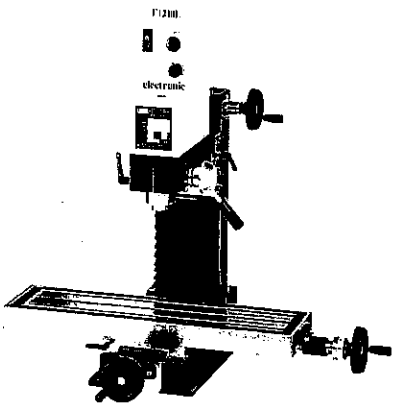
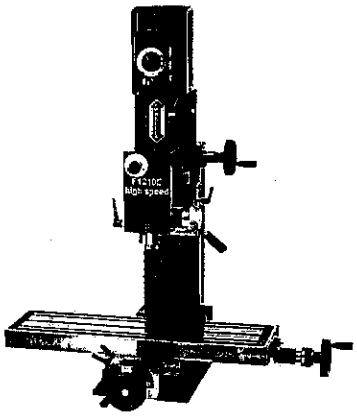
Operating Instructions

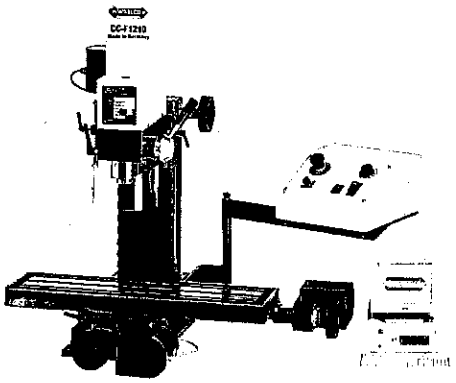
Universal drilling and milling systems



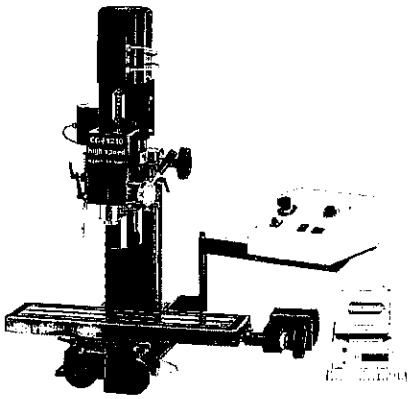
F1210E



F1210E high speed



CC-F1210E



CC-F1210E high speed

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EC – Conformity Declaration

In the name of the manufacturer

Walter Blombach GmbH

Tool and Machine Factory
based in Remscheid and Neuerburg

D-42871 Remscheid - Postfach 12 01 61 - Tel.: (02191) 597- 0 - Fax: (02191) 597 - 40
D-54673 Neuerburg - WABECO Str. 1-10 - Tel.: (06564) 9697-0 - Fax: (06564) 9697-25

We hereby declare that the universal milling and drilling machines specified below

Universal milling and drilling machine Typ:
F1210E
F1210E high speed
CC-F1210E
CC-F1210E high speed

meet the following regulation requirements for standard serie production

- **EC directive for machines 89fJ92/EEC, substituted by 91 fJ68/EEC and 93/44/EEC**
- **EC directive 89/336/EEC substituted by 91/263/EEC and 92/31 /EEC**
- **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
EN 294
EN 349
EN 418
EN 626-1
EN 954
EN 982
EN 983
EN 60204-1

D-54673 Neuerburg

City

Christoph Schneider

Signature

Dear customer!

Congratulations on choosing the **WABECO Universal Drilling and Milling Machine**. 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 we request that you read the respective instructions carefully and follow them exactly.
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 rating plate).

Wir bieten eine umfangreiche weitere Ausstattung an, die das Arbeiten mit diesen Maschinen erleichtert und wesentlich erweitert.

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

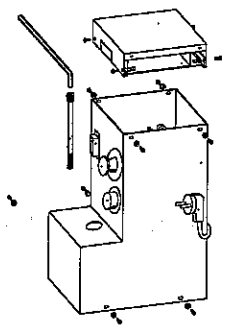
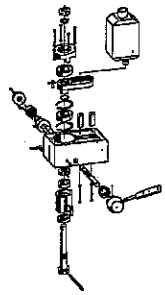
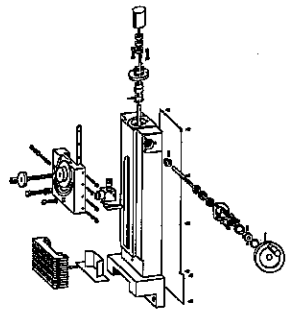
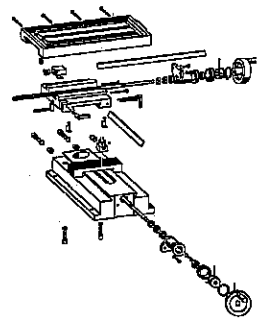
We are able to send you free of charge our Operating Instructions and leaflets in French and/or English translation.

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

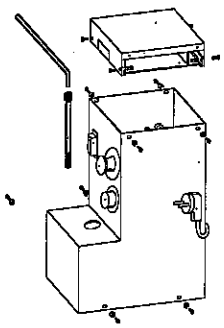
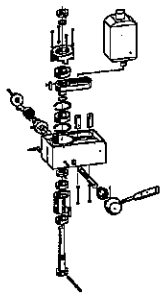
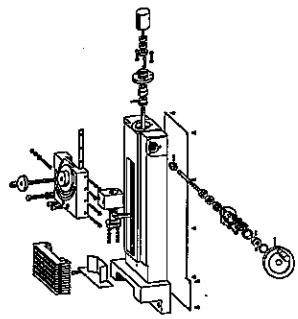
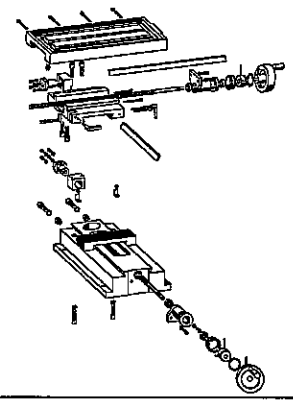
1. Product range

1.1 F1210 E – with 1,4 kW motor

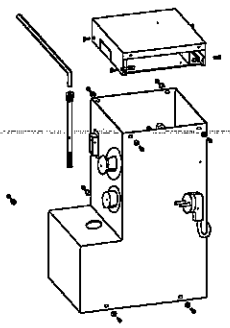
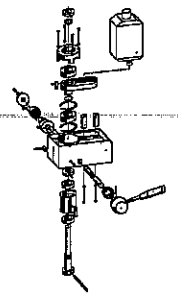
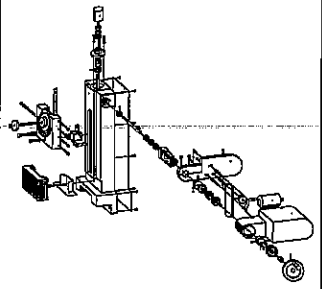
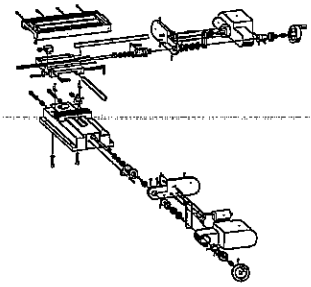
Universal drilling and milling system with dovetail guides, infinitely variable drive and a work bench measuring **700 x 180 mm**

Protective cover page 11	**Milling head with 1,4 kW motor** page 14	**Z-Column** page 19	**Cross table** page 34
			

1.1.1 with ball rolling spindle

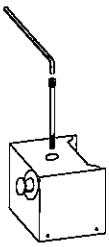
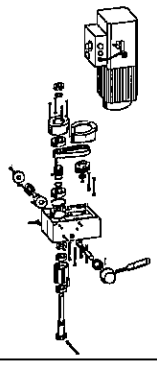
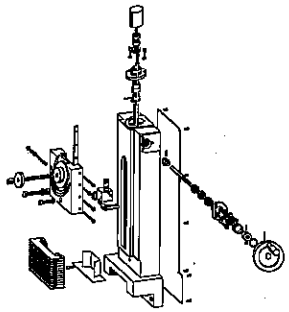
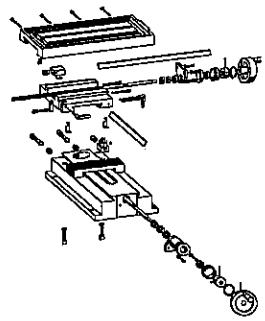
Protective cover page 11	**Milling head with 1,4 kW motor** page 14	**Z-Column with ball rolling spindle** page 22	**Cross table with ball rolling spindle** page 36
			

1.1.2 with automatic feed

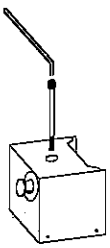
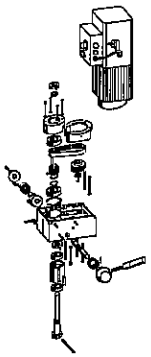
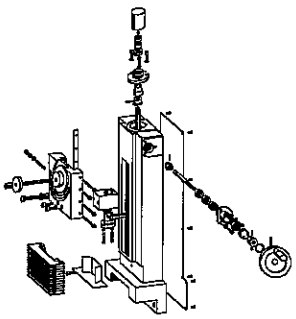
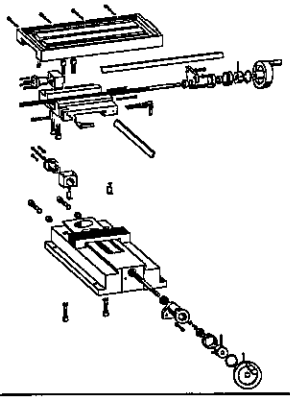
Protective cover page 11	**Milling head with 1,4 kW motor** page 14	**Z-Column with automatic feed** page 25	**Cross table with automatic feed** page 38
			

1. Product range

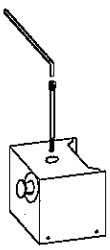
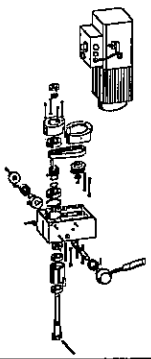
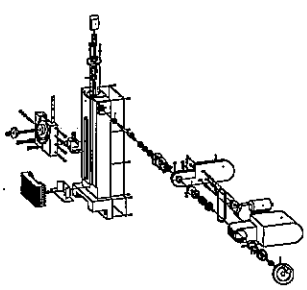
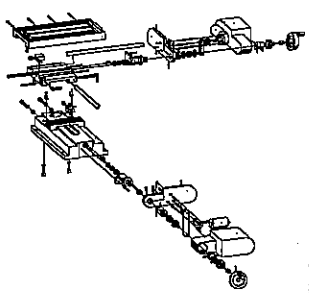
1.2 F1210 E high speed – with 2,0 kW motor

Protective cover page 16	Milling head with 2,0 kW motor page 16	Z-Column page 19	Cross table page 34
			

1.2.1 with ball rolling spindle

Protective cover page 16	Milling head with 2,0 kW motor page 16	Z-Column with ball rolling spindle page 22	Cross table with ball rolling spindle page 36
			

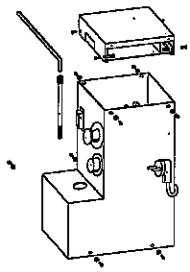
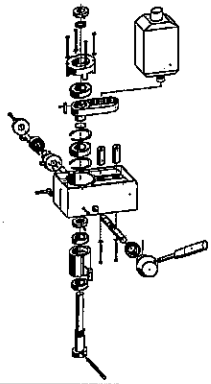
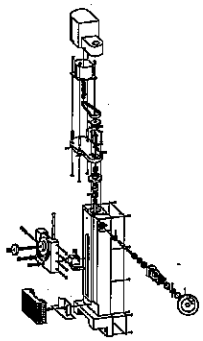
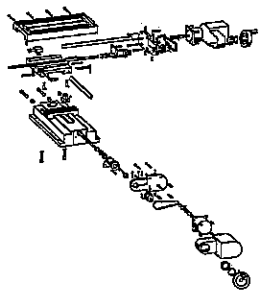
1.2.2 with automatic feed

Protective cover page 16	Milling head with 2,0 kW motor page 16	Z-Column with automatic feed page 25	Cross table with automatic feed page 38
			

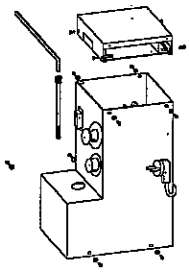
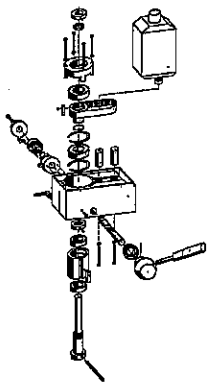
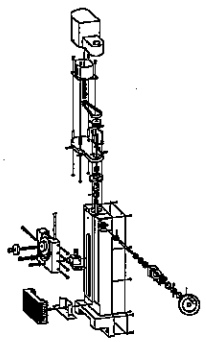
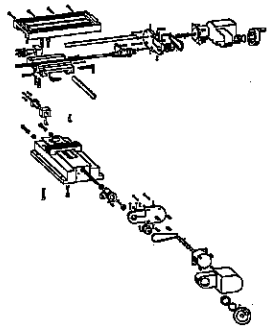
1. Product range

1.3 CC-F1210 E – with 1,4 kW motor

CNC drilling and milling machine with dovetail guides, infinitely variable drive and a work bench measuring **700 x 180 mm**

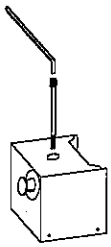
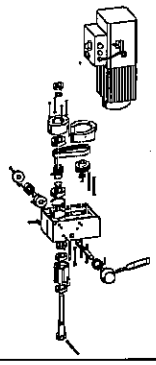
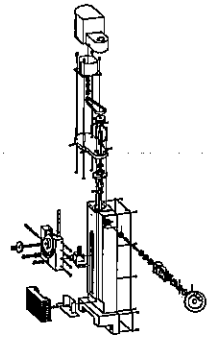
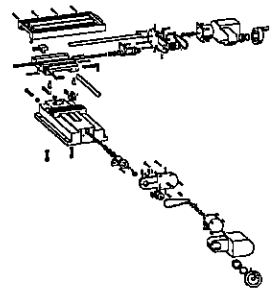
Protective cover page 11	**Milling head with 1,4 kW motor** page 14	**Z-Column with built-in step motor** page 28	**Cross table with built-in step motor** page 41
			

1.3.1 with ball rolling spindle

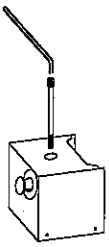
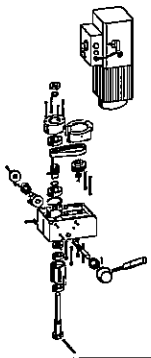
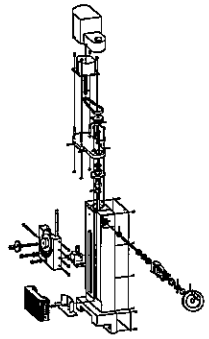
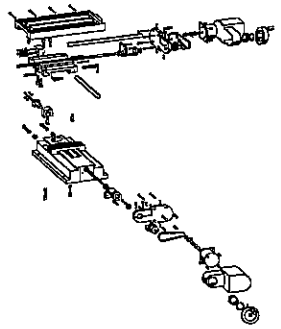
Protective cover page 11	**Milling head with 1,4 kW motor** page 14	**Z-column with built-in step motor and ball rolling spindle** page 32	**Cross table with built-in step motor and ball rolling spindle** page 44
			

1. Product range

1.4 CC-F1210 E high speed – with 2,0 kW motor

Protective cover page 16	Milling head with 2,0 kW motor page 16	Z-Column with built-in step motor page 28	Cross table with built-in step motors page 41
			

1.4.1 with ball rolling spindle

Protective cover page 16	Milling head with 2,0 kW motor page 16	Z-column with built-in step motor and ball rolling spindle page 32	Cross table with built-in step motor and ball rolling spindle page 44
			

2 Technical Data

Dimensions of the milling and drilling machine

Installation area	400x250 mm
Width	1150 mm
Depth	630 mm
Height 1,4 kW	950 mm (1110 mm high speed)

Working area

Longitudinal travel X axis	500 mm
Cross travel Y axis	150 mm
Vertical travel Z axis	280 mm

Work table – cross table

Length x width	700 x 180 mm
No. of slotsl	3

Milling head

Pivotable through	90° both sides
Tool holder	cone 2 **optional MT3 or SK30**
Tool clamping	In-house innovation for clamping and ejecting tools
Drilling stroke	40 mm

Distance Milling spindle/Work spindle

Min	90 mm
Max	370 mm
Depth of throat, milling spindle/column	185 mm

Electrical equipment (*for F1210E)*

Drive	Single-phase series commutator motor as direct current model with continuous r.p.m. surveillance
Nominal voltage, frequency	230V, 50 Hz
Consumption	6A
Service output	**1,4 kW**
Tool spindle r.p.m	**180-3000 1/min**

Electrical equipment (*for F1210E high speed)*

Drive	Motor with frequency converter Infinitely variable with continuous r.p.m. surveillance and clockwise and anticlockwise rotation
Nominal voltage, frequency	230V, 50 Hz
Consumption	8,6 A
Service output	**2,0 kW**
Tool spindle r.p.m	**100-7500 1/min**

Feed motors *(for automatic fedds)*

Voltage	24V
Current	1A (idle running)
Torque	2,0 Nm
Max. r.p.m	140 r.p.m.

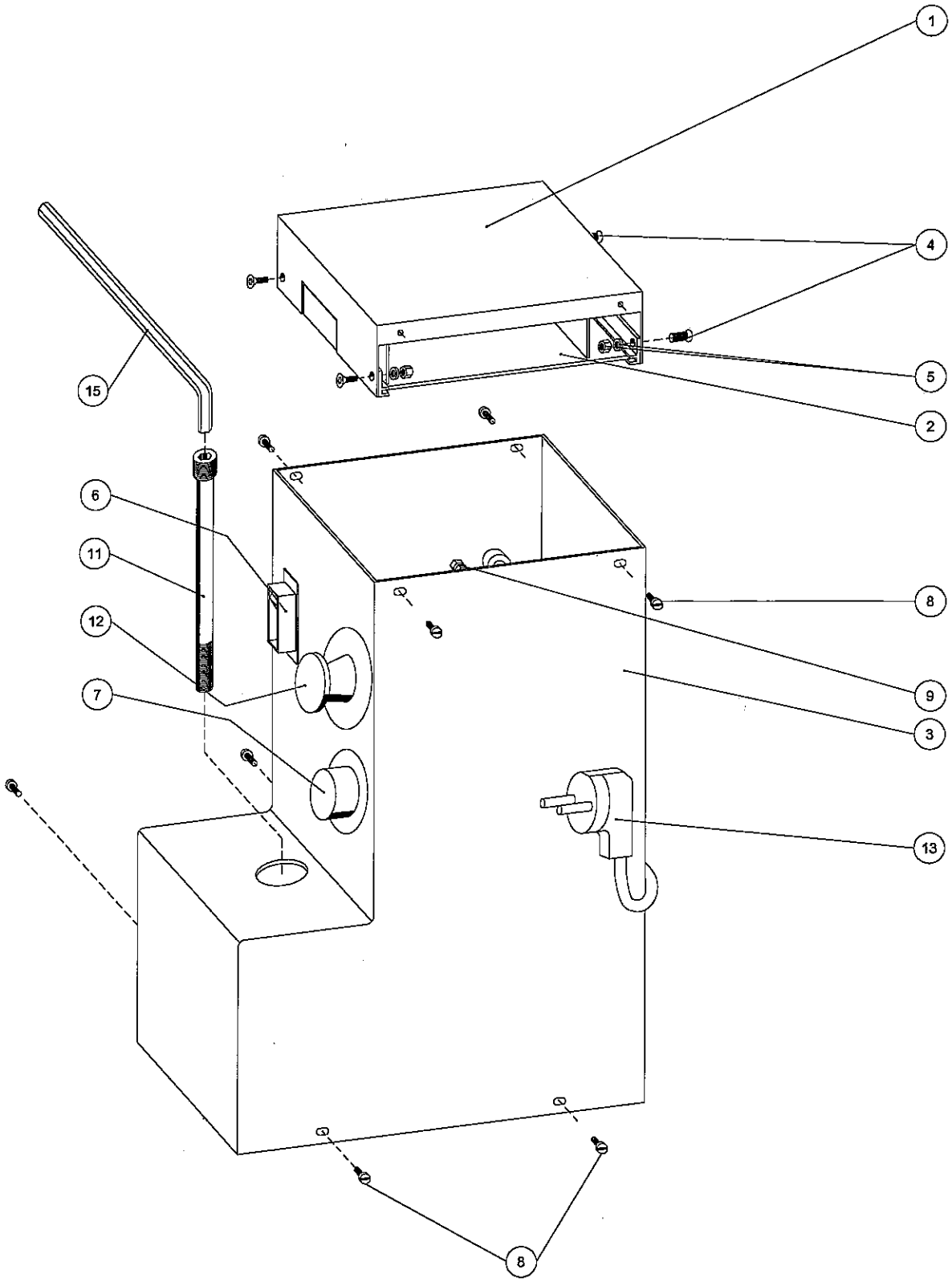
Feed motors (hybrid-step motors)

Voltage	2,9 V_{DC}
Current	1,7 A
Torque resistance	1 Nm
Number of Stepps per rev.	200
Angle of step	1,8°

- Technical data subject to alteration -

3 Drawing and list of parts

3.1 Protective cover with electrical equipment for F1210 E and CC-F1210 E



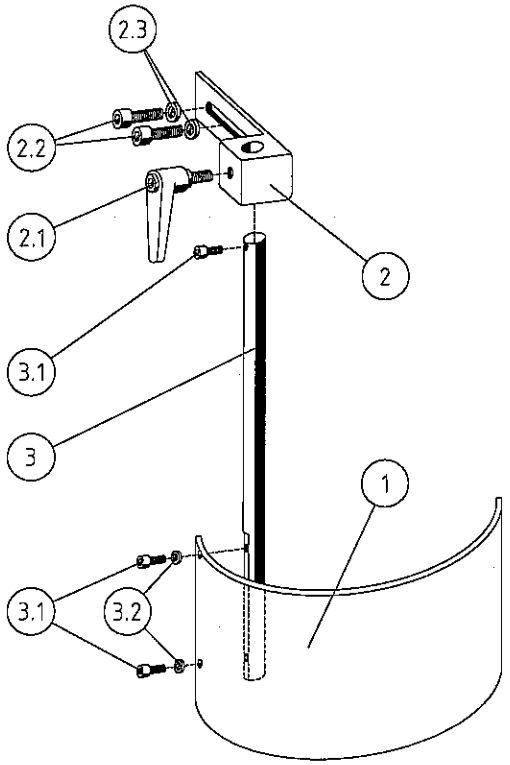
3 Drawing and list of parts

3.1.1 List of parts protective cover with electrical equipment for F1210 E and CC-F1210 E

Part-No.	Pieces	Order-No.	Designation
1	1	11200401	Top lid
2	1	11800005	Circuit board
3	1	11200403	Shroud
4	4	11700001	Countersunk screw
5	4	11700002	Hexagonal nut
6	1	11800001	ON/OFF switch
7	1	11800004	Potentiometer
8	8	11700003	Tapping screw
9	1	11700004	Earthing screw
11	1	11200411	Tool draw-in bolt with thread M10 ***for MT2***
11.1	1	112004111	Tool draw-in bolt with thread M12 ***for MT3 and SK30***
12	1	11800008	Emergency OFF (german)
13	1	11800011	Mains lead with plug and cleat
15	1	11200415	Hexagonal socket key 8 mm ***for MT2***
15.1	1	112004151	Hexagonal socket key 10 mm ***for MT3 and SK30***

3 Drawing and list of parts

3.2 Protective cover
for F1210 E, F1210 E high speed, CC-F1210 E and CC-F1210 E high speed

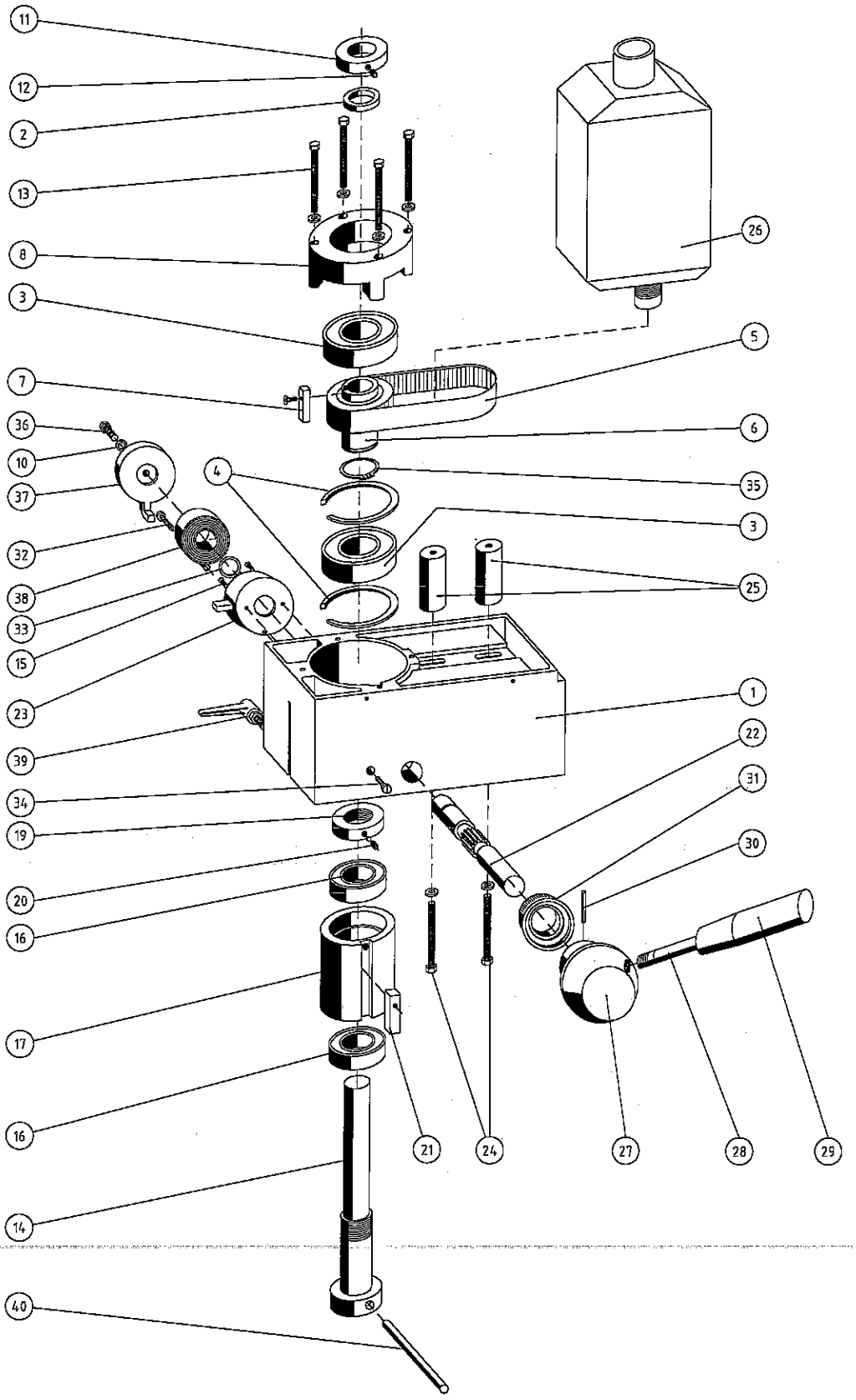


3.2.1 List of parts for protective cover
zu F1210 E, F1200 E high speed, CC-F1210 E und CC-F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11270101	Protective cover
2	1	11270102	Tool holder
2.1	1	11840004	Tool holder
2.2	2	11700031	Screws
2.3	2	11700018	Limpet washer
3	1	11270103	Guide rod
3.1	3	11700026	Screw
3.2	2	11700038	Washer

3 Drawing and list of parts

3.3 Milling head with 1,4 kW motor for F1210 E and CC-F1210 E



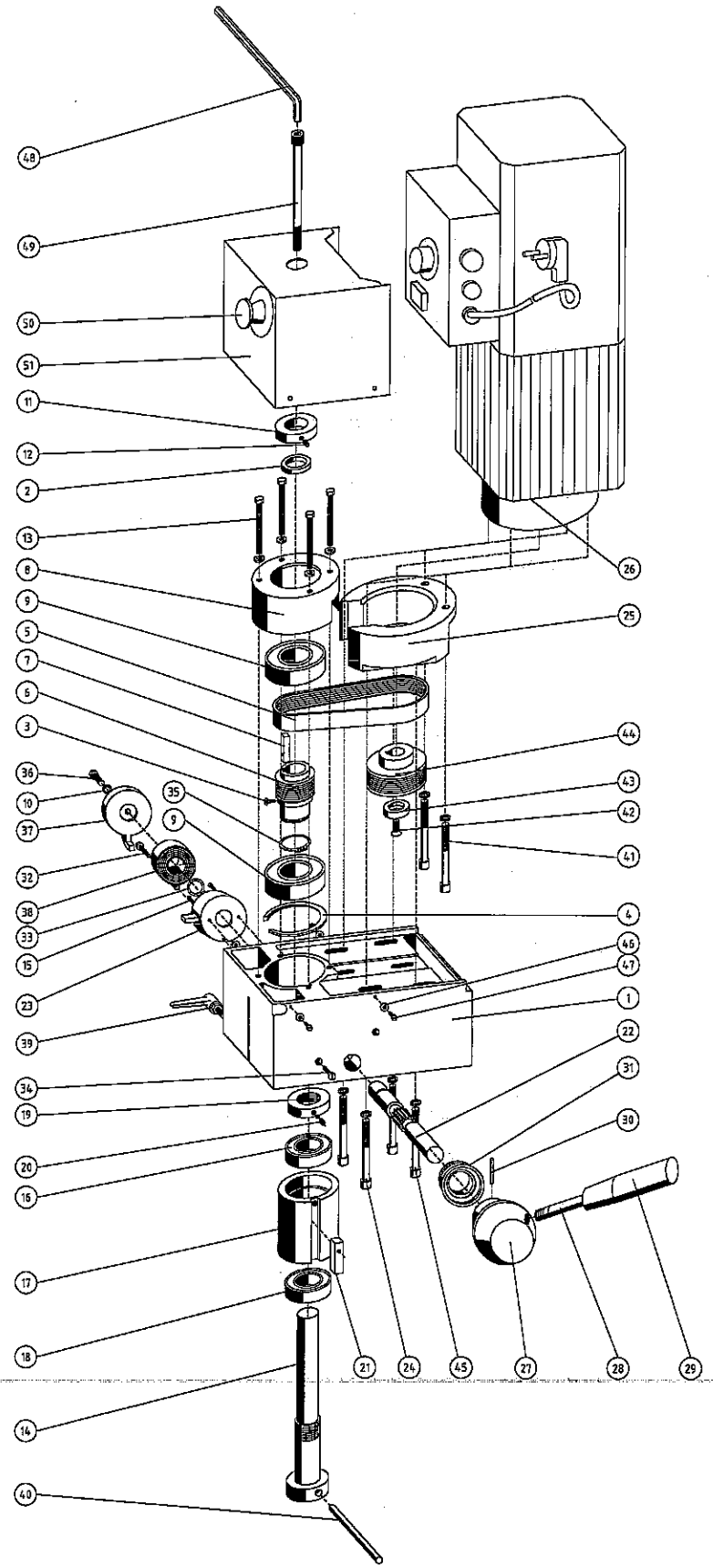
3 Drawing and list of parts

3.3.1 List of parts for milling head with 1,4 kW motor for F1210 E and CC-F1210 E

Part-No.	Pieces	Order-No.	Designation
1	1	11200101	Housing
2	1	11200102	Plastic ring
3	2	11810001	Ball bearing
4	2	11700005	Circlip
5	1	11820001	Drive belt
6	1	11200106	Belt pulley
7	1	11700006	Feather key
8	1	11200108	Bearing flange
10	1	11830001	Limpet washer
11	1	11200111	End of spindle
12	2	11700007	Locking screw
13	4	11700008	Hexagonal socket screws
14	1	11200114	Tool spindle MT2
15	2	11700011	Contersunk screws
16	2	11810002	Ball bearing
17	1	11200117	Quill
19	1	11200119	Nut
20	2	11700009	Locking screw
21	1	11200121	Feather key
22	1	11200122	Pinion
23	1	11200123	Spring attachment
24	2	11700010	Hexagonal socket srew
25	2	11200125	Shim
26	1	11200126	Motor
27	1	11200127	(Wheel) hub
28	1	11200128	Activating lever
29	1	11840001	Handle
30	1	11700016	Spiral clamp pin
31	1	11200131	Graduated collar
32	1	11700004	Cylinder head screw
33	1	11700012	Circlip
34	1	11700013	Hexagonal socket srew
35	1	11700014	Circlip
36	1	11700015	Hexagonal screw
37	1	11200137	Depth stop
38	1	11850001	Spiral spring
39	1	11840002	Clamping lever
40	1	11200140	Assembly pin

3 Drawing and list of parts

3.4 Milling head high speed with 2,0 kW motor for F1210 E high speed and CC-F1210 E high speed



3 Drawing and list of parts

3.4.1 List of parts for milling head high speed with 2,0 kW motor for F1210 E high speed and CC-F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11202101	Housing
2	1	11200102	Plastic ring
3	1	11700011	Flat-headed screw
4	2	11700005	Circlip
5	1	11820002	Drive belt
6	1	11202106	Belt pulley
7	1	11700006	Feather key
8	1	11200108	Bearing flange
9	2	11810001	Ball bearing
10	1	11830001	Limpet washer
11	1	11200111	End of spindle
12	2	11700007	Locking screw
13	4	11700008	Hexagonal socket screws
14	1	11200114	Tool spindle
15	2	11700011	Countersunk screws
16	1	11810002	Ball bearing
17	1	11200117	Quill
18	1	11810002	Ball bearing
19	1	11200119	Nut
20	2	11700009	Locking screw
21	1	11200121	Feather key
22	1	11200122	Pinion
23	1	11200123	Spring attachment
24	2	11700036	Hexagonal socket screw
25	1	11202125	Shim
26	1	11202126	Motor high speed
27	1	11200127	(Wheel) hub
28	1	11200128	Activating lever
29	1	11840001	Handle
30	1	11700016	Spiral clamp pin
31	1	11200131	Graduated collar
32	1	11700004	Cylinder head screw
33	1	11700012	Circlip
34	1	11700013	Hexagonal socket screw
35	1	11700014	Circlip
36	1	11700015	Hexagonal srew
37	1	11200137	Depth stop
38	1	11850001	Spiral spring
39	1	11840002	Clamping lever
40	1	11200140	Assembly pin
41	2	11700037	Hexagonal socket screw
42	1	11700051	Flat-headed screw
43	1	11202143	Thrust washer

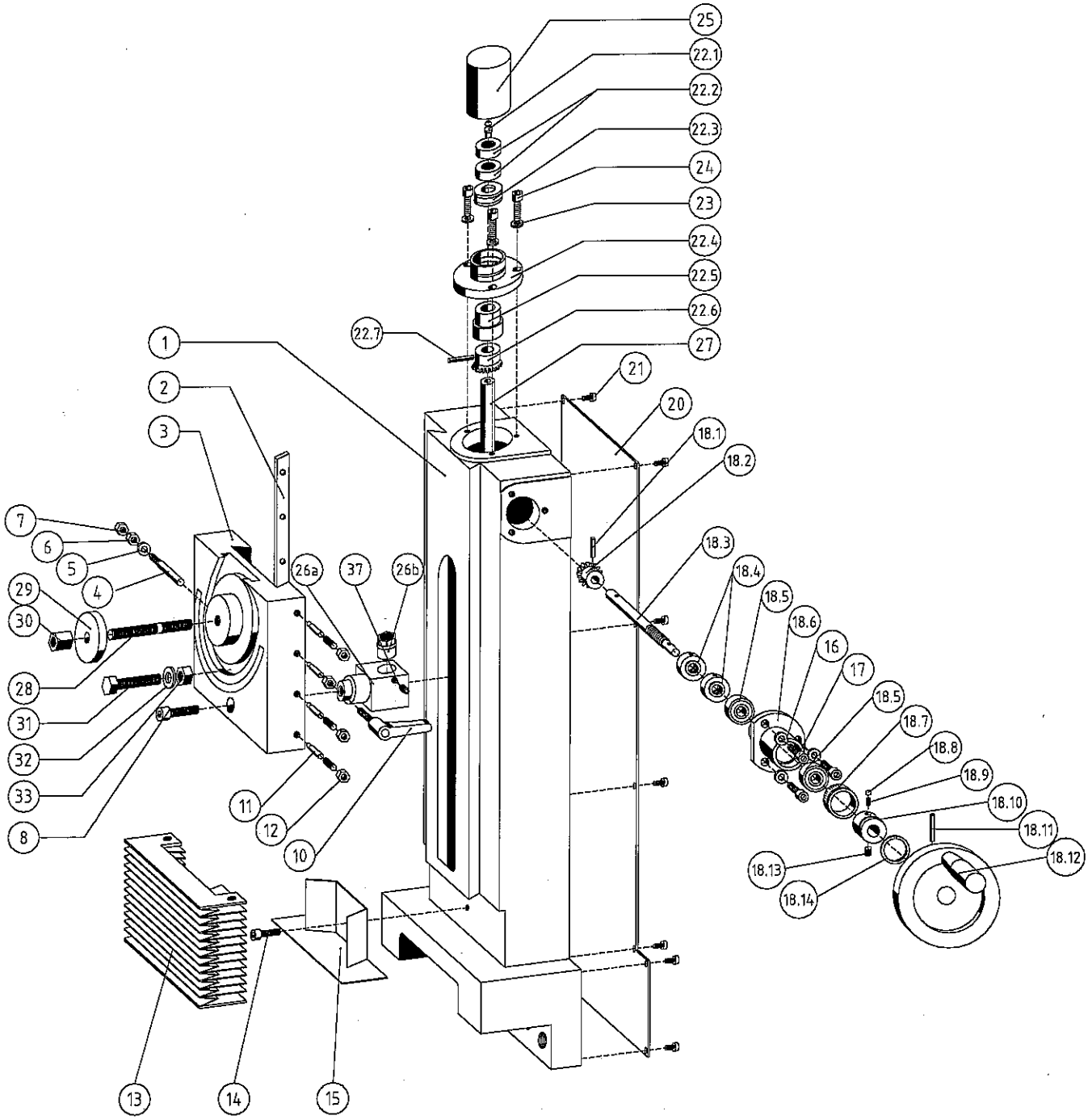
3 Drawing and list of parts

3.4.1 List of parts for milling head high speed with 2,0 kW motor for F1210 E high speed and CC-F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
44	1	11202144	Belt pulley motor
48	1	11200415	Hexagon socket screw key 8 mm ***for MT 2***
48.1	1	112004151	Hexagon socket screw key 10 mm ***for MT3 and SK30***
49	1	11200411	Tool draw-in bolt with thread M10 ***for MT2***
49.1	1	112004111	Tool draw-in bolt with thread M12 ***for MT3 and SK 30***
50	1	11800008	Emergency OFF
51	1	11202151	Protective cover

3 Drawing and list of parts

3.5 Z-Column with vertical slide
for F1210 E and F1210 E high speed



3 Drawing and list of parts

3.5.1 Lists of parts for Z-Column with vertical slide for F1210 E and F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11200301	Stand
2	1	11200302	Adjustable fitting strip
3	1	11200303	Vertical slide
4	1	11700017	Index bolt
5	1	11700018	Limpet washer
6	1	11700019	Hexagonal nut
7	1	11700020	Lock nut
8	1	11700021	Hexagonal socket screw
10	1	11840004	Clamping lever
11	4	11200311	Thrust piece
12	3	11700019	Hexagonal nut
13	1	11860001	Concertina cover
14	1	11700022	Hexagonal socket screw
15	1	11200315	Contertina cover guide
16	3	11700018	Limpet washer
17	3	11700021	Hexagonal socket screw
18	1	11200318	Locking screw
18.1	1	11700023	Spiral clamp pin
18.2	1	112003182	Bevel wheel
18.3	1	112003183	Spindle
18.4	2	112003184	Adusting nut
18.5	2	11810003	Self aligning bearing
18.6	1	112003186	Spindle flange
18.7	1	112003187	Graduated collar
18.8	1	11810004	Ball
18.9	1	11850002	Pressure spring
18.10	1	1120031810	Set collar
18.11	1	11700024	Spiral clamp pin
18.12	1	11840005	Handwheel
18.13	1	11700009	Headless pin
18.14	1	11700025	Circlip
20	1	11200320	Cover plate
21	10	11700026	Hexagonal socket screw
22	1	11200322	Spindle bearing compl.
22.1	1	11810005	Lubricating nipples
22.2	2	112003222	Adjusting nut
22.3	1	11810006	Axial bearing
22.4	1	112003224	Spindle flange
22.5	1	112003225	Liner
22.6	1	112003226	Bevel wheel
22.7	1	11700027	Spiral clamp pin
23	3	11700018	Limpet washer
24	3	11700021	Hexagonal socket screw
25	1	11200325	Covering cap
26a+b	1	11200326	Spindle nut
27	1	11200327	Spindle

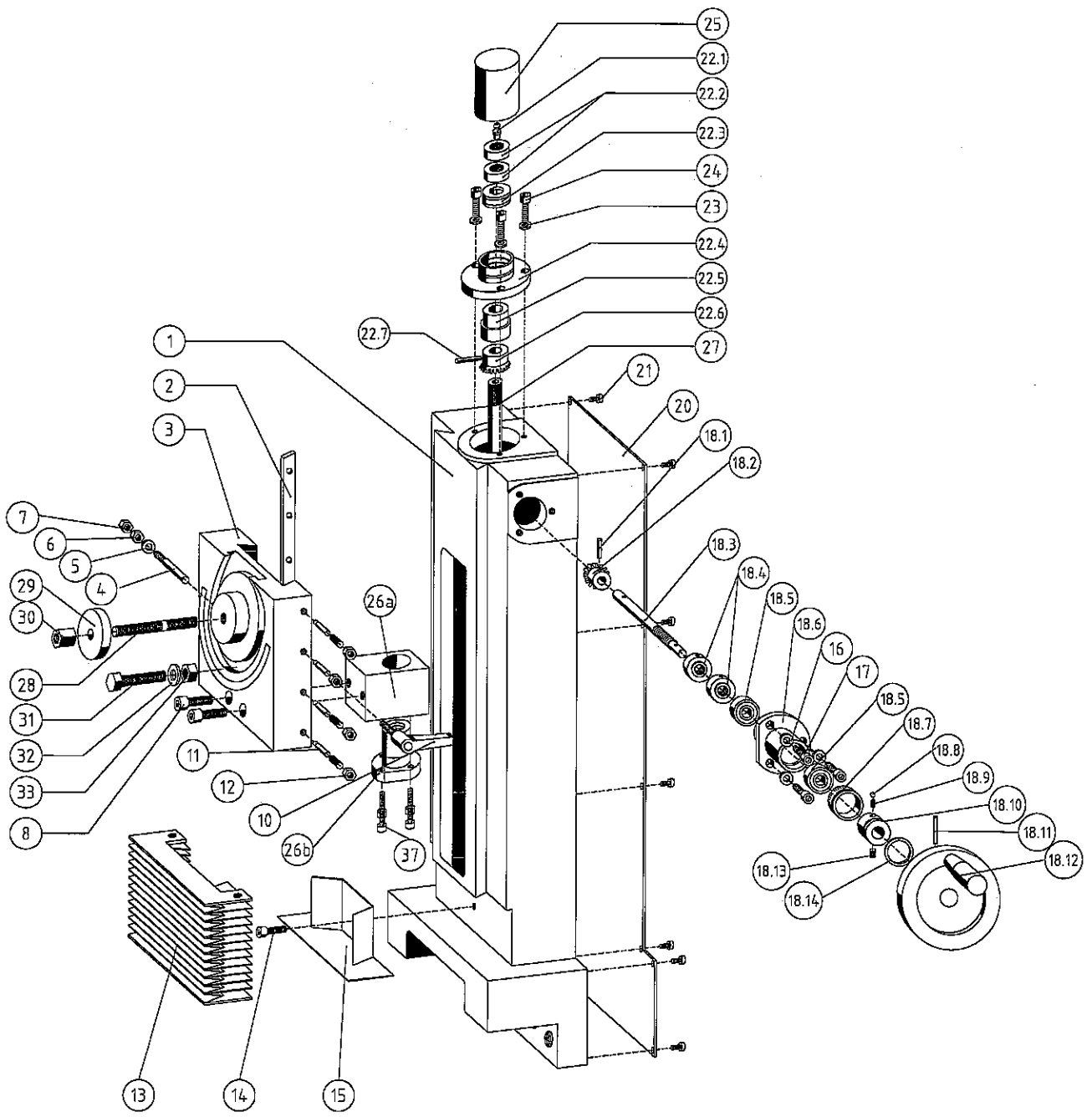
3 Drawing and list of parts

3.5.1 Lists of parts for Z-Column with vertical slide for F1210 E and F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
28	1	11200328	Stud bolt
29	1	11200329	Clamp plate
30	1	11200330	High nut
31	1	11700028	Hexagonal socket screw
32	1	11700029	Limpet washer
33	1	11700030	Hexagonal nut
37	1	11700009	Headless pin

3 Drawing and list of parts

3.6 Z-Column with vertical slide and ball rolling spindle for F1210 E and F1210 E high speed



3 Drawing and list of parts

3.6.1 List of parts for Z-Column with vertical slide and ball rolling spindle for F1210 E and F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11245301	Stand
2	1	11200302	Adjustable fitting strip
3	1	11245303	Vertical slide
4	1	11700017	Index bolt
5	1	11700018	Limpet washer
6	1	11700019	Hexagonal nut
7	1	11700020	Lock nut
8	2	11700041	Hexagonal socket screw
10	1	11840004	Clamping lever
11	4	11200311	Thrust piece
12	3	11700019	Hexagonal nut
13	1	11860001	Concertina cover
14	1	11700022	Hexagonal socket screw
15	1	11200315	Concertina cover guide
16	3	11700018	Limpet washer
17	3	11700021	Hexagonal socket screw
18	1	11245318	Locking screw compl.
18.1	1	11700023	Spiral clamp pin
18.2	1	112003182	Bevel wheel
18.3	1	112003183	Spindle
18.4	2	112003184	Adjusting nut
18.5	2	11810003	Self aligning bearing
18.6	1	112003186	Spindle flange
18.7	1	112453187	Graduated collar
18.8	1	11810004	Ball
18.9	1	11850002	Pressure spring
18.10	1	1120031810	Set collar
18.11	1	11700024	Spiral clamp pin
18.12	1	11840005	Handwheel
18.13	1	11700009	Headless pin
18.14	1	11700025	Circlip
20	1	11200320	Cover plate
21	10	11700026	Hexagonal socket screw
22	1	11245322	Spindle bearing compl.
22.1	1	11810005	Lubricating nipples
22.2	2	112003222	Adjusting nut
22.3	1	11810006	Axial bearing
22.4	1	112003224	Spindle flange
22.5	1	112003225	Liner
22.6	1	112003226	Bevel wheel
22.7	1	11700027	Spiral clamp pin
23	3	11700018	Limpet washer
24	3	11700021	Hexagonal socket screw
25	1	11200325	Covering cap
26a	1	11245326	Nut holder
26b	1	112453261	Spindle nut
27	1	11245327	Ball rolling spindle

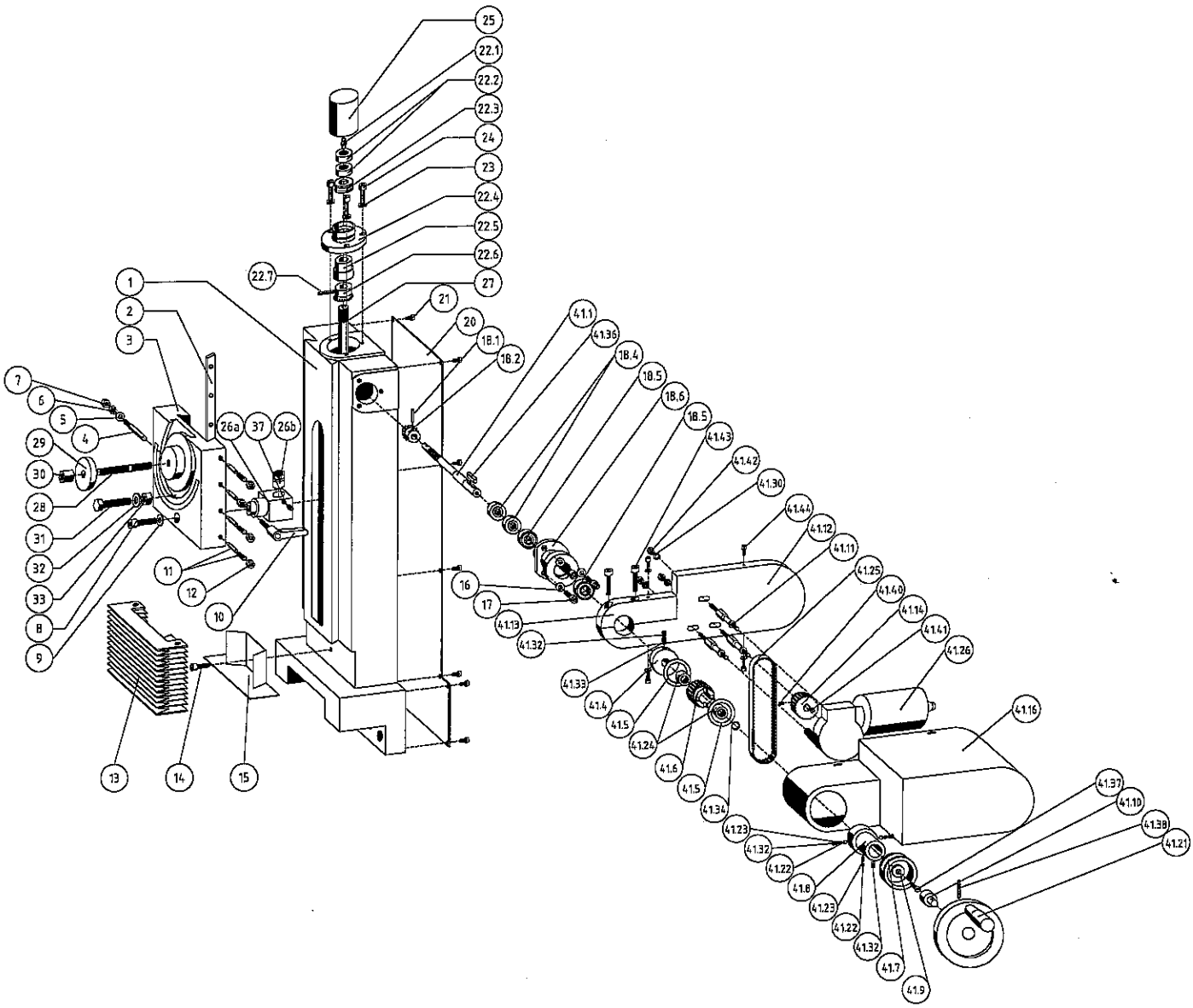
3 Drawing and list of parts

3.6.1 List of parts for Z-Column with vertical slide and ball rolling spindle for F1210 E and F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
28	1	11200328	Stud bolt
29	1	11200329	Clamp plate
30	1	11200330	High nut
31	1	11700028	Hexagonal socket screw
32	1	11700029	Limpet washer
33	1	11700030	Hexagonal nut
37	4	11700039	Hexagonal socket screw

3 Drawing and list of parts

3.7 Z-Column with vertical slide and automatic feed for F1210 E and F1210 E high speed



3 Drawing and list of parts

3.7.1 List of parts for Z-Column with vertical slide and automatic feed for F1210 E and F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11200301	Stand
2	1	11200302	Adjustable fitting strip
3	1	11200303	Vertical slide
4	1	11700017	Index bolt
5	1	11700018	Limpet washer
6	1	11700019	Hexagonal nut
7	1	11700020	Lock nut
8	1	11700021	Hexagonal socket screw
10	1	11840004	Clamping lever
11	4	11200311	Thrust piece
12	3	11700019	Hexagonal nut
13	1	11860001	Concertina cover
14	1	11700022	Hexagonal socket screw
15	1	11200315	Concertina cover guide
16	3	11700018	Limpet washer
17	3	11700021	Hexagonal socket screw
18.1	1	11700023	Spiral clamp pin
18.2	1	112003182	Bevel wheel
18.4	2	112003184	Adjusting nut
18.5	2	11810003	Self aligning bearing
18.6	1	112043186	Spindle flange
20	1	11200320	Cover plate
21	10	11700026	Hexagonal socket screw
22	1	11200322	Spindle bearing compl.
22.1	1	11810005	Lubrication nipples
22.2	2	112003222	Adjusting nut
22.3	1	11810006	Axial bearing
22.4	1	112003224	Spindle flange
22.5	1	112003225	Liner
22.6	1	112003226	Bevel wheel
22.7	1	11700027	Spiral clamp pin
23	3	11700018	Limpet washer
24	3	11700021	Hexagonal socket screw
25	1	11200325	Covering cap
26a+b	1	11200326	Spindle nut
27	1	11200327	Spindle
28	1	11200328	Bolt
29	1	11200329	Clamp plate
30	1	11200330	High nut
31	1	11700028	Hexagonal socket screw
32	1	11700029	Limpet washer
33	1	11700030	Hexagonal nut
37	1	11700009	Headless pin
41.1	1	11204101	Spindle
41.4	1	11204104	Thrust washer
41.5	2	11204105	Flanged wheel

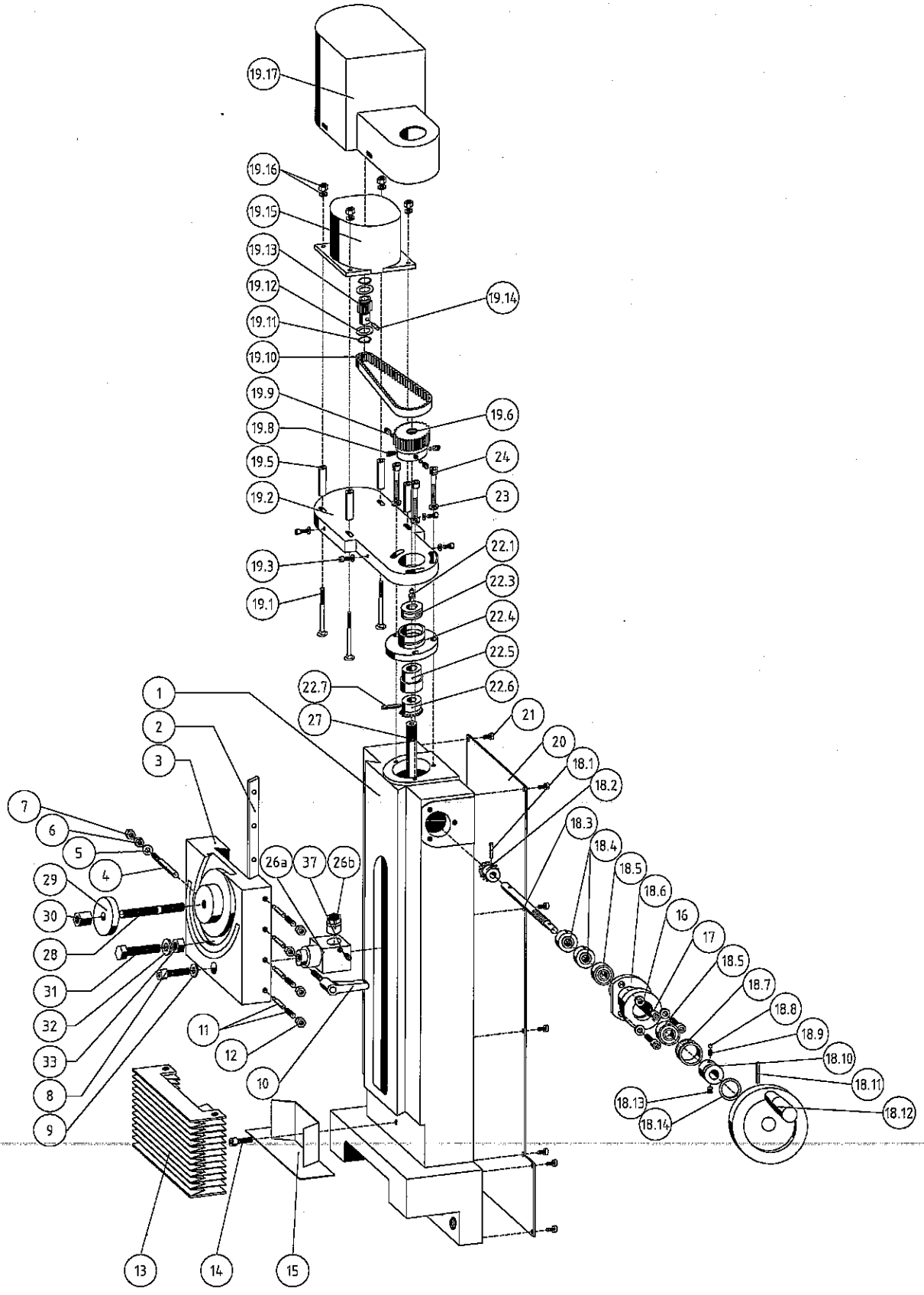
3 Drawing and list of parts

3.7.1 List of parts for Z-Column with vertical slide and automatic feed for F1210 E and F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
41.6	1	11204106	Belt pulley
41.7	1	11204107	Graduated collar
41.8	1	11204108	Coupler
41.9	1	11204109	Connecting plate
41.10	1	11204110	Hand wheel extension
41.11	3	11204111	Stud bolt
41.12	1	11204112	Holder for motor
41.13	1	11204113	Binder motor holder
41.14	1	11204114	Belt pulley
41.16	1	11204116	Protective cover
41.21	1	11840003	Handwheel
41.22	3	11810004	Ball
41.23	4	11850002	Pressure spring
41.24	2	11810008	Roller bearing
41.25	1	11820003	Toothed belt
41.26	1	11800002	D.c. motor
41.30	3	11700018	Limpet washer
41.32	2	11700009	Headless pin
41.33	1	11700007	Headless pin with cone point
41.34	1	11700042	Circlip
41.36	1	11700043	Feather key
41.38	1	11700024	Spiral clamp pin
41.40	1	11700044	Headless pin
41.41	1	11700045	Curved wahser
41.42	3	11700020	Nut
41.43	2	11700046	Hexagonal socket screw
41.44	4	11700026	Hexagonal socket screw

3 Drawing and list of parts

3.8 Z-Column with vertical slide and mounted CNC control for CC-F1210 E and CC-F1210 E high speed



3 Drawing and list of parts

3.8.1 List of parts Z-Column with vertical slide and mounted CNC control for CC-F1210 E and CC-F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11200301	Stand
2	1	11200302	Adjustable fitting strip
3	1	11200303	Vertical slide
4	1	11700017	Index bolt
5	1	11700018	Limpet washer
6	1	11700019	Hexagonal nut
7	1	11700020	Lock nut
8	1	11700021	Hexagonal socket screw
10	1	11840004	Clamping lever
11	4	11200311	Thrust piece
12	3	11700019	Hexagonal nut
13	1	11860001	Concertina cover
14	1	11700022	Hexagonal socket screw
15	1	11200315	Concertina cover guide
16	3	11700018	Limpet washer
17	3	11700021	Hexagonal socket screw
18	1	11200318	Locking screw
18.1	1	11700023	Spiral clamp pin
18.2	1	112003182	Bevel wheel
18.3	1	112003183	Spindle
18.4	2	112003184	Adjusting nut
18.5	2	11810003	Self aligning bearing
18.6	1	112003186	Spindle flange
18.7	1	112003187	Graduated collar
18.8	1	11810004	Ball
18.9	1	11850002	Pressure spring
18.10	1	1120031810	Set collar
18.11	1	11700024	Spiral clamp pin
18.12	1	11840003	Handwheeld
18.13	1	11700009	Headless pin
18.14	1	11700025	Circlip
19.1	4	11700047	Coach bolt
19.2	1	112103192	Motor holder
19.3	4	11700026	Hexagonal socket screw
19.4	4	11700038	Limpet washer
19.5	4	112103195	Spacer block
19.6	1	112103196	Belt pulley
19.8	3	11700009	Headless pin
19.9	3	112103199	Ejector plate
19.10	1	11820003	Toothed belt
19.11	2	11700048	Circlip
19.12	2	1121031912	Flanged wheel
19.13	1	1121031913	Belt pulley
19.14	1	11700049	Spiral clamp pin
19.15.	1	11800003	Step motor
19.16	4	11700050	Hexagonal nut
19.17	1	1121031917	Protective cover

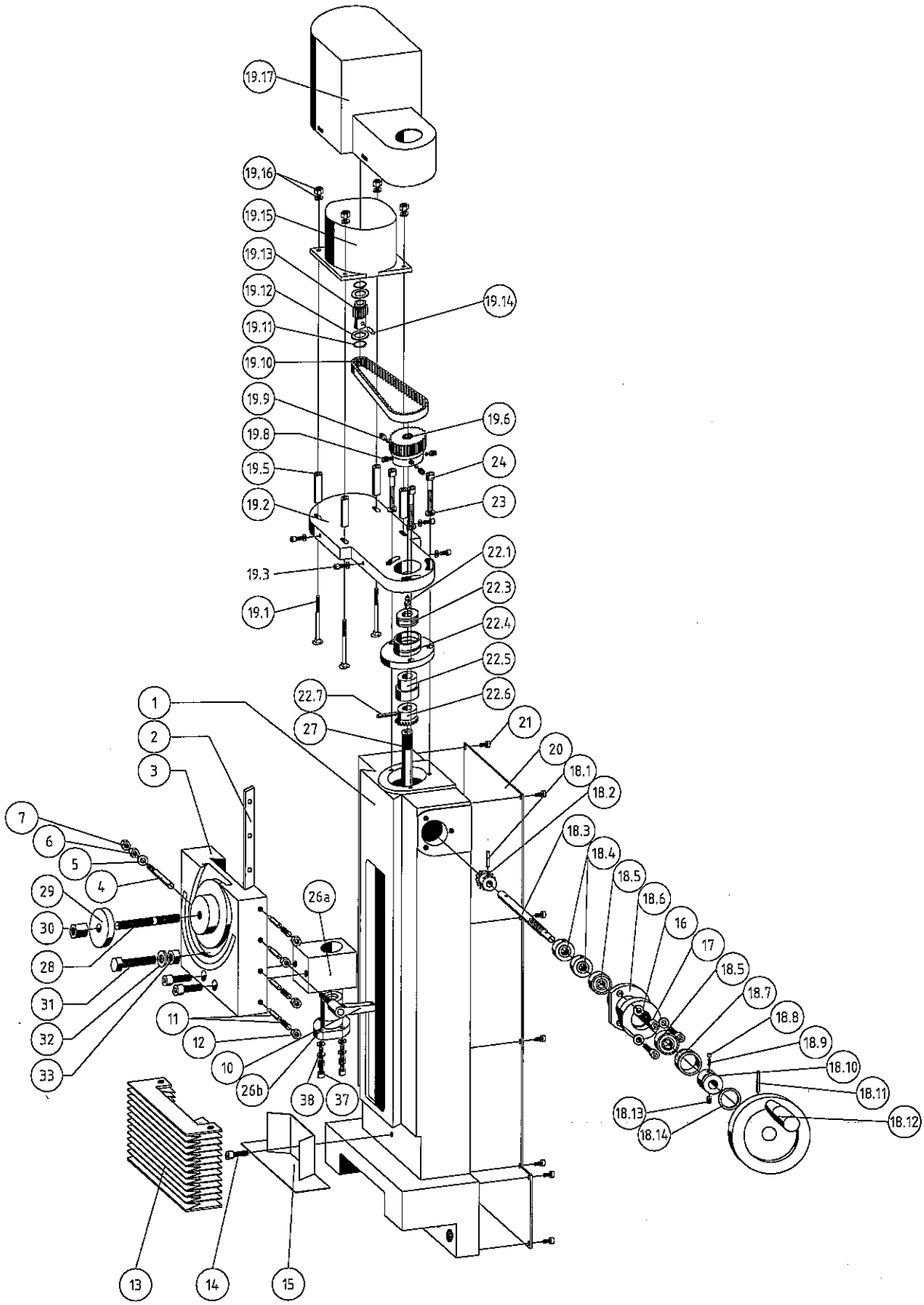
3 Drawing and list of parts

3.8.1 List of parts Z-Column with vertical slide and mounted CNC control for CC-F1210 E and CC-F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
20	1	11200320	Cover plate
21	10	11700026	Hexagonal socket screw
22.1	1	11810005	Lubricating nipples
22.2	2	112003222	Adjusting nut
22.3	1	11810006	Axial bearing
22.4	1	112003224	Spindle flange
22.5	1	112003225	Liner
22.6	1	112003226	Bevel wheel
22.7	1	112003227	Spiral clamp pin
23	3	11700018	Limpet washer
24	3	11700021	Hexagonal socket screw
26a+b	1	11200326	Spindle nut
27	1	11200327	Spindle
28	1	11200328	Stud bolt
29	1	11200329	Clamping plate
30	1	11200330	High nut
31	1	11700028	Hexagonal nut
32	1	11700029	Limpet washer
33	1	11700030	Hexagonal nut
37	1	11700009	Headless pin

3 Drawing and list of parts

3.9 Z-Column with vertical slide and mounted CNC control and ball rolling spindle for CC-F1210 E and CC-F1210 E high speed



3 Drawing and list of parts

3.9.1 List of parts for Z-Column with vertical slide and mounted CNC control and ball rolling spindle for CC-F1210 E and CC-F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11200301	Stand
2	1	11200302	Adjustable fitting strip
3	1	11200303	Vertical slide
4	1	11700017	Index bolt
5	1	11700018	Limpet washer
6	1	11700019	Hexagonal nut
7	1	11700020	Lock nut
8	1	11700021	Hexagonal socket screw
10	1	11840004	Clamping lever
11	4	11200311	Thrust piece
12	3	11700019	Hexagonal nut
13	1	11860001	Concertina cover
14	1	11700022	Hexagonal socket screw
15	1	11200315	Concertina cover guide
16	3	11700018	Limpet washer
17	3	11700021	Hexagonal socket screw
18	1	11200318	Locking screw
18.1	1	11700023	Spiral clamp pin
18.2	1	112003182	Bevel wheel
18.3	1	112003183	Spindle
18.4	2	112003184	Adjusting nut
18.5	2	11810003	Self aligning bearing
18.6	1	112003186	Spindle flange
18.7	1	112003187	Scale ring
18.8	1	11810004	Ball
18.9	1	11850002	Pressure spring
18.10	1	1120031810	Set collar
18.11	1	11700024	Spiral clamp pin
18.12	1	11840003	Handwheel
18.13	1	11700009	Headless pin
18.14	1	11700025	Circlip
19.1	4	11700047	Coach bolt
19.2	1	112103192	Motor holder
19.3	4	11700026	Hexagonal socket screw
19.4	4	11700038	Limpet washer
19.5	4	112103195	Spacer block
19.6	1	112103196	Belt pulley
19.8	3	11700009	Headless pin
19.9	3	112103199	Ejector plate
19.10	1	11820003	Toothed belt
19.11	2	11700048	Circlip
19.12	2	1121031912	Flanged wheel
19.13	1	1121031913	Belt pulley
19.14	1	11700049	Spiral clamp pin
19.15.	1	11800003	Step motor
19.16	4	11700050	Hexagonal nut
19.17	1	1121031917	Protective cover

3 Drawing and list of parts

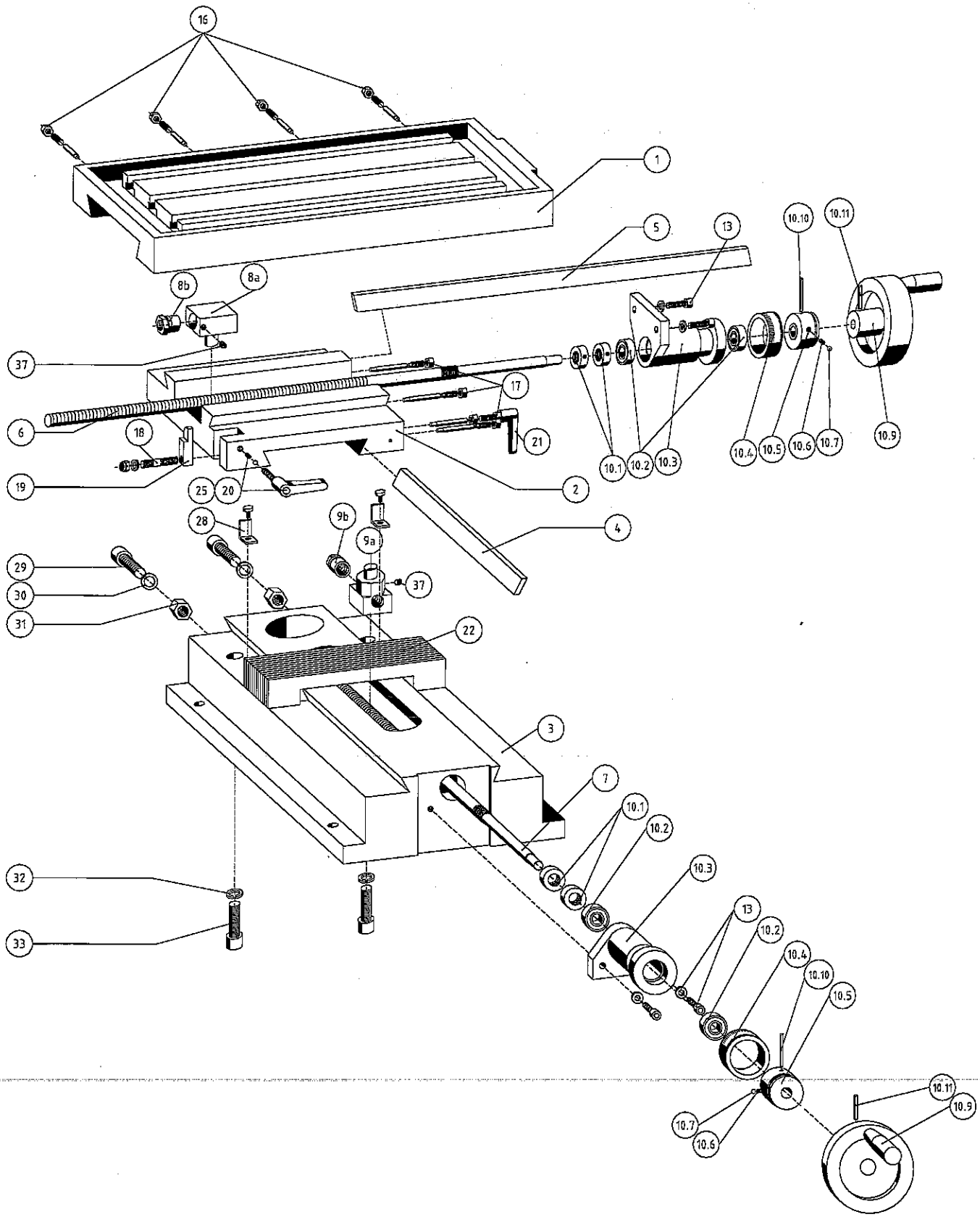
3.9.1 List of parts for Z-Column with vertical slide and mounted CNC control and ball rolling spindle for CC-F1210 E and CC-F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
20	1	11200320	Cover plate
21	10	11700026	Hexagonal socket screw
22.1	1	11810005	Lubricating nipples
22.2	2	112003222	Adjusting nut
22.3	1	11810006	Axial bearing
22.4	1	112003224	Spindle flange
22.5	1	112003225	Liner
22.6	1	112003226	Bevel wheel
22.7	1	112003227	Spiral clamp pin
23	3	11700018	Limpet washer
24	3	11700021	Hexagonal socket screw
26a	1	11254326	Nut holder
26b	1	112453261	Ball rolling nut
27	1	11245327	Ball rolling spindle
28	1	11200328	Stud bolt
29	1	11200329	Clamping plate
30	1	11200330	High nut
31	1	11700028	Hexagonal nut
32	1	11700029	Limpet washer
33	1	11700030	Hexagonal nut
37	1	11700009	Headless pin

3 Drawing and list of parts

3.10 Cross table

for F1210 E and F1210 E high speed



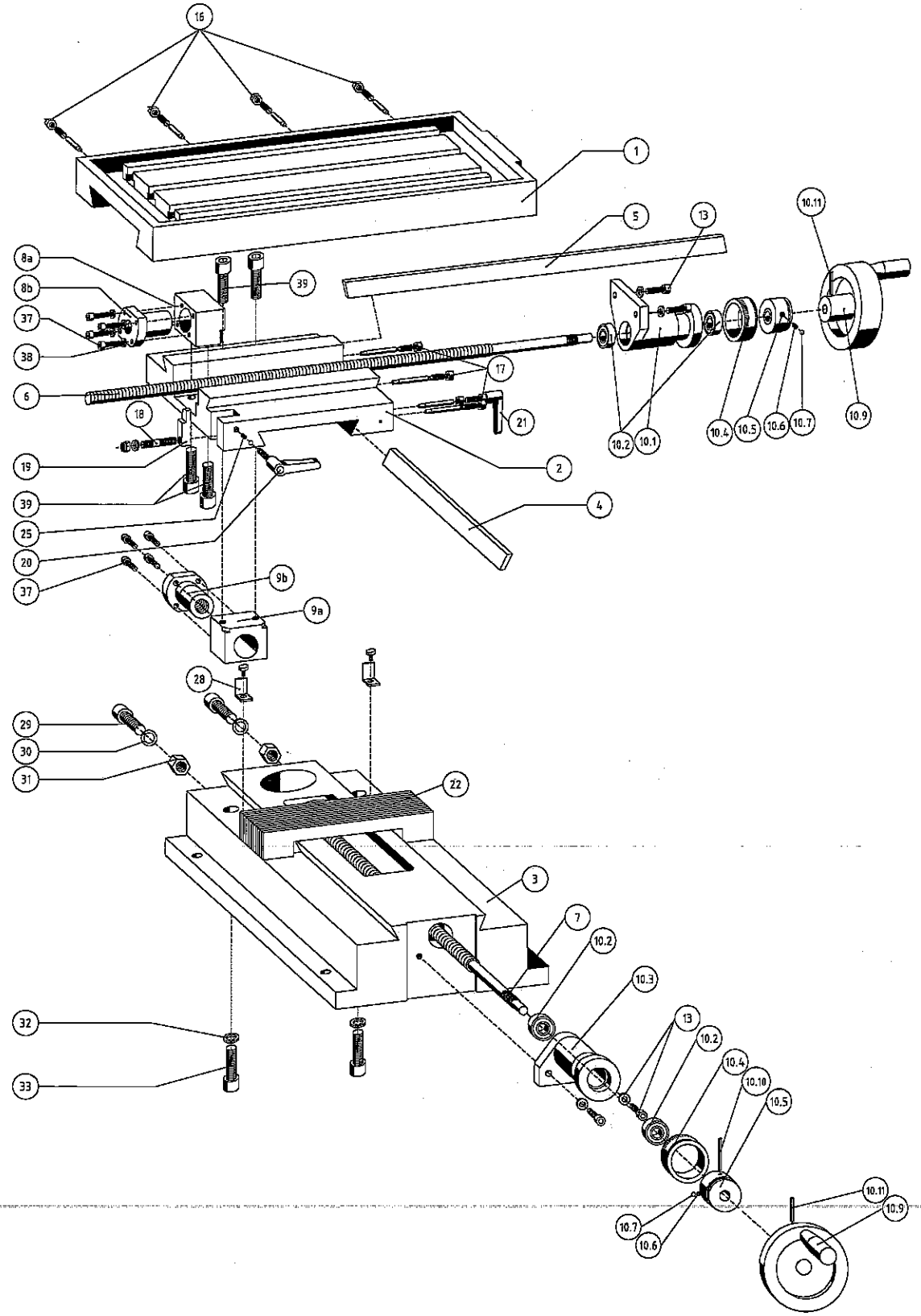
3 Drawing and list of parts

3.10.1 List of parts for cross table for F1210 E and F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11200201	Top slide
2	1	11200202	Compound slide rest
3	1	11200203	Base plate
4	1	11200204	Adjusting strip
5	1	11200205	Adjusting strip
6	1	11200206	Thread spindle ***X-axis***
7	1	11200207	Thread spindle ***Y-axis***
8 a+b	1	11200208	Nut
9 a+b	1	11200209	Nut
10	1	11200210	Spindle bearing compl. with spindle ***X-axis***
10.1	4	112002101	Adjusting nut
10.2	4	11810007	Ball bearing
10.3	2	112002103	Spindle bearing
10.4	2	112002104	Graduated collar
10.5	2	112002105	Set collar
10.6	4	11850002	Pressure spring
10.7	2	11810004	Ball
10.9	2	11840005	Handwheel
10.10	2	11700009	Double-end stud
10.11	2	11700024	Spiral clamp pin
11	1	11200211	Spindle bearing compl. with spindle ***Y-axis***
13	4	11700031	Hexagonal socket screw
16	4	11700019	Hexagonal nut
17	3	11700019	Hexagonal nut
18	1	11700032	Stud bolt
19	1	11200219	Clamping piece
20	1	11840006	Clamp lever
21	1	11840004	Clamp lever
22	1	11860002	Concertina cover
25	1	11850003	Pressure spring
28	2	11200228	Angle of aluminium
29	2	11700033	Hexagonal socket screw
30	2	11700034	Spring lock washer
31	2	11700035	Hexagonal nut
32	2	11700034	Spring lock washer
33	2	11700033	Hexagonal socket screw
37	2	11700009	Headless pin

3 Drawing and list of parts

3.11 Cross table with ball rolling spindles for F1210 E and F1210 E high speed



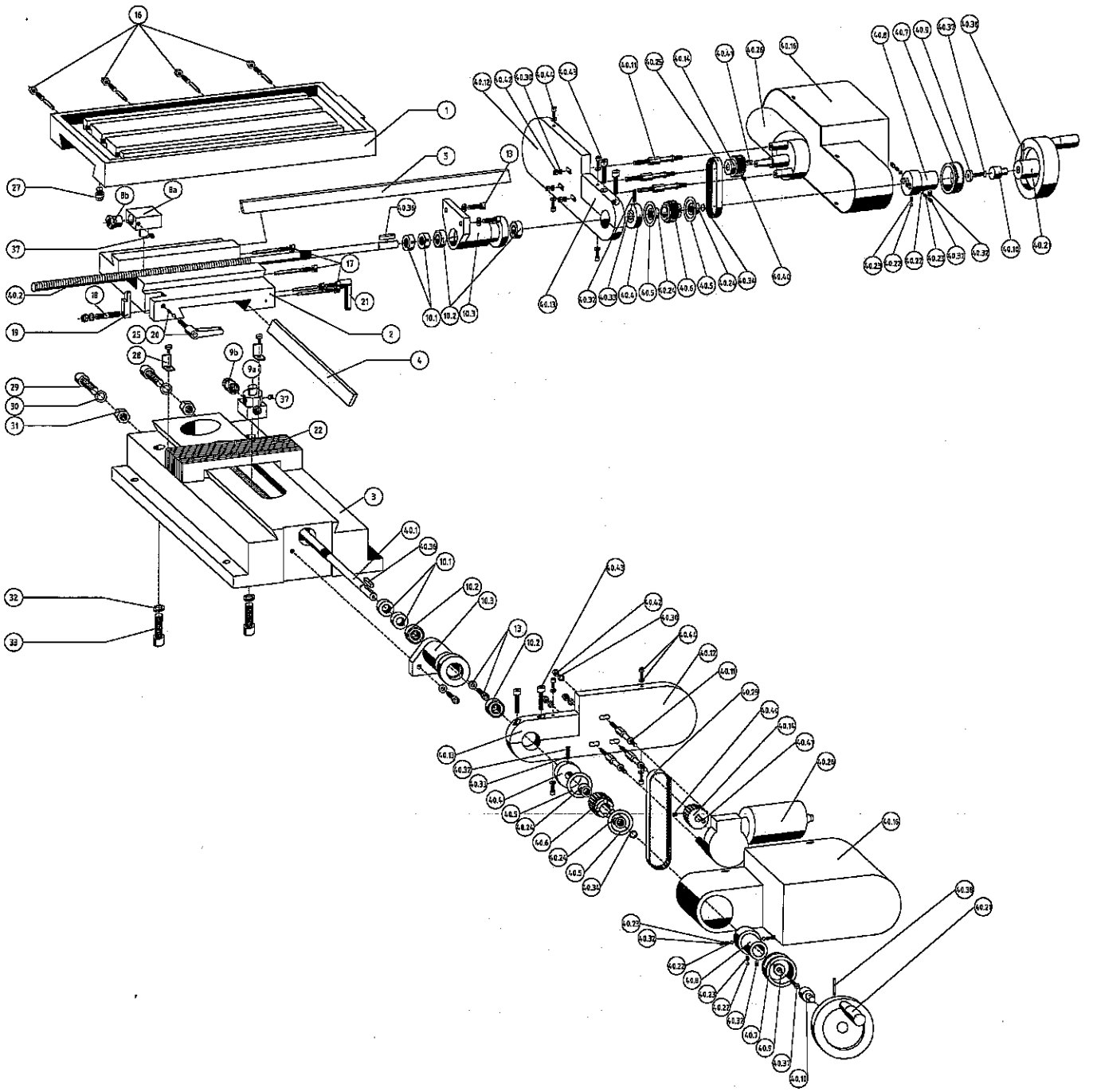
3 Drawing and list of parts

3.11.1 List of parts for cross table with ball rolling spindles for F1210 E and F1210 E high speed

Part-No.	pieces	Order-No.	Designation
1	1	11200201	Top slide
2	1	11245202	Compound slide rest
3	1	11245203	Base plate
4	1	11200204	Adjusting strip
5	1	11200205	Adjusting strip
6	1	11245206	Ball rolling spindle
7	1	11245207	Ball rolling spindle
8 a	1	11245208	Nut holder
8 b	1	112452081	Ball rolling nut ***X-axis***
9 a	1	11245209	Nut holder
9 b	1	112452091	Ball rolling nut ***Y-axis***
10	1	11245210	Spindle bearing compl. with spindle ***X-axis***
10.1	1	11245211	Spindle bearing ***X-axis***
10.2	4	11810007	Ball bearing
10.3	1	112002103	Spindle bearing ***Y-axis***
10.4	2	112002104	Graduated collar
10.5	2	112002105	Set collar
10.6	4	11850002	Pressure spring
10.7	2	11810004	Ball
10.9	2	11840005	Handwheel
10.10	4	11700009	Double-end stud
10.11	2	11700024	Spiral clamp pin
11	1	11245211	Spindle bearing compl. with spindle ***Y-axis***
13	4	11700031	Hexagonal socket screw
16	4	11700019	Hexagonal nut
17	3	11700019	Hexagonal nut
18	1	11700032	Stud bolt
19	1	11200219	Clamping piece
20	1	11840006	Clamp lever
21	1	11840004	Clamp lever
22	1	11860002	Concertina cover
25	1	11850003	Pressure spring
28	2	11200228	Angle of aluminium
29	2	11700033	Hexagonal socket screw
30	2	11700034	Spring lock washer
31	2	11700035	Hexagonal nut
32	2	11700034	Spring lock washer
33	2	11700033	Hexagonal socket screw
37	8	11700039	Hexagonal socket screw
39	4	11700040	Hexagonal socket screw

3 Drawing and list of parts

3.12 Cross table with automatic feed for F1210 E and F1210 E high speed



3 Drawing and list of parts

3.12.1 List of parts for cross table with automatic feed for F1210 E and F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11200201	Top slide
2	1	11200202	Compound slide rest
3	1	11200203	Base plate
4	1	11200204	Adjusting strip
5	1	11200205	Adjusting strip
8 a+b	1	11200208	Nut
9 a+b	1	11200209	Nut
10.1	4	112002101	Adjusting nut
10.2	4	11810007	Ball bearing
10.3	2	112002103	Spindle bearing
13	4	11700031	Hexagonal socket screw
16	4	11700019	Hexagonal nut
17	3	11700019	Hexagonal nut
18	1	11700032	Stud bolt
19	1	11200219	Clamping piece
20	1	11840006	Clamping lever
21	1	11840004	Clamping lever
22	1	11860002	Concertina cover
25	1	11850003	Pressure spring
28	2	11200228	Angle of aluminium
29	2	11700033	Hexagonal socket screw
30	2	11700034	Spring lock washer
31	2	11700035	Hexagonal nut
32	2	11700034	Spring lock washer
33	2	11700033	Hexagonal socket screw
37	2	11700009	Headless pin
40.1	1	11204001	Spindle
40.2	1	11204002	Spindle
40.4	2	11204003	Thrust wahser
40.5	4	11204004	Flanged wheel
40.6	2	11204006	Belt pulley
40.7	2	11204007	Scale ring
40.8	2	11204008	Coupler
40.9	2	11204009	Connecting plate
40.10	2	11204010	Hand wheel extension
40.11	6	11204011	Stud bolt
40.12	2	11204012	Holder for motor
40.13	2	11204013	Binder motor holder
40.14	2	11204014	Belt pulley
40.16	2	11204016	Protective cover
40.21	2	11204021	Handwheel
40.22	6	11204022	Ball

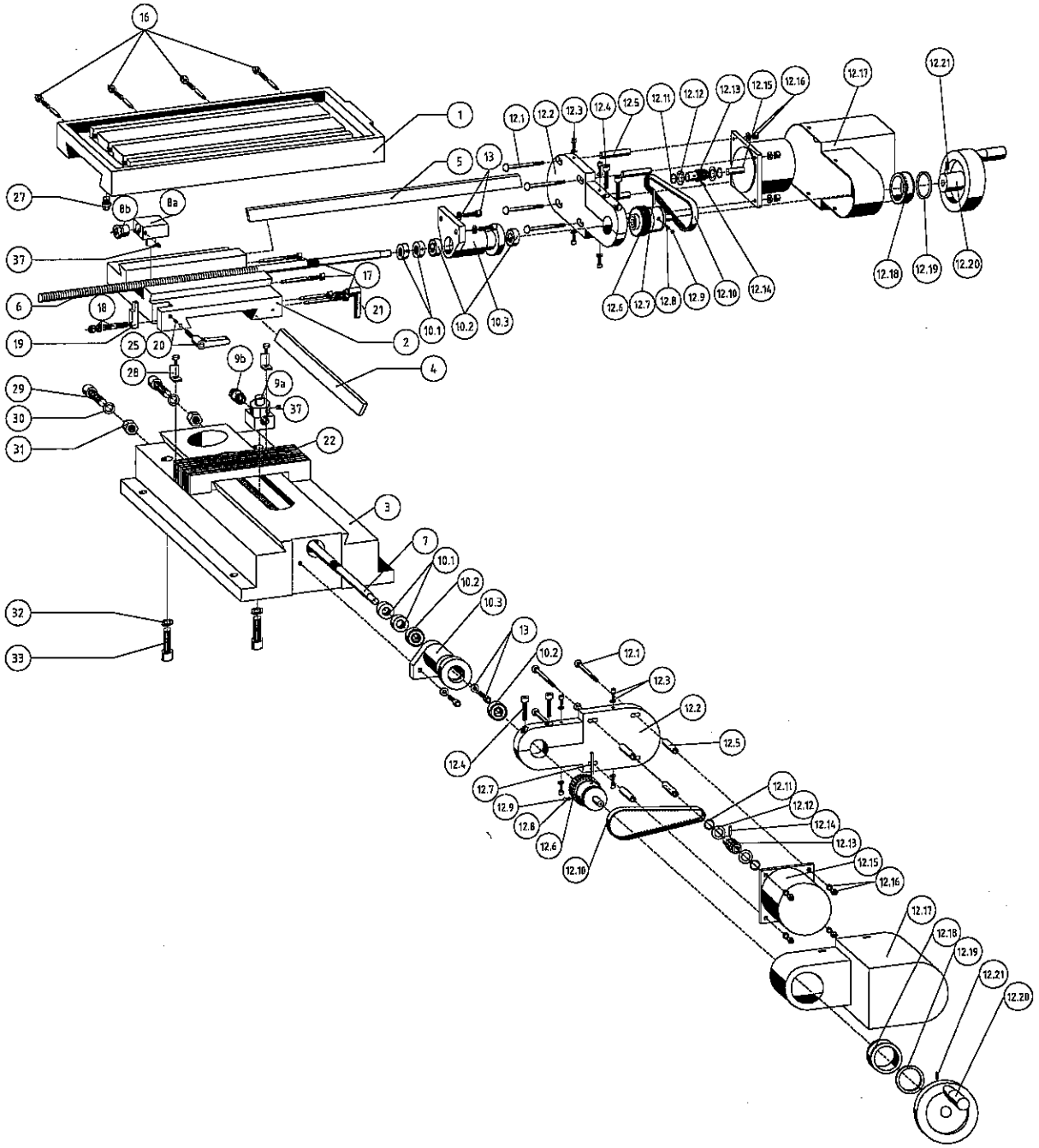
3 Drawing and list of parts

3.12.1 List of parts for cross table with automatic feed for F1210 E and F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
40.23	6	11204023	Pressure spring
40.24	4	11204024	Needle bearing
40.25	2	11204025	Toothed belt
40.26	2	11204026	Motor
40.30	6	11204030	Limpet washer
40.32	8	11204032	Headless pin
40.33	2	11204033	Headless pin with cone point
40.34	2	11204034	Lock ring
40.36	2	11204036	Feather key
40.37	2	11204037	Flat-headed screw
40.38	2	11204038	Spiral clamp pin
40.40	2	11204040	Headless pin
40.41	2	11204041	Curved washer
40.42	6	11204042	Nut
40.43	4	11204043	Hexagonal socket screw
40.44	8	11204044	Hexagonal socket screw

3 Drawing and list of parts

3.13 Cross table and mounted CNC control for CC-F1210 E and CC-F1210 E high speed



3 Drawing and list of parts

3.13.1 List of parts for cross table and mounted CNC control for CC-F1210 E and CC-F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11200201	Top slide
2	1	11200202	Compound slide rest
3	1	11200203	Base plate
4	1	11200204	Adjusting strip
5	1	11200205	Adjusting strip
6	1	11200206	Thread spindle ***X-axis***
7	1	11200207	Thread spindle ***Y-axis***
8 a+b	1	11200208	Nut
9 a+b	1	11200209	Nut
10	1	11200210	Spindle bearing compl. with spindle
10.1	4	112002101	Adjusting nut
10.2	4	11810007	Ball bearing
10.3	2	112002103	Spindle bearing
12.1	8	11700047	Screw
12.2	2	112102122	Holder for motor
12.3	8	11700026	Hexagonal socket screw
12.4	4	11700046	Hexagonal socket screw
12.5	8	112102125	Spacer block
12.6	2	112102126	Belt pulley
12.7	2	11700024	Spiral clamp pin
12.8	4	11850002	Pressure spring
12.9	2	11810004	Ball
12.10	2	11820003	Toothed belt
12.11	4	11700048	Lock ring
12.12	4	1121021212	Flanged wheel
12.13	2	1121021213	Belt pulley
12.14	2	11700049	Spiral clamp pin
12.15	2	11800003	Step motor
12.16	8	11700050	Nut
12.17	2	1121021217	Protective cover
12.18	2	1121021218	Scale ring
12.20	2	11840003	Handwheel
12.21	2	11700024	Headless pin
13	4	11700031	Hexagonal socket screw
16	4	11700019	Hexagonal nut
17	3	11700019	Hexagonal nut
18	1	11700032	Stud bolt
19	1	11200219	Clamping piece
20	1	11840006	Clamping lever
21	1	11840004	Clamping lever
22	1	11860002	Concertina cover

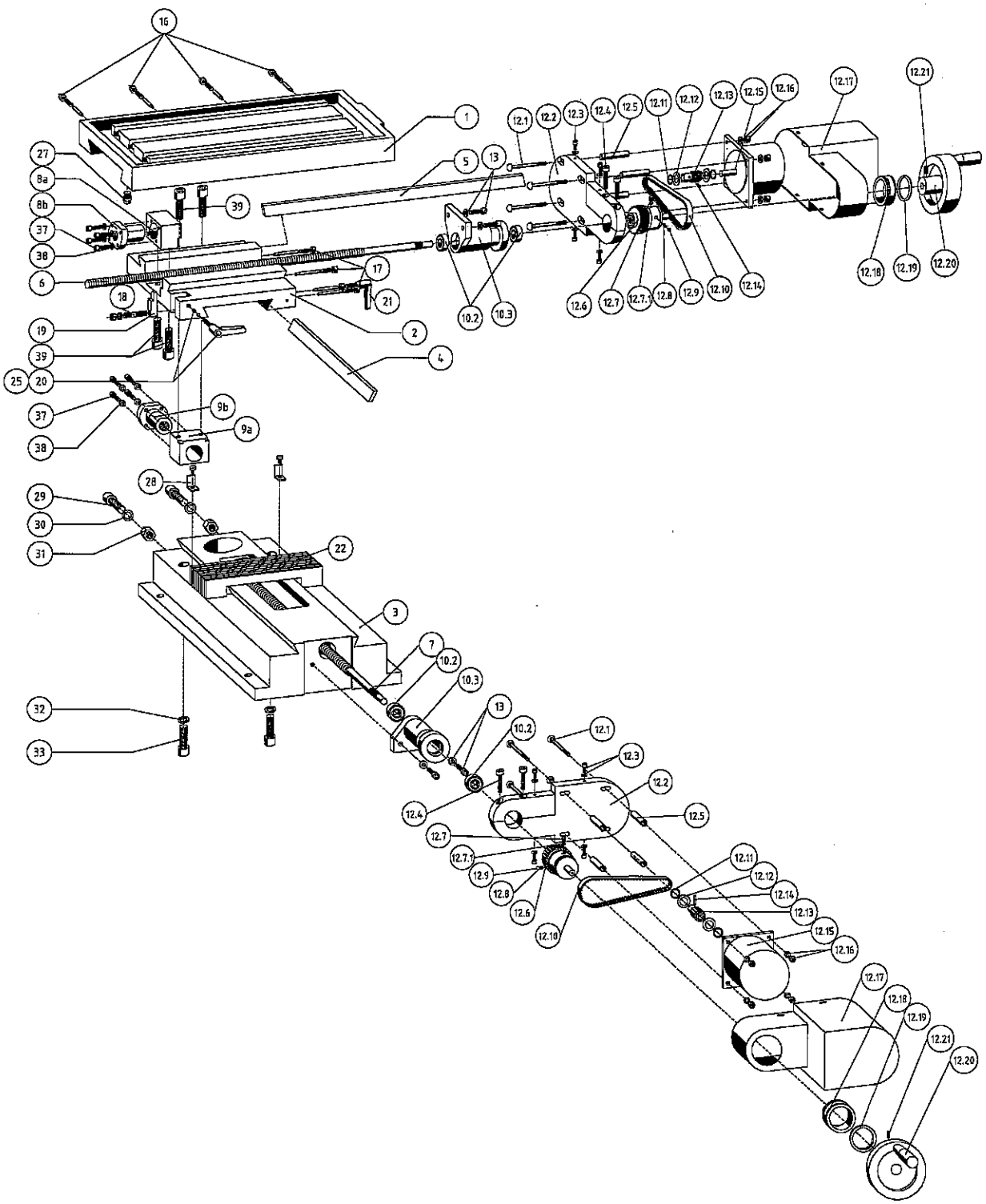
3 Drawing and list of parts

3.13.1 List of parts for cross table and mounted CNC control for CC-F1210 E and CC-F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
25	1	11850003	Pressure spring
28	2	11200228	Angle of aluminium
29	2	11700033	Hexagonal socket screw
30	2	11700034	Spring lock washer
31	2	11700035	Hexagonal nut
32	2	11700034	Spring lock washer
33	2	11700033	Hexagonal socket screw
37	2	11700009	Headless pin

3 Drawing and list of parts

3.14 Cross table and mounted CNC control with ball rolling spindles for CC-F1210 E and CC-F1210 E high speed



3 Drawing and list of parts

3.14.1 List of parts for cross table and mounted CNC control with ball rolling spindles

for CC-F1210 E and CC-F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11200201	Top slide
2	1	11245202	Compound slide rest
3	1	11245203	Base plate
4	1	11200204	Adjusting strip
5	1	11200205	Adjusting strip
6	1	11245206	Ball rolling spindle
7	1	11245207	Ball rolling spindle
8 a	1	11245208	Nut holder
8 b	1	112452081	Ball rolling nut ***X-axis***
9 a	1	11245209	Nut holder
9 b	1	112452091	Ball rolling nut ***Y-axis***
10.1	1	11245211	Spindle bearing ***X-axis***
10.2	4	11810007	Ball bearing
10.3	1	112002103	Spindle bearing ***Y-axis***
12.1	8	11700047	Screw
12.2	2	112102122	Holder for motor
12.3	8	11700026	Hexagonal socket screw
12.4	4	11700046	Hexagonal socket screw
12.5	8	112102125	Spacer block
12.6	2	112102126	Belt pulley
12.8	4	11850002	Pressure spring
12.9	2	11810004	Ball
12.10	2	11820003	Toothed belt
12.11	4	11700048	Lock ring
12.12	4	1121021212	Flanged wheel
12.13	2	1121021213	Belt pulley
12.14	2	11700049	Spiral clamp pin
12.15	2	11800003	Step motor
12.16	8	11700050	Nut
12.17	2	1121021217	Protective cover
12.18	2	1121021218	Scale ring
12.20	2	11840003	Handwheel
12.21	2	11700024	Headless pin
13	4	11700031	Hexagonal socket screw
16	4	11700019	Hexagonal nut
17	3	11700019	Hexagonal nut
18	1	11700032	Stud bolt
19	1	11200219	Clamping piece
20	1	11840006	Clamping lever
21	1	11840004	Clamping lever
22	1	11860002	Concertina cover

3 Drawing and list of parts

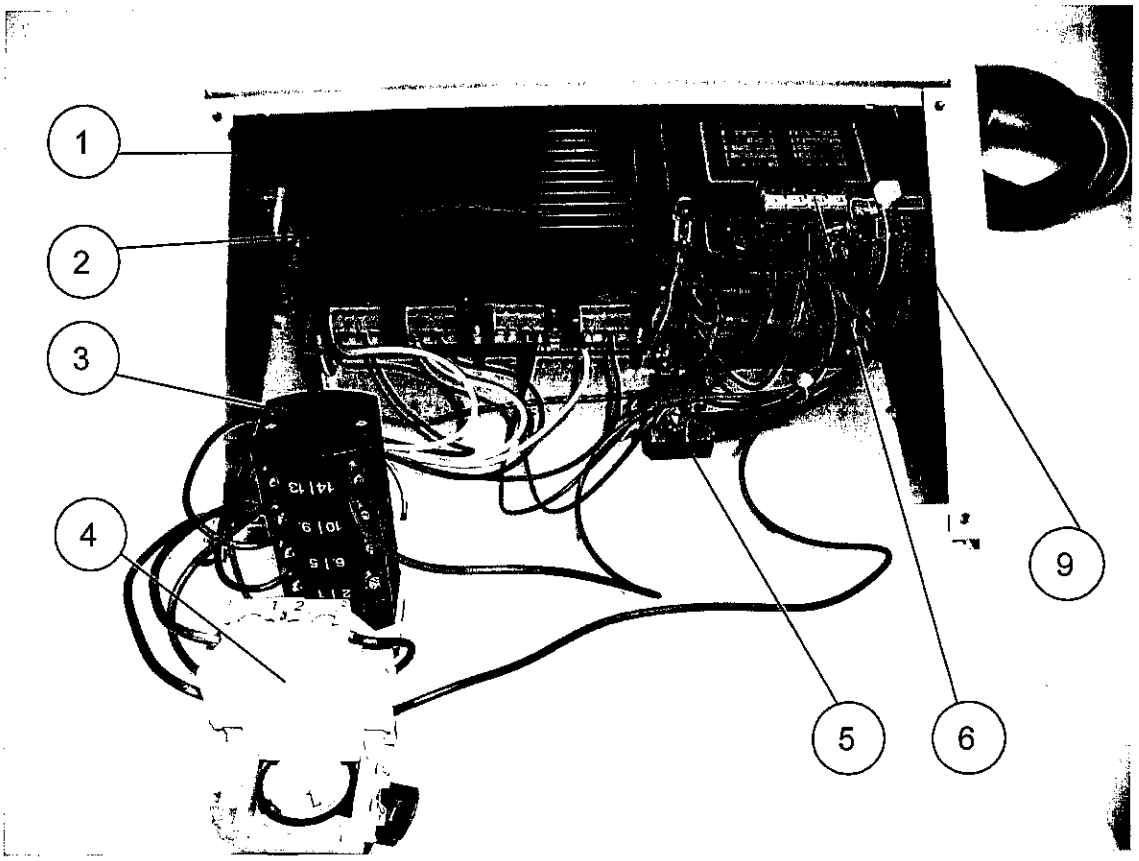
3.14.1 List of parts for cross table and mounted CNC control with ball rolling spindles

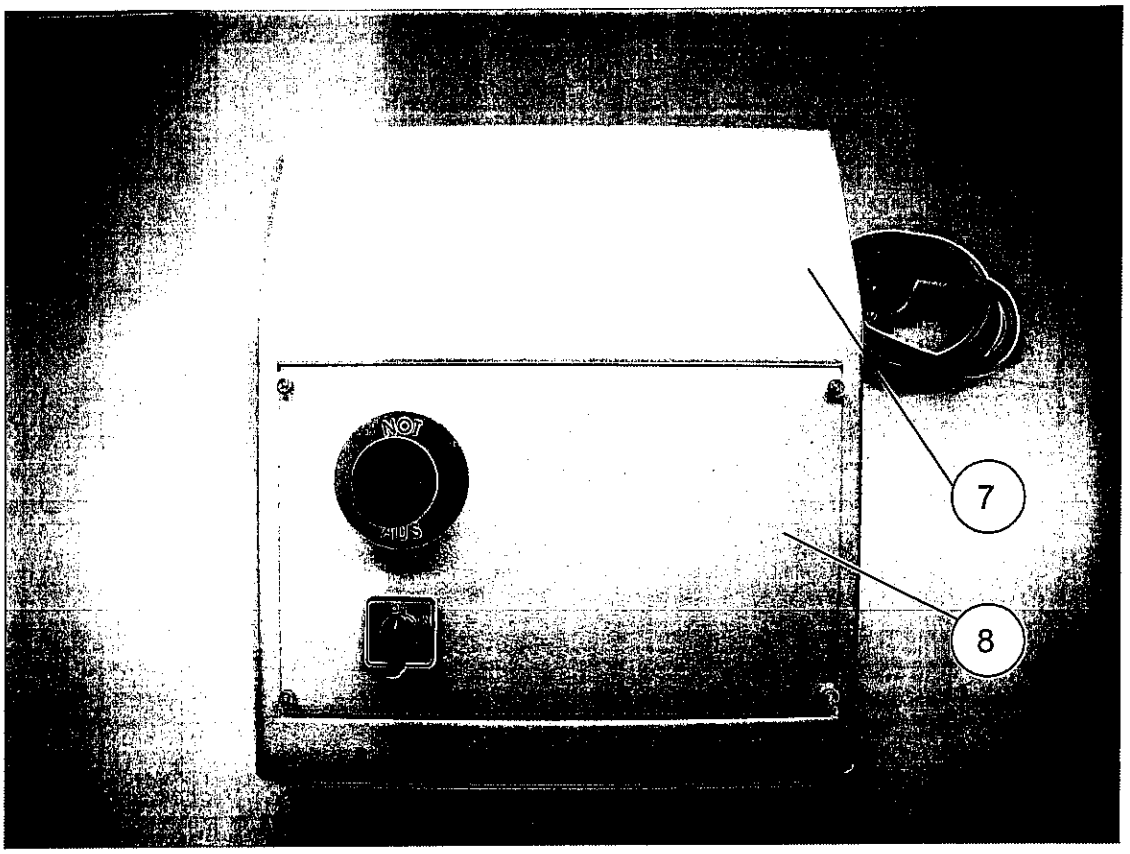
for CC-F1210 E and CC-F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
25	1	11850003	Pressure spring
28	2	11200228	Angle of aluminium
29	2	11700033	Hexagonal socket screw
30	2	11700034	Spring lock washer
31	2	11700035	Hexagonal nut
32	2	11700034	Spring lock washer
33	2	11700033	Hexagonal socket screw
37	8	11700039	Adjusting screw
39	4	11700040	Screw

3 Drawing and list of parts

3.15 Control unit
for CC-F1210 E and CC-F1210 E high speed





3 Drawing and list of parts

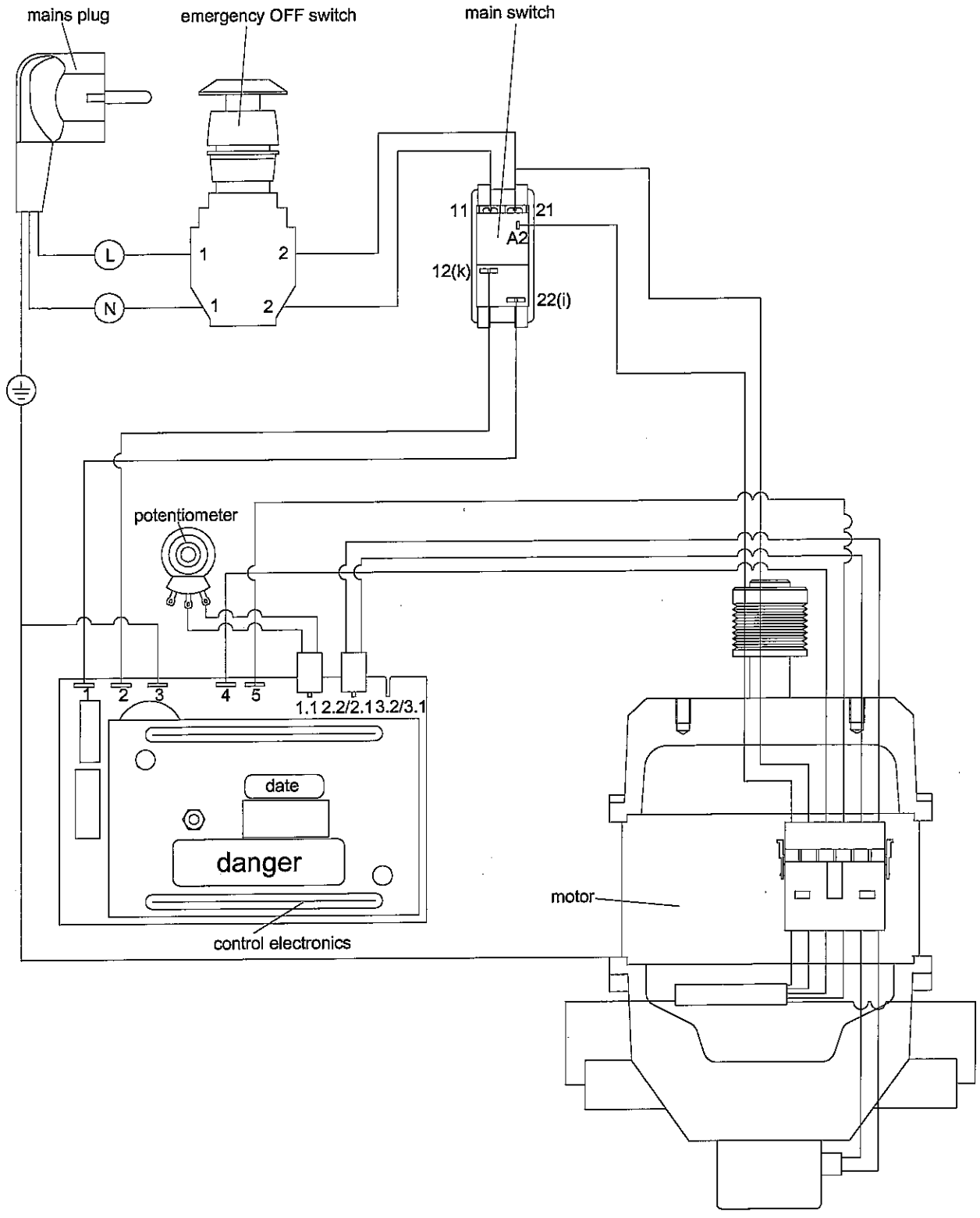
3.15.1 List of parts for control unit for CC-F1210 E and CC-F1210 E high speed

Part-No.	Pieces	Order-No.	Designation
1	1	11200501	Ventilator
2	1	11800009	Control board
3	1	11800010	ON-OFF switch
4	1	11800008	Emergency OFF
5	1	11800012	Rectifier
6	1	11800013	Transformer
7	1	11200507	Casing
8	1	11200508	Top lid
9	1	11800013	Transformer

4 Circuit diagram

4.1 Motor 1,4 kW

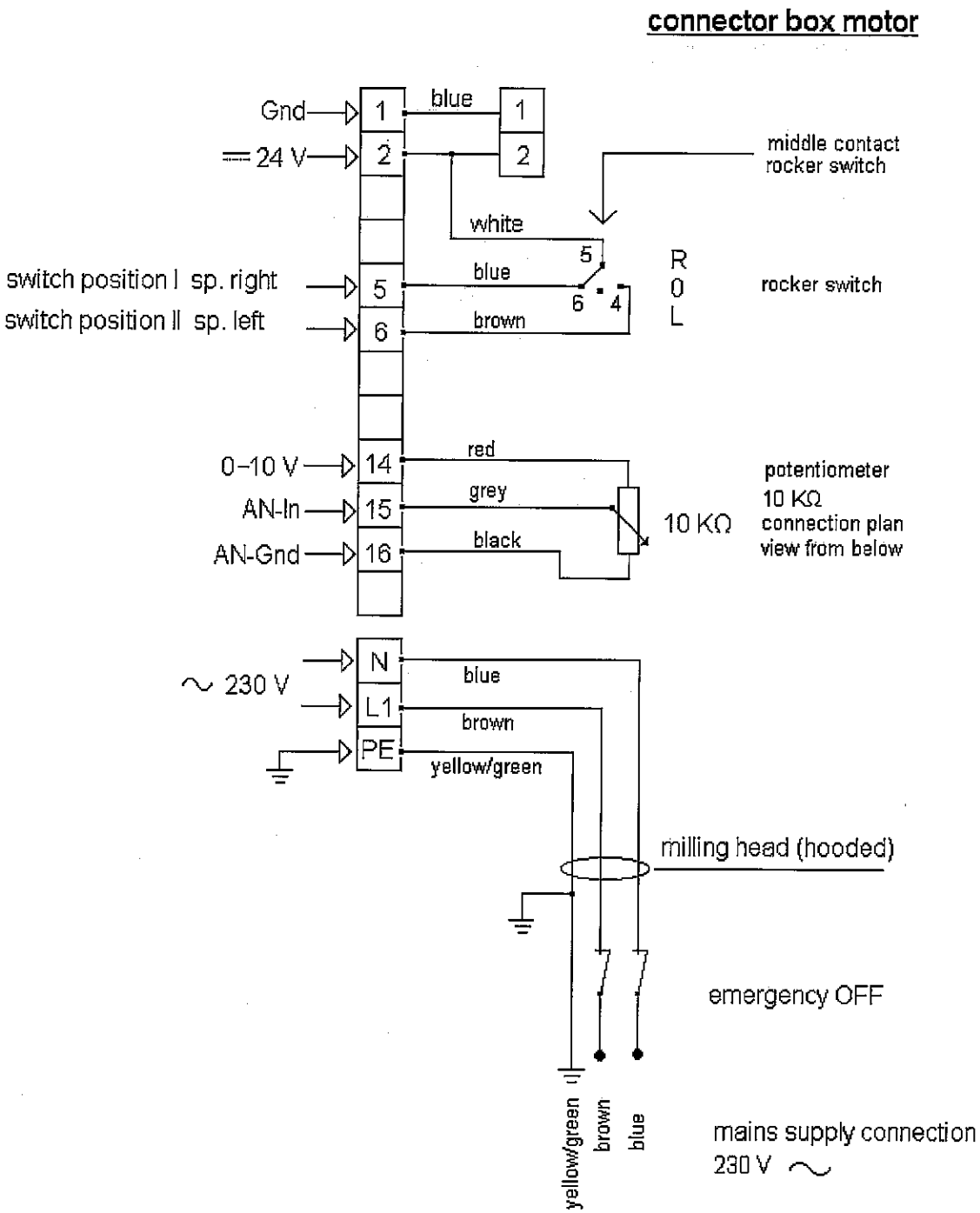
This document shows all units of the electrical parts
including the mains connection



4 Circuit diagram

4.2 High speed motor 2,0 kW

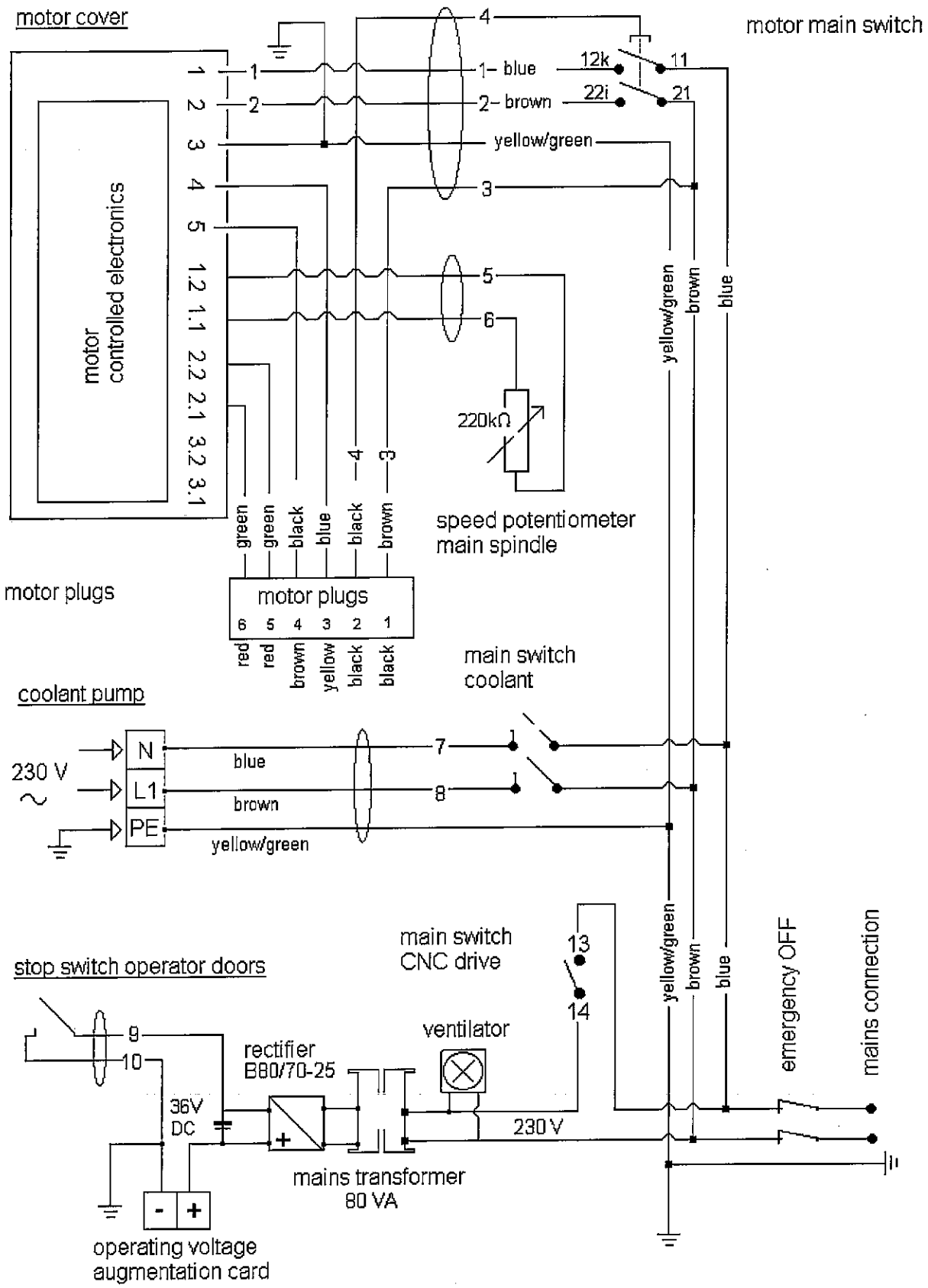
This document shows all units of the electrical parts
Including the mains connection



4 Circuit diagram

4.3 Motor 1,4 kW with safety cabin

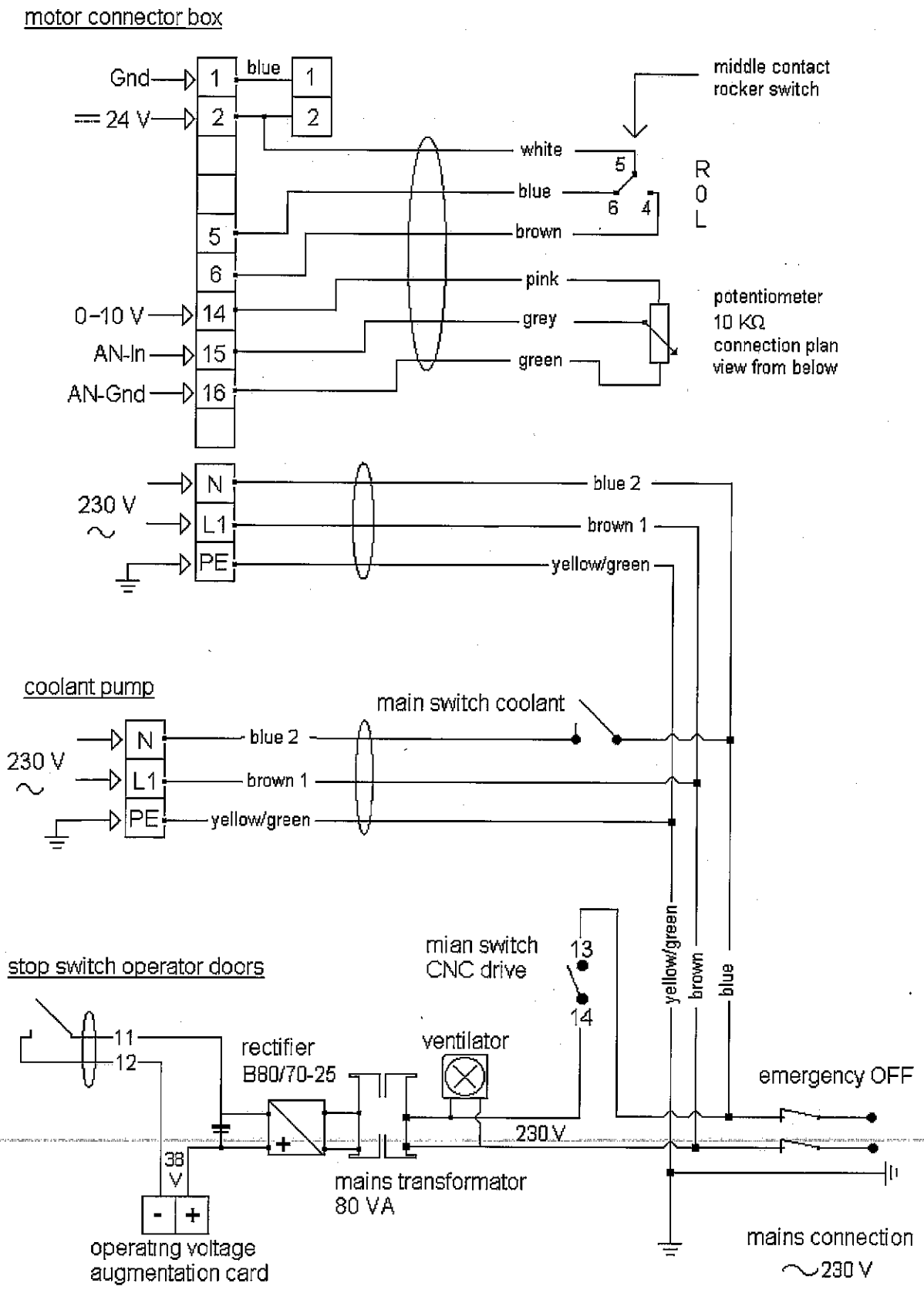
This document shows all units of the electrical parts
including the mains connection



4 Circuit diagram

4.3.1 High speed motor 2,0 kW with safety cabin

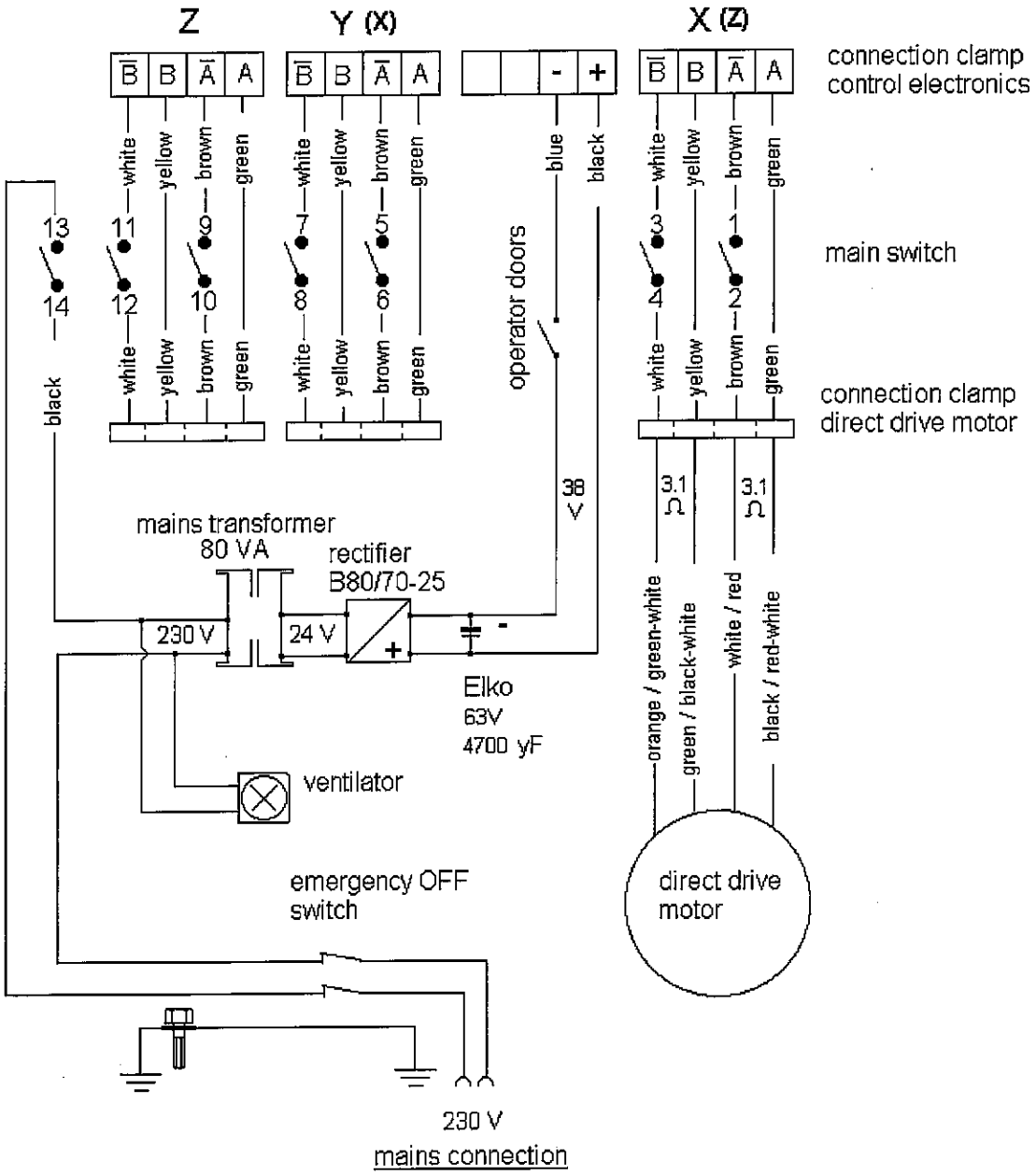
This document shows all units of the electrical parts
including the mains connection



4 Circuit diagram

4.4 CNC control drive

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

5. Delivery and installation

The drilling and milling machines 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 drilling and milling machine 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 drilling and milling machine 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.

6. Starting-up and maintenance

After the machine has been professionally installed and securely mounted it must be connected to the mains supply.

1. A qualified electrician must connect the supply lead of the drilling and milling machine to the local power supply.

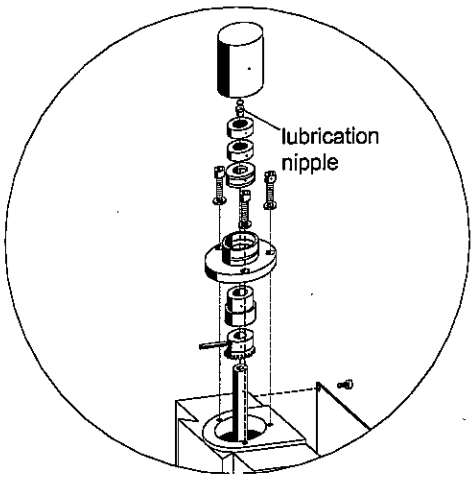
2. A sufficient supply of lubrication coolant should be on hand in order to run the coolant unit (optional).

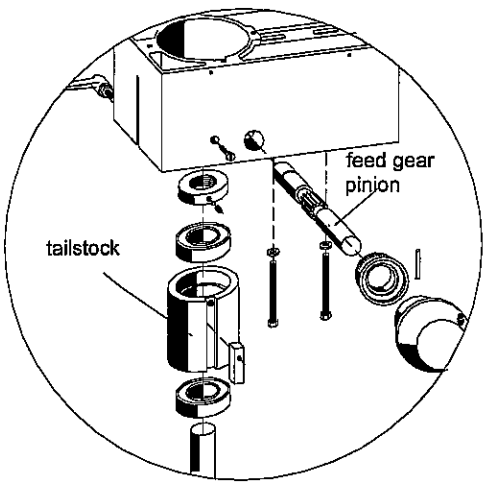
3. All functions must be checked.

In order to clamp workpieces a straing screw (suitable for the T grooves) or a machine vice may be used.

4. Lubrication

The lubrication nipple shown below must be lubricated every 6-8 weeks. (see sketch)





The tailstock and the feed gear pinion must also be greased.
To do this, the tailstock must be moved backwards and forwards, putting some lubricant on the surface of the tailstock and the lateral part of the feed spindle.

We recommend:	for lubrication:	multi-purpose grease grade 2NLGI
	for oiling:	lubrication oil of 100 mm ^{2}/s viscosity

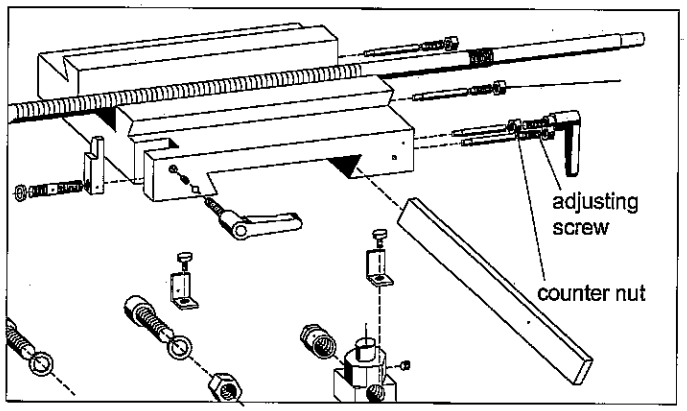
It is not necessary to lubricate the drilling spindle, as the ball bearings are fully enclosed and having been lubricated during production, remain so fort he entire service life of the machine.

5. Adjusting

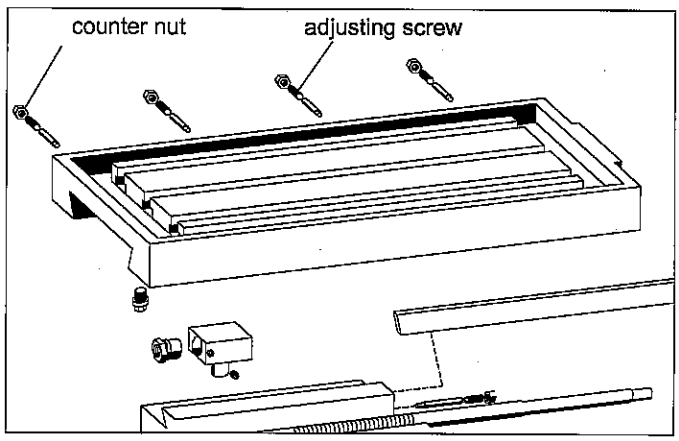
5.1 Dovetail guides

The **dovetail guides are adjustable**. If an adjustment is required, first loosen the counternuts, then tighten the adjusting screws with a hexagonal socket screw key, so the slides can still be turned back and forth easily with the head crank. After the adjustment tighten the counter nuts again.

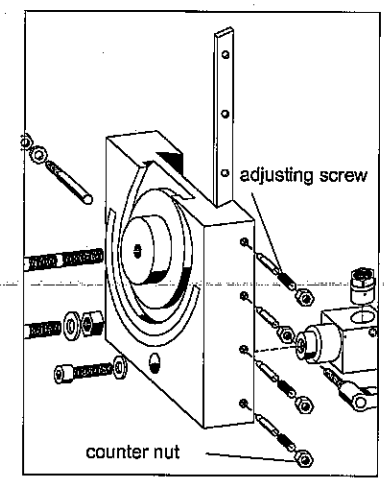
X-axis



Y-axis



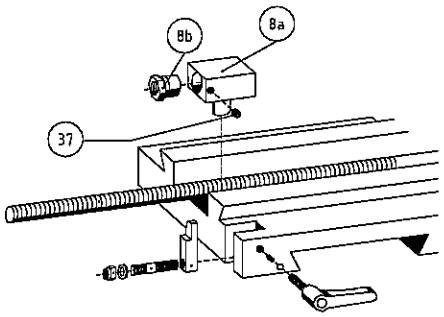
Z-axis



5.2 Spindle nuts including F1210 E and CC-F1210 E

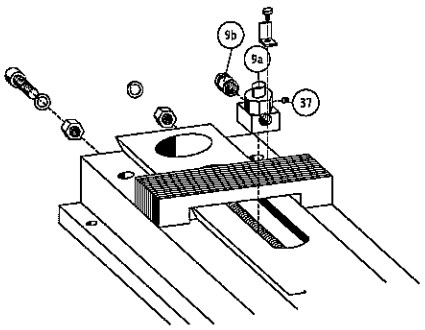
The spindle nuts of the milling machines are adjustable.

Should at some time a spindle nut of one of the three axes show some play, proceed as follows:



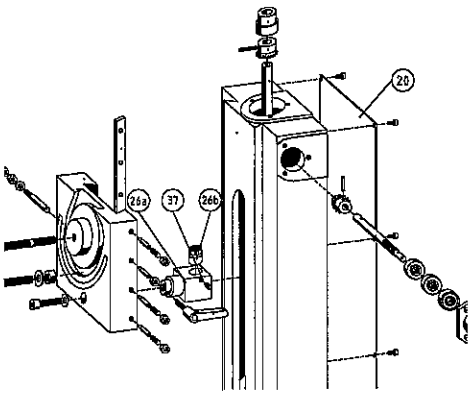
X-axis:

To adjust spindle nuts (part no. 8a+8b) move the cross table as far as it will go to the right. After loosing the set screw (part no. 37), the adjusting nut (part-no. 8b) is turned a little in the clockwise direction. Turning the adjusting nut like this achieves a mutual tightening of the two nuts and as a result play-free running of the threaded spindle. After the adjustment, the set screw (part no. 37) must be re-tightened firmly.



Y-axis:

The adjustment of the spindle nuts (part no. 9a+9b in 1.5.1) is done from below (below the base plate part no. 3 in 1.5.1). The method ist he same as for the X-axis.



Z-axis:

To adjust the spindle nuts (part no. 26a+26b) of the Z-axis, you have to unscrew the cover plate (part no. 20). The further procedure is as for the X-axis.

5.3 Spindle nuts with ball rolling spindle

An adjustment is not necessary and also not possible.

7. Safety devices and recommendations

In order to make working with our drilling and milling machines safe, we have equipped them with the following safety devices and are thus in accordance with the relevant European safety regulations.

1. **Protective cover**
   (protective partition) attached to the machine housing, prevents reaching in and coming into contact with the work spindle. This safety device is constructed in such a way that it can be adjusted to the necessary working height (depending on the dimensions of the workpiece and tool).

2. **Main switch with low voltage release**
   In order to disconnect the electrical parts of the drilling and milling machine safely from the mains, we have provided a main switch with low voltage release besides the mains lead with plug. This under voltage release prevents the drive motor from coming on after a power cut and so excludes the danger of the work spindle moving unexpectedly.

3. **Emergency OFF switch**
   This enables a quick curtailment of dangerous movements, in particular when using devices for automatic feed.

4. **Overload protection**
   This device has been developed to protect the drive motor and it must be noted that after the motor has ben turned off (by hand or automatically), because of overloading, a short pause of 1-3 seconds must be observed before turning the machine on again so that the relay of the electrical parts can re-establish the closed circuit condition.

5. **Security machine cabin**
   The cabin has a door which, when closed, activates a limit switch. The feed motors can only be put into motion on the axis independently by means of the controls when the door is closed. When the door is open the motor is switched to idle whereby manual operation is still possible. The main spindle can be switched on whether the door is open or closed.

It is forbidden to remove the door limit switch or to put it out of action as this could lead to serious danger to the machine operator and cause severe accidents.

7. Safety devices and recommendations

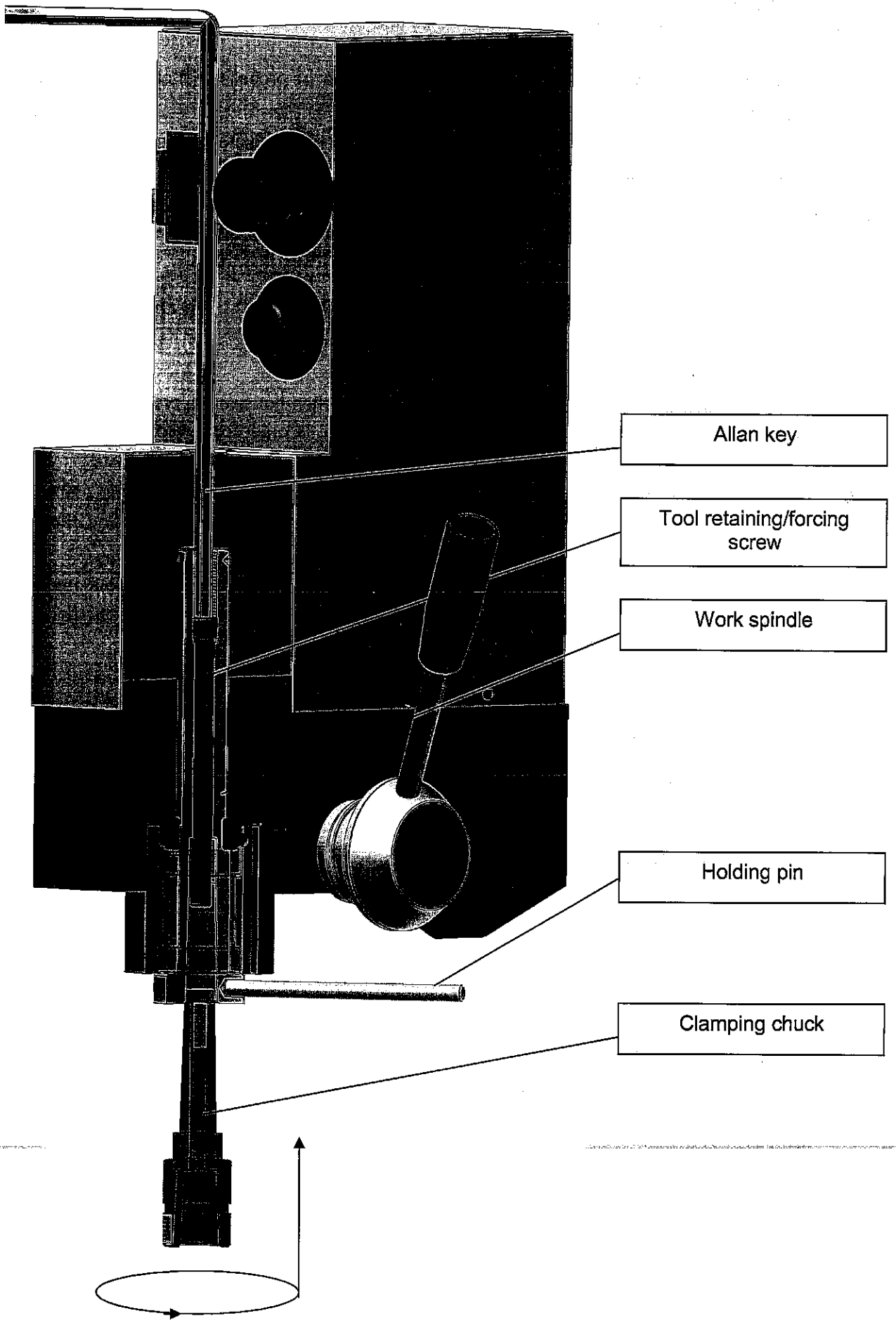
We would like to draw your attention to the following safety recommendations which are a result of a combination of the European standards and our own experience:

1. Workpieces must be secured in such a way that they cannot be propelled out of position by the torque of the drill or mill.
2. Round workpieces such as corrugated pieces, round lathe work or similar things must be fixed into position by suitable means such as prisms in conjunction with a machine vice when drilling.
3. Machine drills and mills are sharp-edged tools. In order to protect hands, these tools should only be held by the shaft and **not** by the cutting edge when being transported or changed.

The tool cutting edges are sharp and can cause serious injury when touched.

4. Throughout the drilling and milling processes, sharp and often hot swarf is produced which is then thrown off by the momentum of the tool in operation. In order to prevent accidents it is necessary to wear goggles or a face shield.
5. It is further recommended that well-fitting clothes be worn, especially on the arms (nothing loose) and in the case of long hair, a hair net should be worn to prevent anything being caught or drawn in by the rotating work spindle or when changing the workpieces.
6. By pulling the mains plug, the drilling and milling machine is disconnected from the electrical current. This should be observed when doing one of the following: a drill or mill is changed or the machine has to be serviced.
7. In order to avoid wear and tear on the tools and the drive motor, it is recommended that the tools be selected with care, worn tools should be exchanged for sharp ones and the feed should be calculated such that the r.p.m. of the work spindle is only slightly reduced. The depth of the feed must be selected with precision so that it is not possible to drill into the support table.
8. We recommend the installation of lighting which provides a level of at least 500 lux at the point of tool cutting operations.
9. Appropriate means must be used to dispose of drilling and milling swarf.
10. We strongly recommend that the drill chuck key be fixed to the machine by means of a clamp or similar attachments only. This is in order to avoid the drill chuck key being caught by the tool spindle and being thrown around if it is fixed to the machine with anything flexible like chains or string.
11. When drilling and milling machines are not in use, we recommend installing a safety device to prevent children or authorized people switching the machine on.
12. The drilling and milling machine should be set up where no dampness, apart from the lubrication coolant, can affect it.
13. It is necessary to carry out regular checks for damages to parts and / or for the functions, on drilling and milling machines. Please do not hesitate to call us if you require original spare parts or advice!

8. Clamping and ejecting tools



8. Clamping and ejecting tools

This is the core of the WABECO clamp and ejection system, **the tool retaining/forcing screw.** It operates on the principle of the screw having a fine thread located at its head and a coarse thread on the shank. Due to this construction, a special procedure has to be observed when tools with internal threads are to be clamped.

It is not possible to insert a tool or tool holder with internal threads into the work spindle first and then to screw in the tool retaining/forcing screw into the internal thread afterwards! The tool or tool holder must be screwed onto the tool retaining/forcing screw.

As you can see on the picture (page 60), For clarification we have cut open the protective cap and the spindle shell so that the tool retaining/forcing screw with the Allan key can be seen.

Please proceed as follows:

With the aid of the Allan key, screw the tool retaining/forcing screw into the work spindle right up to the end of its thread. Once the screw blocks, turn it back 2-3 revolutions.

Now the tool is inserted by hand from underneath into the taper of the work spindle and screwed onto the tool retaining/forcing screw. While this is being done, the tool retaining/forcing screw is held tight by means of the Allan key.

Once the tool has been clamped hand-tight, the work spindle is held by means of the holding pin and the tool retaining/forcing screw can be tightened with the Allan key without any effort.

To eject **tools with an internal thread**, hold the work spindle tight with the holding pin and loosen the tool retaining/forcing screw with the Allan key.
Now the tool can be screwed off the tool retaining/forcing screw by hand and taken out of the work spindle taper from underneath.

Tools with flat tang (without internal threads) can be clamped by first of all screwing the tool retaining/forcing screw as far back with the Allan key as is necessary to insert the tool into the work spindle. After doing this, the tool retaining/forcing screw is screwed lightly onto the tool.

To eject the tool, the holding pin is inserted into the work spindle and held tight with one hand. By turning the Allan key to the left, the tool is released and can be easily removed from the work spindle.

9. Adjustment of the r.p.m.

A specific cutting speed is needed when milling different materials (e.g. steel, aluminium etc.)
The r.p.m. of the work spindle can be infinitely varied from 180 to 3000 min^{-1} or 100 – 7500 min^{-1} on the potentiometer respectively so that the appropriate speed for the material, the workpiece and the diameter of the cutter can be chosen every time.
Please see the table showing the respective r.p.m. values for aluminium and steel as follows:

9.1 R.P.M. values for working aluminium and steel

ALUMINIUM		STEEL	
tool-Ø	r.p.m. $^{-1}$	tool-Ø	r.p.m. $^{-1}$
2 mm	3000	2 mm	2000
4 mm	2900	4 mm	1400
6 mm	2850	6 mm	1200
8 mm	2750	8 mm	850
10 mm	2700	10 mm	700
12 mm	2650	12 mm	590
14 mm	2600	14 mm	500

9.2 R.P.M. values 1,4 kW motor

potentiometer rate %	r.p.m. $^{-1}$
1	130
5	140
10	150
15	160
20	200
25	300
30	400
35	700
40	850
45	1000
50	1200
55	1500
60	1900
65	2500
70	2800
80	3000
90	3050
100	3100

9. Adjustment of the r.p.m.

9.2 R.P.M. values 2,0 kW motor (high speed)

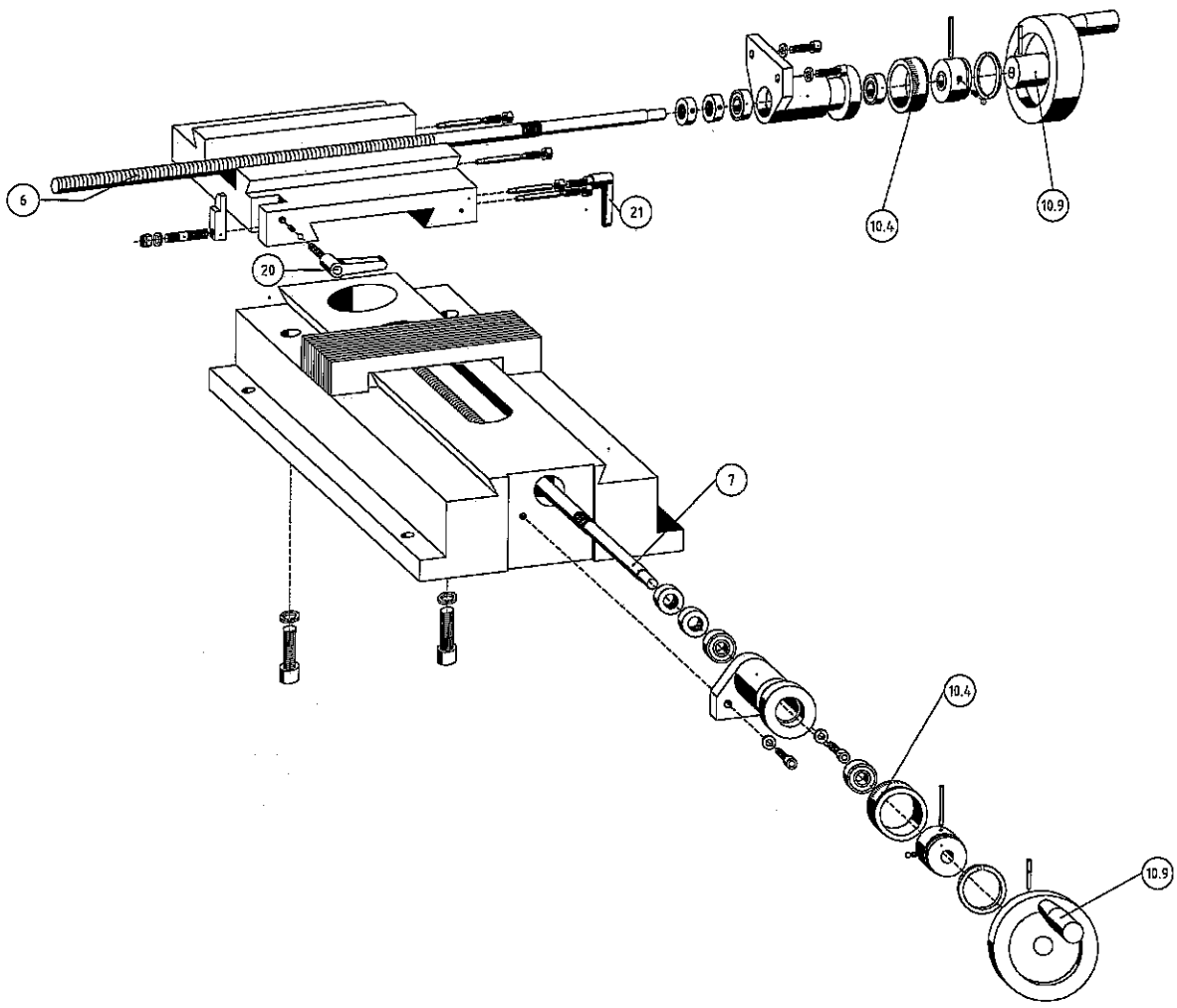
potentiometer rate %	r.p.m. $^{-1}$
2	50
3	100
4	200
5	350
10	700
15	1000
20	1400
25	1700
30	2100
35	2500
40	2900
45	3200
50	3600
55	4050
60	4500
65	4800
70	5200
75	5600
80	6050
85	6500
90	6900
95	7200
100	7500

10. Feed motion

10.1 Feed motion X and Y axis

The traverse and longitudinal motion of the cross support is accomplished by turning the handwheels for both threaded spindles (parts no. 6 and 7). Both slides can be blocked with the aid of clamping levers (part no. 20 and 21).

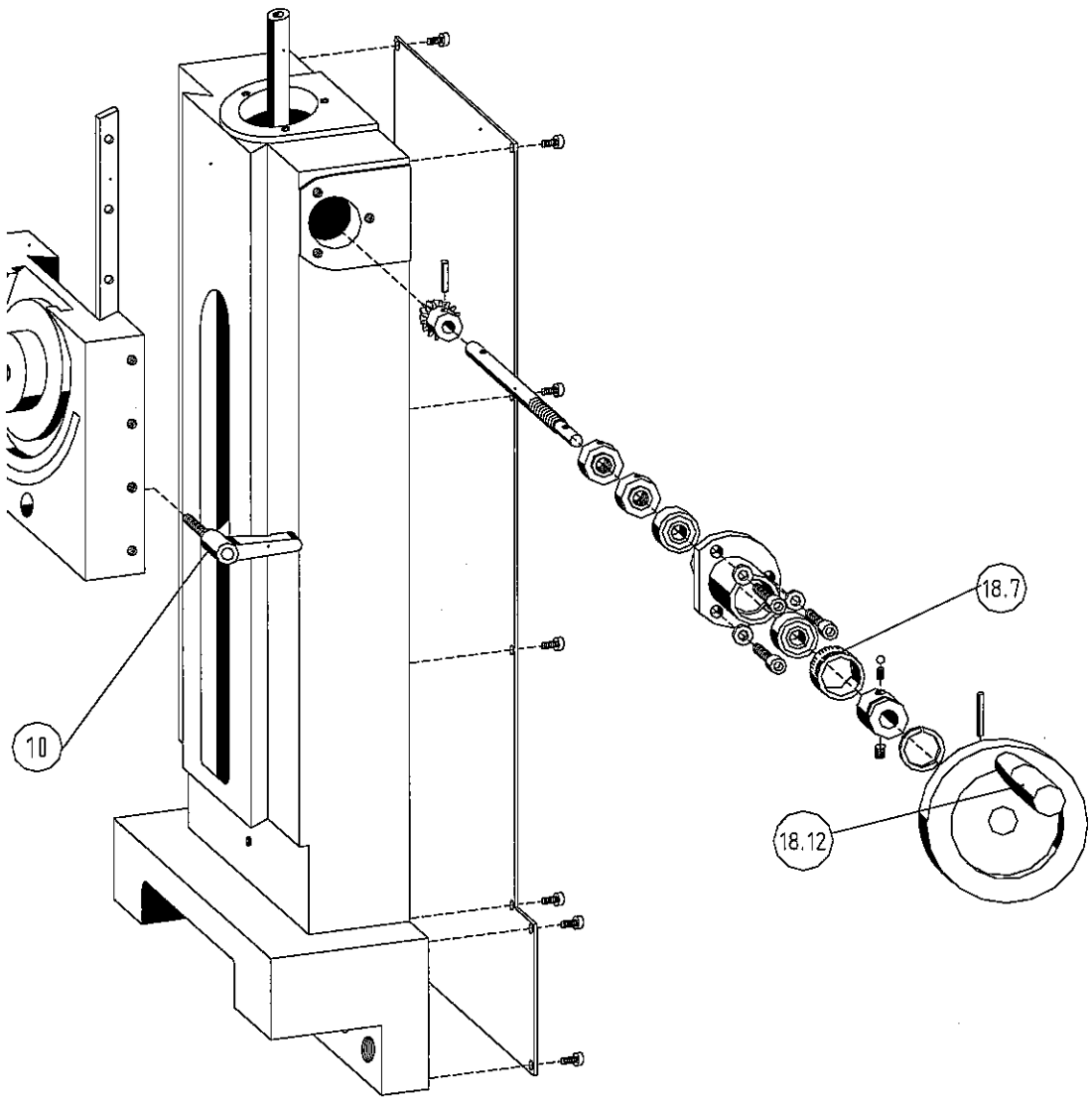
Graduated collars have been installed to enable the feed path to be read off (part no. 10.4). One full rotation of the handwheel corresponds to 4 mm of the slide path and with ball rolling spindle 5 mm; one graduation on the collar corresponds to 0.05 mm on the path.



10. Feed motion

10.2 Feed motion on the Z-axis

The feed motion – drilling and milling depth – is accomplished by using the handwheel (part no.18.12).
One graduation mark on the micrometer collar (part no. 18.7) of the feed screw is equal to 0,05 mm.
To operate the milling head by means of the handwheel, loosen clamp lever (part no.10). After the desired distance has been set, the clamp lever must be tightened up again. The handwheel permits a maximum travel of 280 mm.

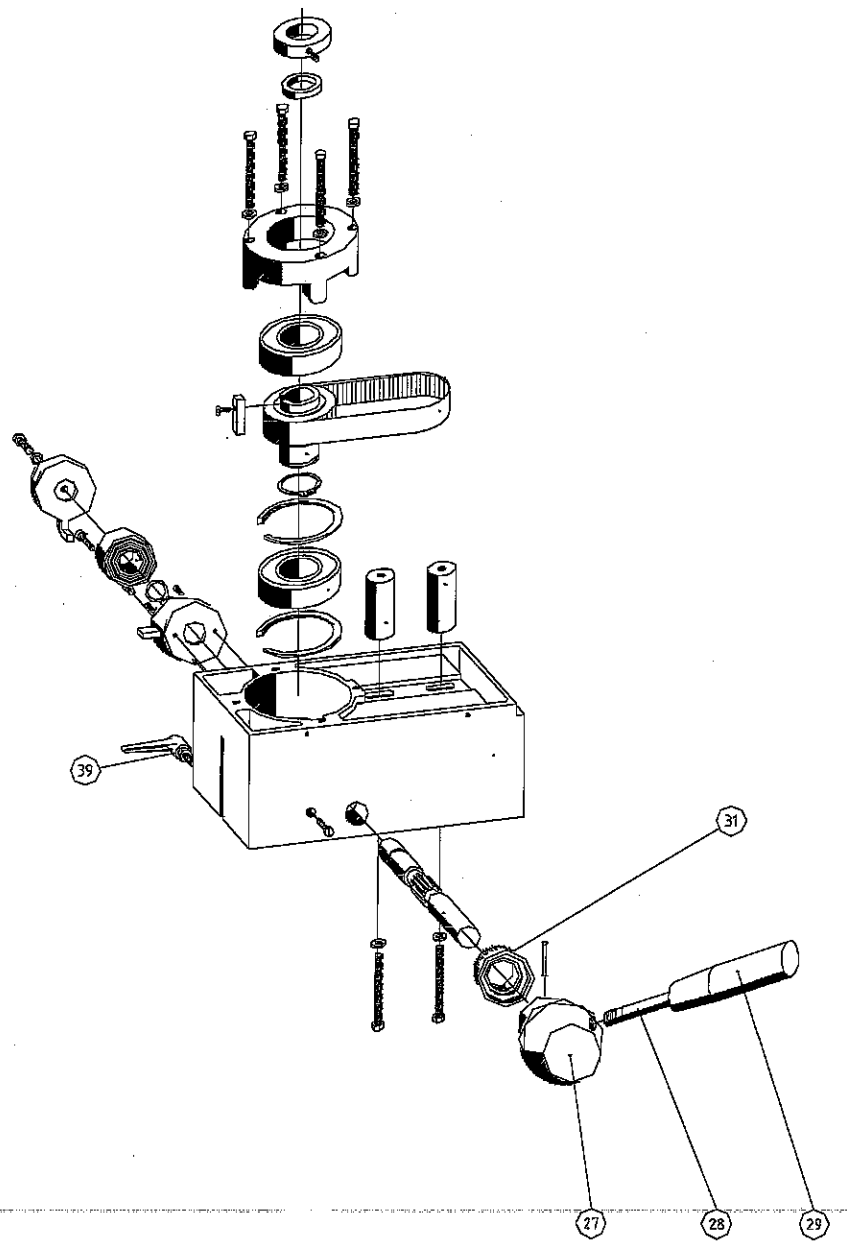


10. Feed motion

10.2 Feed motion on the Z-axis

Another possibility of operating the tool spindle is by turning the control lever (parts no. 27, 28 and 29). After loosening the clamping lever (part no. 39) the control lever can be turned. One graduation on the collar (part no. 31) corresponds to 1 mm of travel.
The work spindle has a maximum travel of 40 mm. The clamping lever must be well tightened up again afterwards.

We recommend that the travel (engagement) should not be selected too generously but that in the case of greater engagement depth that this should be accomplished in multiple steps.



11. Recommendations for application and operation

We recommend the following:

- The drill should be inserted and clamped with the chuck key in such a way that the drill is positioned exactly between the three clamping jaws of the toothed ring chuck, the quick action chuck or the drawing-in attachment of the drill.
- Mills with a shaft should be clamped by means of a precision draw-in attachment with nose cone MK 2 and retaining thread M 10 and the appropriate precision clamping collet in accordance with DIN (German Industrial Standard).
- Mills with a bore hole (all those with a Ø of 16 mm) and a longitudinal groove should be clamped by means of precision shell end mill with mill retaining screw and feather key, MK 2x6, draw-in attachment M10.

It is important to observe the following when drilling:

- The appropriate r.p.m. must be set according to the diameter of the drill.
- The contact pressure should be such that the drill can still cut with ease.
- When the contact pressure is too high it will result in premature wear on the drills, even the possible snapping of drills or them sticking fast in the bore hole.

If a drill sticks fast, switch the motor off immediately, use the emergency OFF switch.

- When processing hard materials, i.e. steel, normal commercial drilling oil must be used.
- The spindle must always rotate when the drill is removed from the workpiece.
- When processing non-metallic materials, i.e. wood and when having to drill right through, splintering can be prevented by clamping a piece of waste wood under the material to be processed.
- When processing veneered or plastic-coated workpieces of wood, always drill from the good side.
- When processing thin metal sheeting, a piece of waste wood should always be clamped underneath.

It is important to observe the following when milling:

- Choose the appropiate cutting speed:
  for materials with normal mechanical strength properties, e.g. steel 18-22m/min
  for materials with higher mechanical strength properties, 10-14m/min
  (see also paragraph 9.1 - r.p.m. adjustment)

- Regulate the contact pressure so that the cutting speed remains constant.
- When processing hard materials use normal commercial drilling oil.

It is important to observe the folowing when clamping the workpieces:

- Use suitable straining screws or machine vices for the chucking groove of the milling machine table.
- Always remove waste material and swarf from the milling machine table of the cross support in order to clamp level and accurately.

11. Recommendations for application and operation

11.1 Swivelling of the milling head

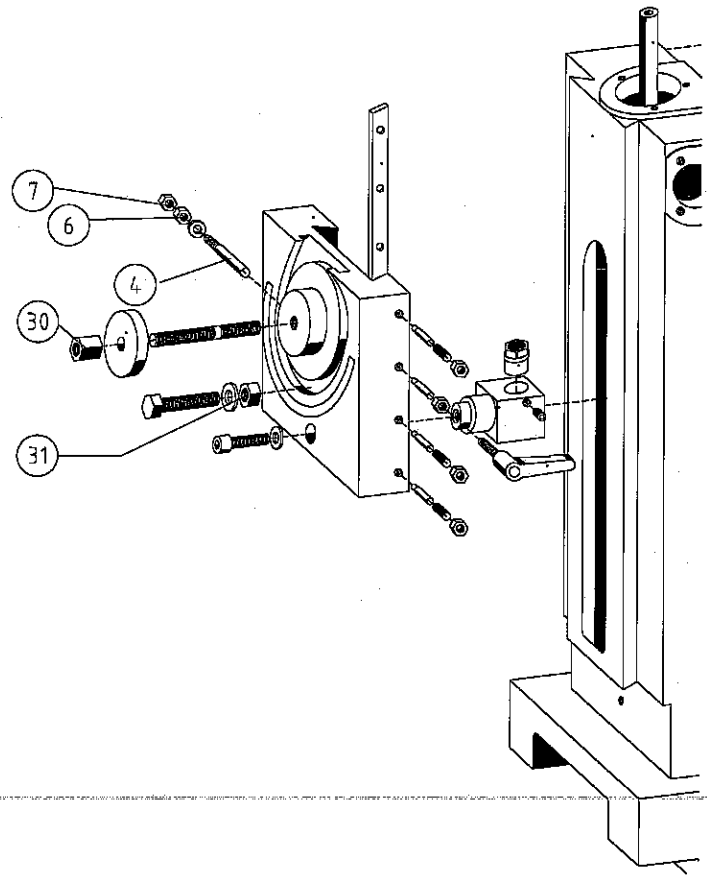
In order to produce bore holes and chamfering at an angle which diverges from the normal vertical position of the milling head, the milling head can be swivelled up to 90° either to the right or to the left.

If an adjustment is intended please proceed as follows:

After loosening (turn to the left) the lock nut (part no. 7) turn the hexagon nut (part no. 6) as far to the right against the housing of the tool spindle until the index pin (part no. 4) can be pulled out by hand.

Loosen both the high nut (part no. 30) and the hexagon nut (part no. 31) on the vertical slide by then turning to the left.
Now the milling head can be swivelled to the desired degree to the left or to the right. In order to arrest the milling head in this position, tighten both the high nut and the hexagon nut again.

In order to bring the milling head back to its normal position, loosen both the high nut and the hexagon nut on the vertical slide and bring the vertical slide back to its upright position. After turning back the hexagon nut on the index pin, the latter can be pushed into the opening in the work spindle housing by hand. Now, both the hexagon nut and the lock nut of the index pin as well as the hexagon nut and the high nut on the vertical slide can all be tightened.



12. Unit for lubrication coolant

The unit for lubrication coolant consists of:

1. Tray with lubrication coolant sump which collects the lubrication coolant mixture fort he feed pump. Contents generally 17 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 1 m complete with earthed plug

3. Adjustable, flexible 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 steel and aluminium
   - to inporove the surface finish and accuracy of the workpieces
   - extends working life of tool
   - to reduce friction heat
   - to prevent built-up edges

When using lubrication coolants, especially water based emulsions, 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 1:10 – 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.

12. Unit for lubrication coolant

6. A service plan should determine the following.
   - check the water has -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 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 should be cleaned with acidic syndets without abrasive ingredients and rich cream should be applied to regenerate the skin.

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

13. Automatic operation

The drilling and milling machines described in these instructions for use are designed for manual feed motion.

In the case of production with high-piece numbers and good repetition accuracy we offer feed spindles for all axes, each with their own drive.
Above all in combination with:
-digital readout systems
-digital measuring guages
This development offers an improvement which is appreciated by an increasing number of customers.

1. **Automatic feed with control unit**

   The feed direction can be pre-selected and the feed speed can be infinitely varied between 1-800 mm/min. An overload clutch comes into action in the case of overloading or when colliding with the end-of-travel points of the slide.
   This overload clutch is also intended to allow a choice between manual feed and automatic feed. In order to switch over, the respective handwheel is pulled out axial from the overload clutch.

   This unit can also be attached retrospectively to the manual machines, type F1200E.
   In respect to this, please note the following:
   Both handwheels on the cross support are connected with the base plate (part no. 3, page 38) respectively the cross slide (part no. 2, page 38) and the spindle bearings (part no. 10.3, page 38) each by 2 Allen screws (part no. 13, page 38). By loosening these Allan screws, the handwheels can be pulled out and replaced by the motorised feed unit, in which case the shorter spindle unit is attached to the cross slide, the longer spindle unit to the side of the base plate, both by means of the Allan screws.

13. Automatic operation

2. Retrofitting as a CNC milling machine

The retrofitting unit is designed in such a way that a WABECO milling machine, type F1200E, for example, can very easily be upgraded to the technical standards of a CNC milling machine.
The retrofitting unit comprises of the softwear and control unit with step motor, motor cover, gear wheels and drive belts for all three axes. We include detailed assembly instructions and would be pleased to advise you further in these matters.

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

Noise levels while running idle

Acoustic capacity level	**78 dB (A)**
Sound pressure level on operator's ear	**62 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.
However, in order to state a reference value of noise levels which could manifest itself to the ears of the operator during processing, the following measurement conditions are given:

Shell end mill 10mm, cutting depth 3mm,
Spindle r.p.m. 2240 1/min, feed 0,09mm/revolution, AlCuMgPb-cuboid workpiece.

The adjusted sound pressure level is 91 dB (A).

15. Disposal of the drilling and milling machine

The transport and protective packaging is 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 drilling and milling machine 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.