



# **OPERATOR'S HANDBOOK**

for the

# **WARCO WM20 Variable TURRET MILL**

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## **NOTE**

The information contained in this handbook is intended as a guide to the operation of these machines and does not form part of any contract. The data it contains has been obtained from the machine manufacturer and from other sources. Whilst every effort has been made to ensure the accuracy of these transcriptions it would be impracticable to verify each and every item. Furthermore, development of the machine may mean that the equipment supplied may differ in detail from the descriptions herein. The responsibility therefore lies with the user to satisfy himself that the equipment or process described is suitable for the purpose intended.

### **A. LIMITED WARRANTY**

Warren Machine Tools Ltd. Makes every effort to assure that its products meet high quality and durability standards and warrants to the original retail consumer/purchaser of our products that each product be free from defects in materials and workmanship as follow: 1 YEAR LIMITED WARRANTY ON ALL PRODUCTS UNLESS SPECIFIED OTHERWISE. This Warranty does not apply to defects due directly or indirectly to misuse, abuse, negligence or accidents, normal wear-and tear, repair or alterations outside our facilities, or to a lack of maintenance.

We shall in no event be liable for death, injuries to persons or property or for incidental, contingent, special, or consequential damages arising from the use of our products.

To take advantage of this warranty, the product or part must be returned to us for examination, postage prepaid. Proof of purchase date and an explanation of the complaint must accompany the merchandise. If our inspection discloses a defect, we will either repair or replace the product, or refund the purchases price if we cannot readily and quickly provide a repair or replacement, if you are willing to accept a refund. We will return repaired product or replacement at WARCO'S expense, but if it is determined there in no defect, or that the defect resulted from causes not within the scope of WARCO'S warranty, then the user must bear the cost of storing and returning the product.

The manufacturers reserve the right to change specifications at any time as they continually strive to achieve better quality equipment.

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**WARNING!**

**Read and understand the entire instruction manual before attempting set-up or operation of this mill/drill**

- 1. This machine is designed and intended for use by properly trained and experienced personnel only.** If you are not familiar with the proper safe use of mill/drills, do not use this machine until proper Training and knowledge has been obtained.
- 2. Keep guards in place.** Safety guards must be kept in place and in working order.
- 3. Remover adjusting keys and wrenches.** Before turning on machine, check to see that any adjusting wrenches are removed from the tool.
- 4. Reduce the risk of unintentional starting.** Make sure switch is in the OFF position before plugging in the tool.
- 5. Do not force tools.** Always use a tool at the rate for which it was designed.
- 6. Use the right tool.** Do not force a tool or attachment do a job for which it was not designed.
- 7. Maintain tools with care.** Keep tools sharp and clean for best and safest performance. Follow instructions for lubrication and changing accessories.
- 8. Always disconnect the tools from the power Source before adjusting or servicing.**
- 9. Check for damaged parts.** Check for alignment of moving parts, breakage of parts, mounting, and any Other condition that may affect the tools operation.
- 10. Turn power off. Never leave a tool unattended.** Do not leave a tool until it comes to a complete stop.
- 11. Keep work area clean.** Cluttered areas and bench Invite accidents.
- 12. Do not use in a dangerous environment.** Do not Use power tools in damp or wet locations, or expose Them to rain. Keep work area well lighted.
- 13. Keep children and visitors away.** All visitors should be kept a safe distance from the work area
- 14 Make the workshop child proof.** Use padlocks, . master switches and remove starter keys.
- 15. Wear proper apparel.** Loose clothing, gloves, neckties, rings, bracelets, or other jewelry may get caught in moving parts. Non-slip footwear is recommended. Wear protective hair covering to contain long hair. Do not wear any glove.
- 16. Always use safety glasses.** Also use face or dust mask if cutting operation is dusty. Everyday eyeglasses only have impact resistant lenses, they are not safety glasses. accessories may be hazardous.
- 17 Do not overreach.** Keep proper footing and balance at all times.
- 18. Do not place hands near the cutterhead** while the machine is operating.
- 19. Do not perform any set-up work while machine is operating.**
- 20. Read and understand all warnings posted on the machine.**
- 21 This manual is intended to familiarize you with the technical aspects of this mill/drill.** It is not, nor was it intended to be, a training manual.
- 22. Failure to comply with all of theses warnings may result in serious injury.**
- 23. Some dust created** by power sanding, sawing, grinding, drilling and other construction activites contains chemicals known to cause cancer, birth defects or other reproductive harm.
- 24. Your risk from those exposures** varies, depending on how often you do this type of work. To reduce your exposure to these chemicals, work in a well ventilated are, and work with approved safety equipment

## MAIN TECHNICAL SPECIFICATION

### Specifications:

### WM20 VS

Spindle Taper .....	R8
Spindle Stroke .....	127mm
Number of Spindle Speeds.....	Variable
Ranger of Spindle Speeds.....	120-2800RPM
Max. Distance Spindle to Table .....	320mm
Max. Distance Spindle to Column .....	260mm
Table Size .....	226x910mm
Longitudinal Travel .....	580mm
Cross Travel .....	240mm
Vertical Travel .....	300mm
Number of T-Slots .....	3
T-Slot Size .....	16mm
Head Tilt Left & Right .....	$\pm 90^{\circ}$
Head Swivel Around Column .....	$360^{\circ}$
Motor .....	1.5KW, 240V/50HZ
Overall Dimensions .....	1250x1150x1900mm
Net Weight .....	750kgs

The specifications in this manual are given as general information and are not binding. Warco reserves the right to effect, at any time and without prior notice, changes or alterations to parts, fitting and accessory equipment deemed necessary for any reason whatsoever.

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## CONTENTS OF SHIPPING CONTAINER

1. WM20 VS Turret Mill (Fig. 01)
1. Oil Tray Of WM20 Mill
1. Drawbar
1. Cooling system
1. Halogen Work Lamp
1. Shot Lubrication Device
1. Operator's Manual
1. Tolerance test certificate
1. Toolbox & Tools

## TOOLBOX CONTENTS (Fig. 0 2)

6. Collet Chucks
2. Crank Handle
1. Oil Gun
10. Hex Wrenches
2. Double Spanners
1. Cross Screwdriver
1. Flat Blade Screwdriver
2. Two handles of arm

## OPTIONAL ACCESSORIE

1. Power Feed
2. Milling Cutter
3. Milling Vise
4. Clamping Kits
5. Digital readout

## UNPACKING AND CLEAN-UP

1. Finish removing the wooden crate from around the turret mill.
2. Unbolt the turret mill from the crate bottom.
3. Sling the turret mill with the proper tools through the lifting ring on the ram.
4. Clean all rust protected surfaces using a mild chemistry solvent, kerosene or diesel fuel. Do not use paint thinner, gasoline, or lacquer thinner. These will damage painted surfaces. Cover all cleaned surfaces with a light film of machine oil.



Fig. 01



Fig. 02

## ASSEMBLY

1. Screw the handle (A, Fig. 03) and tighten. Repeat for another handle of longitudinal slide.
2. Screw the handle (B, Fig.03) and tighten.
3. if you want to up and down the knee, please push the crank handle (C, Fig03) and operating it.
4. Screw the handles (D, Fig.04) and tighten.

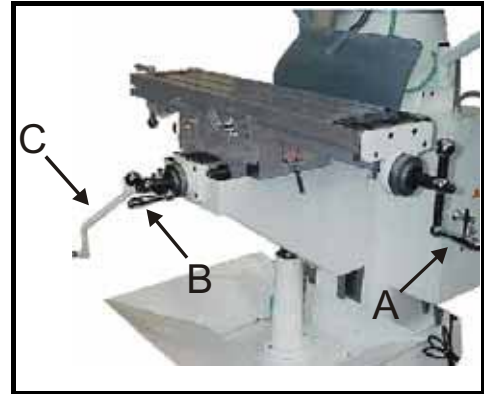


Fig. 03

## INSTALLATION

### WARNING

**Machine is heavy! Please use an appropriate lifting device and use extreme caution when moving the machine to its final location. Failure to comply may cause serious injury!**

1. The location for the mill should be well lit, dry, and have room enough to allow the head to rotate 360°.
2. Put a lifting stick into the holes of lifting ring (E, Fig. 04).
3. Carefully lift the mill with properly rated equipment to stand and through bolt it to the base.
4. Remove the lifting stick.
5. **Before bolting the mill to a stand, the unit must be level in both directions.** Place a level on the table in both directions and adjusted the level.

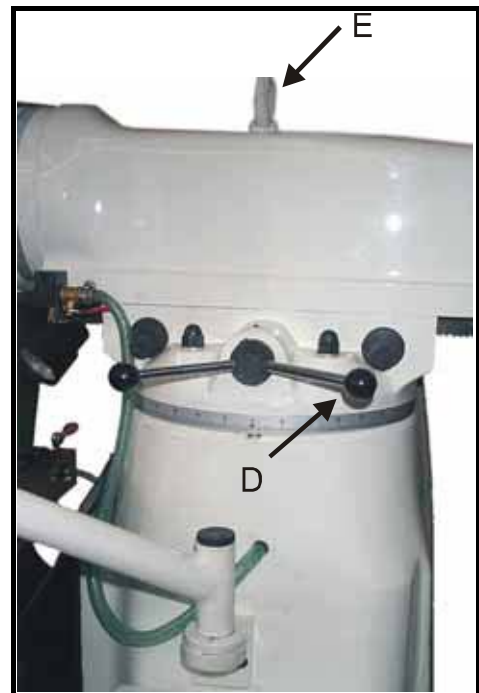


Fig. 04

## LUBRICATION

### WARNING

Mill must be serviced at all lubrication points and all slide ways before the mill is placed into service!

Failure to comply may cause serious damage to the mill!

1. Lubricate the oil point (A, Fig. 05) found the side of mill head once daily with machine oil.
2. Lubricate the oil point (B, Fig. 06) found the left side of knee once daily with machine oil.
3. Lubricate all slide ways by the shot lubrication device (C, Fig. 06), which is founded into the left side of cross slide. Press the knob to distribute the oil for every slide way once daily. **Be sure the oil box is filled oil before operating it!** To removes the plug (D, Fig. 06) before fill. Oil must be up to indicator mark in oil sight glasses (E, Fig. 06).
4. Lubricate the oil point (F, Fig. 07) found the right side of knee once daily with machine oil.



Fig. 05

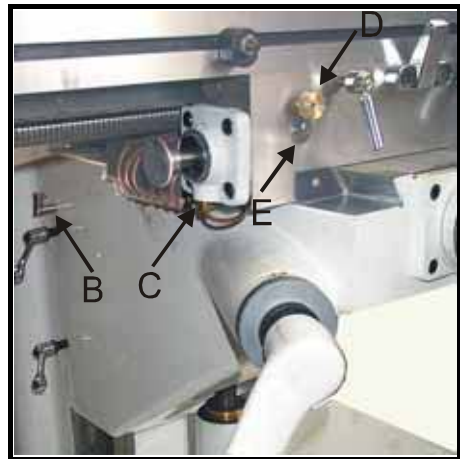


Fig. 06

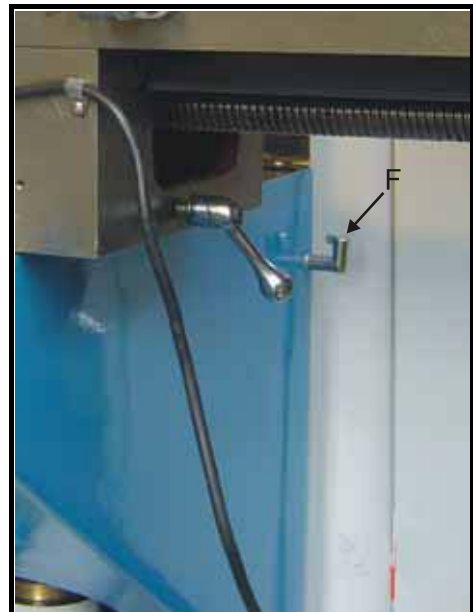


Fig. 07



## ELECTRICAL CONNECTIONS

### ⚠ WARNING

Connection of the mill and all other electrical work may only be carried out by an authorized electrician!  
Failure to comply may cause serious injury and damage to the mill and property!

Before connecting the machine to the mains, make sure that the electrical values of the mains supply are the same as those for the mill's electrical components. Use the wiring diagram (Fig. 08) for connecting the mill to the mains supply.

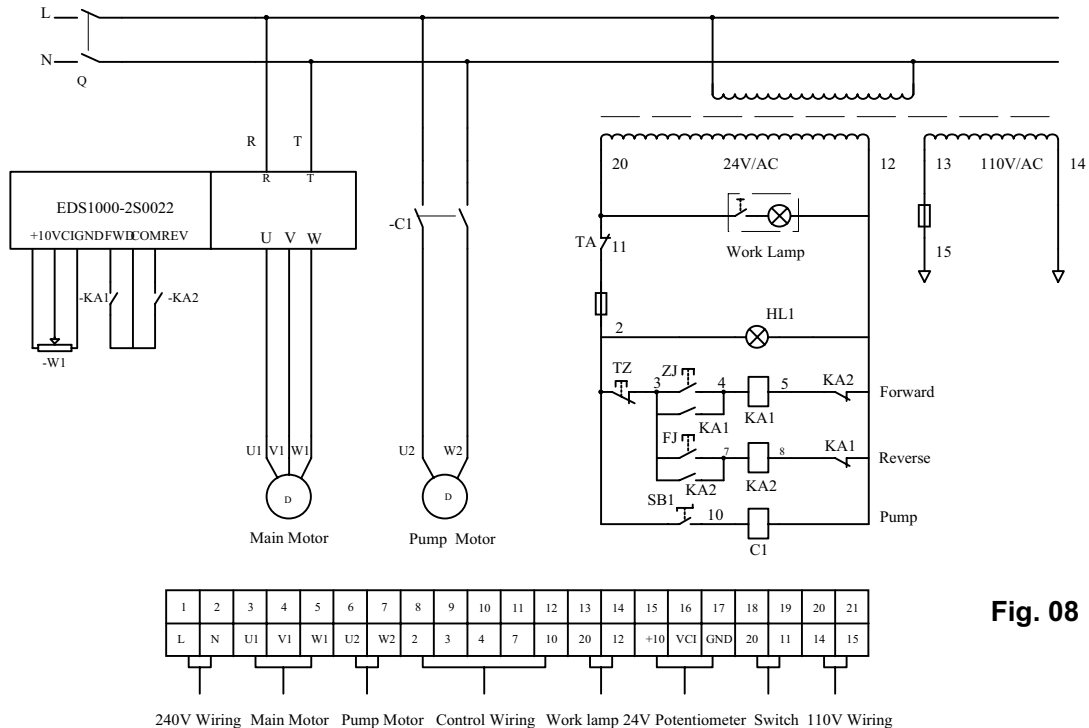


Fig. 08

### ⚠ WARNING

Make sure the mill is properly earthed!  
Failure to do so may cause serious injury and damage to user!

1. **Motor** - is rated at 1.5KW, 240V, 50HZ, Only confirm power available at the mill's location is the same rating as the mill. We can meet special specification according to the voltage in customer's country.

**Make sure that all phase are connected.**

2. **Halogen working lamp** (A, Fig. 09) – mounted on the left side of column. The wiring is 24V.

3. **Coolant system** (B, Fig. 09) – mounted on the right side of column, the pump motor is 40W/240V/50HZ. The pump is mounted inside of the column.



Fig. 09

5. **Power Switch (D, Fig. 10)** – mounted on the side of electrical box. Turn “on” is connected the supply, “off” is disconnected.

6. **Electrical Controlling Box (Fig.11)** – mounted on the right side of column through support. It's wiring is 24V. **You have to loosen the nuts and hold the handle to position the box according to your requirement before operating the mill. To tighten the nuts and operate.**

**Power Indicator Light (E, Fig. 11)** – light to the machine is power.

**Coolant Pump Switch (F, Fig.11)** – turn “0” is off the pump, ‘1’ is power the pump.

**Forward Button (G, Fig.11)** – forward switch, push it to start the motor and keep spindle clockwise direction revolution.

**Reverse Button (H, Fig. 11)** – reverse switch, push it to start the motor and keep spindle counter-clockwise direction revolution.

**Speed Adjusted Knob (I, Fig. 11)** – turn clockwise or counter-clockwise the knob, speed will be increased or reduced.

**Stop Button (J, Fig. 11)** – off switch, push it to off the main motor.

**Emergency Stop Button (K, Fig.11)** – depress to stop all machine function. Twist to re-set.



Fig. 10

**⚠ WARNING**

**Disconnect the machine from power source, during maintenance, commissioning or repair!**

**Failure to do so may cause serious injury!**

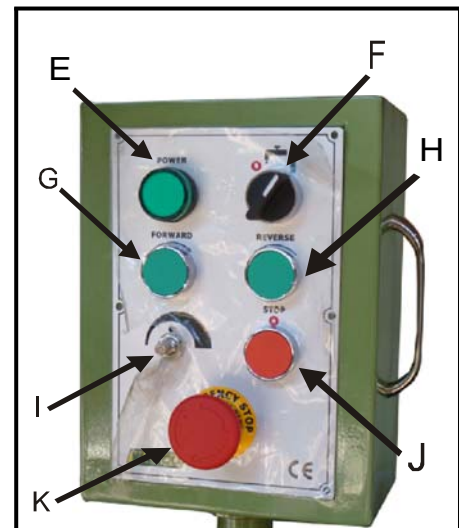


Fig. 11

## CONTROLS

1. **Longitudinal Feed Hand Wheel (A, Fig.12)** - located on either side of the table. Moves table side to side.

2. **Cross Feed Hand Wheel (B, Fig.12)** - located on the front of the knee. Moves table toward or away from the column.

3. **Vertical Feed Crank Handle (C, Fig. 12)** – located on side of the knee. Turns it to slide knee vertically on the column face.

4. **Adjustable Table Stops (D, Fig.12)** - located on front of the table. Adjust to stop table at any setting along the longitudinal axis.

5. **Longitudinal Table Locks (E, Fig.10)** - located on front of the table. Turn clockwise to lock.

6. **Cross Feed Table Locks (F, Fig.12)** - located on the right side of the knee. Turn clockwise to lock.

7. **Knee Locks (H, Fig.13)** - located on the left side of the knee. Turn clockwise to lock.

8. **Depth Stop Nuts (I, Fig. 14)** – located on the front of mill head. Set nuts for desired depth stop.

9. **Down Feed Handle (J, Fig.14)** - located on the right side of mill head. Counter-clockwise movement advances the quill toward the table. Return spring retracts the handle. **Pull out the handle you can select the operating position according to your requirement.**

10. **Fine Feed Handwheel (K, Fig. 14)** - located on the front left of mill head. Clockwise turn the handwheel to down feed the spindle, reverse to retract it.

11. **Quill Lock Lever (L, Fig. 14)** - located on the front right of mill head. Turn clockwise to lock the quill in the desired position. Turn counter-clockwise to release.

12. **Ram Sliding Handles (M, Fig. 14)** – located on the top right side of column. Turn counter-clockwise to move toward the table. Reverse to retract it.

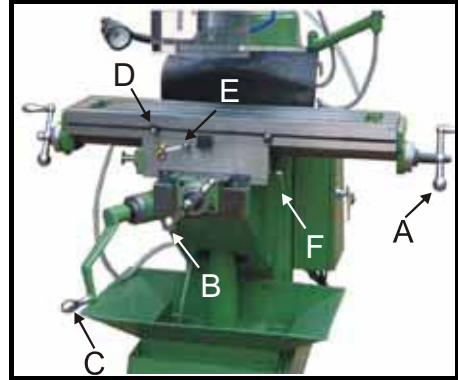


Fig. 12

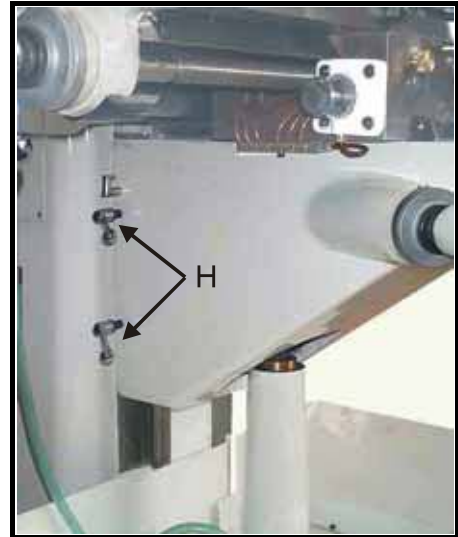


Fig. 13



Fig. 14

13. **Motor Adjusted Handle** (N, Fig.14) - located on the right side of head casting. Move the handle counter-clockwise to loosen the belt. Reverse to retract it.

14. **Motor Lock Lever** (O, Fig.14) – located on the right side of head casting. Locks and unlocks the motor mounting plate enabling the user to tension v-belts.

15. **Spindle Brake Handle** (P, Fig. 14) – located on top of head casting. Move the handle clockwise to brake. Return spring retracts the handle

16. **Engage/Disengage Fine Down Feed Knob** (Q, Fig. 15) – located on the left side of mill head. Turn clockwise to engage, reverse to disengage.



Fig. 15

**⚠ WARNING**

This machine is designed and intended for use by properly trained and experienced personnel! If you are not familiar with the proper and safe use of mill, don't use this machine until proper training and knowledge have been obtained!  
Failure to comply may cause serious injury!

**MILL HEAD ADJUSTMENT**

1. **Mill Head Tilt** – loosen the lock bolts (A, Fig. 16) on either side of the mill head. Rotate the bolt (B, Fig.16) to its desired position, using the reference guides provided on the side of the mill. Once in place, re-tighten the locking nuts.

Keep in mind that the head must be dialed in when it's returned to the "0" position if high levels of accuracy are required. If you are able to use an angle vice to accomplish your milling operation without tilting the mill head, you will save yourself a good amount of set-up time.

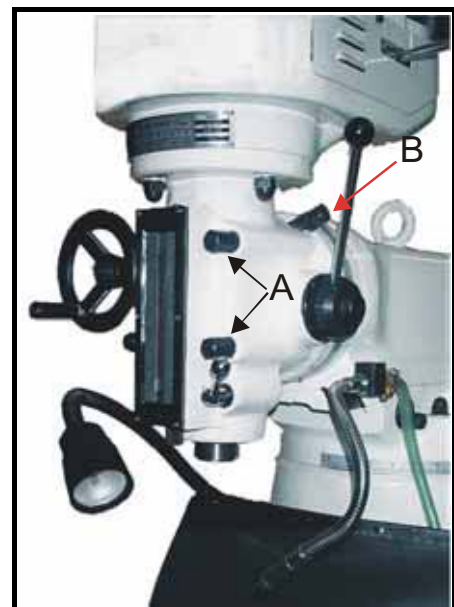


Fig. 16

2. **Arm Rotation** - loosen the lock nuts (C, Fig. 17) on either side of the base of arm. Rotate the head to its desired position, using the reference guides (D, Fig.17) provided around the base of the arm. Once in place, re-tighten the locking nuts.

3. **Sliding Arm** – turn counter-clockwise the nuts (E, Fig. 17) to loosen the arm. Move the handle (F, Fig.17) to desired position and re-tighten the nuts.

**For best results, all milling operation should be done with the quill/spindle as close to the head assembly. Lock spindle and table in place before starting milling operations!**

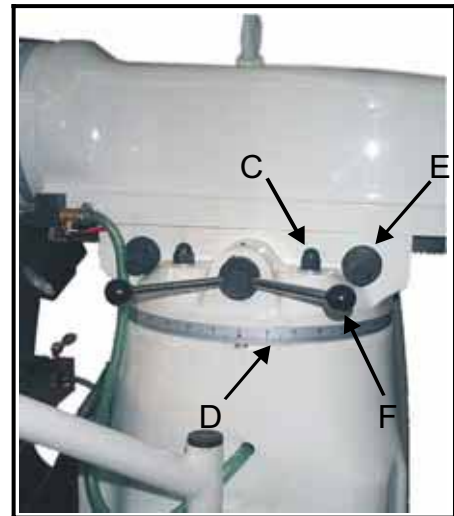


Fig. 17

### SPINDLE SPEEDS CHANGE

1. **Disconnect the mill from power source.**
2. Open the belt cover.
3. Loosen the motor mount lock handle (G, Fig. 18) and pull the handle (H, Fig. 18) toward the mill head to release tension on the v-belts.

4. Arrange the v-belt on the pulleys for the desired speed according to the speed chart (I, Fig.16) on the mill head.

**See the chart for specific spindle speeds in each belt range – Fig. 19**

5. Tension the v-belt by pushing the motor away from the mill head and locking the motor adjusted handle.



Fig. 18

### ARBOR REPLACEMENT

1. **Disconnect the mill from power source.**
2. Remove the cover of drawbar.
3. Hold the braking handle (J, Fig. 18) to keep the pulley from moving while loosening the drawbar (K, Fig. 18) with a wrench.
4. Loosen the drawbar approximately three to four full turns.
5. Tap the drawbar head with a rubber mallet to dislodge the arbor.

**Caution**  
Please always use two belts at L position, it can get strong torque!

SPINDLE	MOTOR	SPINDLE SPEED $\odot$ /min		
		L	M	H
		120-500	500-1000	1000-2800

Fig. 19

**Do not loosen the drawbar more than three or four turns before hitting with a rubber mallet. Damage to the drawbar threads may occur!**

6. Hold the arbor with one hand while loosening the drawbar with the other. Continue to loosen the drawbar until the arbor can be down from the spindle. Wipe out the spindle with a clean dry rag.

7. Wipe down the new arbor with a clean dry rag and place the arbor into the spindle. Thread the drawbar into the arbor. Tighten the drawbar with a wrench while holding on to the spindle pulley.

**Remove cutting tools from arbor when not in use!**



**Fig. 20**

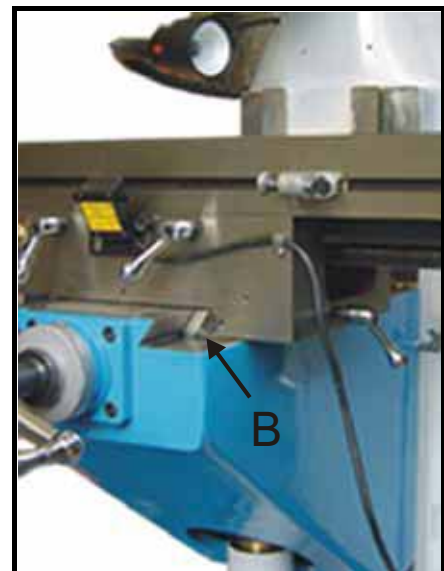
## **GIB ADJUSTMENT**

After a period of time, movement of the table over the ways will cause normal wear. To adjust the gibs for this wear.

1. The longitudinal gib adjustment screw (A, Fig. 20) is found to the front of the saddle under the table. The cross gib adjustment screw (B, Fig. 21) is found to the right on the table. The gib of knee (C, Fig. 22) is found to the left of the knee.

2. Remove the wiper and loose the screw from small end of gib. Turn the screw from large end of gib slightly clockwise to tighten. Turn the table handwheel and check the tension.

3. Re-adjust as required.



**Fig. 21**



**Fig. 22**



# **PARTS LIST FOR**

for the

# **WARCO WM20 Variable TURRET MILL**

**Warren Machine Tools Ltd**

Warco House, Fisher Lane, Chiddingfold, Surrey GU84TD

Tel: 01428 682929

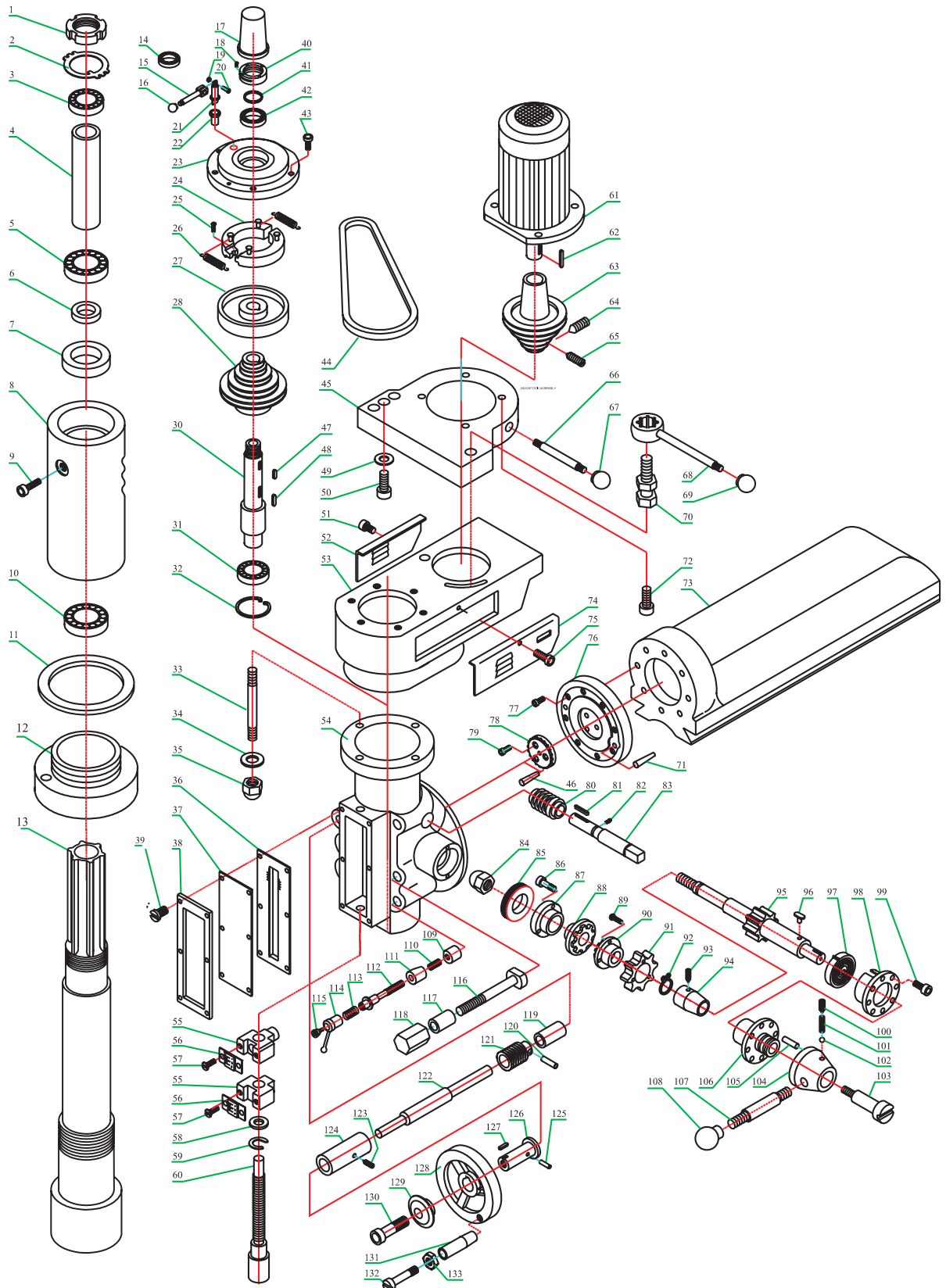
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# WM20-MILLING MACHINE

## Mill Head & Ram Assembly





**WM20-MILLING MACHINE****Head & Ram Assembly (I)**

<b>Index No.</b>	<b>Parts No.</b>	<b>Description</b>	<b>Specification</b>	<b>Qty.</b>
1	1	Lock Nut	M30x1.5	1
2	2	Star Washer	∅ 30	1
3	3	Bearing	6206D	1
4	4	Collar		1
5	5	Bearing	7207P5	1
6	6	Spacer		1
7	7	Spacer		1
8	8	Quill		1
9	9	Hex Socket Cap Screw	M10X10	1
10	10	Bearing	7207P5	1
11	11	Cover		1
12	12	Bearing Cap		1
13	13	Spindle		1
14	14	Washer	1	1
15	15	Handle		1
16	16	Handle Ball	M8	1
17	17	Drawbar Cover		1
18	18	Screw	M5X8	1
19	19	Hex Nut	M6	1
20	20	Hex Socket Cap Bolt	M6X25	1
21	21	Brake Shaft		1
22	22	Sleeve		1
23	23	Cover		1
24	24	Brake Shoe		1
25	25	Screw	M3X10	4
26	26	Spring		2
27	27	Brake Plate		1
28	28	Pulley		1
29	30	Coupling Sleeve		1
30	31	Bearing	1007	1
31	32	C-Clip	∅ 35	1
32	33	Double Stud	M12X60	3
33	34	Washer	∅ 12	3
34	35	Hex Nut	M12	3
35	36	Plate		1
36	37	Plastic Plate		1
37	38	Frame		1
38	39	Screw	M3X10	6
39	40	Locking Nut		1
40	41	Washer		1
41	42	Bearing	1007	1
42	43	Hex Socket Cap Bolt	M6X15	6
43	44	Belt	A787	1
44	45	Motor Mount		1
45	46	Taper pin	∅ 8X30	1
46	47	Flat Key	6X12	1
47	48	Flat Key	6X20	1

**WM20-MILLING MACHINE****Head & Ram Assembly (II)**

<b>Index No.</b>	<b>Parts No.</b>	<b>Description</b>	<b>Specification</b>	<b>Qty.</b>
48	49	Washer	∅ 12	2
49	50	Hex Bolt	M12X45	1
50	51	Hex Socket Cap Bolt	M6X8	1
51	52	Cover		1
52	53	Belt Housing Casting		1
53	54	Milling Head Casting		1
54	55	Stop Block		1
55	56	Plate		1
56	57	Screw	M3X5	2
57	58	Washer		1
58	59	C-Clip	∅ 12	1
59	60	Lead Screw		1
60	61	Main Motor		1
61	62	Flat Key		1
62	63	Motor Pulley		1
63	64	Set Screw	M8X12	1
64	65	Set Screw	M8X8	1
65	66	Handle	M10X110	1
66	67	Handle Ball	M10	1
67	68	Handle		1
68	69	Handle Ball	M8	1
69	70	Lock Bolt		1
70	71	Taper pin	∅ 8X15	2
71	72	Hex Socket Cap Screw	M10X20	4
72	73	Ram		1
73	74	Plate		1
74	75	Hex Socket Cap Bolt	M5X10	1
75	76	Ram Adapter		1
76	77	Hex Socket Cap Screw	M8X15	8
77	78	Worm Gear		1
78	79	Hex Socket Cap Screw	M10X20	3
79	80	Worm		1
80	81	Flat Key	4X12	1
81	82	Set Screw	M6X12	1
82	83	Shaft		1
83	84	Hex Nut	M12	1
84	85	Nut		1
85	86	Hex Socket Cap Screw	M4X10	3
86	87	Flange		1
87	88	Clutch		1
88	89	Screw	M4X15	3
89	90	Clutch		1
90	91	Worm Gear		1
91	92	C-Clip		1
92	93	Set Screw	M6X15	1
93	94	Sleeve		1
94	95	Gear Shaft		1

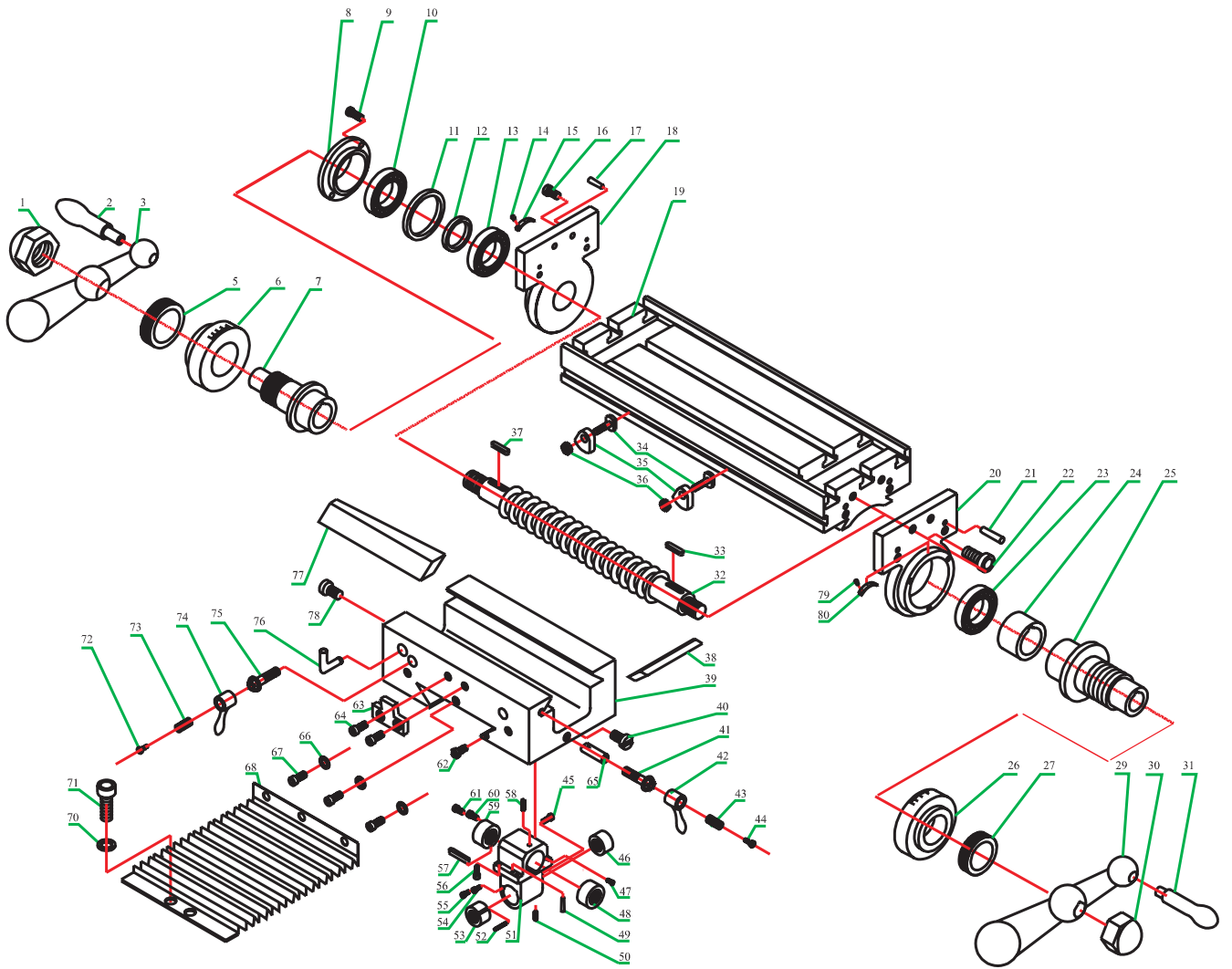
**WM20-MILLING MACHINE**

**Head & Ram Assembly (III)**

Index No.	Parts No.	Description	Specification	Qty.
95	96	T-Pin		1
96	97	Spring		1
97	98	Spring Seat		1
98	99	Hex Socket Cap Screw	M5X12	2
99	100	Set Screw	M8X6	1
100	101	Spring		1
101	102	Steel Ball	∅ 5	1
102	103	Bolt		1
103	104	Handle Body		1
104	105	Spring Pin	∅ 5X10	1
105	106	Turn Plate		1
106	107	Handle Rod		1
107	108	Handle Ball	M10	1
108	109	Locking Block		1
109	110	Spring		1
110	111	Locking Block		1
111	112	Locking Bolt		1
112	113	Spring		1
113	114	Handle		1
114	115	Screw		1
115	116	T-Bolt	M12X140	4
116	117	Spacer		4
117	118	Hex Nut		4
118	119	Brass Sleeve		1
119	120	Spring Pin	∅ 3X15	1
120	121	Worm		1
121	122	Worm Shaft		1
122	123	Set Screw	M6X12	1
123	124	Brass Sleeve		1
124	125	Spring Pin	∅ 3X15	1
125	126	Sleeve		1
126	127	Spring Pin	∅ 3X8	2
127	128	Handwheel		1
128	129	Cover		1
129	130	Hex Socket Cap Screw	M5X35	1
130	131	Handle		1
131	132	Handle Bolt		1
132	133	Hex Nut	M8	1

# WM20-MILLING MACHINE

## Longitudinal & Cross Slide Assembly



Index No.	Parts No.	Description	Specification	Qty.
133	1	Hex Nut		1
134	2	Handle		1
135	3	Handle Body		1
136	4			1
137	5	Locking Nut		1
138	6	Dial		1
139	7	Sleeve		1
140	8	Flange		1
141	9	Hex Socket Cap Screw	M6X12	3
142	10	Bearing	204	1
143	11	Adjusting Spacer		1
144	12	Adjusting Spacer		1
145	13	Bearing	204	1
146	14	Rivets	∅ 2	2
147	15	Indicator		1
148	16	Hex Socket Cap Screw	M8X15	4
149	17	Taper Pin	∅ 8X25	2
150	18	Left Bracket		1
151	19	Table		1
152	20	Right Bracket		1
153	21	Taper Pin	∅ 8X25	2
154	22	Hex Socket Cap Screw	M8X15	4
155	23	Bearing	204	1
156	24	Spacer		1
157	25	Sleeve		1
158	26	Dial		1
159	27	Locking Nut		1
160	28			1
161	29	Handle Body		1
162	30	Hex Nut	M12	1
163	31	Handle		1
164	32	Longitudinal lead Screw		1
165	33	Flat Key	3X30	1
166	34	T- Bolt		2
167	35	Stop Block		2
168	36	Hex Nut	M8	2
169	37	Flat Key	3X40	1
170	38	Cross Gib		1
171	39	Saddle		1
172	40	Gib Adjusting Screw		1
173	41	Locking Bolt		1
174	42	Locking Handle		1
175	43	Spring		1
176	44	Hex Socket Cap Screw		1
177	45	Hex Socket Cap Screw	M8X15	1
178	46	Cross Nut		1
179	47	Taper Pin	∅ 8X20	2
180	48	Longitudinal Nut		1

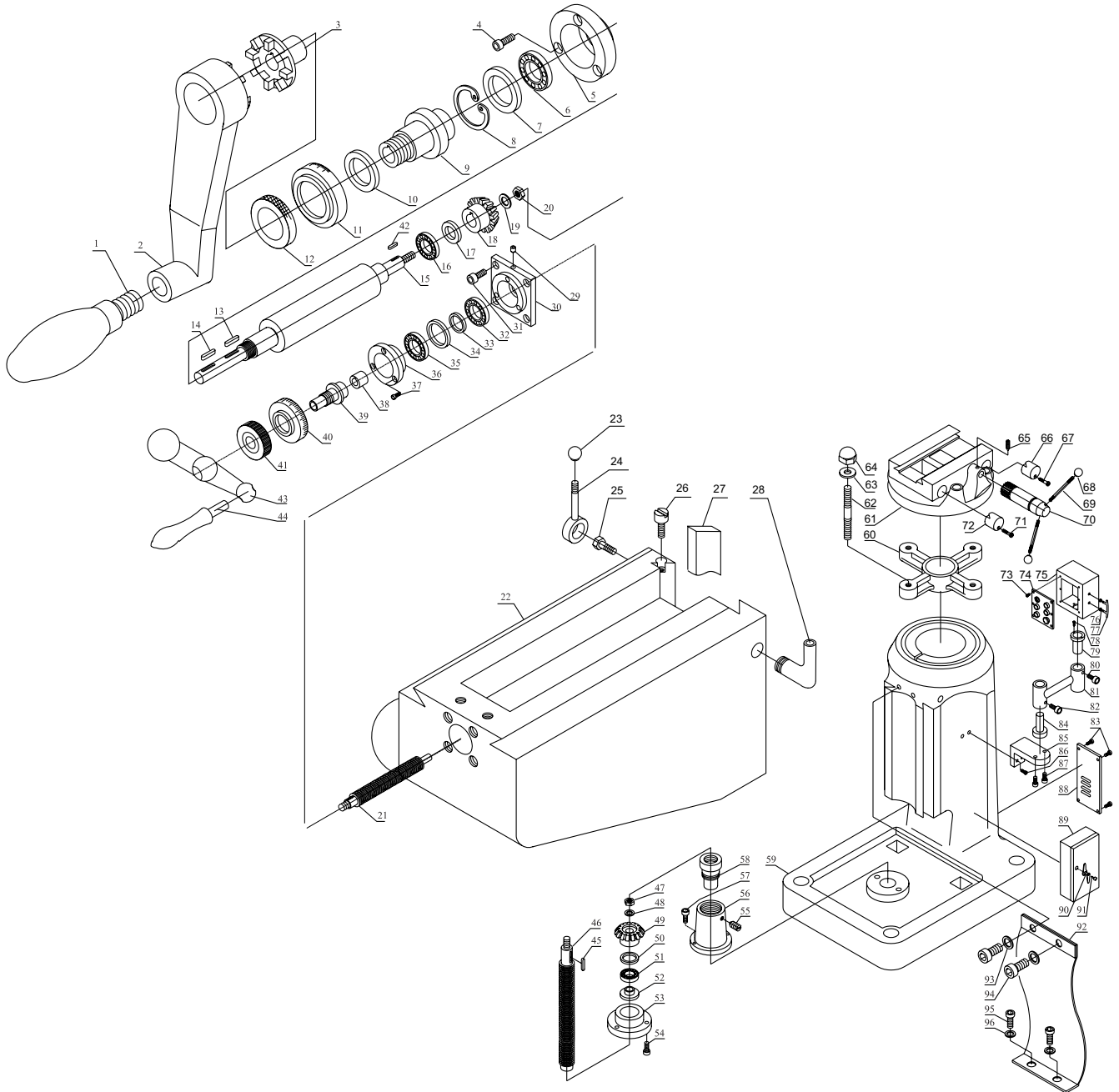
**WM20-MILLING MACHINE**

**Longitudinal & Cross Slide Assembly (II)**

Index No.	Parts No.	Description	Specification	Qty.
181	49	Taper Pin	∅ 8X20	2
182	50	Hex Socket Cap Set Screw	M8X15	1
183	51	Lead Screw Nut Bracket		1
184	52	Flat Key	5X20	1
185	53	Nut		1
186	54	Adjusting Screw	M8X15	1
187	55	Adjusting Screw	M8X20	1
188	56	Hex Socket Cap Screw	M6X20	4
189	57	Flat Key	5X20	1
190	58	Hex Socket Cap Set Screw	M8X15	1
191	59	Nut		1
192	60	Adjusting Screw	M8X15	1
193	61	Adjusting Screw	M8X20	1
194	62	Gib Adjusting Screw	M8X25	1
195	63	Stop Block		1
196	64	Hex Socket Cap Screw	M8X15	2
197	65	Locking Shaft		1
198	66	Washer	∅ 5	3
199	67	Hex Socket Cap Screw	M5X10	3
200	68	Cover		1
201	69			1
202	70	Washer	∅ 5	2
203	71	Hex Socket Cap Screw	M5X10	2
204	72	Hex Socket Cap Screw		1
205	73	Spring		1
206	74	Locking Handle		1
207	75	Locking Bolt		1
208	76	Oil Cup		1
209	77	Longitudinal Gib		1
210	78	Gib Adjusting Screw	M8X25	1

# WM20-MILLING MACHINE

## Knee & Base Assembly



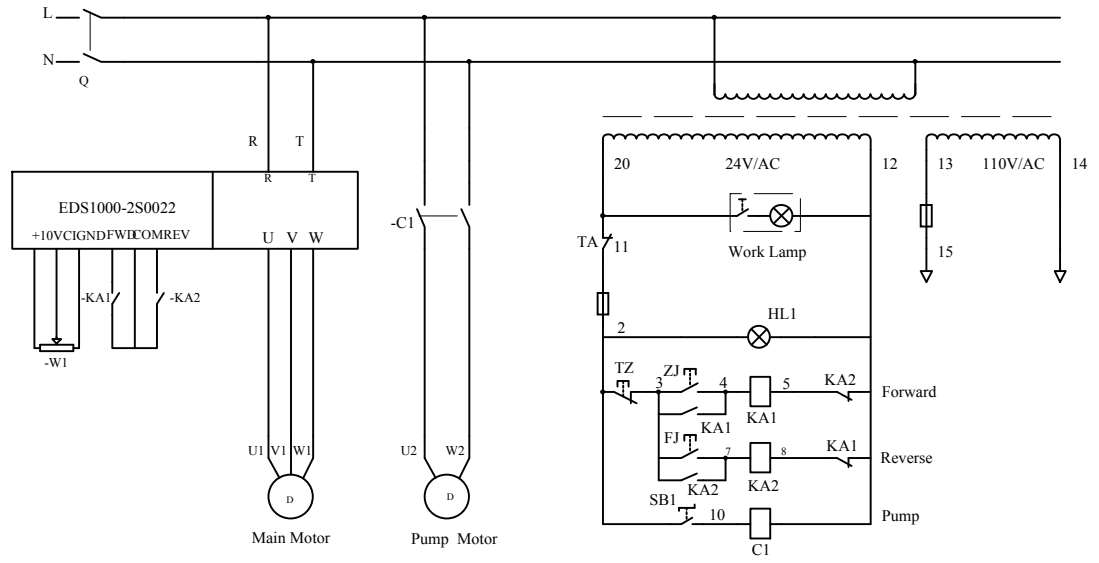
**WM20-MILLING MACHINE****Knee & Base Assembly (I)**

<b>Index No.</b>	<b>Parts No.</b>	<b>Description</b>	<b>Specification</b>	<b>Qty.</b>
211	1	Handle		1
212	2	Elevating Shaft		1
213	3	Clutch		2
214	4	Hex Socket Cap Screw	M6X20	3
215	5	Flange		1
216	6	Bearing	204	1
217	7	Spacer		1
218	8	C-Clip	∅ 47	1
219	9	Sleeve		3
220	10	Spacer		1
221	11	Dial		1
222	12	Nut		1
223	13	Flat Key	4X15	1
224	14	Flat Key	3X20	1
225	15	Elevating Shaft		1
226	16	Bearing	204	1
227	17	Spacer		1
228	18	Bevel Gear A		1
229	19	Washer	∅ 12	1
230	20	Hex Nut	M12	1
231	21	Cross Leadscrew		1
232	22	Knee		1
233	23	Handle Ball	M10	1
234	24	Locking Handle		1
235	25	Hex Cap Screw	M12	1
236	26	Gib Adjusting Screw		1
237	27	Elevating Gib		1
238	28	90° Oil Cup		1
239	29	Oil Cup	6mm	1
240	30	Bearing Bracket		1
241	31	Hex Socket Cap Screw	M8X15	4
242	32	Bearing	204	1
243	33	Spacer		1
244	34	Spacer		1
245	35	Bearing	204	1
246	36	Flange		1
247	37	Hex Socket Cap Screw	M6X15	3
248	38	Collar		1
249	39	Sleeve		1
250	40	Cross Dial		1
251	41	Nut		1
252	42	Flat Key	5X12	1
253	43	Handle Body		1
254	44	Handle		1
255	45	Flat Key	5X15	1
256	46	Elevating Leadscrew		1
257	47	Hex Nut	M12	1
258	48	Washer	∅ 12	1



**WM20-MILLING MACHINE****Knee & Base Assembly (I)**

<b>Index No.</b>	<b>Parts No.</b>	<b>Description</b>	<b>Specification</b>	<b>Qty.</b>
259	49	Bevel Gear B		1
260	50	Spacer		1
261	51	Bearing	205	1
262	52	Sleeve		1
263	53	Flange		1
264	54	Hex Socket Cap Screw	M8X15	3
265	55	Set Screw	M8X12	1
266	56	Bracket		1
267	57	Hex Socket Cap Screw	M10X25	2
268	58	Elevating Screw Nut		1
269	59	Column		1
270	60	Spider		1
271	61	Turret		1
272	62	Double Head Bolt		4
273	63	Washer	∅ 12	4
274	64	Hex Nut	M12	4
275	65	Set Screw	M6X15	1
276	66	Locking Block		1
277	67	Hex Socket Cap Screw	M12	1
278	68	Handle Ball	M10	2
279	69	Handle		2
280	70	Gear Shaft		1
281	71	Hex Socket Cap Screw	M12	1
282	72	Locking Block		1
283	73	Screw	M4X8	6
284	74	Electric Control Plate		1
285	75	Electric Control Box		1
286	76	Screw	M4X8	2
287	77	Handle		1
288	78	Hex Socket Cap Screw	M5X10	7
289	79	Shaft		1
290	80	Screw		1
291	81	Bracket		1
292	82	Screw		1
293	83	Screw	M5X10	4
294	84	Shaft		1
295	85	Angle Iron Bracket		1
296	86	Hex Socket Cap Screw	M5X12	2
297	87	Hex Socket Cap Screw	M5X10	2
298	88	Cover		1
299	89	Electric Box		1
300	90	Lock		1
301	91	Key		1
302	92	Rubber Sheet		1
303	93	Washer	∅ 5	2
304	94	Hex Socket Cap Screw	M5X10	2
305	95	Hex Socket Cap Screw	M5X10	2
306	96	Washer	∅ 5	2



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
L	N	U1	V1	W1	U2	W2	2	3	4	7	10	20	12	+10	V1	GND	20	11	14	15

240V Wiring Main Motor Pump Motor Control Wiring Work lamp 24V Potentiometer Switch 110V Wiring