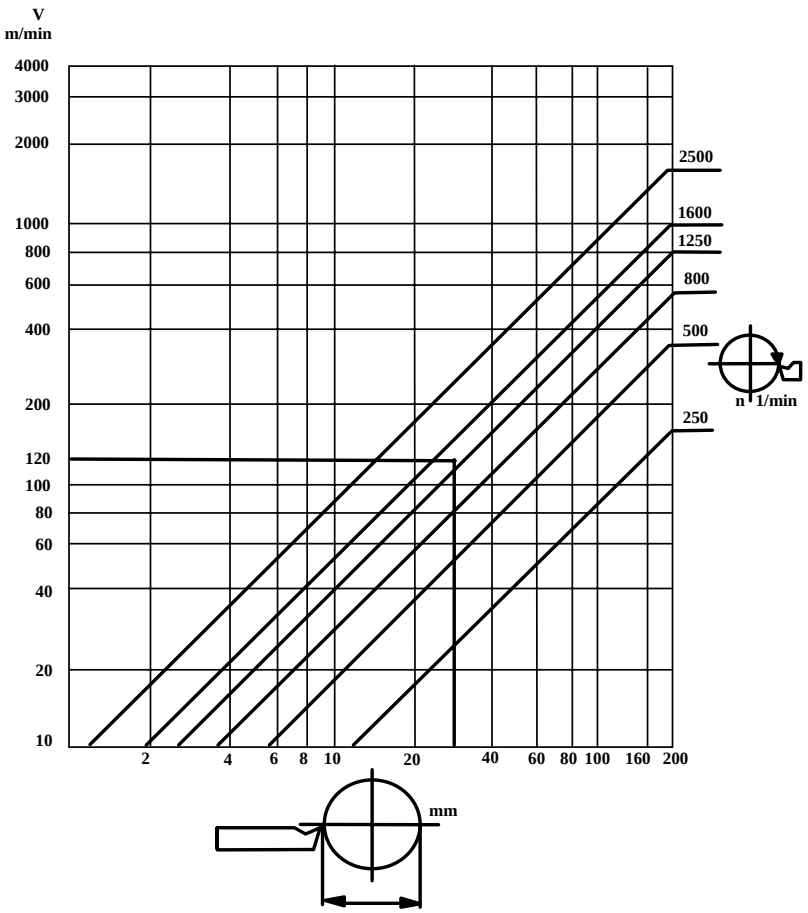
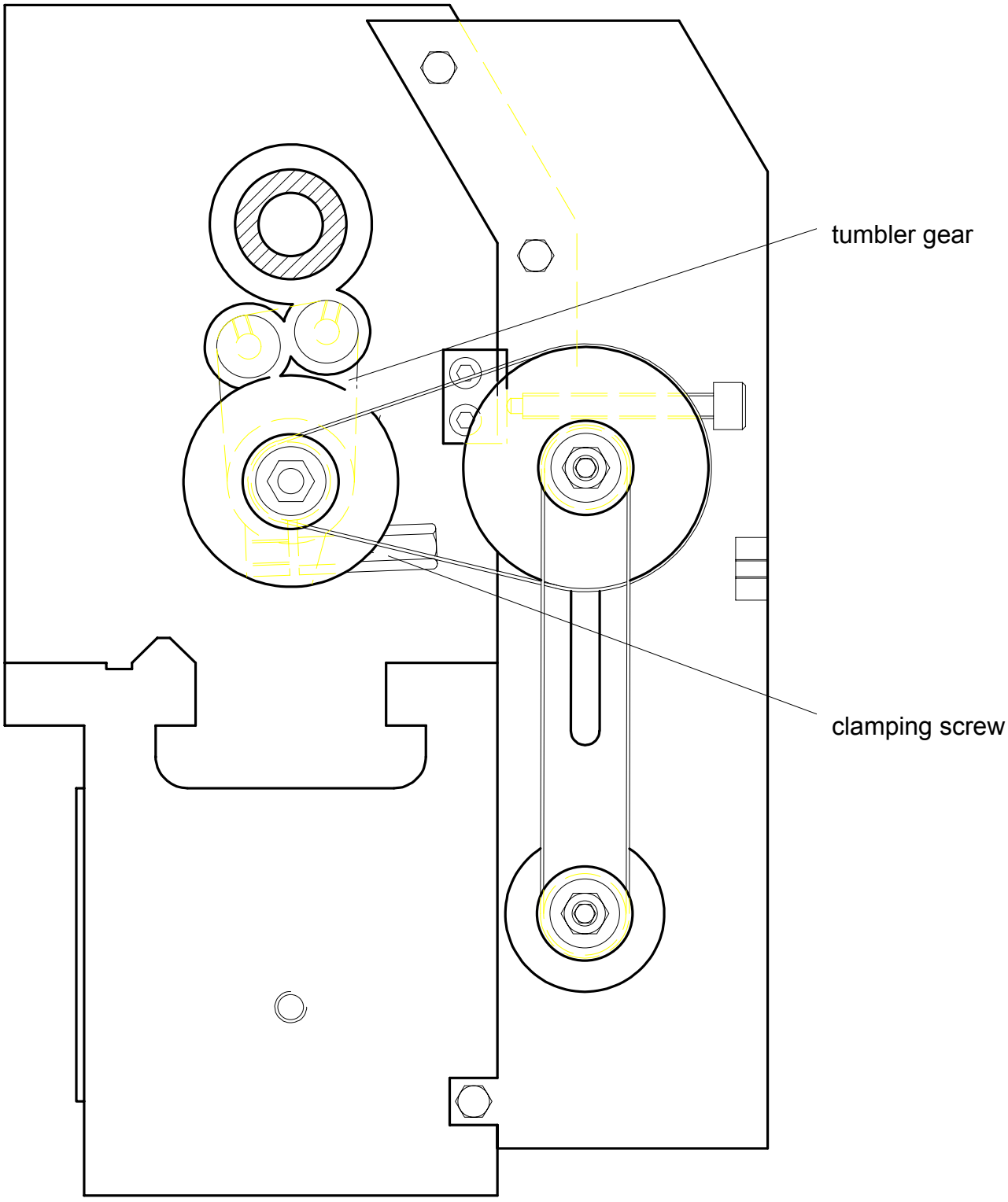


Table 1,4 kW Motor		
	I	II
0%	30	150
10%	35	155
20%	50	220
30%	90	450
40%	150	850
50%	200	1050
60%	290	1500
70%	350	1900
80%	400	2050
90%	460	2200
100%	490	2300

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

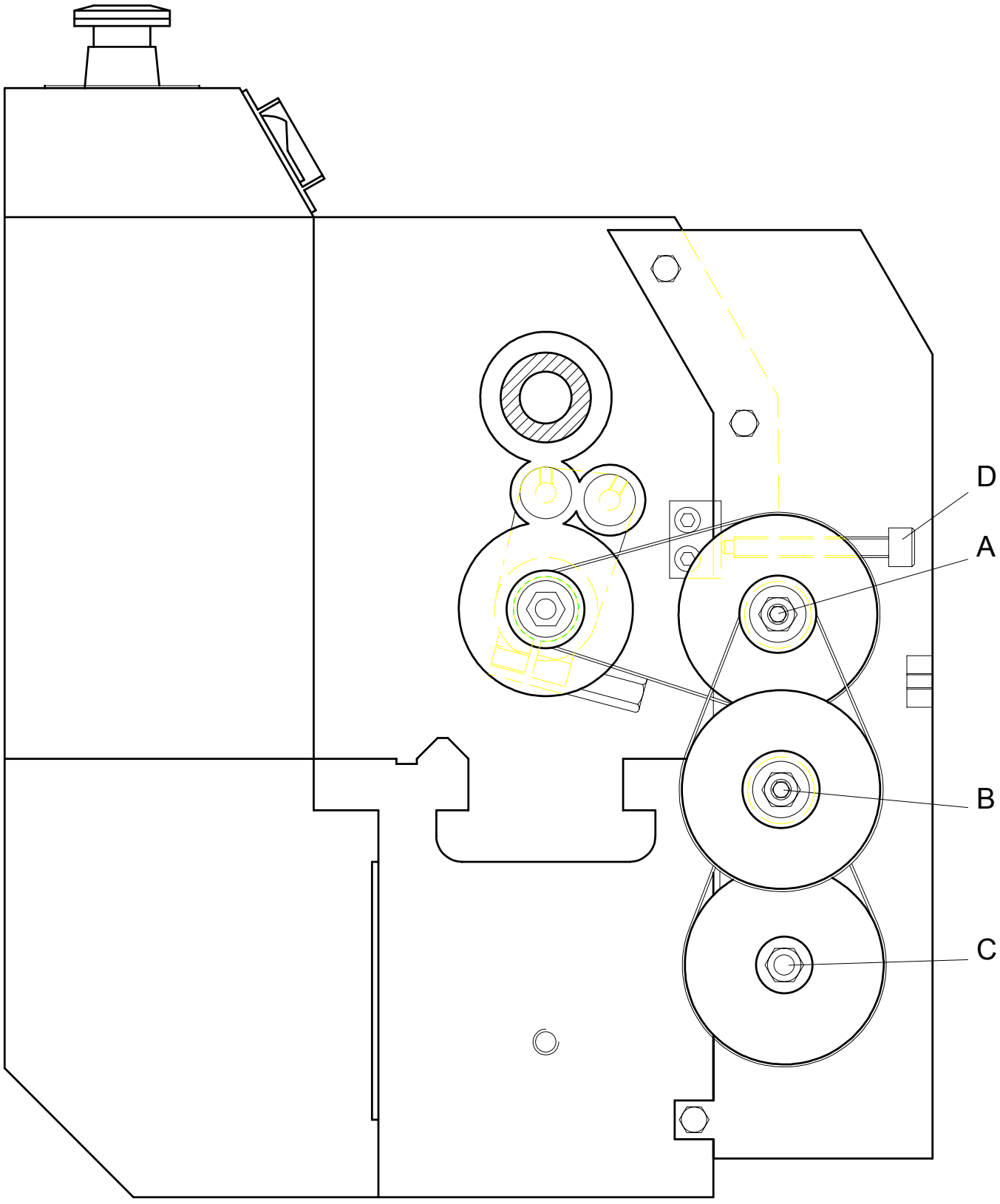
2. Drawing and list of parts

2.4 Position of tumbler gear when cutting LH thread



2. Drawing and list of parts

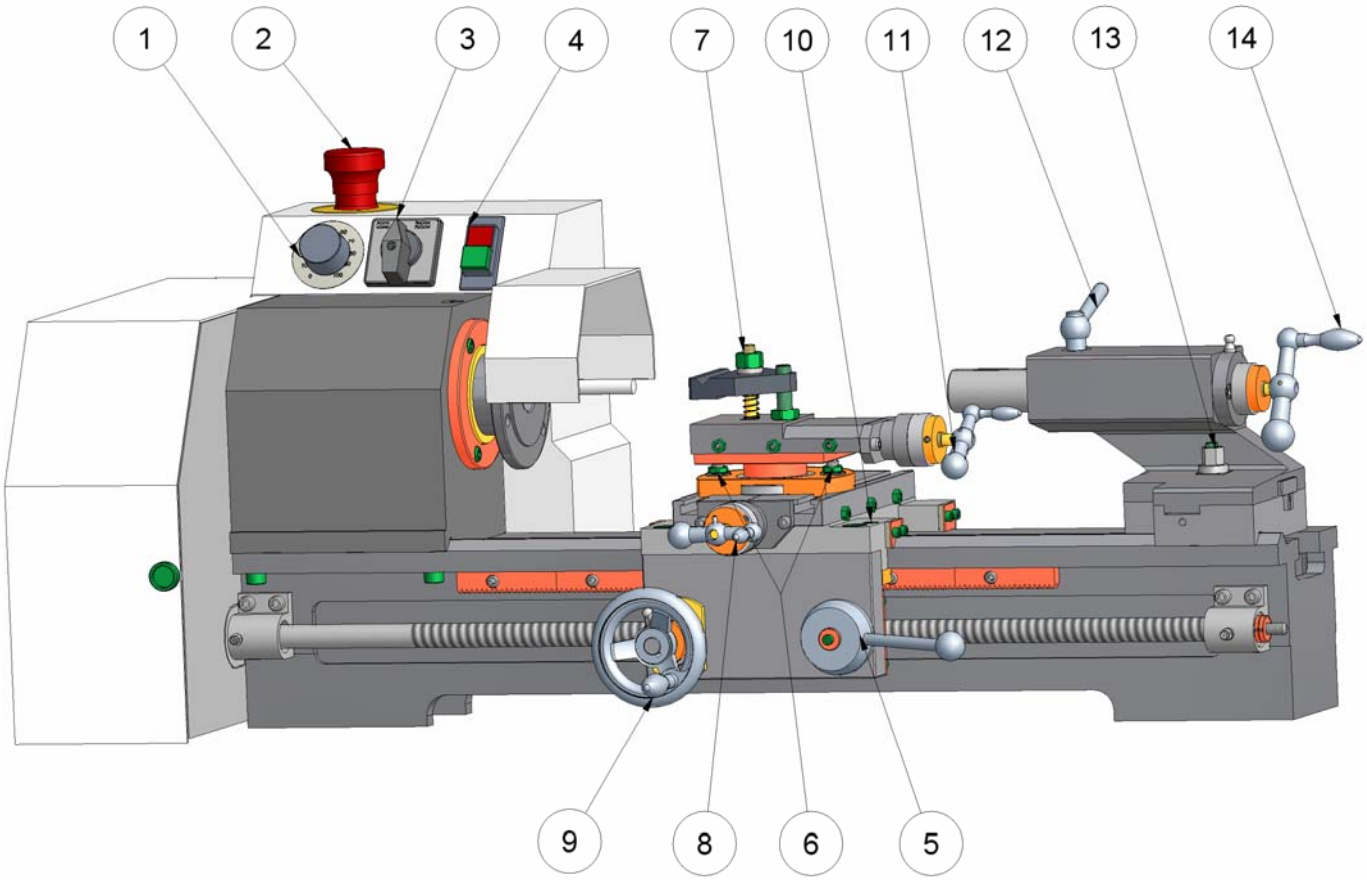
2.5 Position of take-up gears for automatic feed



2. Drawing and list of parts

2.6 Operating elements

1. Potentiometer-turning knob to select speed for the electric drive motor
2. Emergency OFF
3. Switch to change the turning direction – main spindle
4. Main switch with undervoltage circuit breaker
5. Opening and closing of lead-screw nut
6. Securing screws for longtitudinal slide rest
7. Adjusting nut for tool clamping plate
8. Ball crank to adjust the cross slide rest
9. Handwheel for quick adjustment of the tool side
10. Clamping screw to clamp the tool slide
11. Ball crank to adjust the longtitudinal slide rest
12. Clamping lever to fasten tailstock sleeve
13. Adjusting nut to fasten the tailstock onto the guides
14. Ball crank to adjust the tailstock sleeve



2. Drawing and list of parts

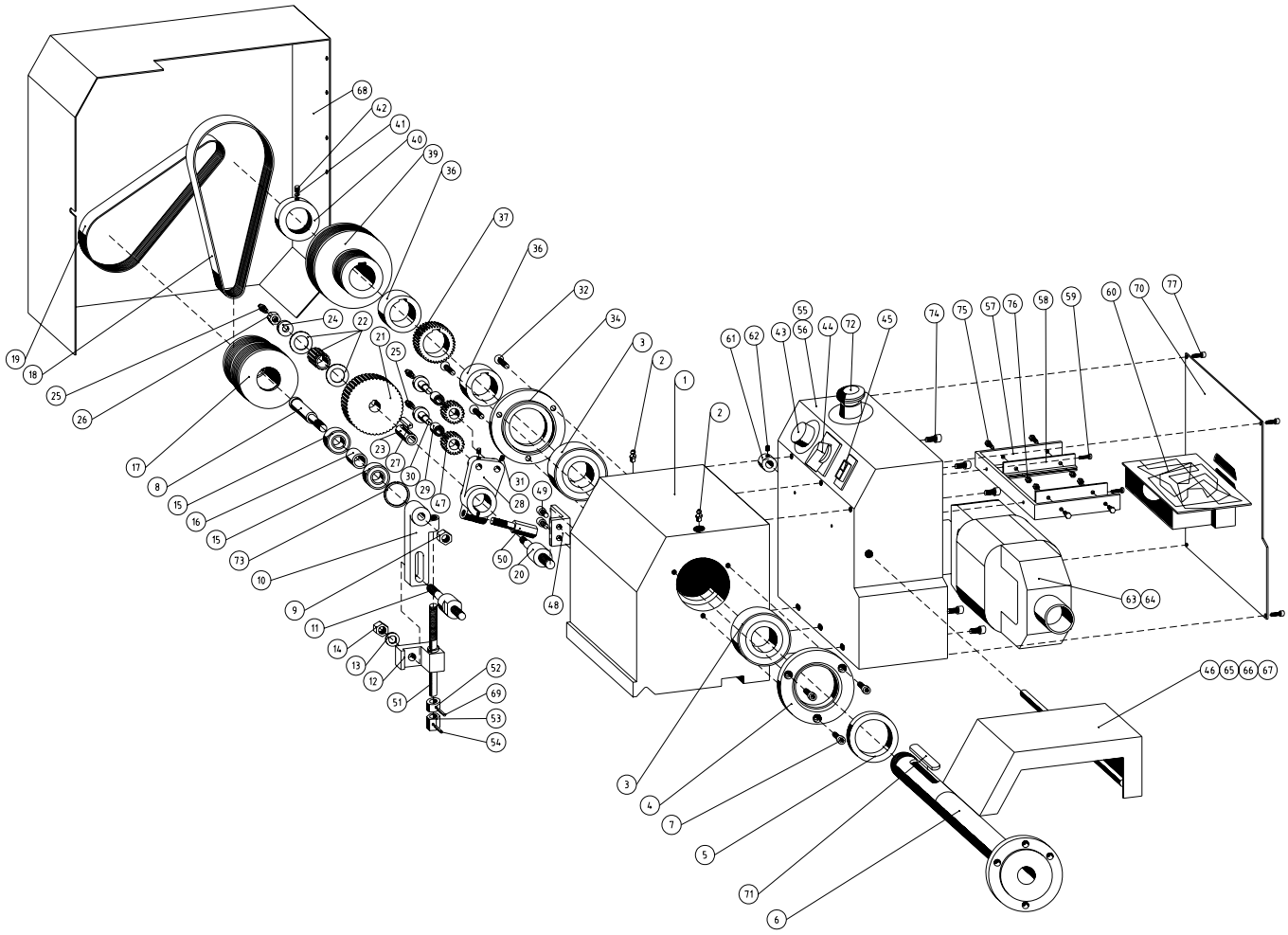
2.7 Headstock

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 bolt
9	1	10600109	Idler lever
10	1	10600110	Idler pulley
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	Idler-pulley
18	1	11820005	Poly-V-belt
19	1	11820008	Poly-V-belt
20	1	10600120	Bolt
21	1	10600121	Belt pulley
22	1	10600122	Toothed belt pulley
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	Handle
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	Belt pulley
39	1	10600139	Belt pulley
40	1	10600140	Nut
41	1	10600141	Thrust pad
42	1	11700066	Stud bolt
43	1	11800004	Potentiometer
44	1	11800015	Reversing switch
45	1	11800001	On-OFF switch
46	1	10600146	Chuck protective hood
47	2	10600147	Belt pulley
48	1	10600148	Bracket
49	2	11700022	Hexagon socket screw
50	1	10600150	Clamping bolt
51	1	10600151	Clamping bolt
52	1	10600152	Set collar
53	1	10600153	Hexagonal piece
54	1	11700023	Spiral chuck pin

2. Drawing and list of parts

2.7 Headstock

Part no.	Pieces	Order no.	Description
56	1	10600156	Steel case
57	1	10600157	Steel bracket
58	2	10600158	Platina holder
59	2	11700001	Steel bolt
60	1	11800005	Control electronics
61	1	11700091	Set collar
62	1	11700044	Threaded pin
63	2	11700092	Hexagonal bolt
64	1	10600164	Motor
65	1	10600165	Excenter
c	1	11700044	Threaded pin
67	1	11800014	Unit switch
68	1	10600168	Protective hood
69	1	11700023	Spiral clamp pin
70	1	10600170	Cover plate
71	1	10600171	Feather key
72	1	11800008	Emergency OFF tracing pin



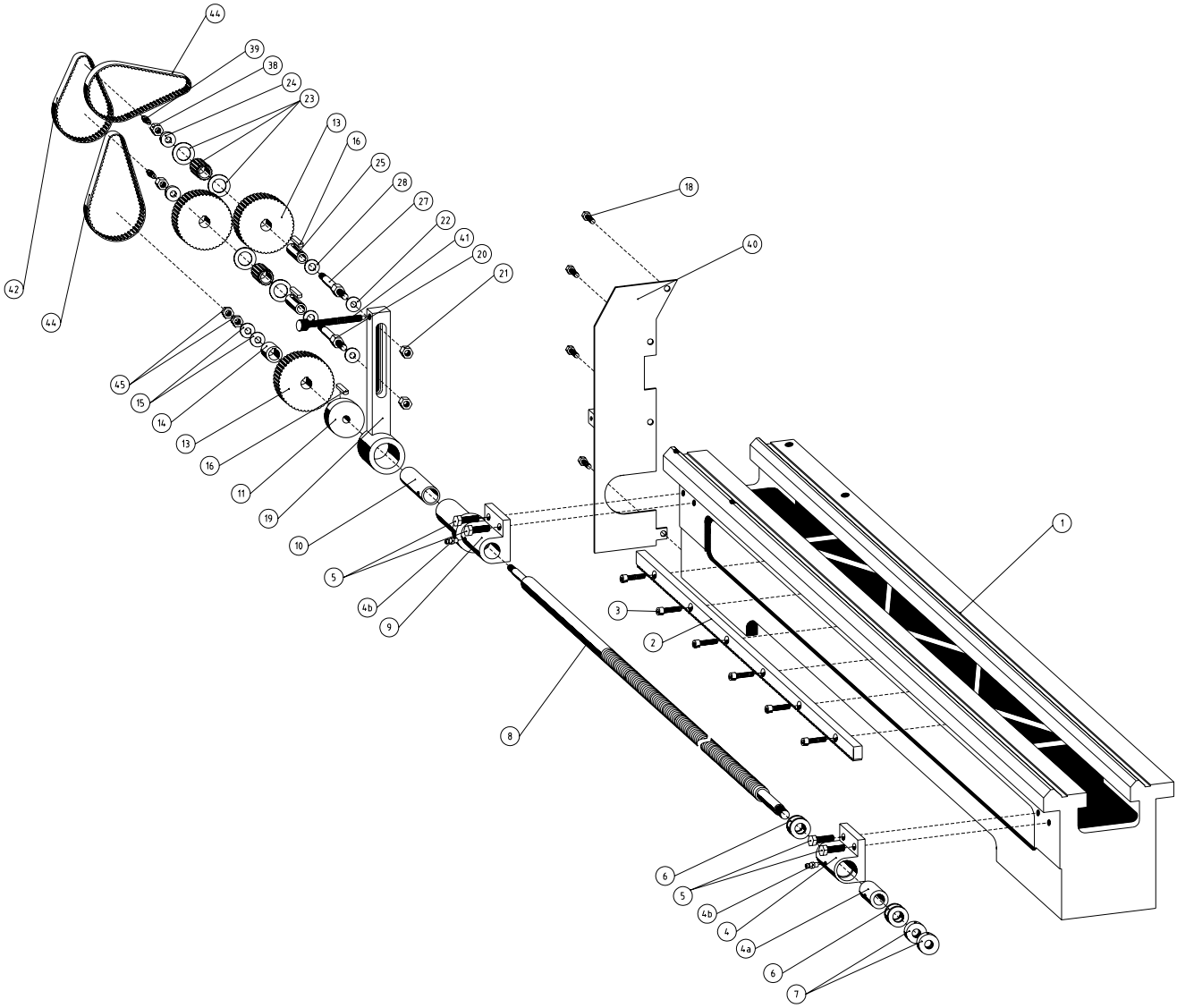
2. Drawing and list of parts

2.8 Bed with leading spindle drive

Part no.	Pieces	Order no.	Description
1	1	10600201	Bed
2	5	10600202	Toothed racket
3	1	11700031	Hexagon socket screw
4	1	10600204	Supporting bearing, rear
4a	4	106002041	Bushing
5	2	11700041	Hexagonal bolt
6	2	11810006	Deep groove bolt bearing
7	1	11700093	Capstan nut
8	1	10600208	Leading spindle
9	1	10600209	Support bearings, front
10	1	10600210	Bushing
11	3	10600211	Shearing bushing
13	1	10600213	Tooth lock washer
14	1	10600214	Bushing
15	3	10600215	Washer
16	4	11700072	Feather key
18	1	11700094	Hexagonal socket screw
19	1	10600219	Take-up gear cutter
20	2	10600220	Take-up gear bolt
21	2	11700054	Square nut
22	2	10600222	Disc
23	2	10600223	Toothed belt pulley
24	2	10600224	Washer
25	1	10600225	Bushing
27	2	10600227	Take-up gear bolts
28	1	10600228	Disc
30	2	11840007	Knurled nut
38	2	11700053	Hexagonal 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

2. Drawing and list of parts

2.8 Bed with leading spindle drive



2. Drawing and list of parts

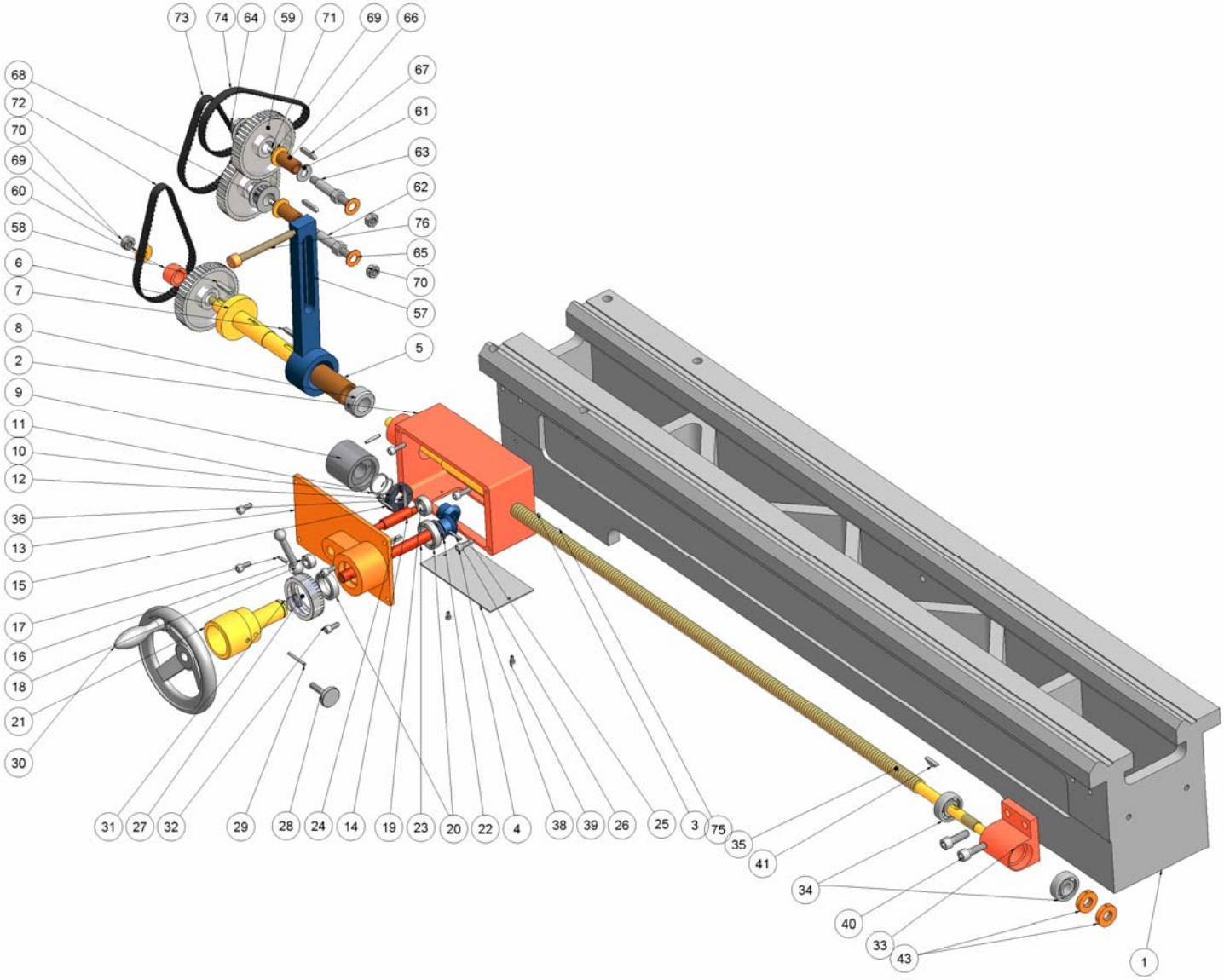
2.9 Bed with leading spindle drive for ball bearing spindle

Part no.	Pieces	Order no.	Description
1	1	10600601	Bed
2	1	10600602	Supporting bearing, front
3	2	11700077	Headless pin
4	4	11700070	Hexagonal socket screw
5	1	10600603	Liner
6	1	10600604	Feed shaft
7	1	11700072	Feather key
8	1	11700108	Set collar
9	1	10600605	Coupler
10	1	10600606	Pressure spring
11	1	10600607	Clutch disc
12	2	11700099	Spiral clamp pin
13	1	10600608	Crown
14	1	10600609	Eccentric shaft
15	1	11700024	Spiral clamp pin
16	1	11700109	Set collar
17	2	11700049	Spiral clamp pin
18	1	11840016	Clamp 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	Leading spindle pinion shaft
24	1	11700110	Feather key
25	1	10600612	Pinion
26	2	11700023	Spiral clamp pin
27	1	10600613	Graduated collar
28	1	11840017	Knurled nut
29	1	11700024	Spiral clamp pin
30	1	11840014	Handwheel
31	1	10600614	Pressure spring
32	4	11700107	Hexagonal socket screw
33	1	10600615	Bearing, rear
34	2	11810019	Ball bearing
35	1	10600615	Leading spindle
36	1	11700111	Zylindrical pin
38	1	10600616	Crown cower
39	2	11700112	Hexagonal socket screw
40	4	11700041	Hexagonal socket screw
41	1	11700113	Curved wahser
57	1	10600617	Feed lever
58	1	11700072	Feather key
59	3	10600213	Toothed belt washer
60	1	10600214	Liner
61	2	10600222	Disc
62	1	10600220	Take-up gear bolt
63	1	10600227	Take-up gear bolt
64	2	11700054	Square nut
65	2	10600228	Disc
66	2	10600225	Liner

2. Drawing and list of parts

2.9 Bed with leading spindle drive for ball bearing spindle

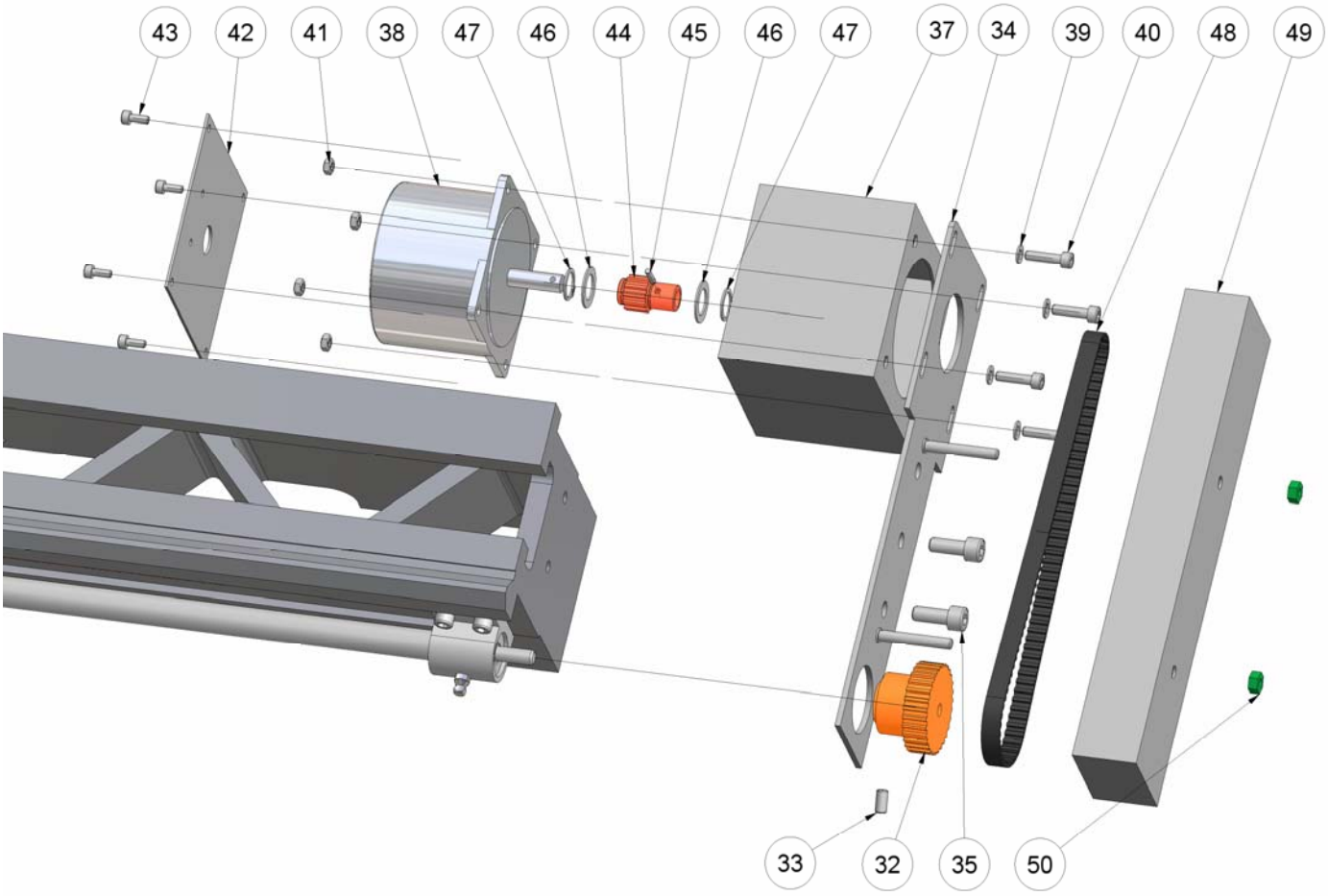
Part. no	Pieces	Order no.	Description
67	2	11700072	Feather key
68	2	10600223	Toothed belt pulley
69	3	10600224	Disc
70	3	11700053	Hexagonal nut
71	3	11810009	Lubricating nipples
72	1	11820003	Toothed belt
73	1	11820004	Toothed belt
74	1	11820004	Toothed belt
75	1	11810020	Needle bearing
76	1	10600241	Clamping bolt



2. Drawing and list of parts

2.10 CNC drive Z-axis

Part no.	Piece	Order no.	Description
32	1	10600801	Belt pulley Z30
33	1	11700087	Headless pin
34	1	10600802	Motor sheet metal
35	2	11700040	Earthing screw
37	1	10600803	Motor housing
38	1	11800003	Step motor
39	4	11700088	Limpet washer
40	4	11700039	Earthing screw
41	4	11700050	Hexagonal nut
42	1	10800804	Lid for motor housing
43	4	11700107	Earthing screw
44	1	1121021213	Belt pulley Z12
45	1	11700049	Zylindrical pin
46	2	1121021212	Washer for tooth wheel Z12
47	2	11700048	Circlip
48	1	11820006	Toothed belt
49	1	10800805	Protective cover
50	2	11700019	Nut



2. Drawing and list of parts

2.11 Tool carriage

Part no.	Pieces	Order no.	Description
1	1	10600301	Lower part of cross slide
2	1	10600302	Upper part of cross slide
3	1	10600303	Clamping ring
4	1	10600304	Guide ring
5	1	10600305	Top slide lower part
6	1	10600306	Top slide upper part
7	1	10600307	Saddle apron
8	1	10600308	Clasp nut
9	2	11700095	Zylindrical pin
10	1	10600310	Clasp holder
11	1	11840013	Switch lever
12	1	11700096	Feather key
13	1	10600313	Washer
14	1	11700004	Hexagonal socket screw
15	1	10600315	Spindle cross slide
16	1	10600316	Spindle bearing cross slide
17	1	10600317	Scale ring cross slide
18	3	11810004	Steel bearing
19	3	11850002	Pressure spring
20	2	10600320	Scale support
21	6	10400428	Thrust piece
22	6	11700087	Thread pin
23	1	11840011	Ball-ended crank
24	1	11700023	Spiral clamp pin
25	2	10600325	Nut
26	3	10600326	Washer
27	2	11700097	Hexagon bolt
28	1	10600328	Guide rail
29	4	11700061	Hexagon bolts
31	1	11700026	Hexagonal socket screw
32	1	11700024	Spiral clamp pin
33	1	10600333	Adjustment rail
34	3	11700098	Thread pin
35	6	11700019	Hexagon nuts
36	1	10600336	Clamping claw
37	1	10600337	Thrust disc
38	1	11700081	Hexagonal 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 (saddle)
45	1	10600345	Spindle bearing (saddle)
46	1	10600346	Scale ring (saddle)
47	1	10600347	Guide piece
48	1	10600348	Supporting bearing
49	2	11700100	Hexagonal socket screw
50	2	11810005	Lubricating nipples
51	2	11700100	Hexagonal socket screw
52	1	11840009	Ball-ended crank
53	1	11700049	Spiral clamp pin

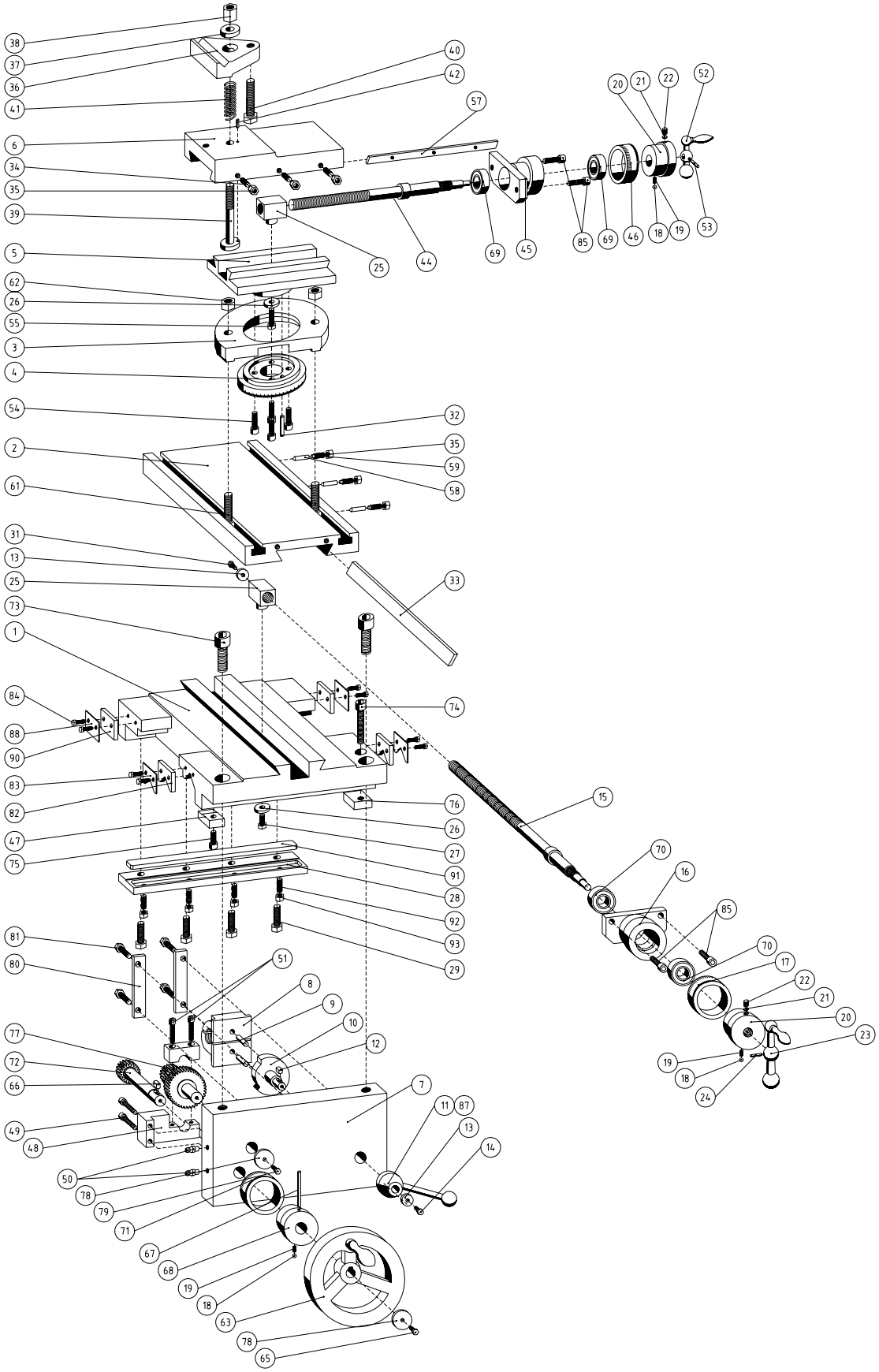
2. Drawing and list of parts

2.11 Tool carriage

Part no.	Pieces	Order no.	Description
54	4	11700078	Hexagonal socket screw
55	1	11700101	Hexagon bolt
57	1	10600357	Adjustment rail
59	3	11700102	Thread pin
60	2	11700029	Washer
61	2	11700103	Hexagon bolt
62	2	11700030	Hexagon nut
63	1	11840014	Hand wheel
65	1	11700026	Hexagonal socket screw
66	1	11700104	Feather key
68	1	10600368	Scale support
69	2	11810011	Ball bearing
70	2	11810011	Ball bearing
71	1	10600371	Scale ring
72	1	10600372	Pinion
73	2	11700033	Hexagonal socket bolt
74	1	11700037	Hexagonal socket screw
75	1	11700022	Hexagonal socket screw
76	1	10600376	Clamping piece
77	1	10600377	Take-up gear
78	2	10600378	Washer
79	1	11700026	Hexagonal socket screw
80	2	10600380	Guide rails
81	4	11700078	Hexagonal socket screw
82	2	10600382	Felt
83	2	10600383	Felt clamp
84	8	11700026	Hexagonal socket screw
85	4	11700031	Hexagonal socket screw
88	2	10600388	Felt clamp
90	2	10600390	Felt
91	1	10600391	Guide rail
92	4	11700087	Headless pin
93	4	11700019	Nut

2. Drawing and list of parts

2.11 Tool carriage



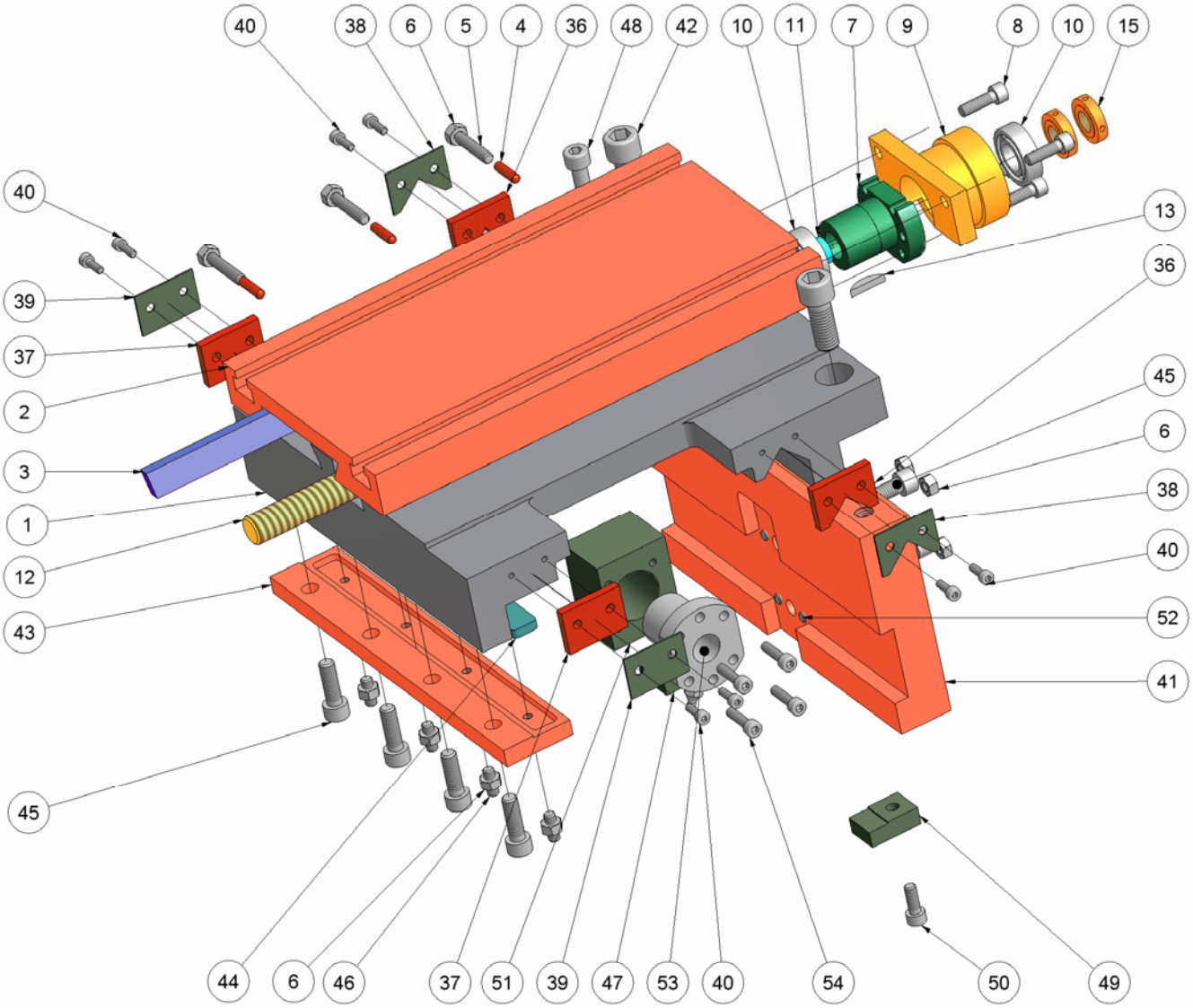
2. Drawing and list of parts

2.12 Tool carriage below for ball rolling nut

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 fitting strip
4	3	10600704	Thrust piece
5	3	11700102	Headless pin
6	15	11700019	Hexagonal nut
7	1	10600705	Ball rolling nut
8	4	11700031	Hexagonal socket screw
9	1	10600706	Spindle bearing cross slide rest
10	2	11810011	Ball bearing
11	1	10600707	Spindle holding
12	1	10600708	Ball rolling spindle
13	1	11700113	Curved wahser
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	Hexagonal socket screw
41	1	10600714	Saddle apron
42	2	11700033	Hexagonal socket screw
43	1	10600715	Guide rail
44	1	10600716	Adjustment rail
45	6	11700041	Hexagonal socket screw
46	4	11700087	Headless pin
47	1	10600717	Clamping piece
48	1	11700037	Hexagonal socket screw
49	1	10600718	Guide aid
50	1	11700078	Hexagonal socket screw
51	1	10600719	Ball rolling nut holder
52	4	11700114	Headless pin
53	1	10600720	Nut ball rolling spindle
54	4	11700039	Hexagonal socket screw

2. Drawing and list of parts

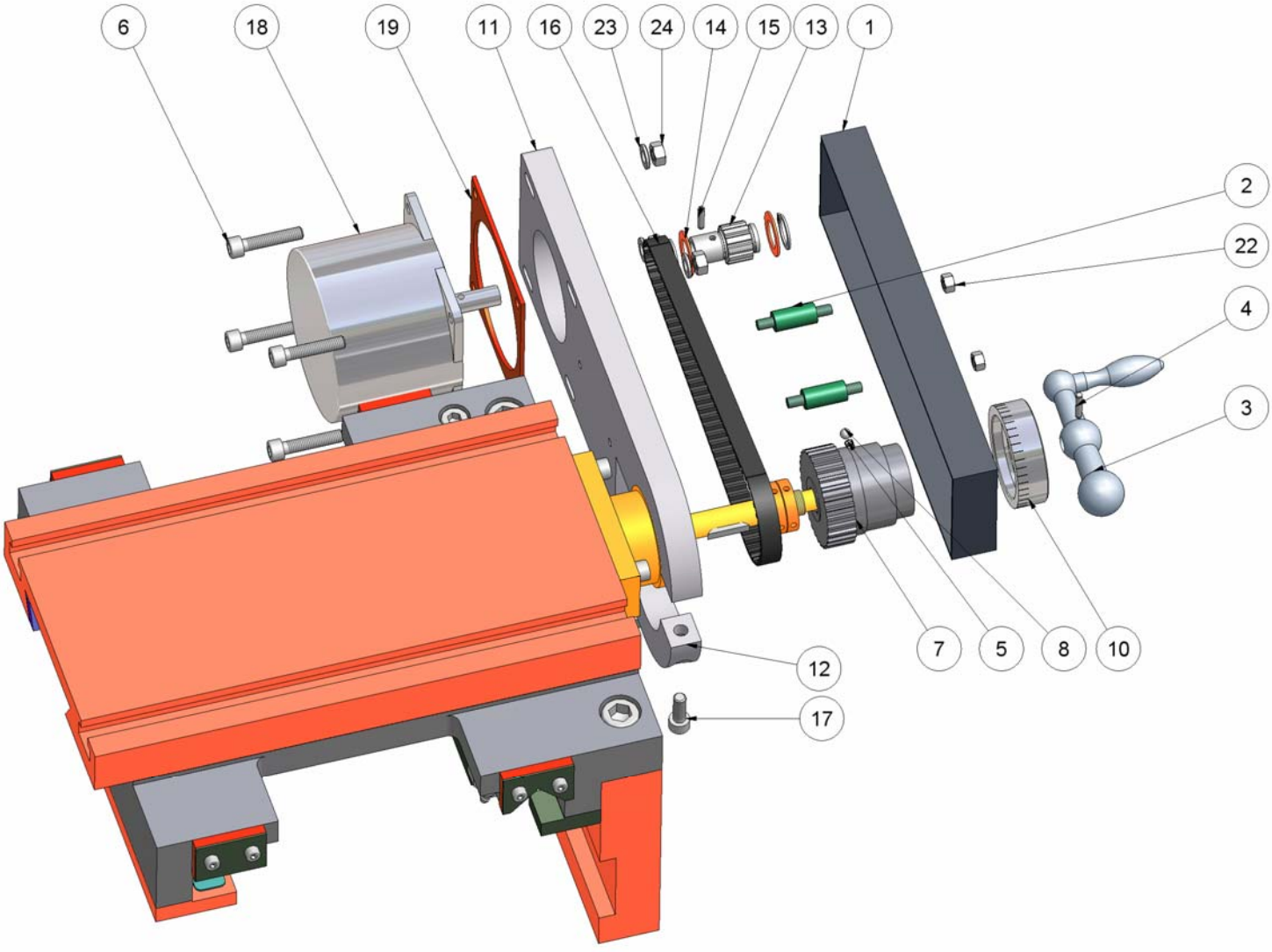
2.12 Tool carriage below for ball rolling nut



2. Drawing and list of parts

2.13 CNC drive X-axis

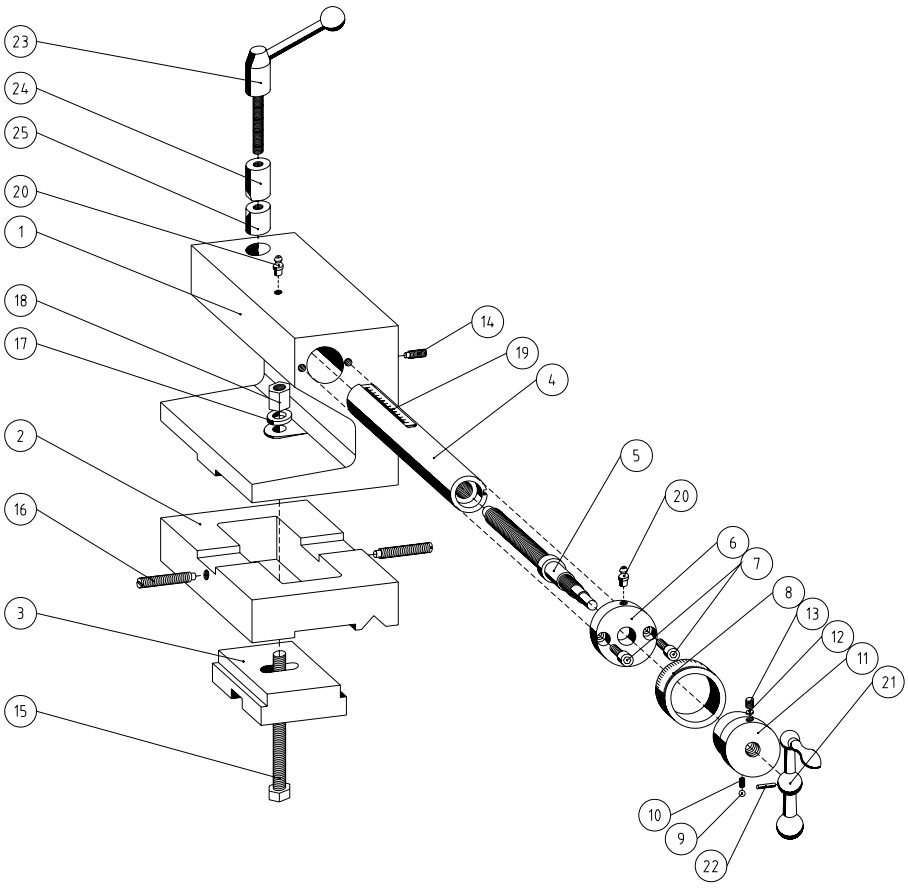
Part no.	Pieces	Order no.	Description
1	1	10600901	Protective cover
2	2	10600902	Spacer block
3	1	11840011	Ball-ended crank
4	1	11700023	Spiral clamp pin
5	1	11850002	Feder
6	4	11700046	Hexagonal socket screw
7	1	10600903	Belt pulley
8	1	11810004	Ball
10	1	10600904	Graduated collar
11	1	10600905	Motor mechanism plate
12	1	10600906	Clamp plate
13	1	10600907	Belt pulley
14	2	10600908	Flanged wheel
15	1	11700049	Spiral clamp pin
16	1	11820007	Toothed bel
17	2	11700031	Earthing screw
18	1	11800003	Step motor
19	1	10600908	Motor distance plate
22	2	11700050	Hexagonal nut
23	4	11700018	Disc
24	4	11700019	Hexagonal nut



2. Drawing and list of parts

2.14 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	Quill
5	1	10600405	Spindle
6	1	10600406	Flange
7	2	11700070	Hexagon socket screw
8	1	10600408	Scale ring
9	1	11810004	Steel bearing
10	1	11850002	Pressure springr
11	1	10600411	Scale support
12	1	10600412	Pressure spring
13	1	11700087	Thread pin
14	1	11700087	Thread pin
15	1	11700106	Hexagon bolt
16	2	11700105	Thread pin
17	1	10600417	Washer
18	1	11700081	Hexagon nut
19	1	10600419	Scale band
20	2	11810005	Lubricating nipple
21	1	11840011	Ball-ended crank
22	1	11700023	Spiral clamp pin
23	1	11840015	Clamping lever
24	1	10600424	Upper part of shim
25	1	10600425	Lower part of shim



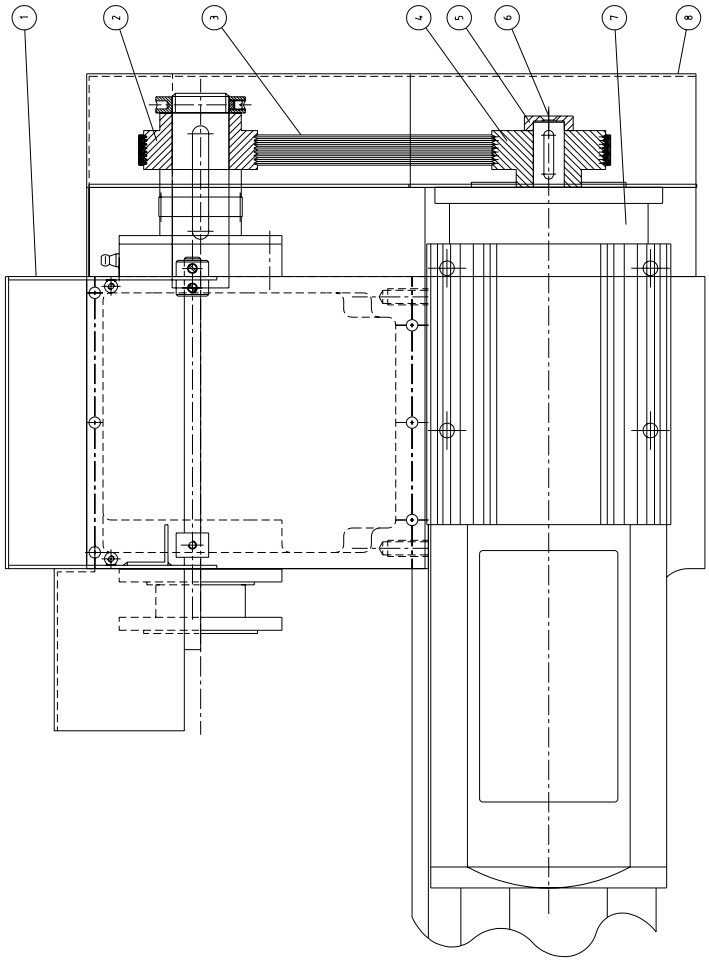
2. Drawing and list of parts

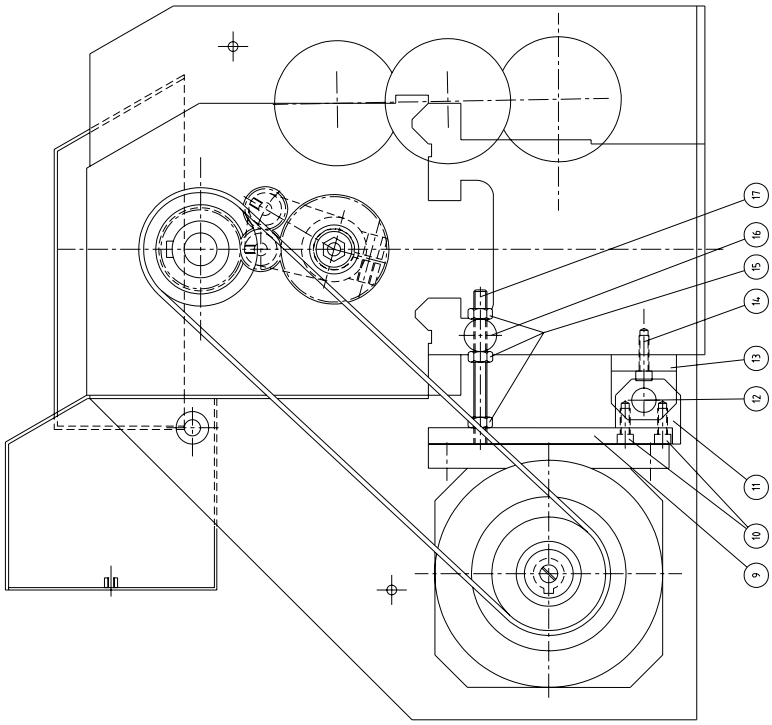
2.15 Legend high speed drive with 2,0 kW motor

Part no.	Order no.	Description
1	10600501	Switch case
2	10600502	Lock washer – main spindle
3	11820009	Drive belt
5	10600504	Lock washer – motor
5	10600505	Clamping disc
6	11700031	Screw
7	11800018	Motor high speed
8	10600508	Protective cover
9	10600509	Mechanism plate
10	11700059	Fastening screw
11	10600511	Flange bearing – motor
12	10600512	Shaft
13	10600513	Flange bearing - machine
15	11700103	Fastening screw
15	11700053	Hexagonal nut
16	10600516	Stud bolt
17	10600517	Thread pin

2. Drawing and list of parts

2.15 high speed drive with 2,0 kW motor

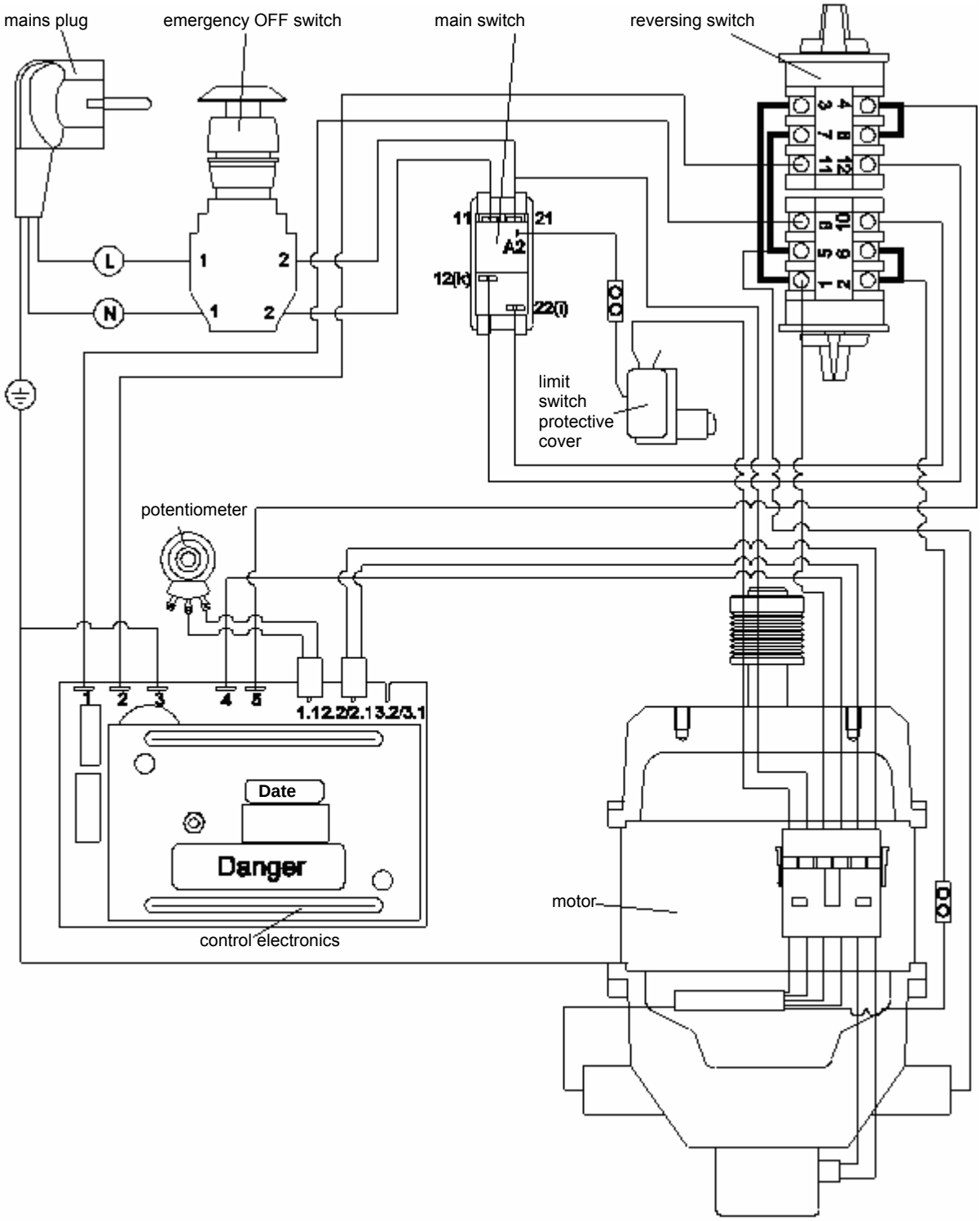




3. Circuit diagram

3.1 Motor 1,4 kW

This document shows all units of the electrical parts including the mains connection

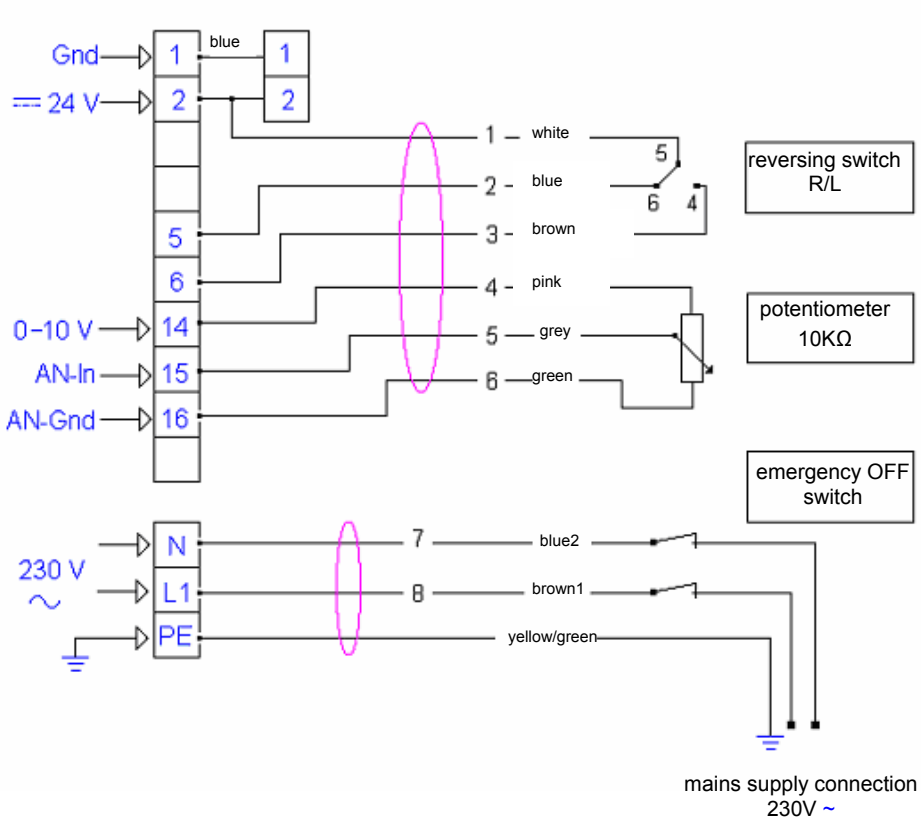


3. Circuit diagram

3.2 high speed Motor 2,0 kW

This document shows all units of the electrical parts including the mains connection

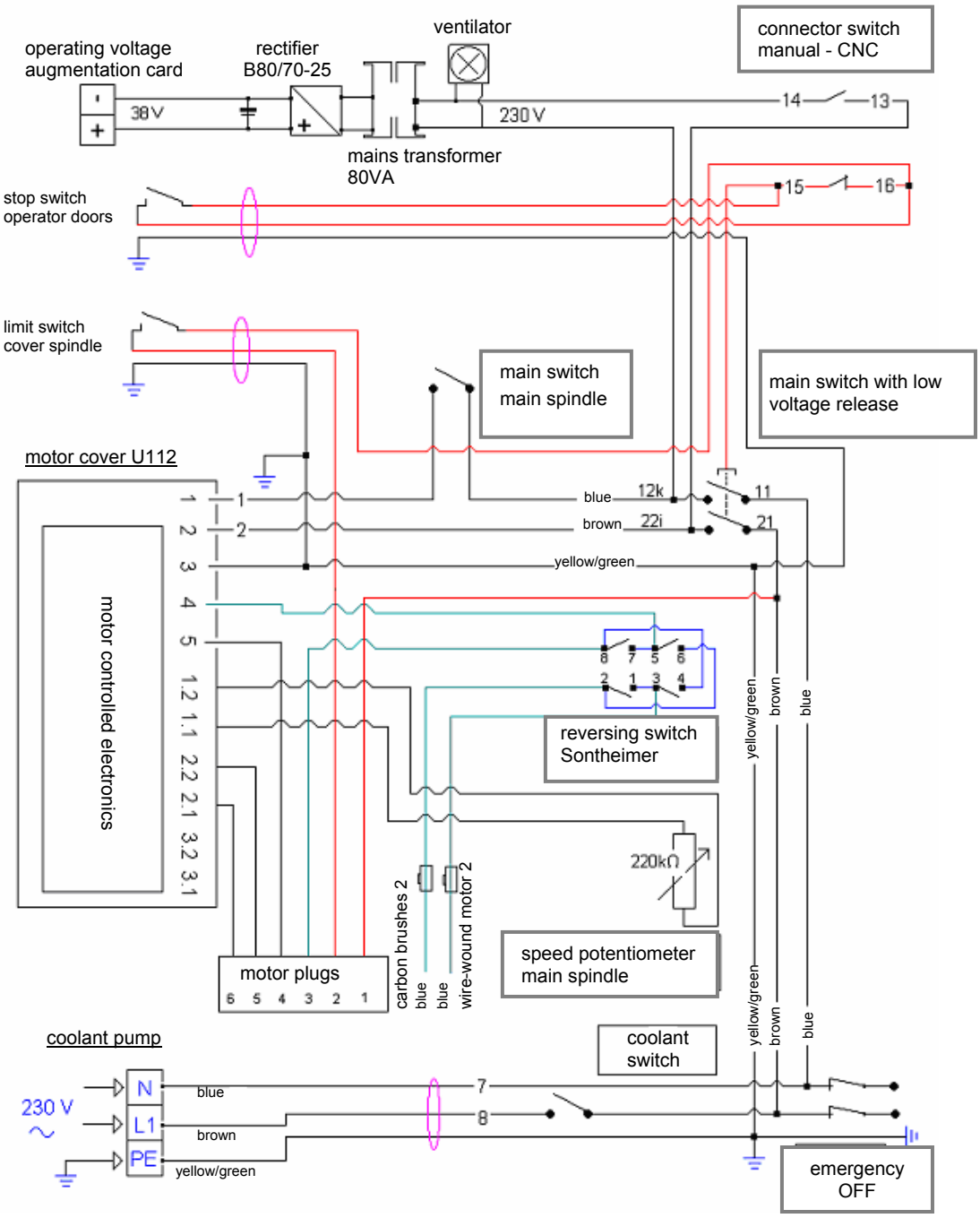
Connection box high speed motor



3. Circuit diagram

3.3 Motor 1,4 kW with safety cabin

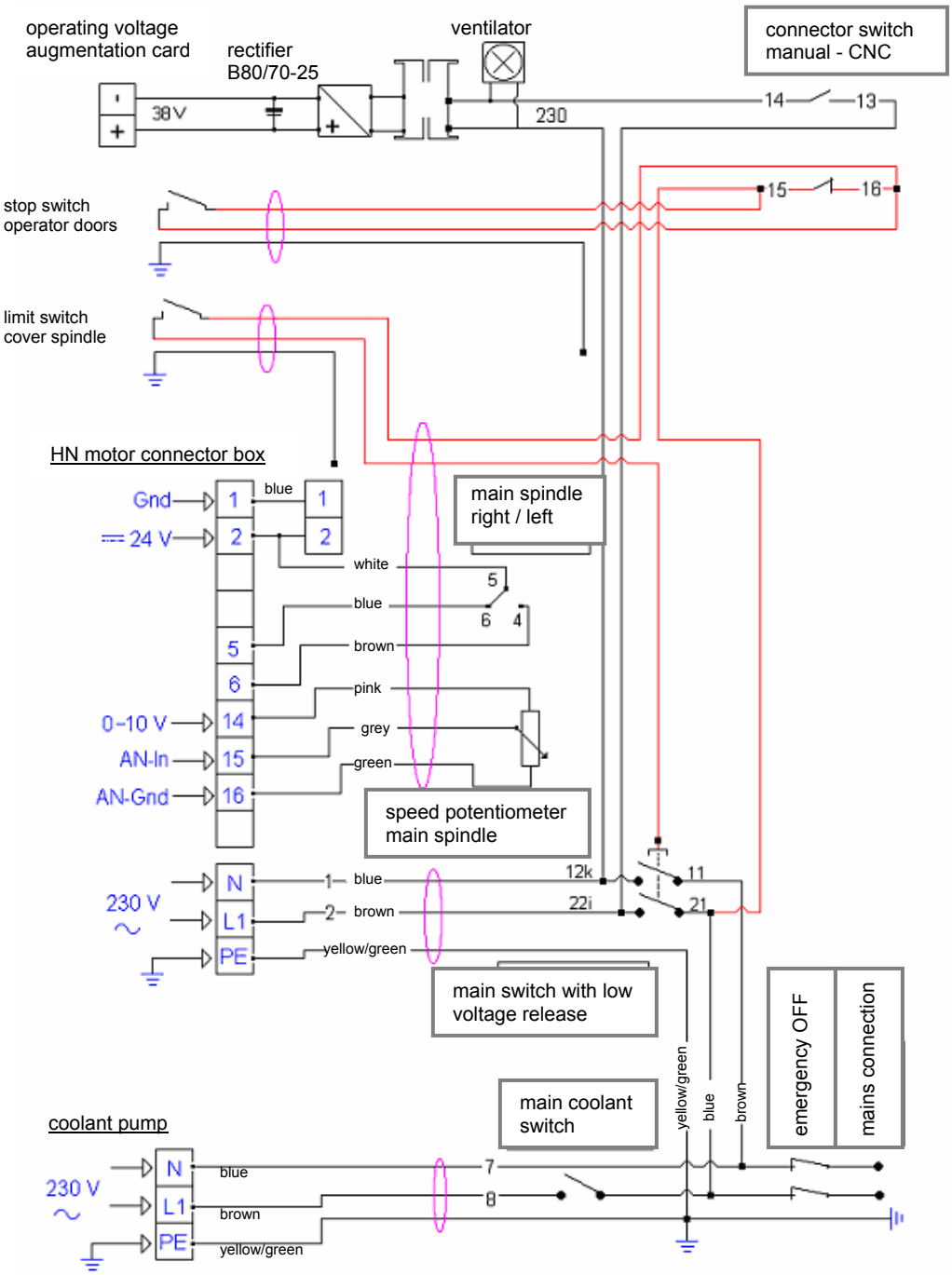
This document shows all units of the electrical parts including the mains connection



3. Circuit diagram

3.3.1 High speed motor 2,0 kW with safety cabin

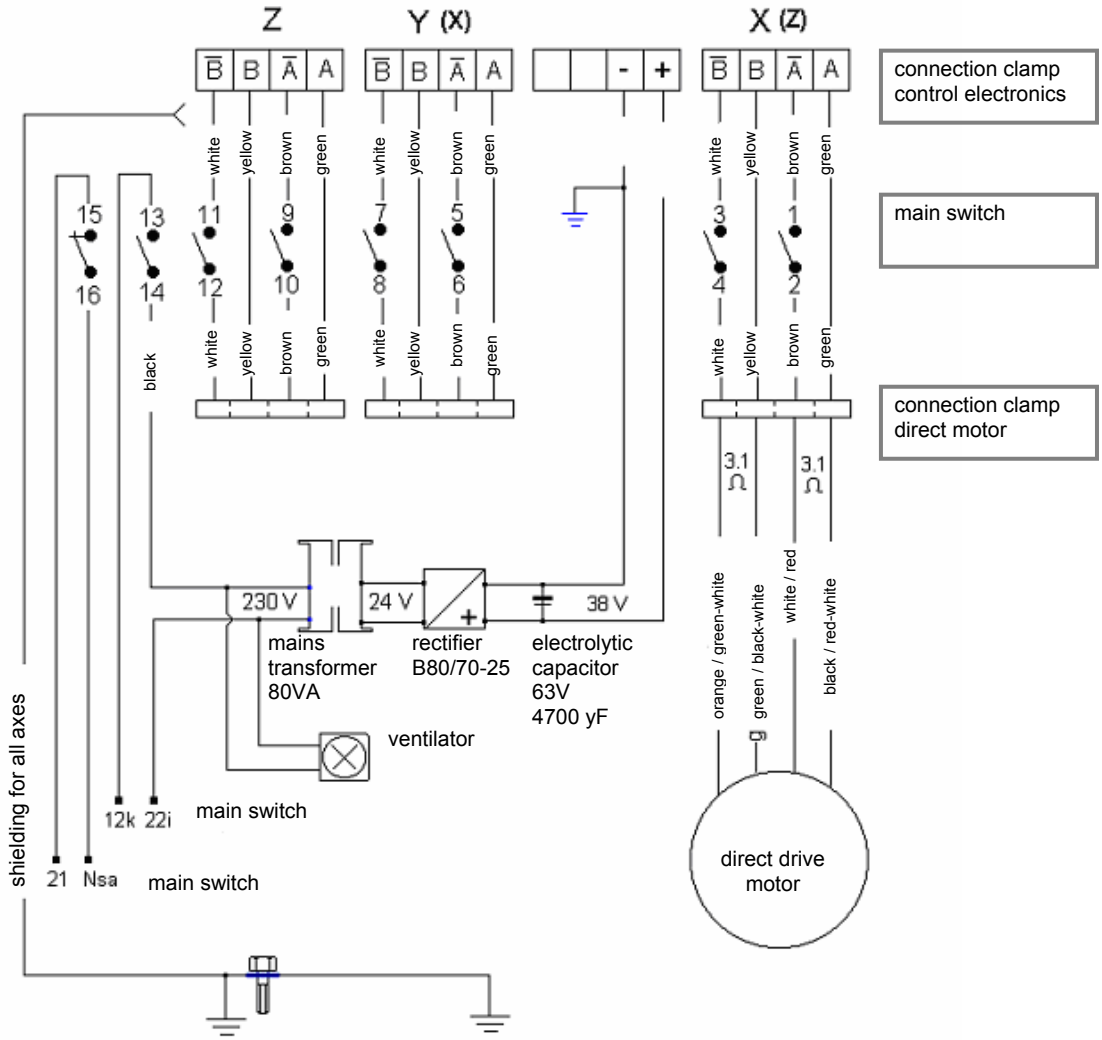
This document shows all units of the electrical parts including the mains connection



3. Circuit diagram

3.4 Drive for CNC control

This document shows all units of the electrical parts including the mains connection



To change axial direction = exchange green for brown	(Z) (X) = for CC-D

4. 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 transport damage or if there are grounds for complaint. In this case we request your immediate notification. Claims made at a later date cannot be acknowledged.**

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
- own work bench as long as it is strong enough to carry the weight of the machine without warping (see technical data and check with spirit level) and has an even surface
- a steel plate

The lathe must be firmly screwed down onto the base. To facilitate this, there are 9 mm 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 have been kept to.

The installation of the machine should take place where there is sufficient lighting, electrical cables with earthed sockets and O-conductors are installed adequately near to the machine so that the mains connection lead is not subject to any tension whatsoever. The mains lead should be such that, by means of a multiple socket, a coolant or lubrication unit can also be connected.

5. Conditions for best working results

Fix the machine on 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 near possible to the workpiece.
Clamp the workpieces fast and without vibrations.
Long pces. support with tailstock or with fixed stay.
Apply coolant and lubricant for better surface quality (finish) and dimensional accuracy.
Fix processing tools and workpieces on clean clamping surfaces.
Grease the machine sufficiently.
Use the correct tools for removing the material from the workpieces.
Set correct bearing clearances and align guides early enough.

6. Starting-up and maintenance

6.1 Maintenance

The longtime serviceability is vitally dependent upon a corresponding serving attendance. The lathe needs to be cleaned after every turning job.

In case the lathe is being erected within a moist cellar, all naked parts need to be oiled after completed usage to avoid corrision.
An overall and constant lubrication of all moving parts is highly signeficant.
In case backlash within the bearings or within the guideways of the slides should occur, readjust in time to avoid the bearing or the guideways of the slides being destoyed.

6.2 Starting-up

Before starting up the machine please clean it thoroughly and lubricate all lubricating points with grease. Oil the cross support, leadscrews, guiding rods and tailstock barrel well.
Check all spindles manually to make sure they move smoothly.
Run the lathe on the lowest speed. Do not run the machine on full load at first.

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

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

6.3 Lubrication of the machine

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

Lubricating points (bed guide), (dove-tail guide cross slide), (dove-tail guide top slide) and (tailstock barrel) with the help of an oil can and a standard lubricating oil, moving the saddle and the barrel backwards and forwards while doing so.

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

6. Starting-up and maintenance

6.4 Guidelines for the periodical maintenance of the machine

Daily	the lubricating 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 pulley and tighten as necessary.
(every 500-600	Check the play in the guideways and leadscrews and adjust.
operating hours)	Check the bearing heat in the main spindle and electric motor.

7. Safety instructions

1. The feed line for the motor may only be connected to a shock-proof socket or juction box. (Have the socket or junction box checked by an electrician beforehand; protection against children being able to put into operation).
2. The socket or junction box must be close enough to the equipment, that the current-carrying cable is subjected to no tensile strain whatsoever.
3. When maintenance or cleaning work is being done, the machine must be shutdown and the mains plug pulled out.
4. Do not brake workpieces or chuck by hand or any other objects.
5. Wear safety goggles when working 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 on the driving mechanism closed.
8. The turning tools must be firmly tightened at the correct height and as short as possible.
9. The turning tools must never be exchanged when the machine is running.
10. **Never leave the clamping chuck key in (even when not in operation).**
11. Observe the bearing distance of the turning chuck (turning jaws max. 40mm ∅, drilling jaws max. 100mm ∅).
12. **Never take measurements on workpieces being turned** (danger of accidents and damage to the measuring gauges).
13. Do not wear loose items of clothing (ties, shirt sleeves, jewellery etc.).
14. When working between centres, always centre well in order to avoid a flying-out of the workpiece. In addition, check the tightening screw of the tailstock to make sure it is tight.
15. When working with automatic advance take care that the cross table does not touch the chuck or the tailstock.
16. Never leave the machine when in operation.
17. **When turning wood, use the lathe centre for the slaving of the work piece instead of the lathe chuck.**
18. The machine must be secured so that it cannot be swichted on by children. Make sure that other people do not come in contact with the machine.
19. The machine must be kept dry at all times.
20. Check the machine frequently for damage. Any damage parts must be replaced with original parts and should be fitted by an expert or by us.

8. Description of the machine

To make sure the machine runs properly and in order to have maximum protection from damage it is necessary for the operator to get to know how the machine works very thoroughly. Please read the following instructions very carefully before starting up the machine.

8.2 Labelling

On the front of the protective hood you will find tables for the individual feeds and pitches with the combinations of take-up gears.

The take-up gears for other feeds and pitches are situated in the accompanying gear set for metric and inch threads.

In chapter 9.3 we have shown graphically the relationship of the cutting speed of the workpiece diameter and the machine speed. Given a certain workpiece diameter and a certain cutting speed then it is relatively easy to determine the correct speed of the main spindle, e.g. d = 30mm, v = 120 m/min you can conclude that n = 1250 min^{-1}.

9. Description of modules

9.1 Structural features

- Massive large-dimensioned grey cast iron machine bed.
- Sturdy cross ribbing makes the bed extremely stable and enables you to work with no oscillations.
- The wide prismaticatic guide is ground.
- Cross and longitudinal support with dove-tail guides and adjusting rails.
- A stripper for chips and dirt on all guides.
- Large-dimensioned, pivoting scale rings 0.05 mm exactness.
- Main spindle sited in adjustable tapered roller bearings.
- Ground main spindle nose.
- Electronic infinitely-adjustable spindle speeds.
- Manageable ergonomically-arranged controls.
- Equipped with Emergency Off tracer.
- Main switch with undervoltage release.
- Motor switchable left-right.
- Tailstock with its own prismaticatic guides.
- Large torque on main spindle via gear reducing units.

9. Description of modules

9.2 Spindle head

9.2.1 Main spindle

The spindle head is firmly attached to the slide bars. In the spindle head, the work spindle is run on two adjustable precision tapered roller bearings.

Should a readjustment of the bearings be neccessary, 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 a clockwise direction until the bearings again run free of play (the work spindle being easily able to be turned by hand).
3. Tighten the locking screw again.

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

The spindle throat (capacity) is 20 mm.
For safety reasons the whole drive is completely covered with a protective hood and is fixed on to the headstock.

9.2.2 Electrical parts

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 shock-proof plug can be connected directly via a shock-proof socket to the 220 V mains supply.

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

If you wish to change the direction of turn of the motor with a reversing switch then 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 control platina has enough time to switch over.

Before connecting the machine to the mains supply you must check the earth.

9. Description of modules

9.2.3 Speed regulation (for 1,4 kW motor)

The revolutions of the work spindle can be infinitely variably adjusted from 380-2300 min^{-1} when the potentiometer is positioned at the front of the machine. Should you require the lower revolution grade with a minimum revolution of 30 min^{-1} , the driving belt must be placed around it.

Proceed for this as follows: (see haedstock)
After removing the protective cover, release the driving belt. For this, release the nut (14) and turn the screw (51) as far as is necessary in order to place the driving belt on the other transposing gear wheels (39 and 17) easily.

In order to tighten the belt, tighten the screw so well, that it is not possible for the belts to slip onto the washers.

Finally, fasten the nut (14) once again.

9.2.4 Speed regulation (for 2,0 kW motor)

The revolutions of the work spindle can be infinitely variably adjusted from 0-5000 min^{-1} when the potentiometer is positioned at the front of the machine.

9.2.5 Speed transmission from main spindle to leadscrew

The gearwheel (37) on the main spindle drives the take-up gearwheels (47) on the tumbler gear. On the centre of rotation of the tumbler gear there is a gearwheel with a toothed belt wheel. The gearwheel is driven by the take-up gears and the toothed belt wheel takes over the drive of the gear combination on the change-over cutter.

9.2.6 Tumbler wheel adjustment

As shown in the diagram (Kapitel 2.2) the left-hand wheel on the tumbler gear is engaged in the gearwheel of the main spindle.
This setting is for RH threads or normal feed, i.e. if the spindle is turning in an anti-clockwise direction (looking at the chuck), then the tooling carriage will move towards the chuck.
If clamping bolt (50) is slackened, then the tumbler gear can be pivoted over to the left so that the right-hand take-up gearwheel engages the gearwheel of the main spindle. With this setting you can then do left-hand threads, or the slide can run as before (given the same direction of turn of the main spindle) away from the chuck towards the tailstock (siehe Kapitel 2.4).

9.2.7 Protective cover for chuck

The main spindle of the machine will only run when the chuck protective hood (46) is closed.

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

9. Description of modules

9.3 Bed with leadscrew drive

9.3.1 Overload clutch

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

The clutch is adjusted with the hexagon bolts and fixed by a locknut.

9.3.2 Setting the bearing play on the leadscrew

On the RH side the leadscrew is placed radially in bearings in a bronze bushing (4a) and axially in two axial bearings (6). These two axial bearings allow the leadscrew to be adjusted so that there is no play (8).

If you have to adjust the setting of the bearings, then first of all the outer of the two capstan nuts (7) must be slackened. Then the inner nut is turned against the axial bearing so that the leadscrew has no more air axially.

Finally fix the outer capstan nut against the inner capstan nut with a locknut.

9.4 Tooling carriages

9.4.1 Cross slide

The cross slide rest is at the front, on a V-guide and at the back, on a surface guide. The slide rest is kept on the bed from below by means of the guide bead. The hexagonal socket screw (74) can be found at the front, on the right. The clamping piece (76) can be clamped against the lower part of the V-guide by using this screw. This clamping is suitable for transverse turning and slicing work.

The dove-tailed guide of the cross slide can be adjusted. If you wish to make an adjustment, then first you must loosen hexagonal nuts (35). Tighten threaded pins (59) so that the slide can move backwards and forwards along with ball-ended crank (23). After adjusting, tighten hexagonal nuts (35) again.

You can also adjust any axial play which occurs in spindle (15) of the spindle bearing. If you wish to make an adjustment first of all you have to loosen threaded pin (22). Now scale support (20) can be turned to the right until there is no more axial play. Then tighten threaded pin (22) again.

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

For calculating the displacement path of the slide on scale support (20) there is a large scale ring (17) divided into millimetres. One notch corresponds to 0.05 mm of adjustment and this corresponds to the same amount of shaving on the workpiece. This means that in reality the slide is only adjusted by 0.025mm, whereas the diameter of the workpiece changes by 0.05mm.

A rotation with the bell crank corresponds to 2 mm way, however, a change of 4 mm to the diameter of the workpiece.

9. Description of modules

9.4.2 Top slide

The top slide is clamped via clamp ring (3) on the cross slide upper part (52). Loosen hexagonal nuts (62) and the top slide can be pushed or turned along the cross slide. This is suitable for lathing short tapered pieces. A scale is engraved on guide ring (4) so that you can read the setting exactly. The zero line is on the cross slide upper part.

The dove-tail guides of the top slide can be adjusted as described for the cross slide. The parts have a different numbering in the drawing: hexagonal nut (35), threaded pins (34), ball-ended crank (23).

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

As described in the case of the cross slide, the top slide has also got a read-off scale for its travel path. Here, one notch corresponds to 0.05mm of movement. Since you do not work with diameters on the top slide, then this 0.05 mm corresponds to the actual path. A complete turning of the crank corresponds to a path of 2mm.

9.5 Tailstock

The tailstock can be pushed along the lathe bed and can be lightly clamped in all positions by tightening hexagonal nut (18). The tailstock consists of an upper and lower part. The upper part can be displaced slightly for turning long, slim tapered parts, maximum 10mm.

To do this please proceed as follows:
Loosen hexagonal nut (18) and with the help of the two threaded pins (16) and push the upper part in the desired direction.

The central position of the tailstock is shown by the notch embossed on the side. Find out by doing some trial turns if the workpiece is cylindrical and if necessary correct the tailstock setting.

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

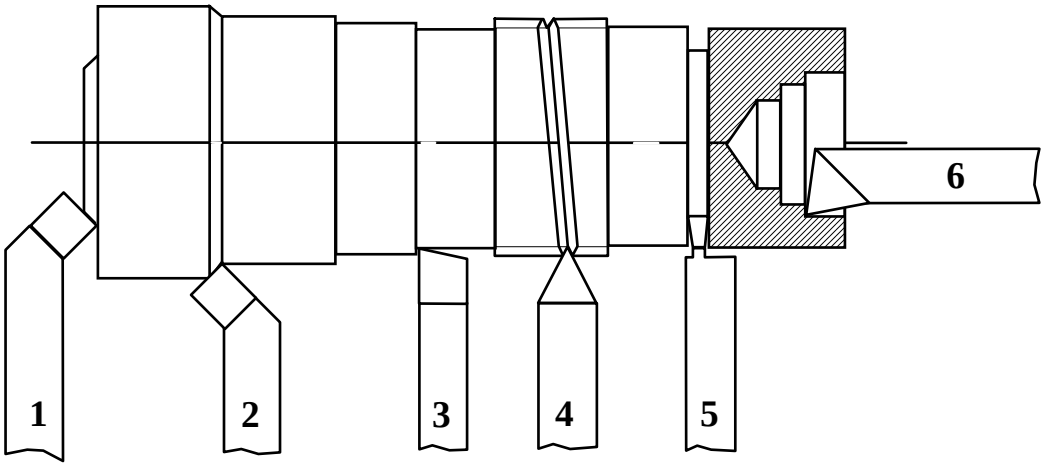
Tool clamping:
An **internal cone MT 2** is available for the holding of the tool. This is positioned in the sleeve (4). The sleeve can be clamped easily in any position by tightening the upper clamping lever. The sleeve can be moved axially by the crank handle (21) which can be found at the rear end, by means of the treaded spindle (5).

10. Applications

10.1 Longitudinal and transverse turning

Longitudinal turning:
In the case of longitudinal turning tool moves parallel to the axis of the workpiece. For roughing at longitudinal turning the use of either a straight or arcuated turning tool is favourably.

Transverse turning:
The tooling 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 compound rest is to be locked. The main cutting edge of the turning tool is to be exactly centred so that no scar remains in the middle of the workpiece. The arcuated tool is used for transverse turning.



to 1+2: **Roughing tools arcuated to the left and or right:** By using them a maximum on material is to be cut off 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 smoothing (clean surface) in the case of longitudinal and transverse turning.

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

to 5: **Narrow square-nose cutting tool:** Used for the cutting of grooves and slicing of workpieces.

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

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

10. Applications

10.1 Longitudinal and transverse turning

For the reason of the power at the turning chisel take care that the tool is short and fast fixed. If the lever arm is to long the turning chisel curves and springs back. The cutting part enters uneven into the workpiece and is producing a waved surface.

Take care that the turning chisel is placed on the middle of the turning piece.
The control of the height position of the middle of the workpiece is done with the live lathe center in the tailstock.

For the regulation of the height position of the turning chisel use with straight sheet steel pieces.

10.2 Thread cutting and automatic feed

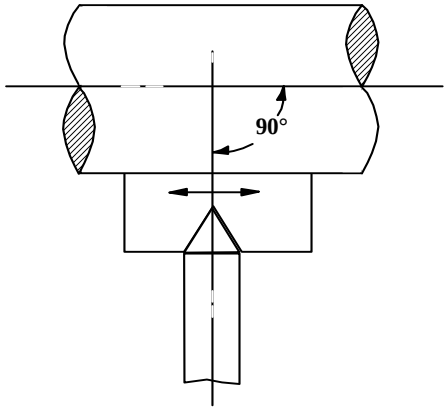
10.2.1 Thread cutting

The thread turning chisel is a form turning chisel with the profile of the thread to be cut. It is ground according to jigs (diagram 1) and must be adjusted exactly to the middle of the workpiece as, otherwise, the profile of the thread would be distorted.
In order to obrain the correct position of the flanks of the thread 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.

The feed of the thread turning chisel is affected via the leadscrew, and must correspond to the thread pitch. The gearwheels in the accessories establish the connection between the feed gears and the leadscrew. By fitting different conbinations of gearwheels it is possible to cut metric and inch RH and LH threads. The different axis distances of the toothed wheels can be adjusted by pivoting the cutting edge and adjusting the cutting screws.

The feed is switched on by hand on the cam box. When cutting thread, please make sure that the feed remains continously switched on so that the turning chisel always goes back to the same position when carrying cut several cuttings. For this reason, when the cutting is finished, the turning chisel is disengaged from the cross slide because otherwise the flanks and the cuts would be damaged. The chisel is taken back to ist home position via the reversing switch by means of a change of direction of the motor. It is advisable to cut a 4-5 mm wide groove on the thread end in order to be able to disengage the threading tool better.
In the case of a long thread diameter, the lathe centre should travel along with the cutting head in order to avoid the workpiece from being pushed to one side.

Diagram 1: Setting the thread turning chisel



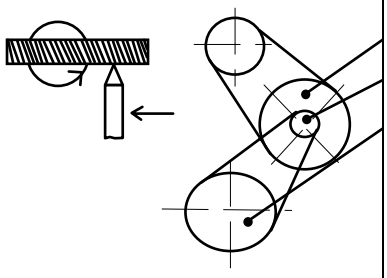
10. Applications

10.2.2 Application of change gears

For the purpose of automatic longitudinal turning there are two feed rates, being at your disposal: 0,085 mm and 0,16 mm/revolution. (Upon delivery, the gears producing a feed of 0,085 mm/revolution have been put on).

Putting on different combinations of gears enables you to cut metric thread ranging from 0,4 to 3,0 mm in pitch. The same applies to inch thread ranging from 10 threads/" to 32 threads/" in pitch.

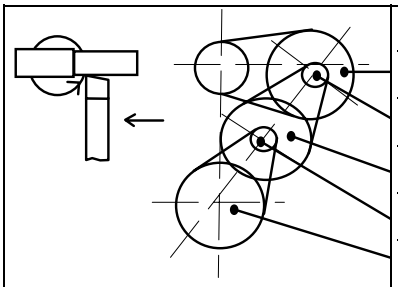
Table on thread cutting



*** = Extras**

mm	**0,4**	**0,5**	**0,7**	**0,75**	**0,8**	**1,0**	**1,25**	**1,5**	**1,75**	**2,0**	**2,5**	**3,0**
A	48	48	48	48	48	48	48	48	48	48	48	48
B	16	20	14	18	16	14	20	36	28	40	40	48
C	40	40	20	24	20	14	16	24	16	20	16	16
Z/1"	**10**	**11**	**12**	**13**	**14**	**16**	**18**	**19**	**20**	**24**	**28**	**32**
A	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
C	20	22	24	26*****	28	32	14	36	20	32	28	32

Table automatic longitudinal feed



mm/□	0,085	0,16
A1	48	48
A2	14	18
B1	48	48
B2	14	20
C	48	48

10. Applications

10.2.3 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 the fixing screw D of the change gear quadrant. (First loosen the hexagonal socket screw at the front of the headstock and open the protective cover.)

b. Loosen and remove the hexagonal nuts and washers from the bolts A and B.

c. Loosen the hexagonal bolts A and B. Remove the toothed belt connecting A and B. Turn bolt B out of the cutter with the two tooth pulleys and take them out. Remove toothed belt of drive disc to A.

d. Remove both tooth belt pulleys Z 14 from their bolts A and B and change them for tooth belt pulley Z 18 or tooth belt pulley Z 20, respectively.

e. Mount bolt B, together with both tooth belt pulleys into the change gear quadrant again by slightly tilting the bolt and screwing it into the square nut located behind the quadrant. Put on the toothed belt connecting B and C, pull bolt B upwards imparting tension to the toothed belt. Then, tighten bolt B.

f. Pull bolt A upwards until the toothed belt is under tension.

g. Close the cover of the headstock and tighten again the screw with hexagonal recessed hole.

2. Changing the feed from 0,085 mm to a metric pitch of 1,5 mm

a. - c. Start the procedure exactly as already described under pos. 1, a-c, expect for the hexagonal nut being removed as well from the shearing bushing C, as described under pos. 1 b.

d. Pull off the bushing and the tooth belt Z 48 from the shearing bushing C. Put the bushing a and the tooth belt pulley Z 24 onto the shearing bushing but, make sure that the bushing precedes the tooth belt pulley.
Bolt B with toothed belt will not be needed with thread cutting!

e. As the toothed belt Z14 is already on bolt A you do not have to make any changes. Move the toothed belt from the drive disc to bolt A and from A to C..

f. - g. Proceed as described under pos. 1, f-g!

For thread cutting you need the two long toothed belts 140XL

3. Changing the feed from 0,085 mm to thread pitch 12 threads/"

Proceed exactly as already described under pos. 2. The procedure differs merely in additionally changing the tooth belt pulley Z48 running on bolt A for the tooth belt pulley Z34.

The feed is switched over via the lever grip on the front side of the cam box. When cutting thread please make sure that the feed remains permanently switched on so that the turning chisel gets into the same position every time in the case of several cuttings.

For this reason, when you have finished cutting, the chisel is turned out with the cross slide and is brought back by means of a change of direction of the motor via the reversing switch into the original position.

10. Applications

10.2.4 LH thread

To cut an LH thread all you have to do is bring the RH take-up wheel on the tumbler gear and link it into the drive wheel on the main spindle.

In figure 9.4 you can see the position when cutting an LH thread. In order to pivot the tumbler gear all you have to do is loosen the clamping screw.

11. Three-jaw chuck and four-jaw chuck

The three-jaw chuck
serves to clamp circular, triangular and hexagonal workpieces centrically to the spindle axis.

The four-jaw chuck
serves to clamp square workpieces centrically to the spindle axis.

Danger of accident

Do not try to clamp larger workpieces. The chucking power is then too low and the jaws can detach themselves.

Mounting of turning jaws:
The jaws and guides are numbered from 1-3. Open the chuck by means of the chuck key until the jaws loosen. (order: 3, 2, 1 bzw. 4, 3, 2, 1).
Now, take the inner jaws beginning with the number 1 and put this in the guide number 1. Push the jaw number 1 in the direction of the centre point of the chuck 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 put in the guide provided. The same now happens to number 2 as to number 1. Proceed with number 3 and number 4 in the same way. Subsequently, examine the position of the jaws.

Mounting of drilling jaws:
If, afterwards, you again want to work with outer jaws, the process repeats itself in the same order (first jaw 1, then 2, then 3, then 4).

12. Tool holder with conical sleeve

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 workspindle. 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 liftet from the concentric flange of the workspindle and the closer can be inserted into the workspindle by gently pushing it.

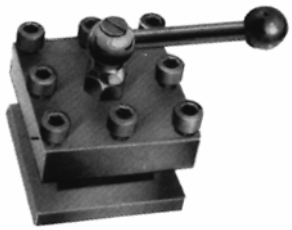
Subsequently, insert the required collet chuck into the closer and by means of the hand draw-in tube (which is fed in through the hollow workspindle from the gear side) draw the collet chuck into the closer.

13. Square turret head

The square turret head is used instead of the clamping plate in order to clamp the tools.

Four turning tools can be changed simultaneously. By swivelling the turret head by 90 degrees each time, the required turning tool can quickly be brought into its working position

There are four centering holes on the bottom for securing the square turret head in its four positions. For this purpose, the screw supplied with the springmounted steel ballmsut first be screwed into the threaded hole in the upper part of the turning carriage.



14. Unit for lubrication coolant

The unit for lubrication coolant consists of:

1. Tray with lubrication coolant sump which collects the lubrication coolant mixture for the feed pump. Contents generally 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 lead with a length of 2 m complete with earthed plug.

3. Adjustable, felxible pressure tubing with stop valve and nozzle for transporting the lubrication coolant to the processing point.
   An increasing number of customers wish to include this fixture in their order so as to take advantage of “wet processing” for the production of their goods / workpieces and to:

   - to cool and lubricate, in particular during lengthy processing
   - when processing high alloy stell an aluminium
   - to increase the tool life
   - to inporove the surface finish and accuracy of the workpieces
   - to reduce friction heat
   - to prevent built-up edges

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

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

4. When mixing a refill of lubrication coolant, 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 nitrates (< 50 mg NO 3-, test strip)

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

6. 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.

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

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

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

15. 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 or 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.

16. Disposal of the lathe

The transport and protective packaging made up of the following materials:
- corrugated cardboard
- polystyrene free of freon
- polyethelene 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 facilties.

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.