

Operating instructions

Universal milling and drilling machine **UF 8/1**

*Milling table with toothed belt drive
and ballscrew*

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Enclosures:

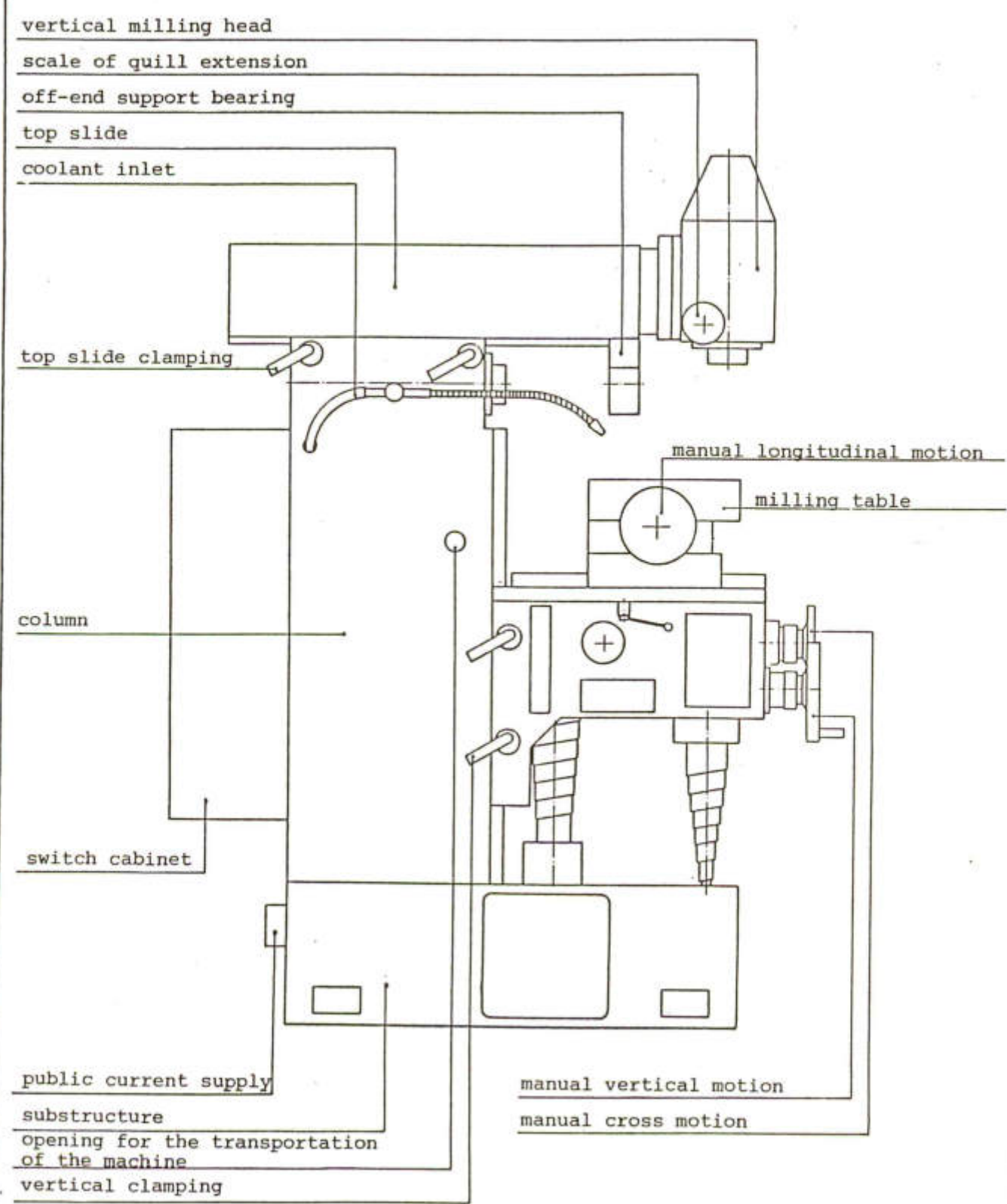
Coolant pump (Brinkmann)
 Gear units (Ortlinghaus)
 Direct current - motor (Indramat)
 Speed controlling device (Indramat)
 Service instructions MDC 10 (Indramat)

Electric

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Only for machines with slotting head

Page 80	Assemblage of slotting head
Page 81	Slotting head



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selective system of gear shifting for the milling spindle

programming switch upon request

swinging arm for the control panel

hexagon receiver of socket head wrench for quill stroke

switch desk

clamping of the milling head quill

horizontal milling spindle

oil-level sight glass for the gear

cross clamping

coolant measuring stick
coolant pump

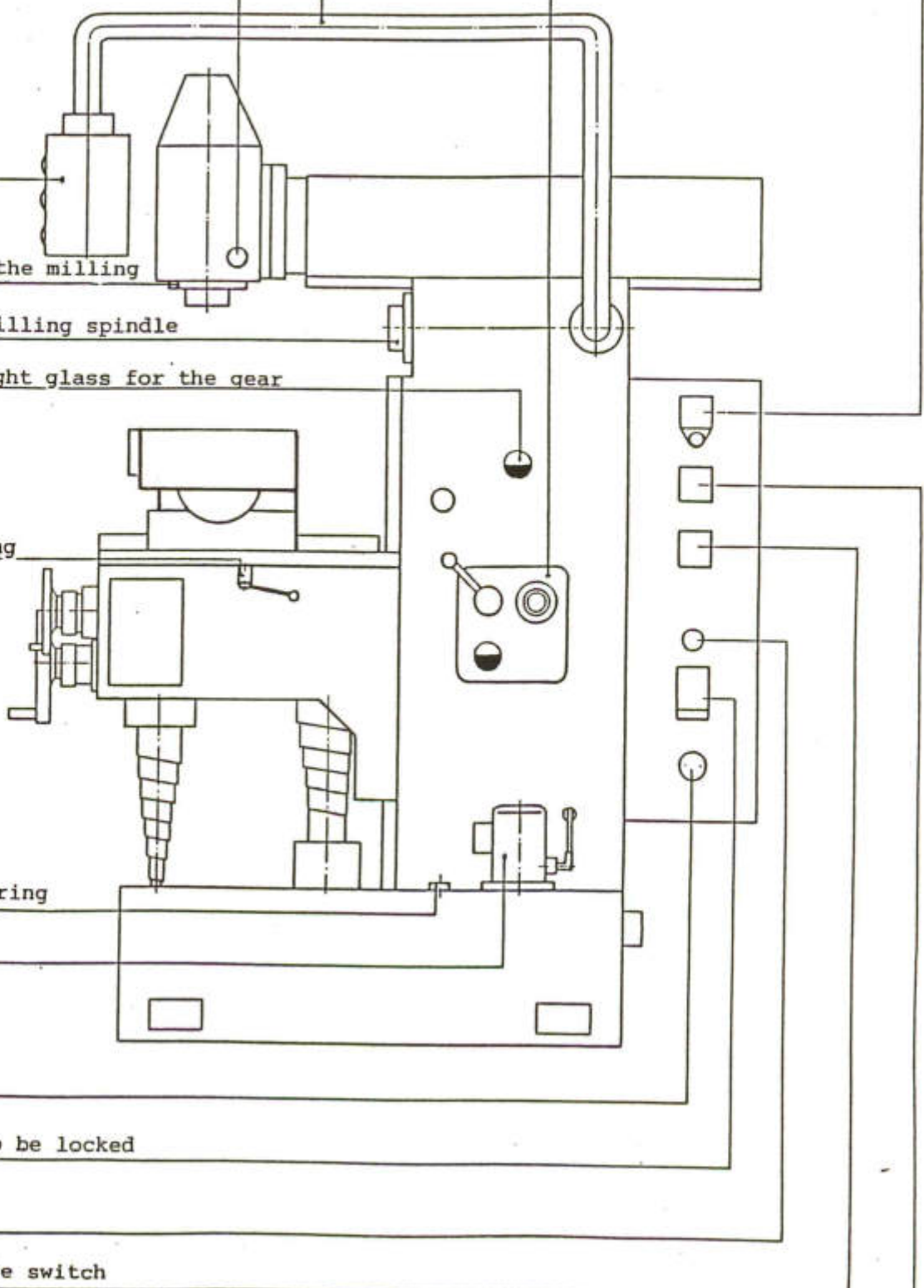
socket

main switch to be locked

signal lamp

milling spindle switch

coolant switch



Technical Specifications

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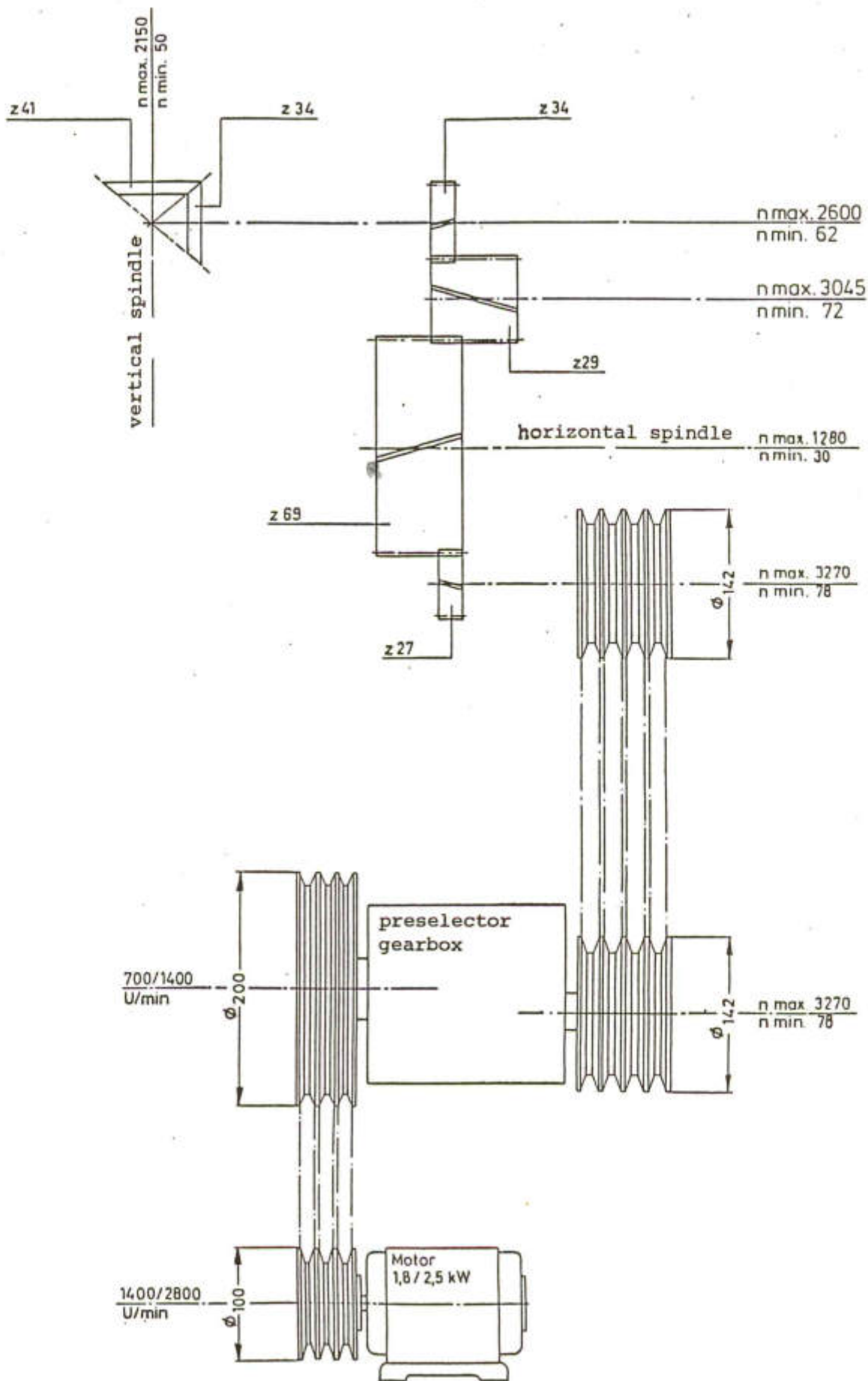
Milling table	clamping area clamping slots slot width slot distance swivel feature degree	1000 x 315 mm 5 14 H 7 56 mm +/- 45°
Working range (traverses in mm)	longitudinal by hand longitudinal automatic transverse by Hand vertical by hand transverse including adjustment of the top slide	600 590 200 410 336
Distances in mm	table top until centre of horizontal spindle table top until bottom edge of the vertical head	400 450
Milling spindle	spindle taper speeds horizontal speeds vertical switch steps geometrically stepped quill stroke vertical head, swivel feature vertical head displaceable distance from the centre of the horizontal spindle to the bottom border of the off-end support	SK 30 or SK 40 or MK 4 30 to 1280 RPM 50 to 2150 RPM 18 60 mm 360° 136 mm 87 mm
Feed	continuous longitudinal rapid longitudinal transverse and vertical	0 - 1000 mm/min. 2000 mm/min. by hand
Main drive	motor pole-changeable	1400/2800 RPM
Weight	net/include of seaworthy case	1450/1800 kg
Dimensions (packed)	length x width x height	1,60 x 1,50 x 2,00 m

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Scheme of the main drive

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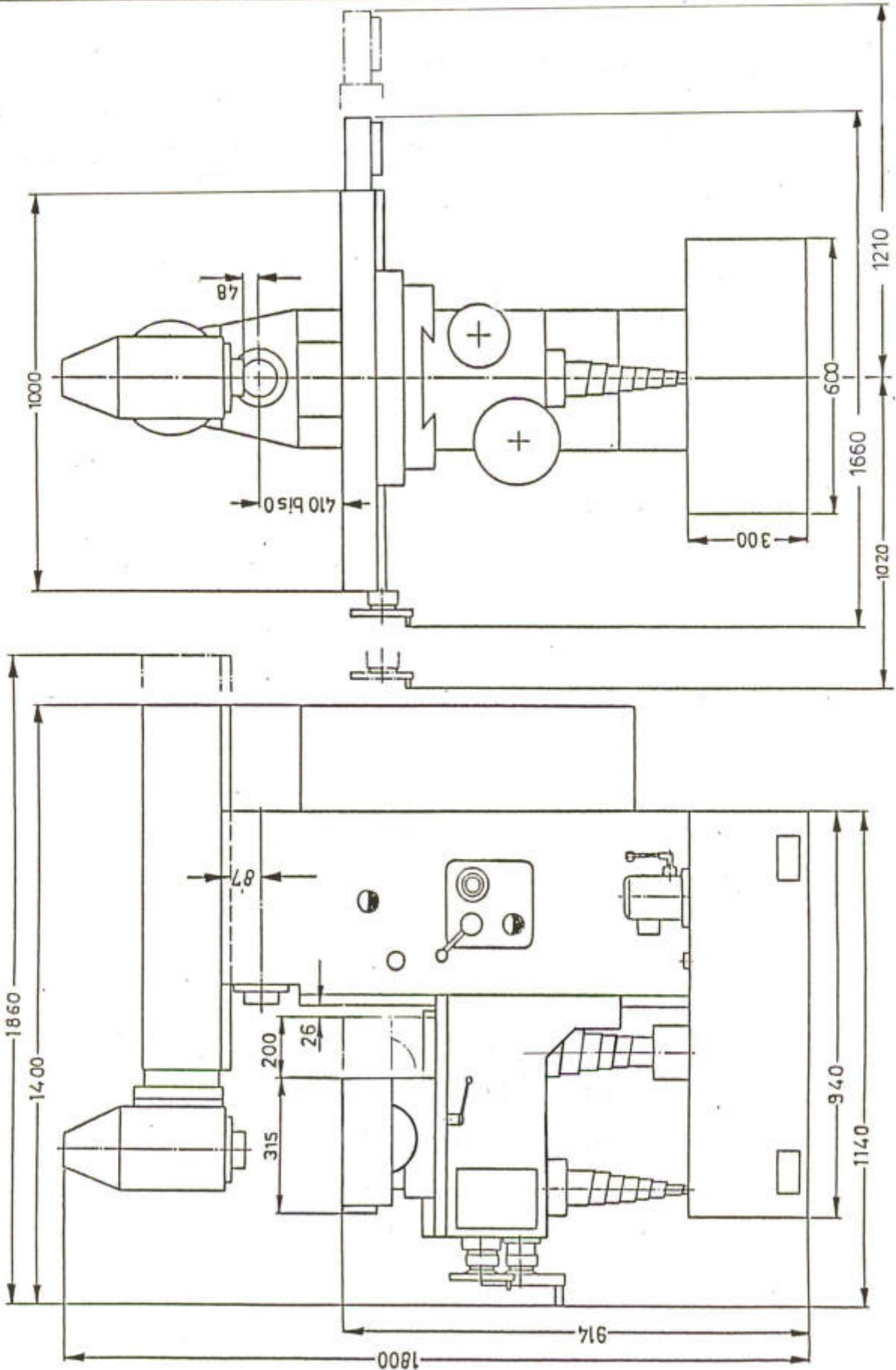
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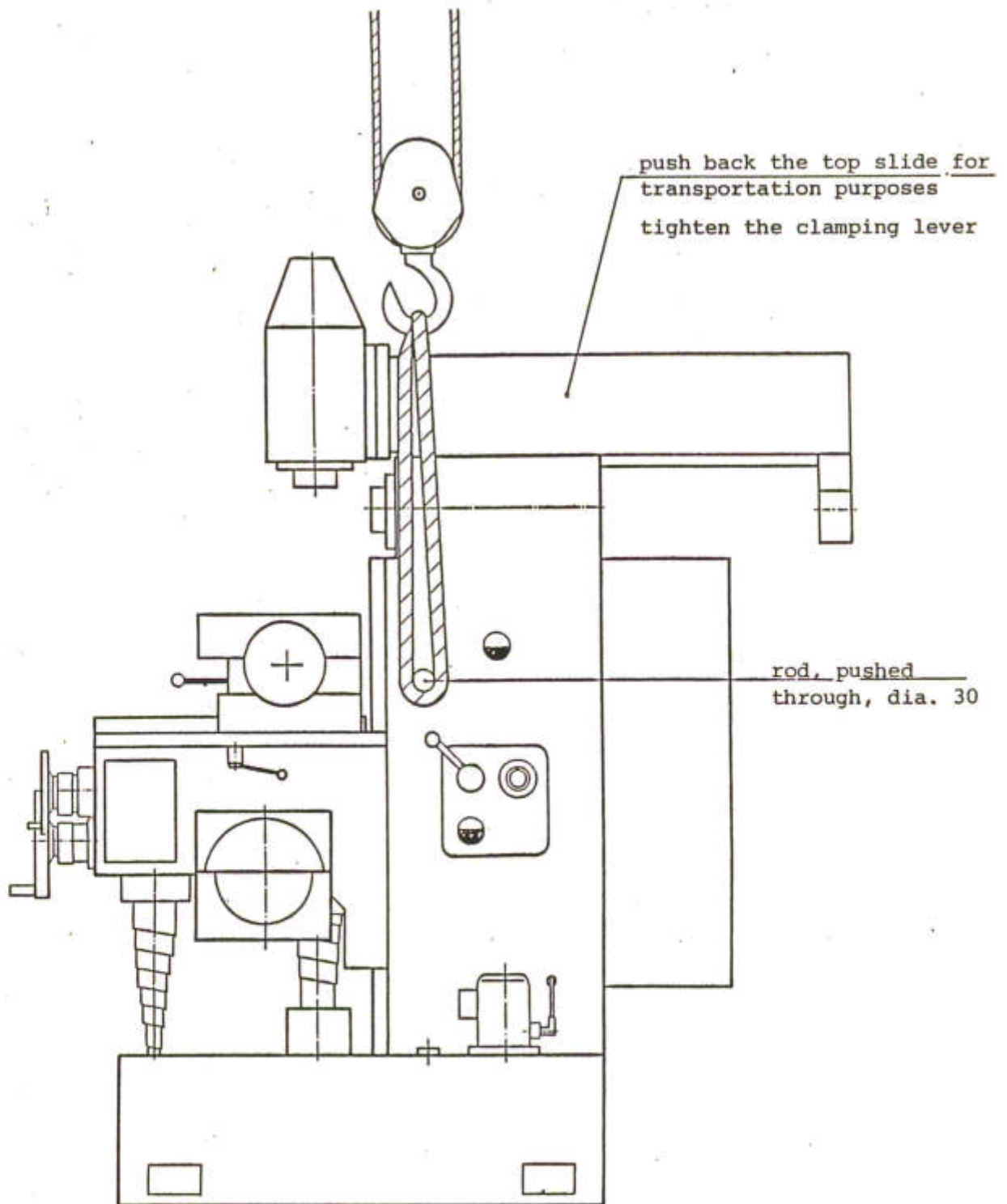
Dimensions and required space

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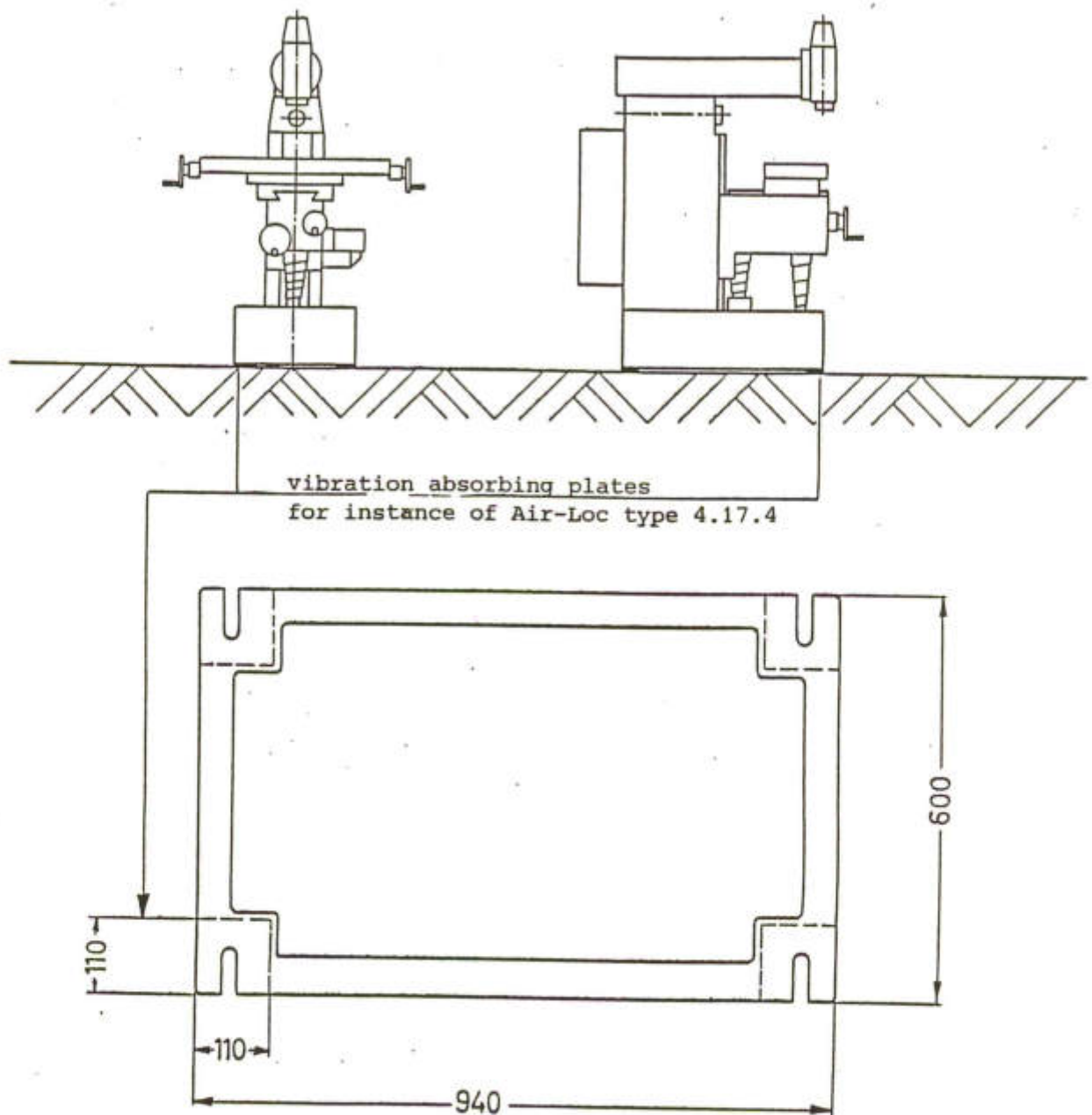


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Required elements for the transportation:

- 1 piece of round steel of dia. 30 mm, length 600 mm
- 1 rope of transportation, admissible load minimum 2500 kgs



It is possible to erect the machine on any smooth ground of good foundation. Thus, a special foundation for the machine is not necessary.

It is recommended to erect the machine on plates showing vibration absorbing properties. In this way, all internal and external vibrations are chiefly suppressed.

It is useful to align the machine by means of an air level. The alignment shall be carried out in longitudinal and cross directions, placing sheets underneath which are firmly connected to the ground (for instance glued). For this purpose, put the air level on the table surface.

We shall equip and wire the machine in accordance with the service voltage required and precised by the customer in his order sheet.

The feed line to the public supply box housed in the substructure shall be encased in a steel armoured conduit, while a minimum cross section of 5 x 2,5 mm is required for the feed line.

Connect the green-yellow protective wire of the feed line to the corresponding terminal in the public supply box.

This box also houses the additional terminals in the order of succession, N - L1,L2,L3

Primary and secondary connections respectively outlets of the transformer are protected.

In addition to fuses and with the object of overload protection, bi-metal relays are connected in series to the main and to the advance motor at the corresponding contactors.

The motor of the cooling pump is protected against excess current by means of a special motor protecting switch. Therefore the pump is not protected anymore by fusible plugs.

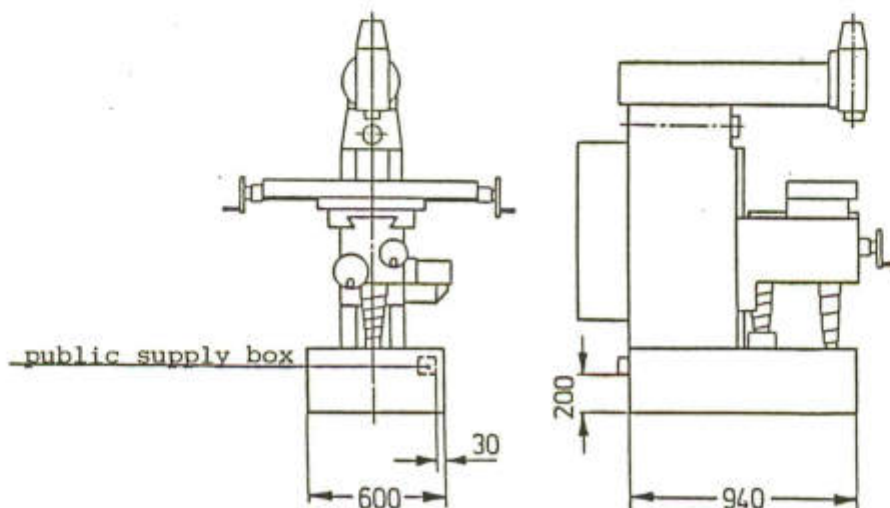
After connection to the public supply, check the adequate direction of rotation of the milling spindle.

Set the milling cutter switch to the right to ("I") (clockwise direction) in the switch cabinet.

Press the push button on the control panel "Fräser ein" (milling cutter on).

Now the horizontal milling spindle must turn to the right (clockwise direction).

In the negative, change two phases on the main switch connection in order to obtain the correct direction of rotation of the motor.



1. Inspect the oil sight glasses (see page 30) with respect to sufficient oil level.
2. Release all clamping levers on the adjusting slides, set the cut-out cams for the limit switches to the extreme final positions and tighten them.
3. On the control panel set the rotary potentiometer by turning it to the left until it reaches the stop.
4. Adjust one of the three lowest revolution speeds on the preselecting gearing.

Once the requirements 1 to 4 are fully met, it is possible to switch the machine electrically.

5. Set the main switch on the switch cabinet to I. Now the control or signal lamp must light up.
6. Programm-switch on 0 position.
7. Switch on the switch for the milling spindle on the switch cabinet. This switch also serves to change the sense of rotation of the milling spindle, i.e. the milling spindle motor may be set to the double revolution speed.

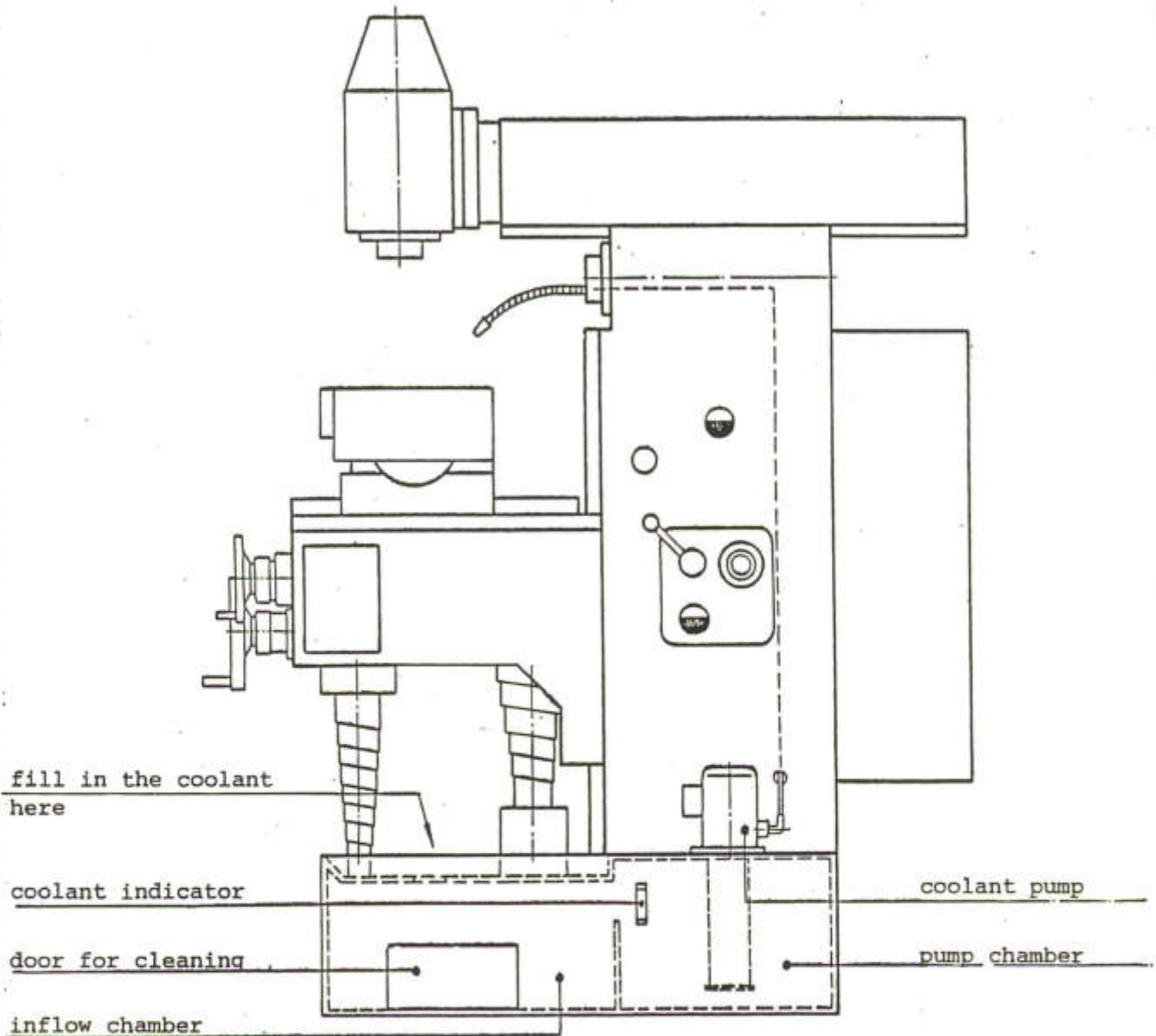
Attention: Do not switch this push button directly from a high revolution speed into a lower one at running milling spindle. Always switch off first the motor by using the push button "milling cutter off" (Fräser aus) on the control panel.

8. Switch on the coolant pump on the switch cabinet.
9. Press the push button "milling cutter on" (Fräser ein) on the control panel. Now the milling spindle will be running.
10. The required moving sense of the feed advance is switched electrically by pressing a selector switch for directions.
11. The preselected moving direction of the feed advance is switched electrically by pressing the push button "advance on" (Vorschub ein).
12. Now it is possible to adjust the advance speed infinitely variable ranging from 0 to 1.000 mm/min. on the rotary potentiometer.

Attention: The moving direction of the feed advance must be switched off by push button "feed off".
Position 0 on the rotary potentiometer guarantees no standstill of the feed advance.

13. Whether the feed advance is running or not, it is possible to operate with the rapid motion in the adjusted direction by pressing the selector-switch for rapid motion in any position. However, the rapid motion will be running only as long as the push button is pressed by hand.
14. Moving the milling table on X-axes by handwheels press button **Brake X**. After pressing again button **Brake X** (signal lamp off) it is possible to work in automatic mode.

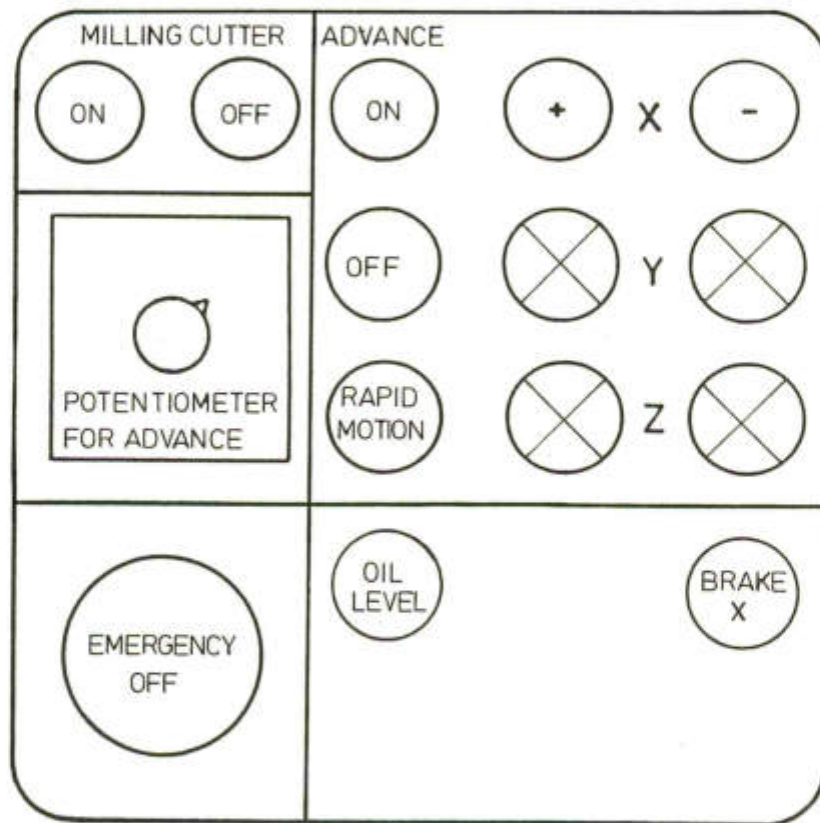
Prior to the initiation of the machine, all conditions for the electrical connection must be fully ensured. Take special care to inspect the moving senses of the feed advances. (See page 16.)



It is possible to operate the coolant pump with a coolant emulsion or with cutting oil. The substructure is laid out as coolant tank with a volumetric capacity of 20 litres. The liquid level shall not exceed the maximum line of contents and may be checked by means of coolant indicator.

Dismantle the coolant pump when cleaning the inflow chamber. Now it is possible to empty the inflow chamber via the pump chamber.

After having removed the door for cleaning, it is possible to clean the inflow chamber.



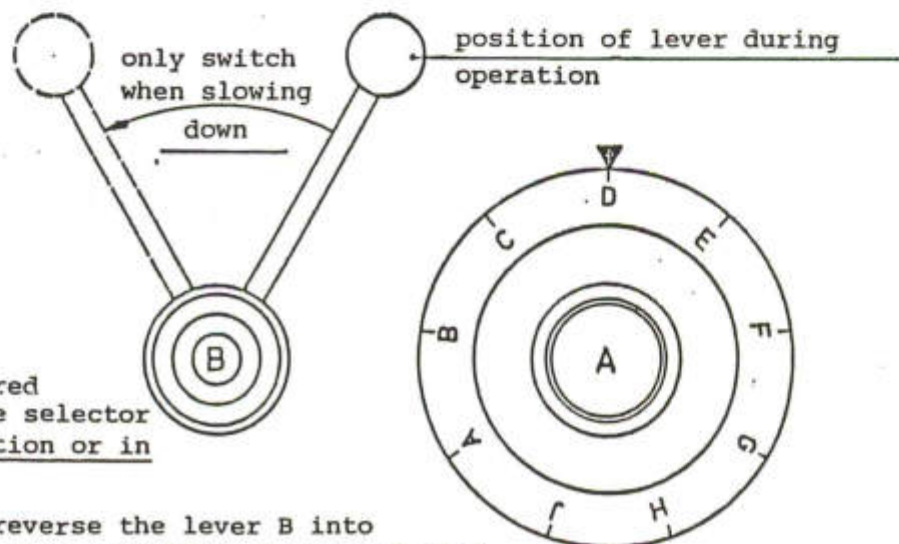
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7537 Remchingen 3 - Nöttingen

Type		Year of construction		Serial No.						
S p i n d l e s p e e d s R P M										
Switch step		A	B	C	D	E	F	G	H	J
Horizon- tally	I	30	43	65	101	144	213	303	432	640
	II	60	87	129	202	289	426	606	865	1280
Verti- cally	I	50	73	109	170	243	358	510	728	1075
	II	100	146	217	340	486	716	1019	1455	2150

For the adjustment of the milling spindle speeds, first set the revolution speed at the main motor. This is effected by means of the switch "Frässpindel" (milling spindle) at the switch cabinet. The switch is provided with the switch steps "I" and "II". These switch steps are divided into each of 18 speeds for the horizontal and vertical spindle in the preselector gearbox. If the horizontal spindle should run at 200 RPM, set the milling spindle switch to the switch step "II". Then turn on the dial the letter "D" underneath the arrow. The desired revolution speed is achieved by switching the lever.



ATTENTION !

1. Preselect the required spindle speed at the selector dial A during operation or in idle position.
2. When slowing down, reverse the lever B into direction of arrow, thus switching the preselected revolution speed.
3. Reset the lever B immediately in position of operation. (see above)
Switch on the machine!

It is absolutely essential to observe the following instructions for the clamping of the milling mandrel:

1. Firmly draw in the milling mandrel in the taper bore hole of the milling spindle by means of the milling mandrel screw. While drawing in, take the milling mandrel at the collar and turn it opposite to the direction of rotation of the milling mandrel screw.
2. If the mandrel got stuck, turn back the milling mandrel screw again, until it is not exposed anymore to the tensile stress (however, make sure not to press out again the mandrel).
3. Retighten the milling mandrel screw moderately so that it retains the milling mandrel as well as itself.

Notes:

Re.1: It is necessary to turn the milling mandrel opposite to the retaining position, in order to avoid that the driving surface of the collar on the milling mandrel would touch the spindle. Otherwise, the mandrel might get toed in, impeding the cone from irreproachable drawing in the taper bore hole. Following negative consequences could result from it:

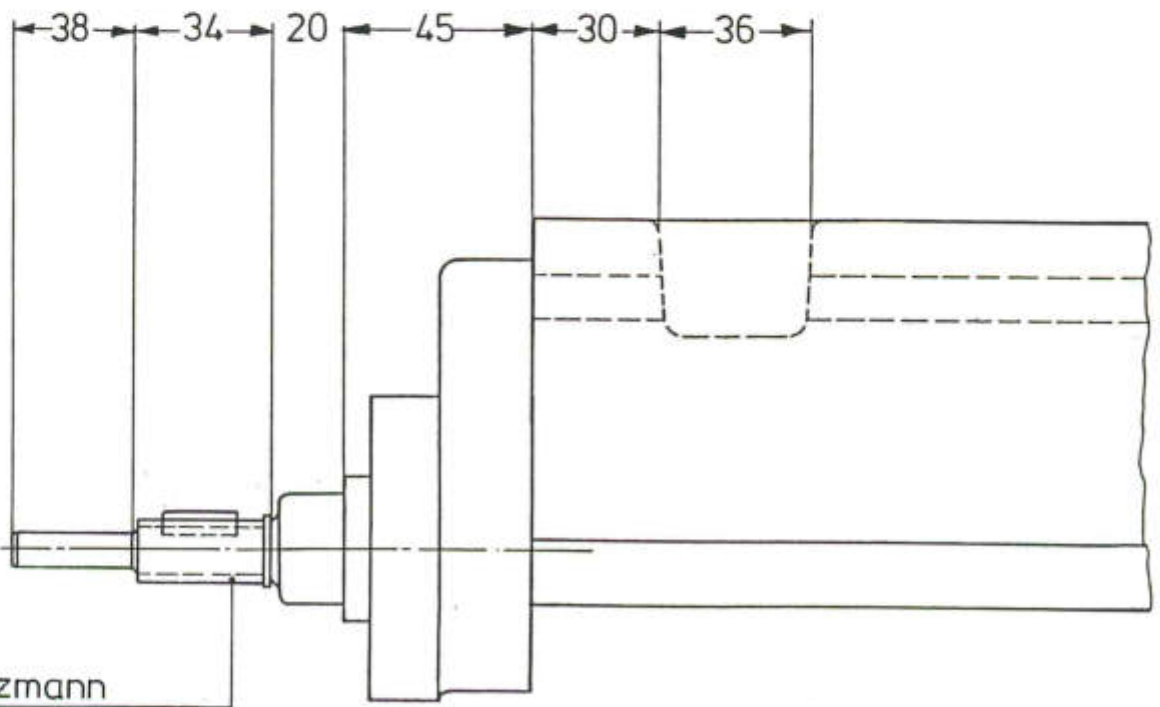
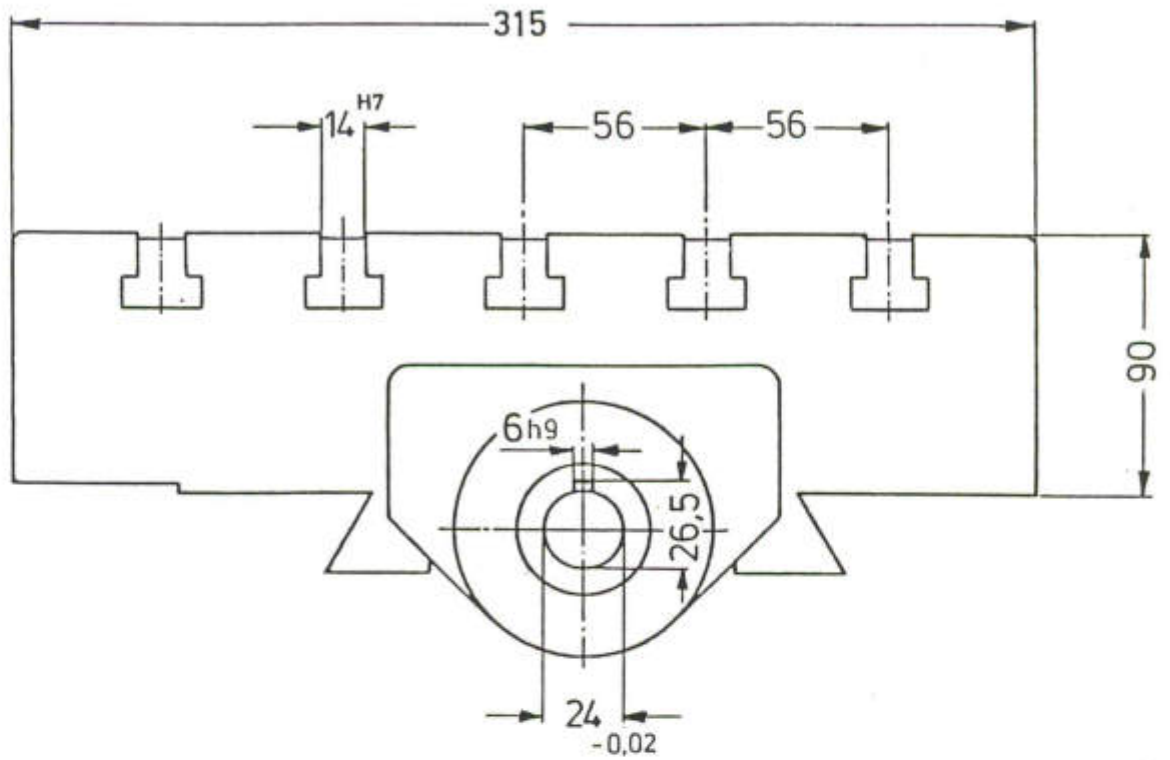
- a) No exact centering of the milling mandrel,
- b) between the milling mandrel cone and the taper bore hole of the spindle an insufficient adhesive force to ensure a safe slaving of the milling mandrel. In fact, the driving surfaces on the milling mandrel collar are only intended to produce safety but not to ensure slaving. (A milling mandrel is clamped correctly if a light metallic bang is heard when releasing it).

Re.2 and 3:

It is necessary to observe this procedure for the following reason:

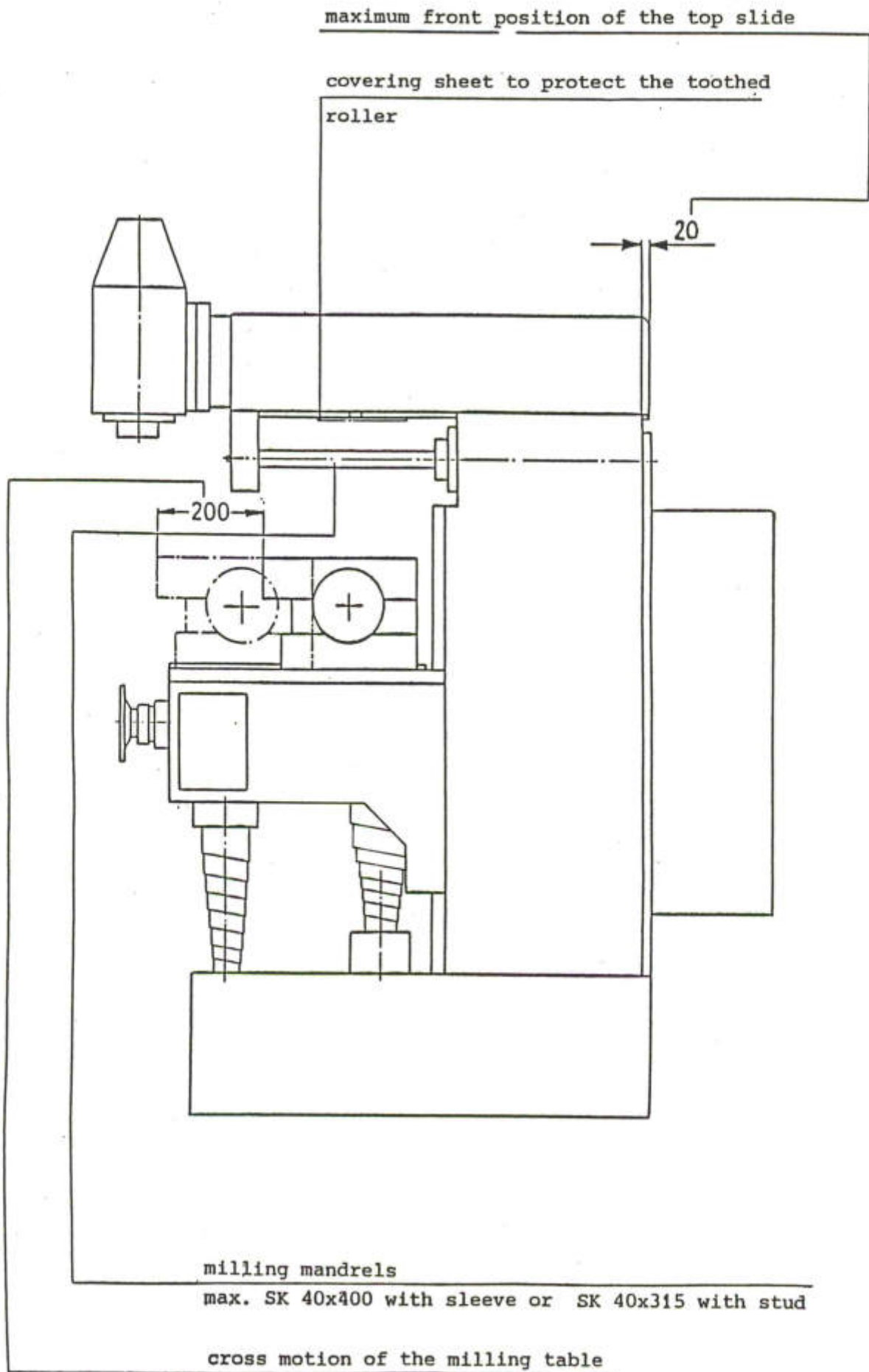
If the milling mandrel screw is not released a little after it has drawn the mandrel into the taper bore hole, it remains under the stress which has been necessary first to draw in the milling mandrel in the bore hole.

So if during operation and consequently because of the normal heating up of the machine the taper bore hole of the milling spindle dilates, the milling mandrel screw being still under stress would still draw further the milling mandrel into the inner cone. Once the spindle is cold, the milling mandrel would get stuck (shrink collar effect) fast and it will be rather difficult then to release it.

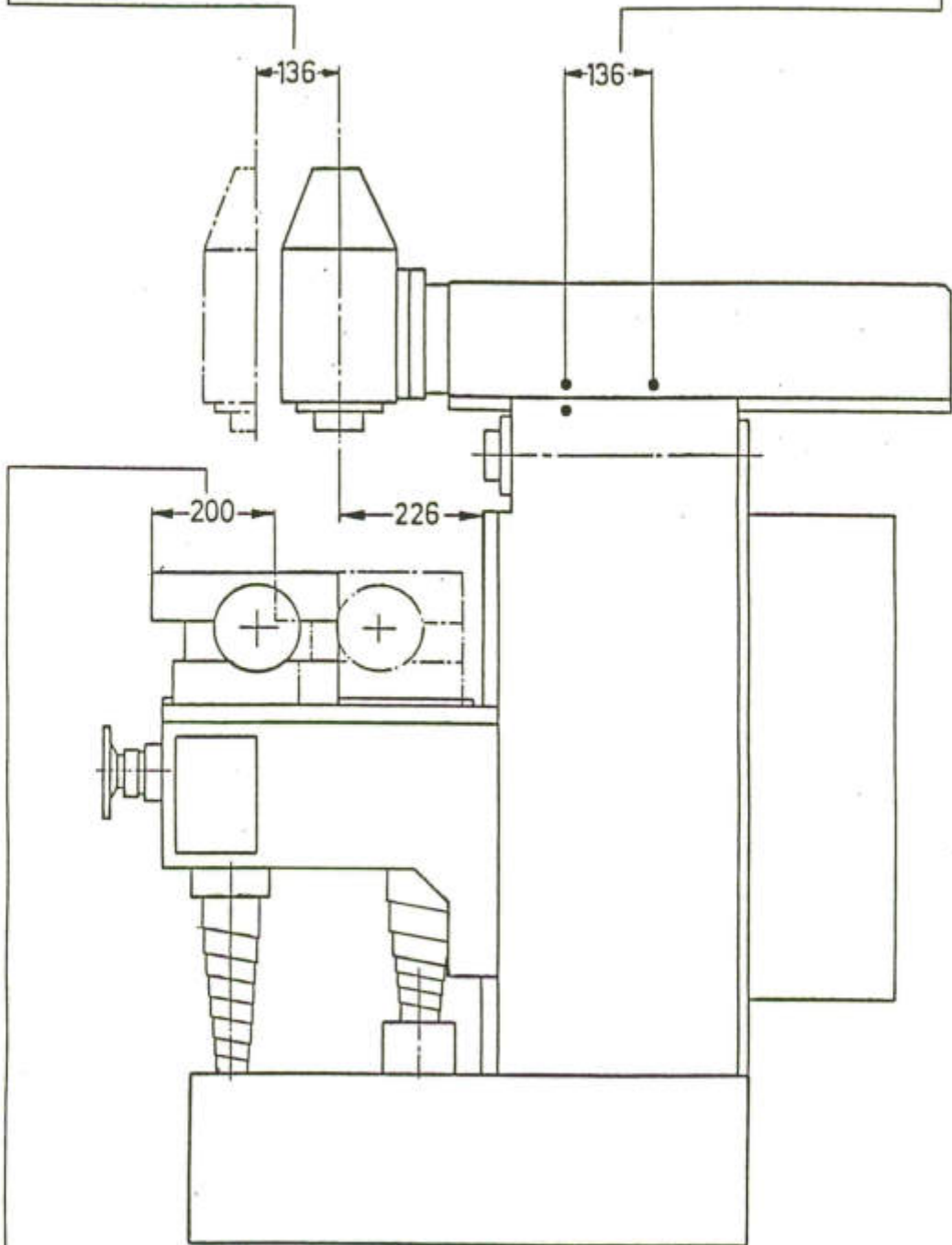


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UF-5.5-20

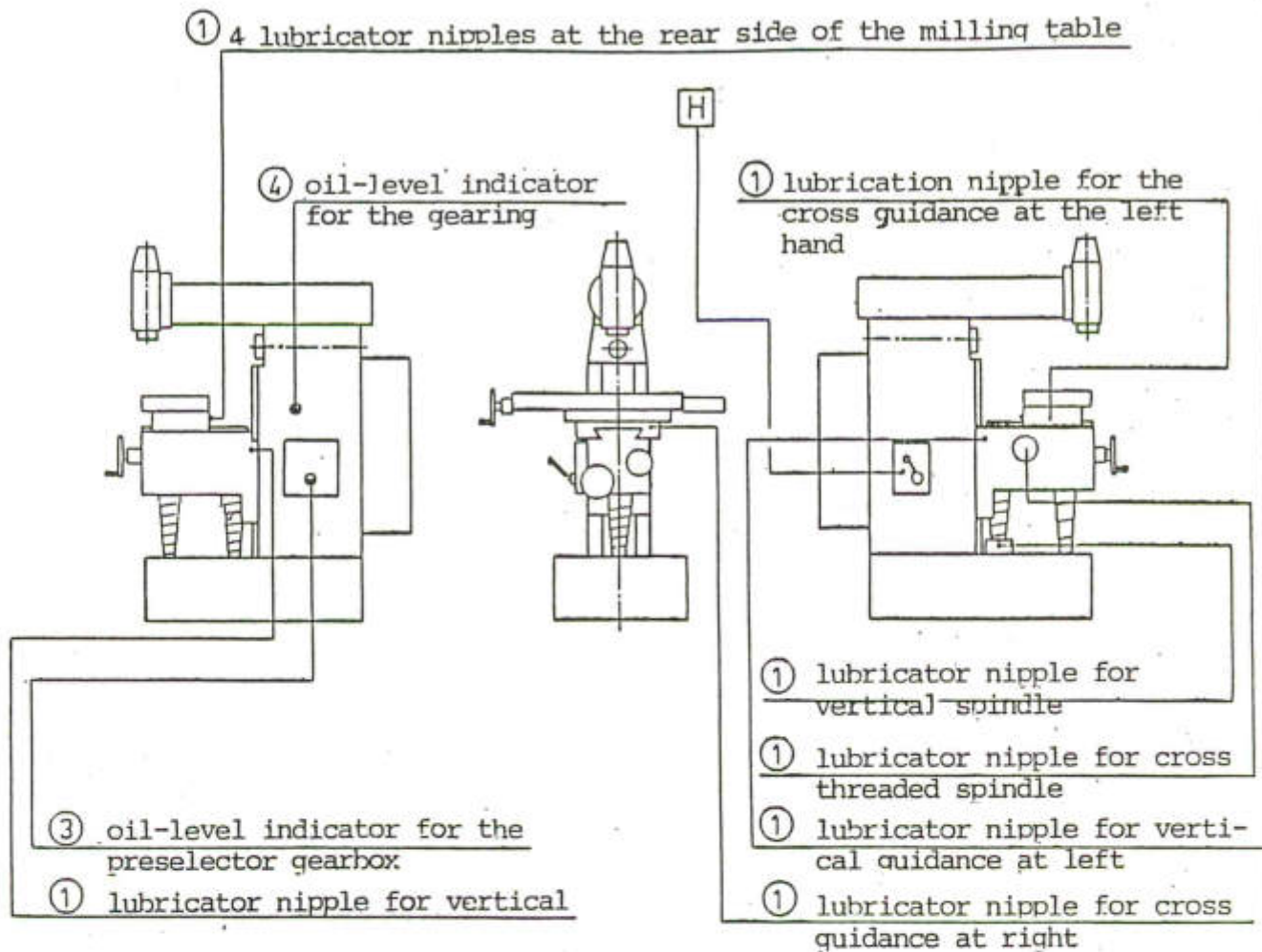
Progression of the ball screw : 32 x 5



The two points illustrate the reach of displacement of the top slide with driven milling head

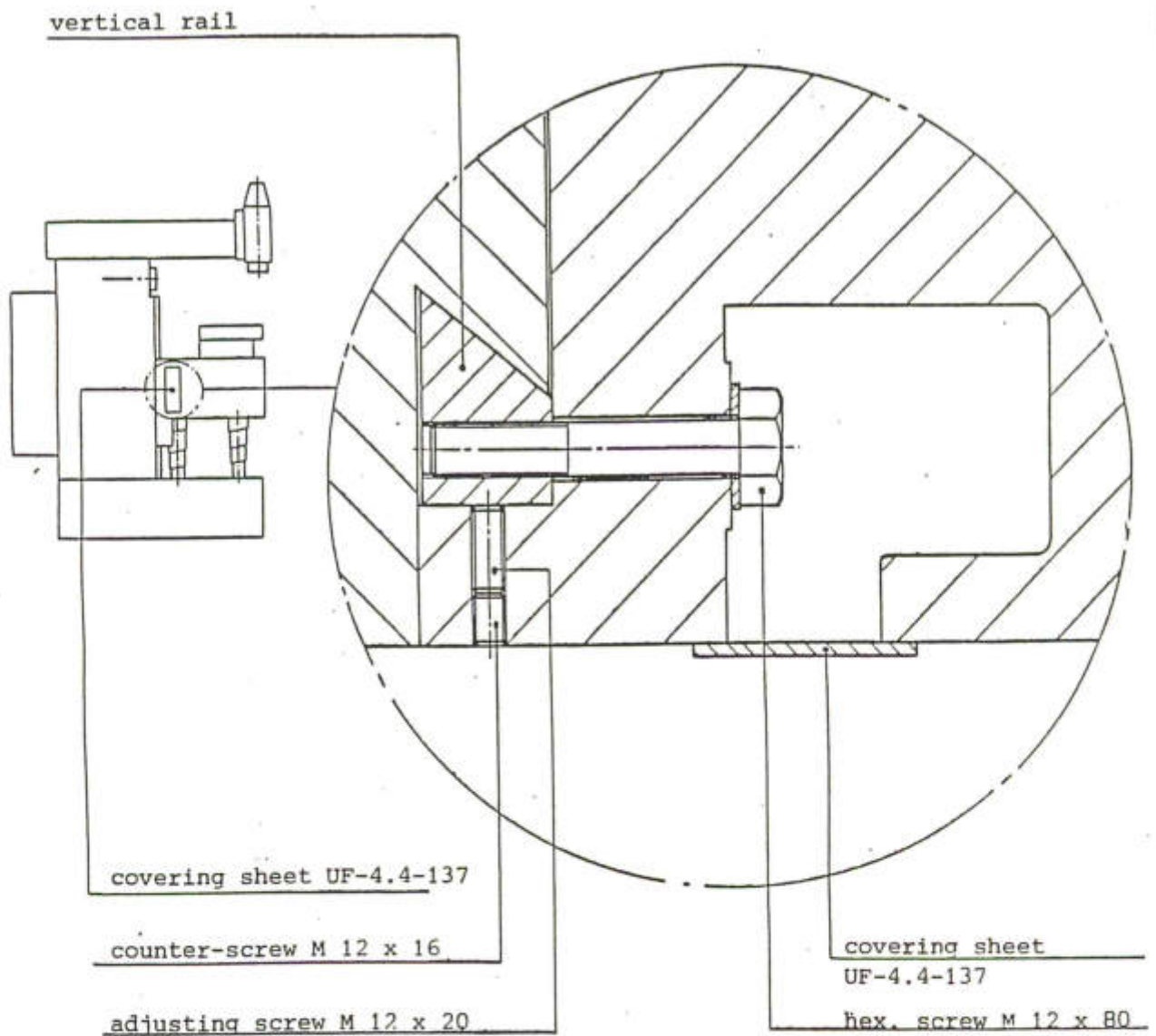


cross motion of the milling table

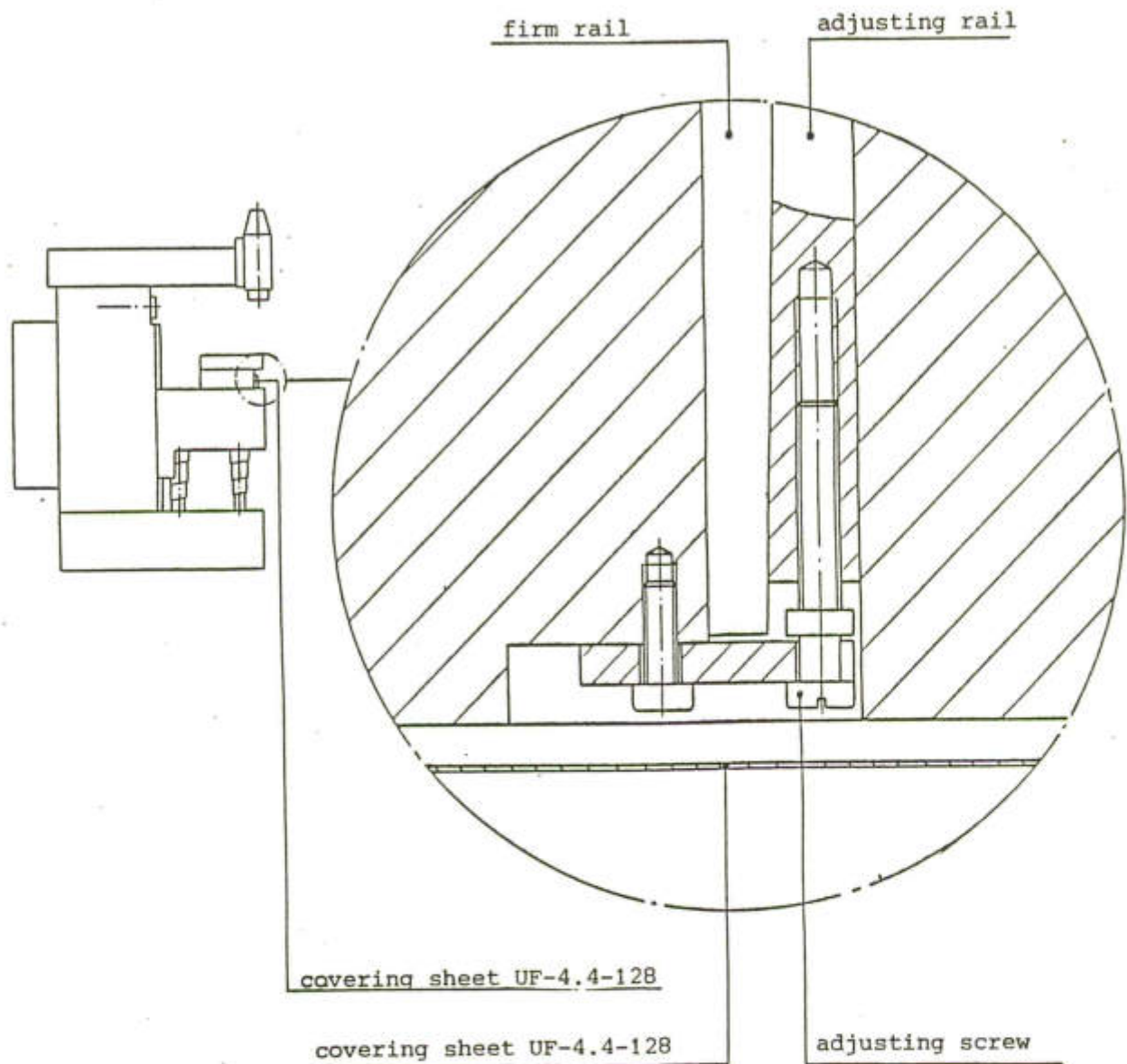


[H] central lubrication, hand-operated

grease point	frequency of lubrication	type of lubrication	quantity of lubricants	lubricants	DIN 515 02	notes
①	daily	oil lubricator nipple	3-4 strokes with the grease gun	CASTROL MAGNABTH 68	C-LP 36	see page 30
③	yearly	oil change	0,50 litres	CASTROL VARIO HDX	C-LP 36	see page 43
④	yearly	oil change	3,00 litres	CASTROL VARIO HDX	C-LP 36	see page 43
[H]	daily	central lubrication hand operated	5-6 strokes	CASTROL MAGNA BTH 68		

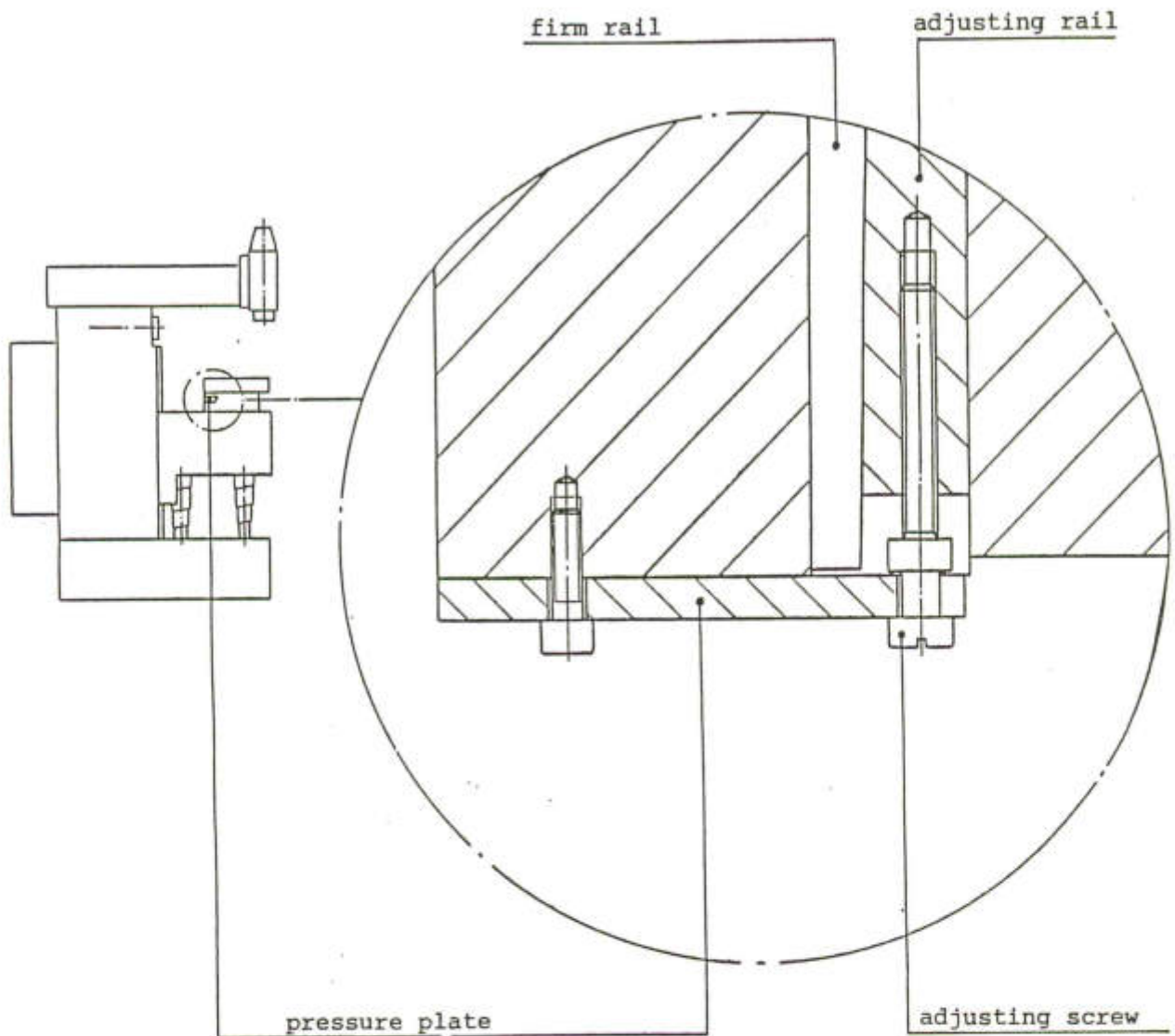


1. Take off the covering sheet UF-4.4-137.
2. Release the upper hex. screw M 12 x 80 and retighten it with approx. 10 kp at the ring spanner.
3. Release the second hex. screw M 12 x 80 from the top and retighten it well as well. Subsequently release all 5 screws from the top to the bottom and retighten them.
4. Remove the counter-screws M 12 x 16.
5. Slightly readjust the adjusting screws M 12 x 20.
6. Turn in again the counter-screws M 10 x 12 and retighten them.
7. Firmly tighten the hex. screw M 12 x 16.
8. Turning the vertical hand-wheel, you could check now the slide for easy running.



1. Remove the covering sheet UF-4.4-128 with felt.
2. Turn out the counter-screw M 5 x 45 with inner hexagon (it is mounted diagonally over the adjusting screw with slot).
3. Displace the adjusting rail against the firm rail, using the adjusting screw.
4. Counter again, using the inner hex. screw M 5 x 45.
5. While turning the cross hand-wheel, check the slide for easy running.

For readjustment of the cross rail, make sure not to press the rail against the rear covering sheet. If this would happen after repeated readjustments, shorten the rail at its rear end.



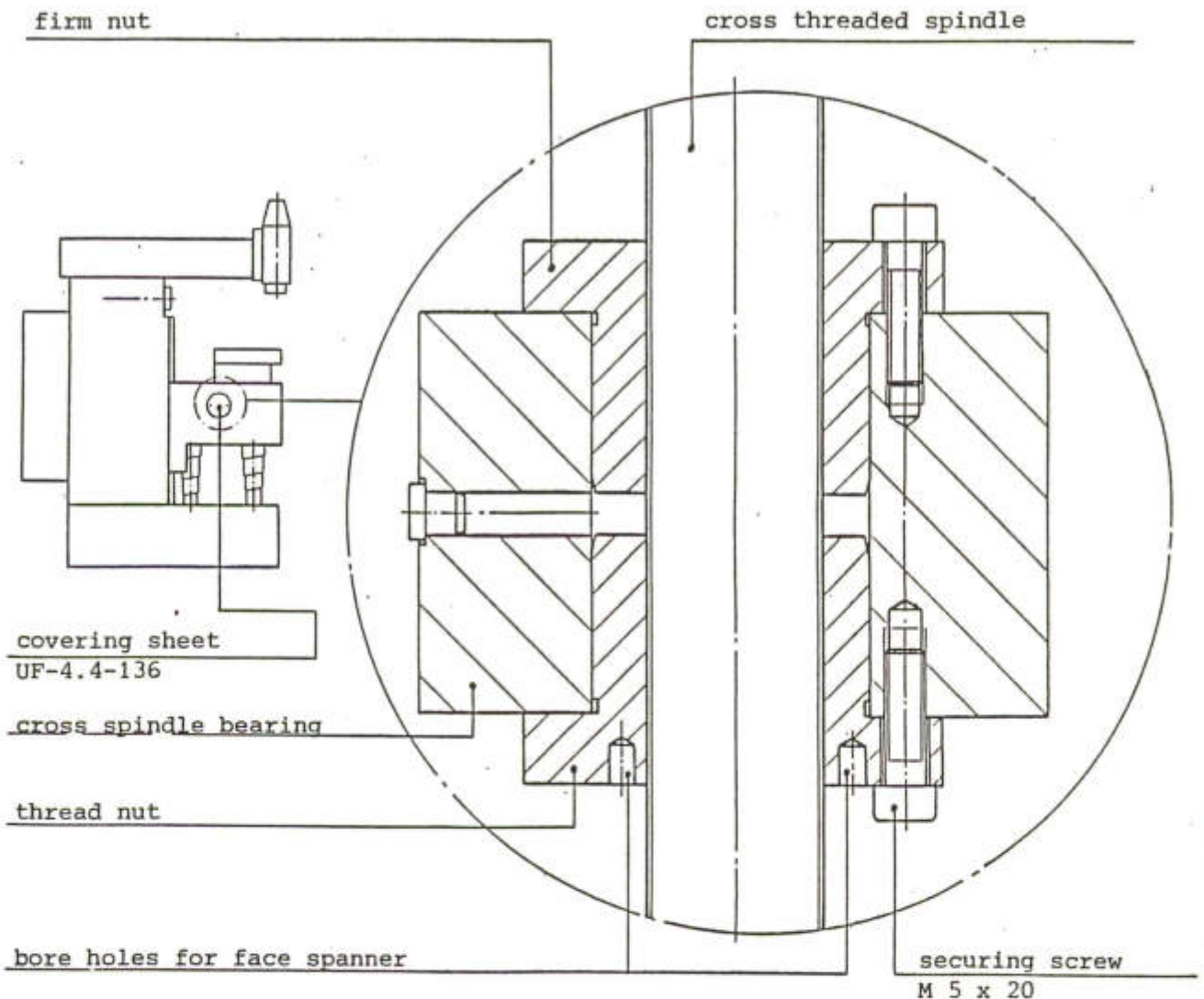
The readjusting attachment for the longitudinal rail is mounted laterally underneath the milling table at the left hand side of the milling table guidance.

1. Turn out the counter-screw M 5 x 50 with inner hexagon (it is fitted diagonally over the adjusting screw with slot).
2. Displace the adjusting rail against the firm rail, using the adjusting screw.
3. Counter again, using the inner hex. screw M 5 x 50.
4. While turning the longitudinal hand-wheel, check the milling table for easy running.

Readjustment of the thread nut for the cross motion

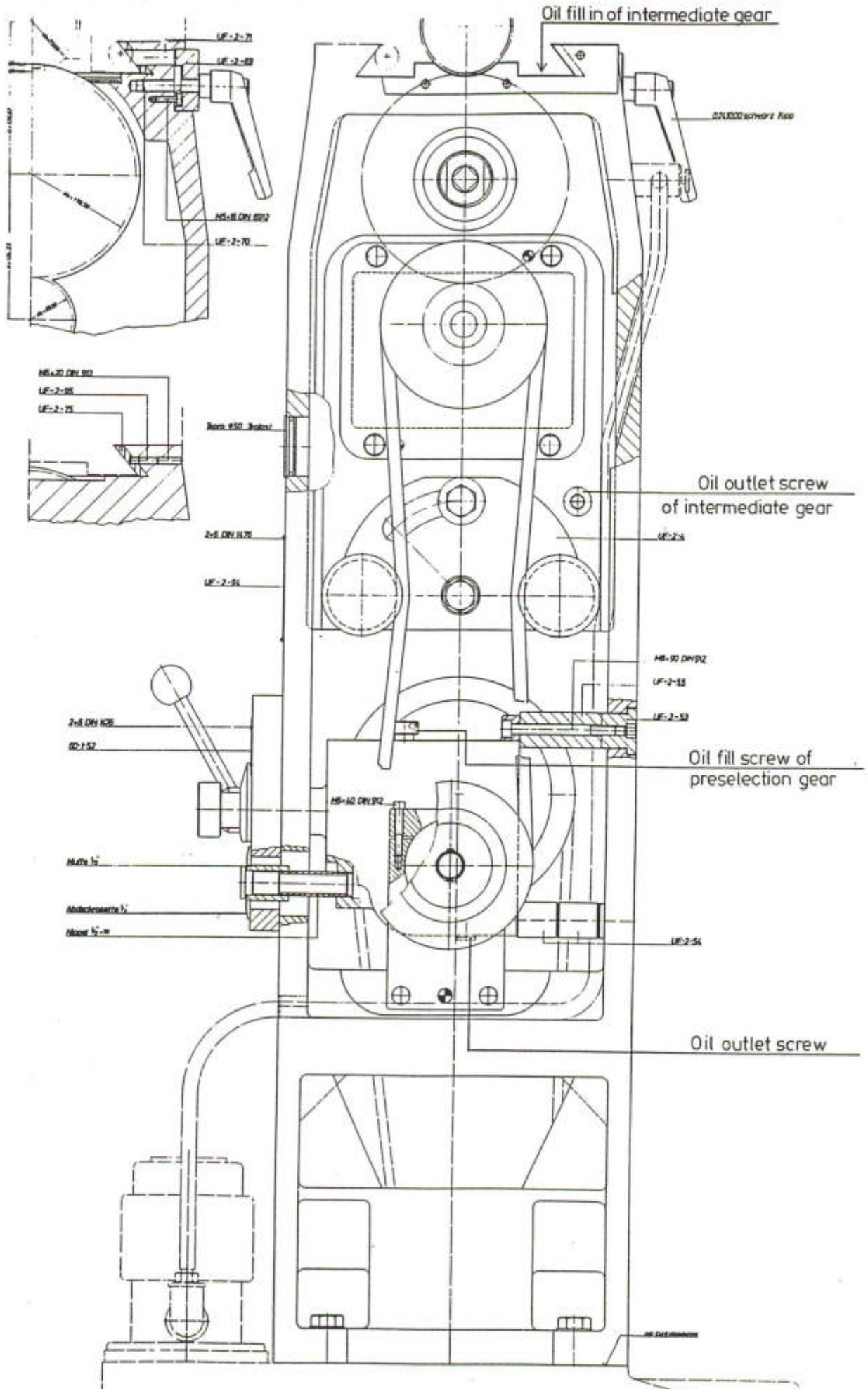
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1. Remove the covering sheet UF-4.4-136 laterally at the bracket.
2. Turn the cross hand-wheel so as to adjust the cross bearing until it gets visible through the opening which is formed by this operation.
3. Release the securing screws M 5 x 20.
4. Readjust the thread nut by turning the face spanner. (The thread nut is also accessible from underneath in the corner bracket.)
5. Retighten the securing screws M 5 x 20.
6. While turning the cross hand-wheel, check the milling table for easy running.

When the oblong holes for the securing screws are fully used after repeated readjustings, it is possible to adjust the thread nut by means of the firm nut at the other side of the cross bearing, allowing then to reuse the oblong holes again.

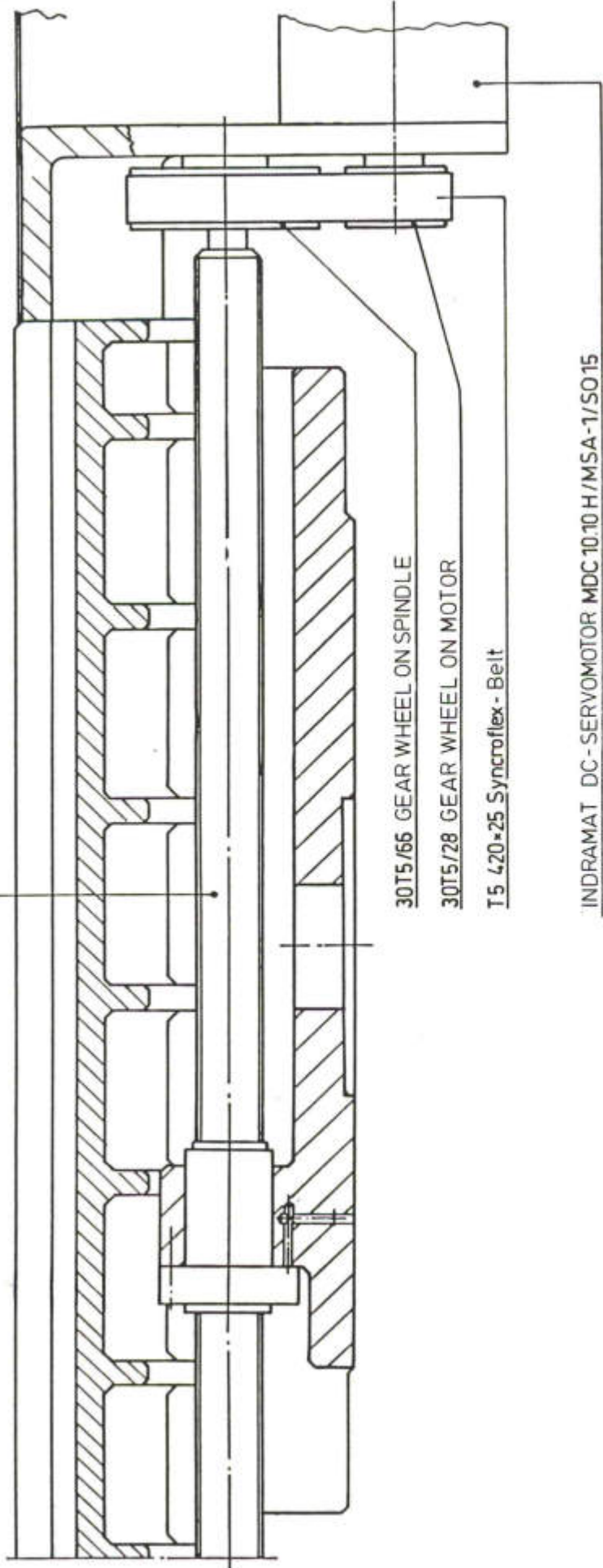


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MILLING TABLE

UF8/1
Blatt:49

BALL SCREW - SPINDLE UF-510-7



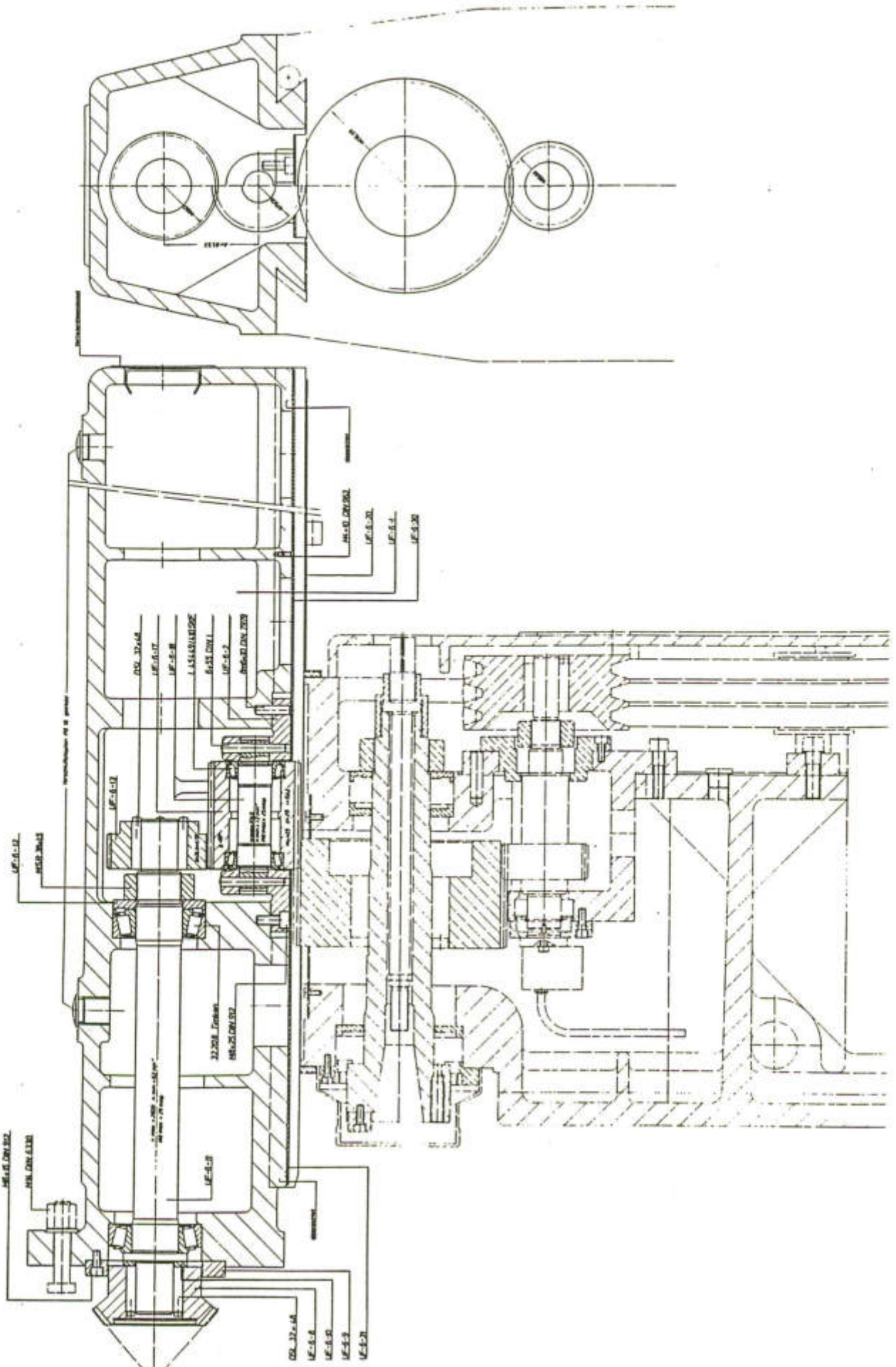
30T5/66 GEAR WHEEL ON SPINDLE

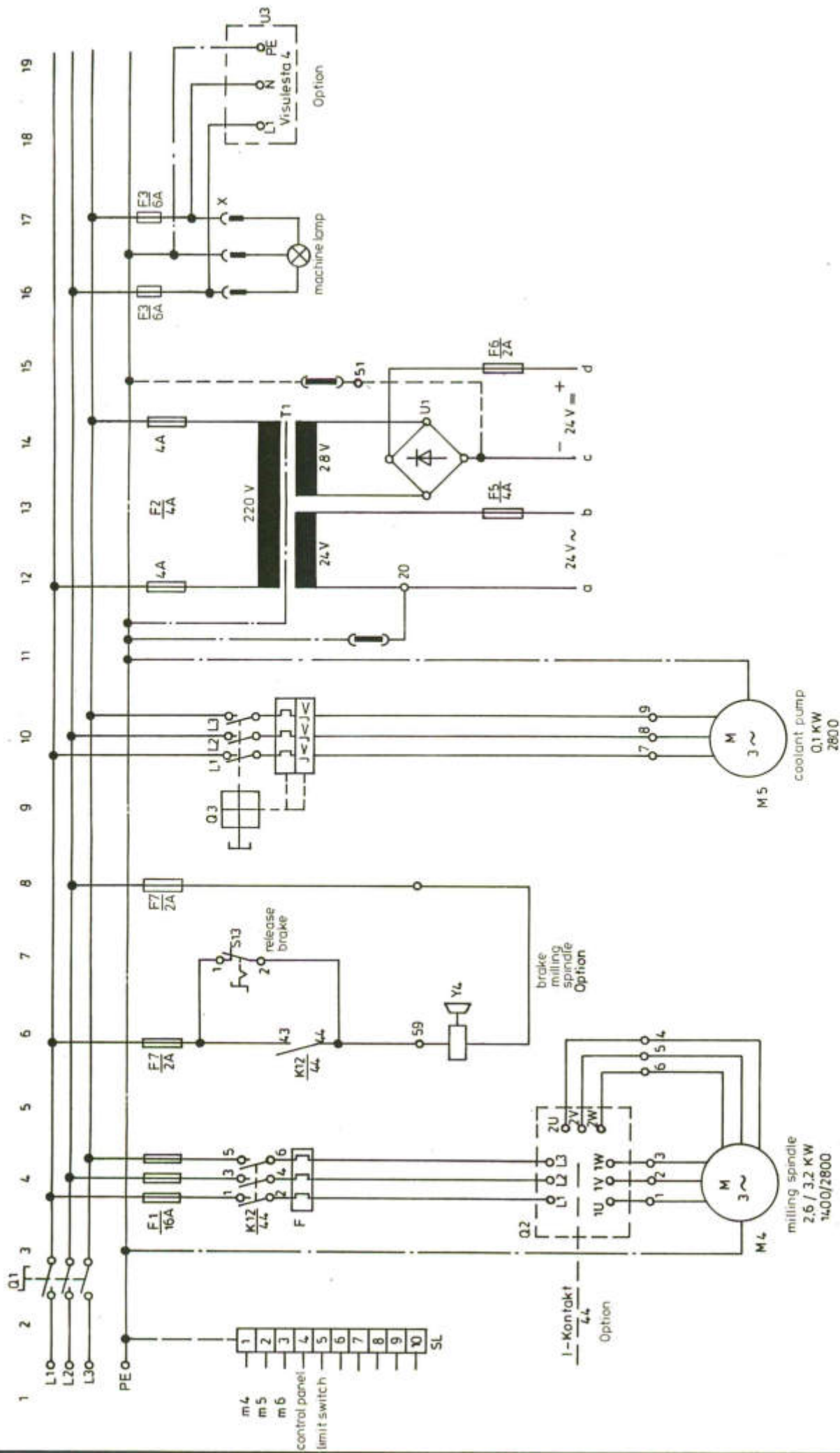
30T5/28 GEAR WHEEL ON MOTOR

T5 420*25 Syncroflex - Belt

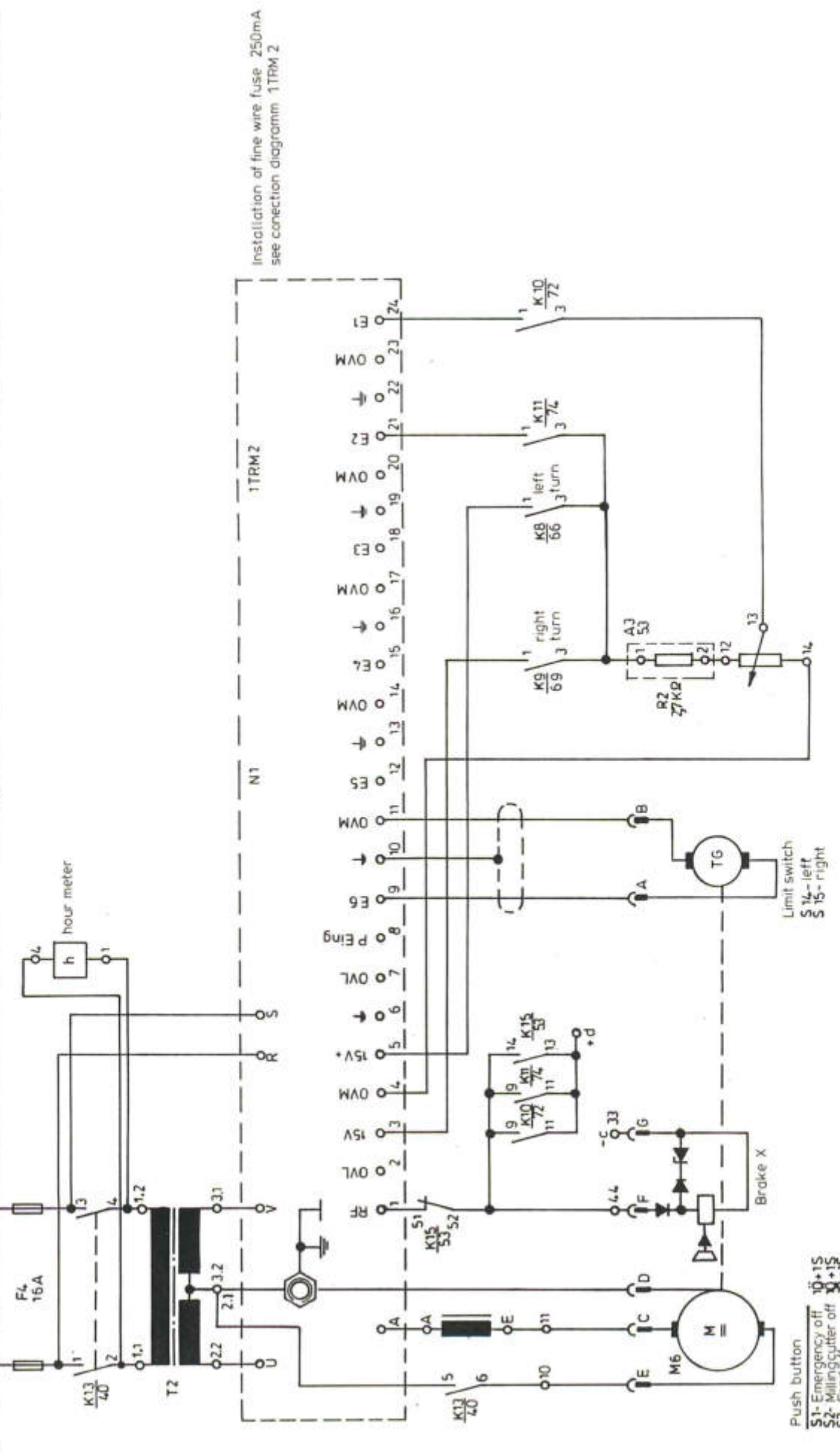
INDRAMAT DC - SERVOMOTOR MDC10.10 H/MSA-1/SO15

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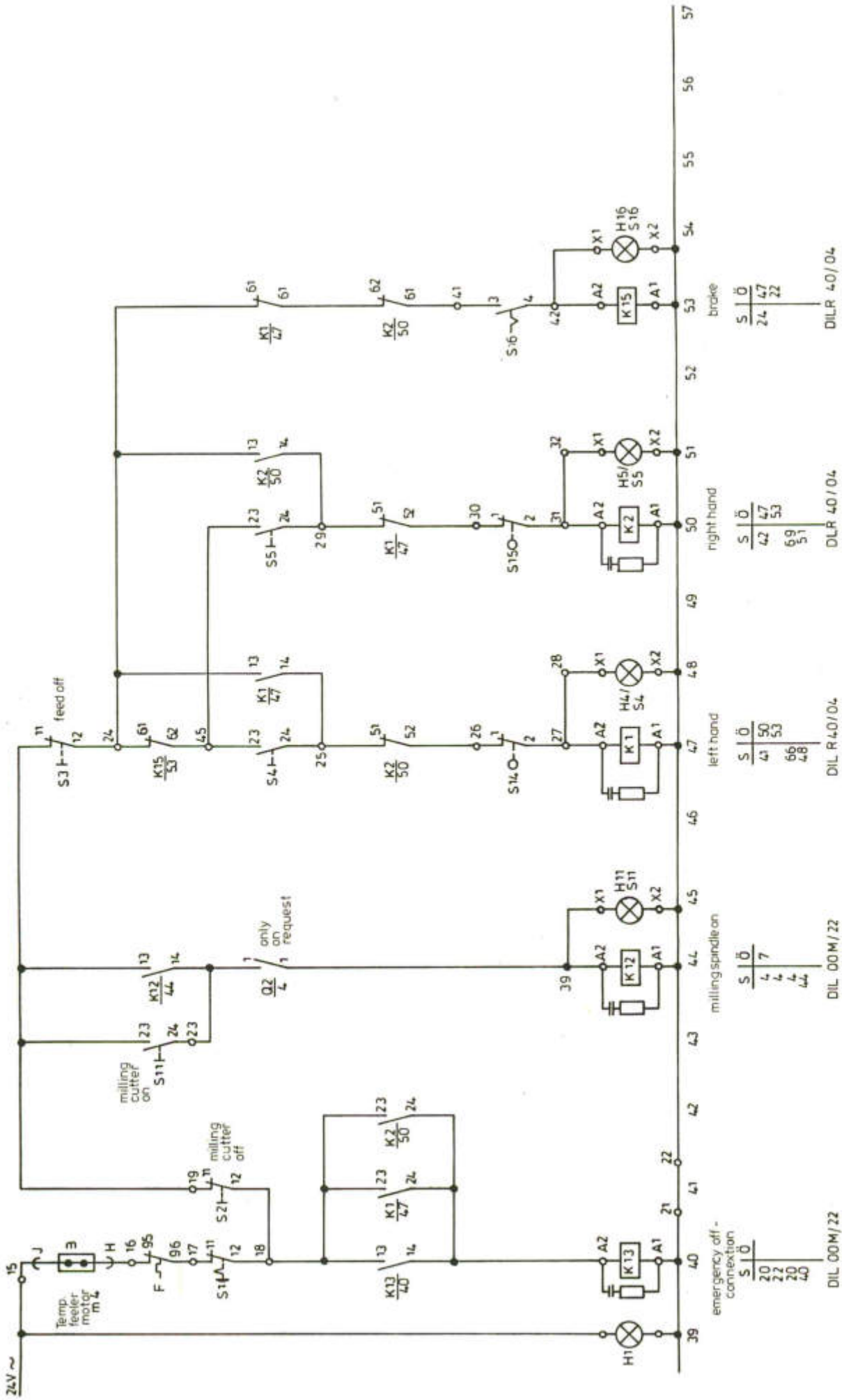


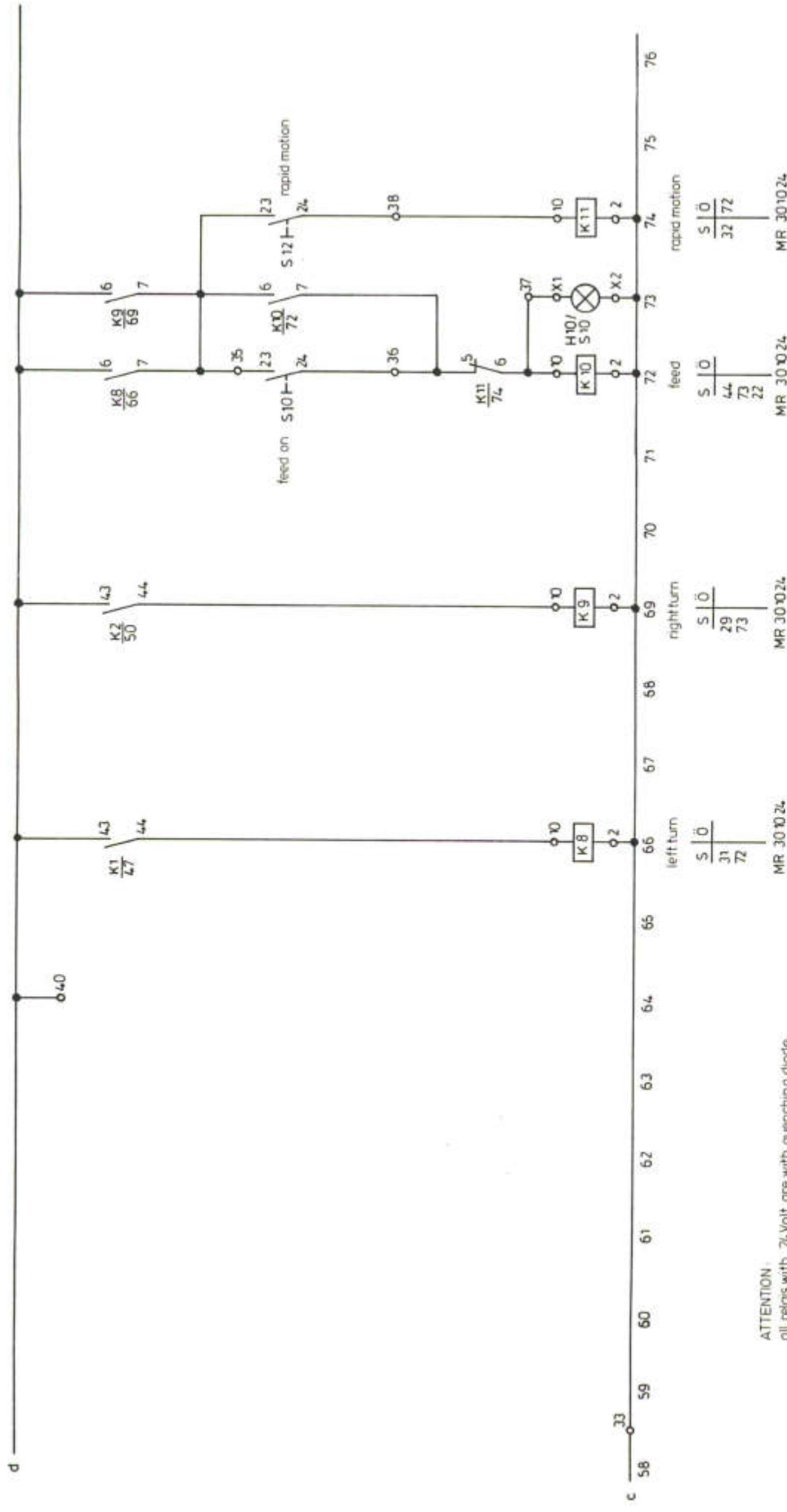
Mr.	60
Page	1
Zerchnungs-Nr.	180716
Benennung	wiring diagram
Kom.-Nr.	
Name	
Datum	3.11.92
Bearb.	
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KUNZMANN MASCHINENBAU GMBH	
Ansatz	
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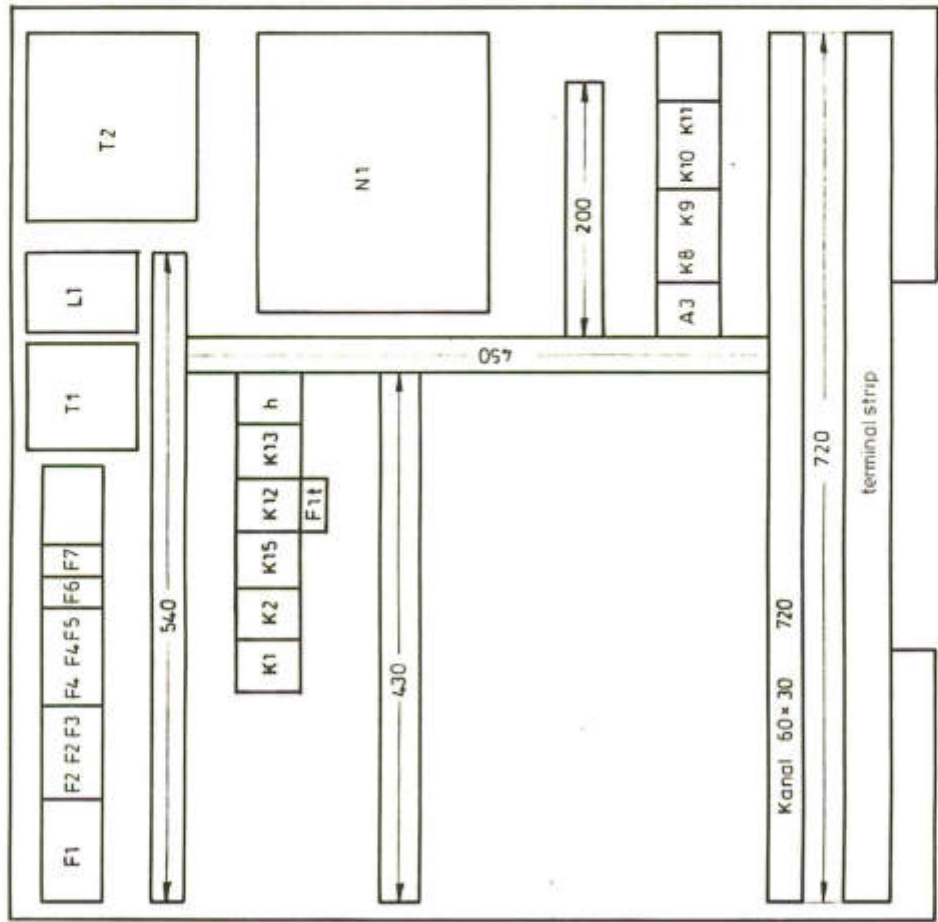
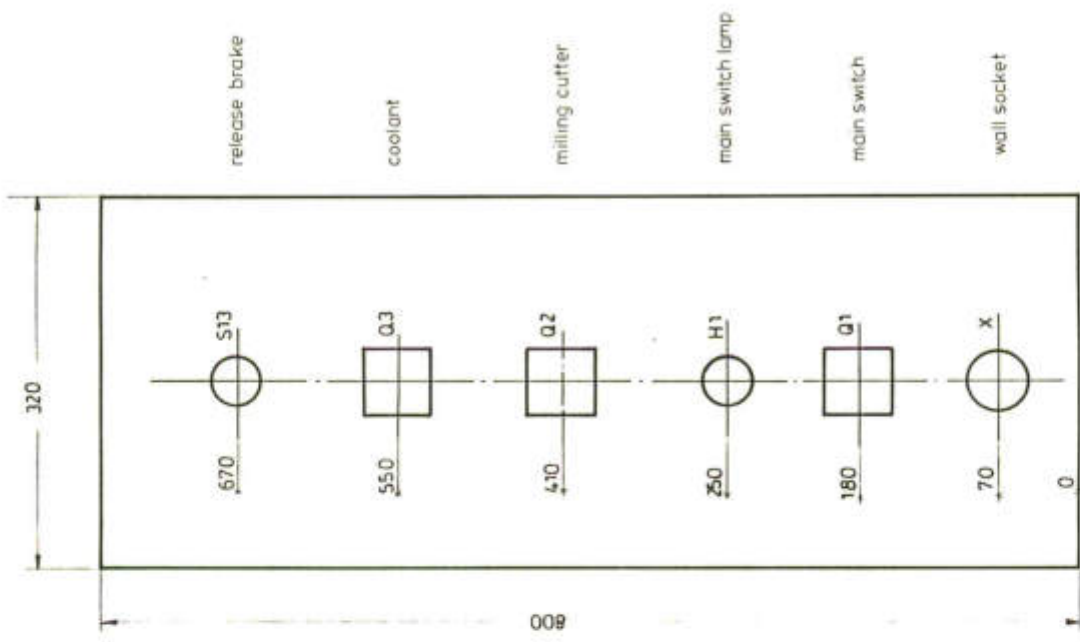
Installation of fine wire fuse 250mA
see connection diagramm 1TRM 2

- Push button
- S1- Emergency off 10+15
 - S2- Milling cutter off 10+15
 - S3- Feed off 10+15
 - S4- Left hand 10+15L
 - S5- Right hand 10+15R
 - S10- Feed on 10+15L
 - S11- Milling cutter on 10+15
 - S12- Rapid motion 10+15
 - S13- Brake milling sp. 10+15





ATTENTION:
all relays with 24-Volt are with quenching diode



UFB/1 180716 LIST OF ELECTRICAL PARTS

PIECE	NAME	TYPE	PRODUCER	BMK	PREIS EK.	OK.	LAGER BEST.	AV	BESTELLUNG EINK.	AUSGABE
		ELECTRICAL BOX								
1	CONTROL TRANSF.	BV 26461 380/28/24 160VA	GASS	T1						
1	CONTROL TRANSF.	BV 21510 2 X 90V 2KVA	GASS	T2						
1	SERVO AMPLIFIER	1 TRM 2 G11 W0	INDRAMAT	N1						
1	MODUL	TSS 7 / 001	INDRAMAT							
1	INDUCTANCE	GLD 2 BV17986	GASS	L1						
1	SEL. RECTIFIER	B50/40-S PTA1	HERRMANN	U1						
1	FUSE ELEMENT	DO 1 1 FACH	LINDNER	F6						
13	SCREMP LUG FUSE	DO 1	LINDNER							
4	FUSE	DO 1 3 FACH	LINDNER	F1, F1, F1, F2, F2, F3, F4, F4, F5, F3, F7, F7						
1	MONTAGEBASE	MP6 62001	MURRELEKTR.	A1						
2	RELAISSOCKET	RP 2/11 61130	MURRELEKTR.							
4	RELAIS	MR301024	SCHRACK	K8, K9, K10, K11						
3	CONTACTOR	R40 24V50HZ	K-MOELLER	K1, K2, K15						
3	CONTACTOR	04D11	K-MOELLER	K1, K2, K15						
2	CONTACTOR	D11 -00M 24V50HZ	K-MOELLER	K12, K13						

UFB/1 180716 LIST OF ELECTRICAL PARTS

PIECE	NAME	TYPE	PRODUCER	BMK	PREIS EK. VK.	LAGER BEST. AV	BESTELLUNG EINK.	AUSGABE
1	PROTECTIVE -RELAYS	Z00-10	K-MOELLER	F1T				
2	CONTACTOR	22DIL M	K-MOELLER	K12, K13				
5	INTERFERENCE SUPPRESSOR	RC-A12/48 NR.20001	MURRELEKTR.					
1	HOUR METER	MÜLLER BW70 NR:30K3353	BURKLIN	H				
1	RESISTANCE	2,7 K OHM	BURKLIN	R2, R3				
1	MILLING SWITCH	UN16 145613	ELEKTRA	Q2				
1	COOLANT SWITCH	MF1R/KA 72208	ELEKTRA	Q3				
1	KEY SWITCH	RS	MOELLER	S13				
1	CONTROL ELEMENT	EK10	MOELLER	S13				
1	FIXTURE ADAPTER	BE 3	MOELLER	S13				
5	NEOZED-FUSE	D01 16A	RATZ	F1/1/1/4/4				
3	NEOZED-FUSE	D01 20A	RATZ	F7/7/4				
3	NEOZED-FUSE	D01 40A	RATZ	F2/2/5				
2	NEOZED-FUSE	D01 60A	RATZ	F3/3				

UFB/1 190714 LIST OF ELECTRICAL PARTS

PIECE	NAME	TYPE	PRODUCER	BPK	PREIS		LAGER	BESTELLUNG		AUSGABE
					EK.	UK.		BEST.	AU	
1	MAIN SWITCH	UNA4/HS16F3-D	145317	ELEKTRA	Q1					
1	LAMP SHIELD	3700 067.09		SCHIELE	H1					
1	LAMP SOCKET	3721 010.00		SCHIELE	H1					
1	WALL SOCKET	SCHUKO		ST. TECHNIK X						
45	BINDER	SAK 2,5 2796.6		WEIDMÜLLER						
2	PE-BINDER	EK 2.5N 047436		WEIDMÜLLER						
2	PE-BINDER	EK 4 035456		WEIDMÜLLER						
2	BINDER	SAKL 4 034062		WEIDMÜLLER						
4	BINDER	SAK 6N 1932.6		WEIDMÜLLER						
20CM	PE-STRIP	3499.0		WEIDMÜLLER						
18	PE-BINDER	ZB4 3165.0		WEIDMÜLLER						
7	BINDER	Q2 3370.0		WEIDMÜLLER						
1	BINDER	Q10 3697.0		WEIDMÜLLER						
2	HOLDER F. PE-STRIP	2999.6		WEIDMÜLLER						

CONTROL PANEL

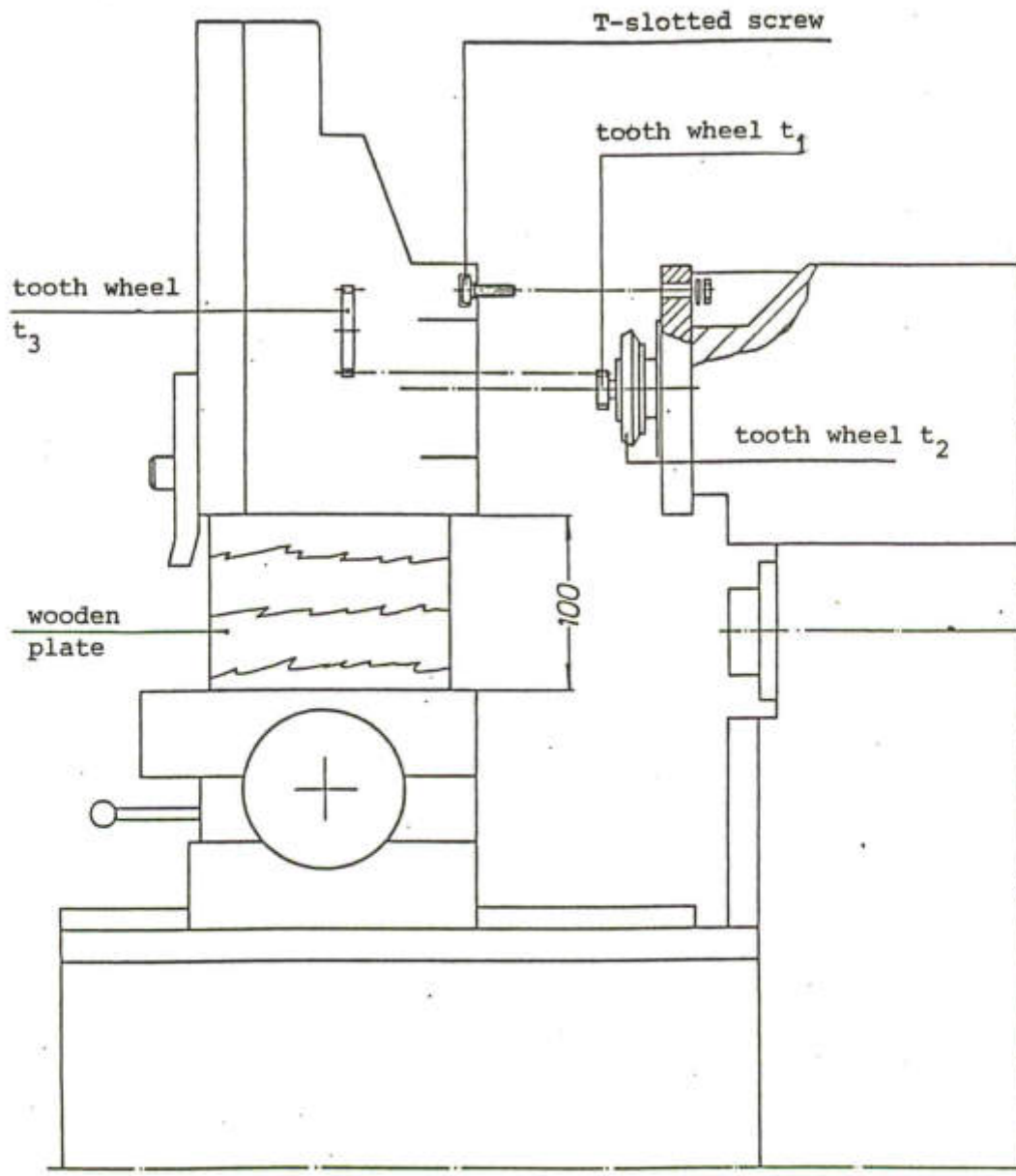
PIECE	NAME	TYPE	PRODUCER	RMK	PREIS BY UK	LOGES BEST	BESTELLEUNG AU EINZ.	ANSCHAFFUNG KOSTEN
1	DESK	8-9510-200	KUNZMANN					
1	PANEL	UE9.5-20	KUNZMANN					
8	DIRECTION PUSH	14-131 022	LUMITOS					
1	SWITCH	14-271 022	LUMITOS	S12				
9	FRONTING PLU	204.600.1	LUMITOS					
9	SHIELD	09609.9	LUMITOS					
3	PUSH BUTTON	04602.2 KLOB	LUMITOS	S4/S5/S16				
2	PUSH BUTTON	04602.2 ROI	LUMITOS	S2/S3				
1	PUSH BUTTON	04602.4 GELB	LUMITOS	S12				
2	PUSH BUTTON	04602.5 GRUN	LUMITOS	S10/S12				
4	INCANDESCENT LAMP	24V 0.6W 01-913.24	LUMITOS					
1	EMERGENCY SWITCH	04 075.2	LUMITOS	S1				
1	SWITCH ELEMENT	204915.5	LUMITOS	S1				
1	POTENTIOMETER	10K OHM+E	PREH	R1				
1	CONTROL KNOB	274105	BUCKLIN	R1				
1	CAP	274190	BUCKLIN	R1				

UFB/1 180716 LIST OF ELECTRICAL PARTS

PIECE	NAME	TYPE	PRODUCER	RMK	PREIS EX. WK.	LAGER BEST.	RESERVE OU	RESERVE LINK	AUSGABE
1	SCOLE	4-501-203	JOHN	R1					
1	OROM	274275	BURKIN						
1	EMERGENCY SHIELD	MDP-8 52MM	ELON	S1					

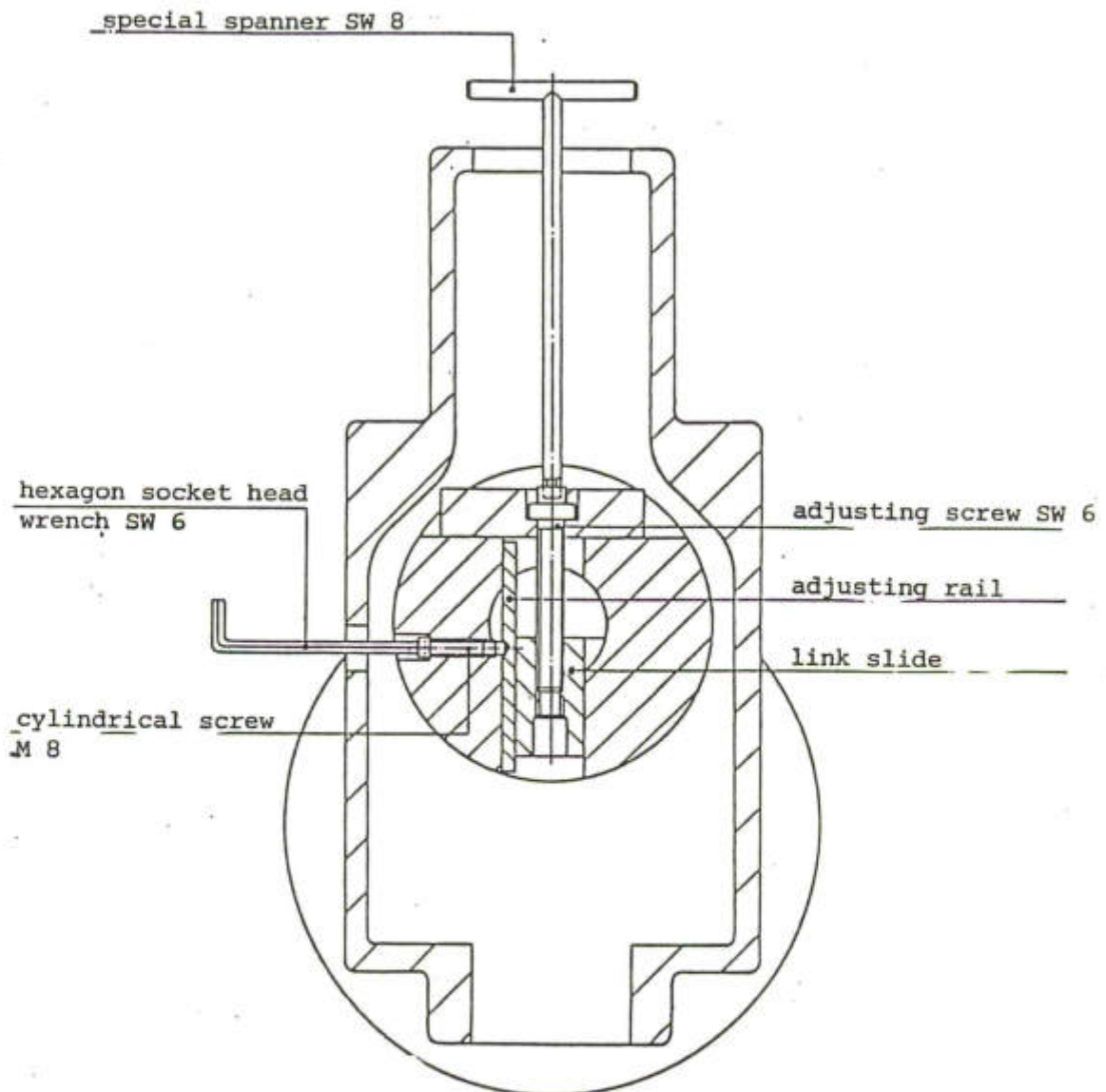
MACHINE

PIECE	NAME	TYPE	PRODUCER	RMV	PRETS EX. UK.	LOGER REST.	RESTEL OU	RESTEL LIM.	QUICORE
1	MAIN MOTOR	DR100 BR/4/20 012	DIETZ	M1					
1	LIMIT SWITCH	57812.2020	KISSELING	514/515					
1	TERMINAL BOX	AKN 4	ELEKTR						
1	SERVO MOTOR	MDC 10.10 H/MM9-1	INDROMAT	M4					
1	COOLANT PUMP	1B25/270 30	BRINKMANN	M5					
2M	INSULATING PLASTIC	20-27 458.21	HUGBO						
2	SCREENING	PC21 2032120	HUGBO						
1	PLUG FOR SERVO MOTOR	IN 112	INDROMAT	M4					



1. Release the nuts on the back stop flange holding the vertical milling head and take it off.
2. Fix the tooth wheel t_1 by means of a cylindrical screw M 8 x 50 DIN 912 (in addition use a spring ring A 8 DIN 127) and three cylindrical pins 6 x 6 x 24 DIN 7 on tooth wheel t_2 .
3. Put the slotting head with the incorporated T-slotted screws on the milling table (wooden plate approx. 100 mm of thickness) and move it forward to the back stop flange.
4. Press the slotting head to the back stop, put the T-slotted screws through the bore hole and tighten with the nuts.

Tooth wheel t_1 and t_3 are engaged, the slotting head is ready for operation.



Stroke adjustment at the slotting head:

1. Adjust the percussion slide until the adjusting spindle with the special spanner SW 8 gets visible through the lateral bore hole at the slotting head.
2. Release the cylindrical screw M 8 by means of the hexagon socket head wrench SW 6. (The adjusting rail is set free).
3. It is possible to adjust the stroke length by means of the special spanner SW 8 by regulating the link slide.
4. After having adjusted the stroke length, retighten again the cylindrical screw M 8.

SERVICE INSTRUCTIONS FOR BRINKMANN COOLANT PUMPS

GENERAL

PRIOR TO DISPATCH ALL PUMPS ARE TESTED FOR SATISFACTORY OPERATION AND DENSITY BY MEANS OF HIGH VISCOSITY OIL.

PIPING

WITH A VIEW TO OBTAINING A MAXIMUM CAPACITY, IT IS ADVISABLE TO CHOOSE, IF POSSIBLE, THE SAME DIAMETER FOR THE PIPING AS THE ONE OF THE THREAD STAND PIPE. WHEN REDUCING THE PIPING, THE CAPACITY WILL AUTOMATICALLY DIMINISH ALONG WITH IT. BENDS SHOULD BE AVOIDED AS FAR AS POSSIBLE. ONLY USE ARCHES PIPING, BUT NO ELBOWS. AT THE SITE OF CONSUMPTION THE CAPACITY WILL BE ADJUSTED BY MEANS OF A THROTTLE. IT IS NOT NECESSARY TO MAKE USE OF AN OVERPRESSURE VALVE. BY CURBING THE CAPACITY THE MOTOR CANNOT BE SUBJECTED TO EXCESSIVE STRAIN, AS THE POWER REQUIRED WILL DIMINISH ALONG WITH THE DECREASING CAPACITY.

CONNECTION OF THE MOTOR:

WHEN CONNECTING THE MOTOR, SPECIAL ATTENTION IS TO BE PAID TO THE INDICATIONS SHOWN ON THE DATA-PLATE. IF THE MOTOR IS WOUND FOR STAR-DELTA THE CONNECTION TO THE MAIN NETWORK AT 200-250/350-440 VOLTS WILL BE MADE AS FOLLOWS:

AT LOW TENSION OF 200-250 VOLTS=DELTA-CONNECTION
AT HIGH TENSION OF 350-440 VOLTS=STAR-CONNECTION

IF, ON PLACING THE ORDER, ONLY ONE WORKING VOLTAGE IS INDICATED, THE PUMP WILL BE SUPPLIED FOR THE VOLTAGE REQUIRED IN STAR-CONNECTION.

WHEN PUTTING THE MOTOR INTO OPERATION, ATTENTION IS TO BE PAID TO THE ARROW OF DIRECTION SHOWN ON THE DATA-PLATE.

TEMPERATURE:

UNDER NORMAL CONDITIONS THE MOTOR WILL ATTAIN AN ULTIMATE TEMPERATURE OF APPROX. 45 C. IT IS, HOWEVER, ARRANGED IN SUCH A WAY AS TO BE ABLE TO RESIST 60 C. ABOVE NORMAL AMBIENT TEMPERATURE UNDER EXCEPTIONAL CONDITIONS.

MAINTENANCE:

THE PUMP SHAFT RUNS IN TWO BALL-BEARINGS, THE GREASE FILLING OF WHICH IS SUFFICIENT FOR APPROX 5000-6000 HOURS OF OPERATION. AFTER THIS PERIOD, IT IS ADVISABLE GENERALLY TO OVERHAUL THE MOTOR AND ON THAT OCCASION THE BALL-BEARINGS WILL HAVE TO BE NEWLY GREASED WITH A HIGH QUALITY BEARING GREASE AFTER HAVING BEEN PREVIOUSLY CLEANED.

THE REFRIGERANT CONTAINER SHOULD BE FREQUENTLY CLEANED, SO THAT THE MOTOR, WHEN STARTING, IS NOT TOO OVERLY STRAINED BY DEPOSITED MUD.

1. Description

1.1 Gearbox models with strengthened bearings (Main gear units)	0-017-000-15-000	} $\varphi \equiv 1,26$	Selection on box	} Box-type, totally enclosed, oilproof	
	0-017-001-15-000		Remote selection		
	0-017-020-15-000	} $\varphi \equiv 1,41$	Selection on box		
	0-017-021-15-000		Remote selection		
With cover on both ends	0-017-002-15-000	} $\varphi \equiv 1,26$	Remote selection		} Round, open; h6 fit on location webs
Flange on input side	0-017-003-15-000				
Flange on output side	0-017-004-15-000				
With cover on both ends	0-017-022-15-000	} $\varphi \equiv 1,41$	Remote selection		
Flange on input side	0-017-023-15-000				
Flange on output side	0-017-024-15-000				

The above gear units are fine stage main gear drives with preselection, on which the required speed can be preselected while in operation or while stationary and can then be engaged when running to a standstill or when stopped. The preselected speeds locate positively within the gearbox. The input and output shafts have double ball bearings so as to be able to sustain safely the shaft loadings and belt tension loadings arising.

1.2 Gearbox models (Feed gear units)	0-017-000-13-000	} $\varphi \equiv 1,26$	Selection on box	} Box-type, totally enclosed, oilproof	
	0-017-001-13-000		Remote selection		
	0-017-020-13-000	} $\varphi \equiv 1,41$	Selection on box		
	0-017-021-13-000		Remote selection		
With cover on both ends	0-017-002-13-000	} $\varphi \equiv 1,26$	Remote selection		} Round, open; h6 fit on location webs
Flange on input side	0-017-003-13-000				
Flange on output side	0-017-004-13-000				
With cover on both ends	0-017-022-13-000	} $\varphi \equiv 1,41$	Remote selection		
Flange on input side	0-017-023-13-000				
Flange on output side	0-017-024-13-000				

The above gear units are fine stage gear transmissions with preselection and these are suitable for light main drives and feed drives.

2. General comments

All gear units of range 0-017 have hardened and ground splineshafts and hardened gears. Bores and gear flanks are ground, shafts run in anti-friction bearings.

The output serving for drive purposes offers 9 speeds with ratio $i = 6,32$ with $\varphi = 1,26$ and $i = 20,8$ with $\varphi = 1,41$.

The direction of rotation on the output end is opposite to that of the input end.

3. Fitting

3.1 Box-type gearbox, totally enclosed, oilproof

3.1.1 External fitting to machine frame

Preselection and gear shifting directly on gearbox.

3.1.1.1 Bolt gearbox to a smooth machined surface and secure location by using dowels.

3.1.1.2 After connecting the input and output shafts, fill in Shell Tellus 29 oil until the oil sight glass is half covered.

3.1.1.3 Preselect required speed and engage.

3.1.1.4 Start machine.

3.1.2 Fitting internally into machine frame

Gearboxes with selector shafts for remote operating device.

3.1.2.1 Fit in the same way as for external mounting, see 3.1.1.1.

3.1.2.2 Connect oil filler aperture, oil level indicator and oil drain to points accessible externally on a machine face, using pipes. Fill in Shell Tellus 29 oil up to centre of oil sight glass.

3.1.2.3 Extend actuator shaft spigots by appropriately designed intermediate elements (shafts, universal joints, angle drives) to an external position so that the gear shifting (L.H. spigot) can be rotated through approximately 65° and the preselection (R.H. spigot) through 360° .

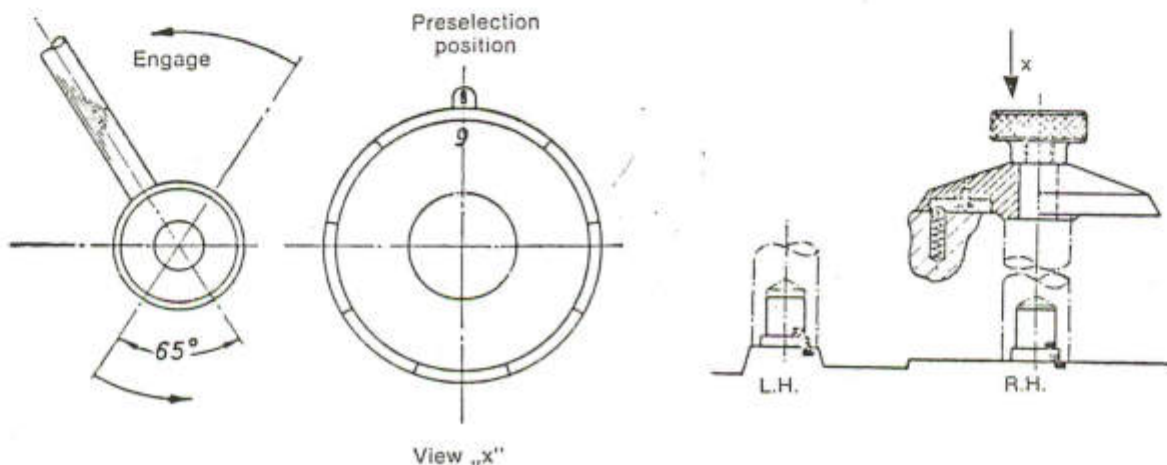
Attention! The gear unit is adjusted in state of delivery as follows:

Preselection of 9th stage engaged in gearbox. Gear shifting lever in neutral position.

3.1.2.4 The gear unit remains in the above setting until a–f are completed:

- Provide a ball index for 5 mm dia. ball on a 60 mm dia. pitch circle.
- Place selector dial in position on key (dial can be rotated) and transfer the 9th position dial mark to the machine frame.
- Rotate index ring on selector dial through its elongated hole until the ball engages.
- Tighten screws, drill fixing holes and secure ring by screws.
- Place marked dial in position.
- Tighten knob, dowel and check whether engagements in gearbox and those on selector dial agree.

Attention! If the user should dismantle a gearbox unit it is essential to ensure when reassembling, that the red dots marked on shafts and selector elements coincide. These red marking points are incorporated for correct orientation in such cases.



3.2. Round gearbox, open, h6 fit on location webs

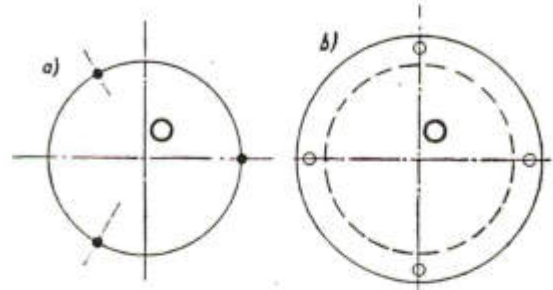
3.2.1 Slide gear unit into prepared bore in machine frame.

Fit of bore H7.

When inserting it is essential to align input and output accurately in relation to the connection elements. Arrange for oil level check in such a way that the smallest gear at the bottom is submerged to a depth of at least 5 mm in the oil bath.

3.2.2 Securing with screws

- by using grub screws around the periphery of gearboxes without flange.
- by inserting bolts into the flange holes in the case of gearboxes with flange.



3.2.3 Extend actuator shaft spigots to an external point by appropriately designed intermediate elements (shafts, universal joints, angle drive)

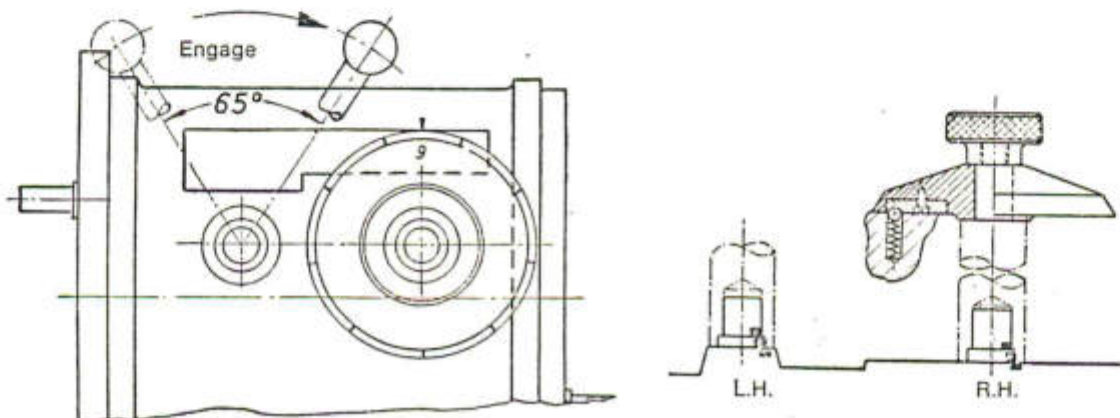
in such a way that the gear shifting spigot (L.H. spigot) can be rotated through approximately 65° and the preselection spigot (R.H. spigot) through 360° of delivery.

Attention! The gear unit is adjusted in state as follows: Preselection of 9th stage engaged in gearbox. Gear shifting lever in neutral position.

3.2.4 The gear unit remains in the above setting until a–f are completed.

- Provide a ball index for 5 mm dia. ball on a 60 mm dia. pitch circle.
- Place selector dial in position on key (dial can be rotated) and transfer the 9th position dial mark to the machine frame.
- Rotate index ring on selector dial through its elongated hole until the ball engages.
- Tighten screws, drill fixing holes and secure ring by screws.
- Place marked dial in position.
- Tighten knob, dowel and check whether engagements in gearbox and those on selector dial agree.

Attention! If the user should dismantle a gearbox unit it is essential to ensure when re-assembling that the red dots marked on shafts and selector elements coincide. These red marking points are incorporated for correct orientation in such cases.



4. Operation and maintenance

For starting-up, turn gear shifting lever to the right and then preselect desired speed by rotating the selector dial. At this stage move gear shifting lever to left and then to right once more.

The gear shifting lever should always point to the right when the gear unit is running. Speed preselection takes place either while the gear unit is running or when it has been stopped.

Engagement of the next preselected speed is then obtained by moving the lever to the left.

Attention!

Engagement only when running to a standstill or when stopped

Oil level should be kept under constant observation (oil sight glass half covered). Excessive gearbox temperature rises are caused by excessively high or low oil level, by too high an oil viscosity or by excess pressure existing within the gearbox.

The oil-filler also serves as a vent plug.

First oil change after 200 working hours but no later than after 3 months. Subsequent oil changes every 1200 working hours or no later than every 6 months. When carrying out an oil change, flush gearbox with flushing oil. For refilling use a lube oil of 28,5cSt50 (3,9 E 50) , for example, Shell Tellus Oil 129.

5. Rectification of engagement errors (caused by incorrect fitting)

5.1 Gear unit for remote operating device (round, open and box-type, totally enclosed, oilproof)

Fault: Gear shifting lever cannot be moved through the necessary engagement travel of 65°.

Cause: Ball index has not engaged or the requisite speed stage was not engaged when fitting the selector dial index.

Correction: Slowly rotate selector dial until the lever can be rotated through approximately 65° and the index ball engages when actuating carefully.

Fault: Gear shifting lever can be engaged but the speeds cannot be selected from index to index in logical sequence.

Cause: The internal indexing of the gearbox was not engaged during fitting.

Correction: Release index ring, turn selector dial through 1/18 to left or right until gear shifting is noticed. Realign index ring relative to index and redrill in this position.

5.2 Gear unit with operating device on the box (box-type, totally enclosed, oilproof)

Fault: The gear shifting lever cannot be moved through the necessary travel of 65°.

Cause: The selector dial has not been set in correct alignment to the limiting line or the preselected speed has not been engaged by the ball index.

Correction: Rotate selector dial until the limiting lines point in one direction. Index ball will now engage.

ORTLINGHAUS-WERKE GMBH · D-5632 WERMELSKIRCHEN · W-GERMANY

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Summary

INDRAMAT direct-current servo drives of series MDC 10 are fast-responding direct-current control drives with static torques of 2,5 to 10,0 Nm and useful speeds of up to 2 000 min⁻¹.

The MDC 10 motor series has been developed for operation with INDRAMAT thyristor or SELEKTOR control amplifiers, in particular as regulative feed drives for numerically controlled machine tools.

The servo motors, with the exception of the front shaft gland, are designed in protective system IP 65 for use in the chip compartment of machine tools.

Constructional characteristics:

The field

is a 4-pole field consisting of permanent magnets of field-tested material.

The rotor

is iron-doped and optimized in compliance with the field characteristics. It has a high heat capacity for temporary overloading.

The rotor bearing assembly

is constructed with maintenance-free roller bearings.

The face-end flanged bearing is designed for overhung mounting of straight-toothed spur gears or toothed-belt pulleys.

The tachogenerator

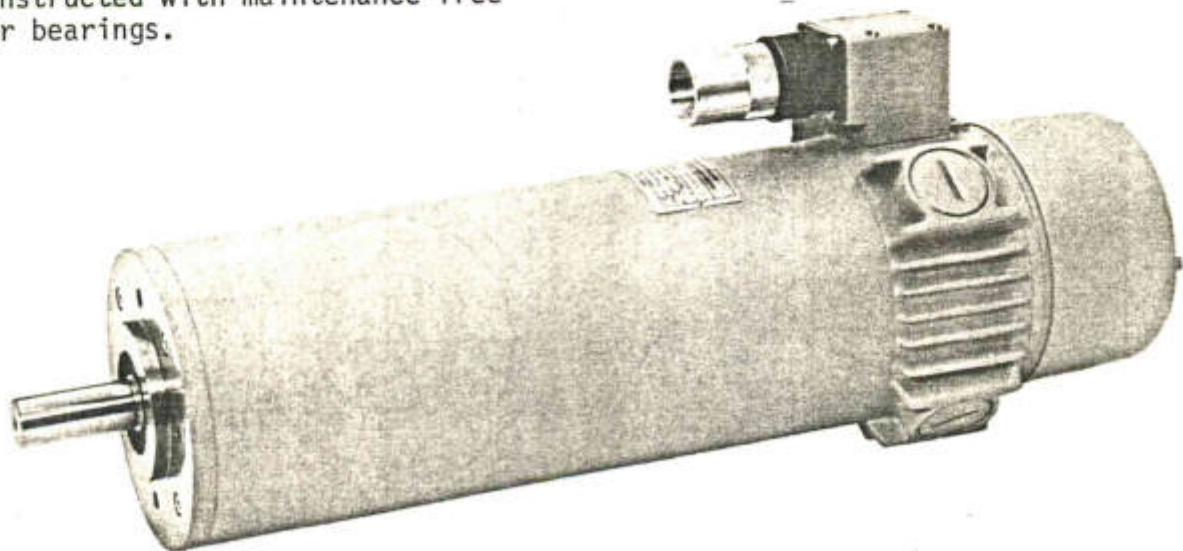
is a 4-pole permanent magnet hollow-shaft tachogenerator with a high e.m.f. and a low interfering voltage. It is mounted on the motor shaft by means of a tensioner so that it is non-positive and absolutely rigid.

An electrically operated brake

with 24 V direct voltage actuation is integrated in the rear bearing bracket. The brake is provided for the "Emergency Off" function and to hold the servo motor against external torque effects when the controller is switched off. The brake is wired with an overrunning circuit diode and a protective diode against incorrect polarity.

Transducers for position controls

The servo motors is also produced with a second shaft end and a fastening flange for mounting any transducers with or without a sensor gear. Standard equipment is available in externally mounted assemblies with protective casings.



Type MDC servo motor	Symbol unit	10.10 H	10.20 D	10.30 C
Permissible continuous effective current ¹⁾	$I_{eff \text{ zul.}}$ (A)	11	19	24
Maximum peak pulse current	\hat{I} (A)	75	150	200
Torque constant	K_m (Nm/A)	0,30	0,30	0,35
Voltage constant	C_ω (Vs/rad)	0,30	0,30	0,35
Armature resistance at 20°C	R_A (Ω)	0,5	0,19	0,15
Armature inductance	L_A (mH)	4,2	1,1	0,7
Rotor moment of inertia	J (Kgm ²)	0,003	0,005	0,0075
Mechanical time constant	τ_m (ms)	17	11	9
Maximum useful speed	n (min ⁻¹)	3 000	3 000	3 000
Permissible peak voltage	\hat{U} (V)	170	170	170
Insulation class		F	F	F
Maximum ambient temperature	ϑ (°C)	40	40	40
Thermal time constant	τ_{th} (min)	55	70	85
Weight	m (kg)	13,0	18,5	24,0
Short-circuit torque	M_{dk} (Nms/rad)	0,18	0,47	0,82
Continuous torque (2-pulse) ¹⁾	M_{deff} (Nm)	2,5	3,5	5,0
Continuous torque (3-pulse) ¹⁾	M_{deff} (Nm)	3,0	4,3	5,7
Continuous torque (SELEKTOR) ¹⁾	M_{deff} (Nm)	3,0	5,2	7,3

Tachogenerator		
Voltage constant (e.m.f.)	C_ω (Vs/rad)	$0,317 \pm 10 \%$
Armature resistance	R_A (Ω)	115
Minimum terminating resistance	R_l (Ω)	15 K
Ripple percentage	(%)	0,5
Brake		
Holding torque	M_B (Nm)	5
Nominal voltage	U_N (V)	$+24 \pm 10 \%$
Winding resistance	R_i (Ω)	47

1) 50°C excess motor temperature

Diese Unterlage darf weder kopiert noch dritten Personen zugänglich gemacht werden. Gesetzl. betr. Urheberrecht.

Maintenance Instructions MDC 10

A. Dismounting and Mounting Instructions for Tacho Armature

Attention:

Care must be taken not to damage the winding when working at the tacho armature. Besides, it is not permissible to dismount the field magnets of the tacho generator in the yoke, because this would cause a shift of the neutral zone which cannot be corrected in a simple manner.

If tacho generators with stamped-in serial numbers from 3051 on are changing place with tacho generators with serial numbers up to 3050, then the red and blue connecting wires must be interchanged on the circuit board arranged laterally, because of changed tacho polarity.

1. Dismounting the Tacho Armature

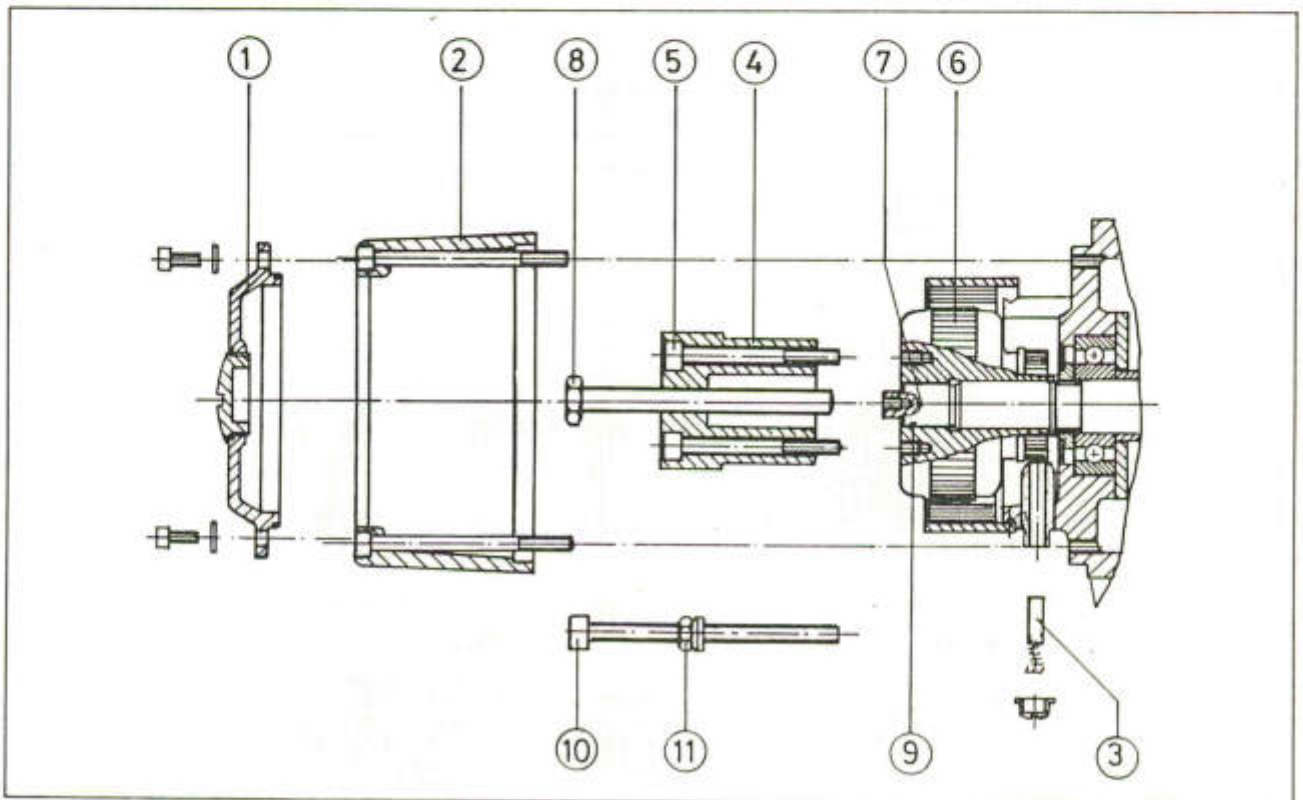
- 1.1 Take off cover ①, pull off cap ②
- 1.2 Remove tacho carbon brush ③ and mark it individually so that it can be mounted again in the same quiver and in the same fitting position later on.

For this refer also to the instructions given on the reverse side.

- 1.3 Mount detaching device ④ onto tacho armature ⑥ by means of screws ⑤.
- 1.4 Pull tacho armature ⑥ off the motor shaft ⑦, using the shaft as a support. (Turn screw ⑧ clockwise).

2. Mounting the Tacho Armature

- 2.1 Slide a new (!) spacer ⑨ onto the motor shaft ⑦. (Each spacer can only be used once!)
- 2.2 Mount device ④ without screw ⑧ onto the new tacho armature and slide the armature onto the motor shaft. Turn screw ⑩ into motor shaft.
- 2.3 Pull armature up to the stop by turning the nut ⑪ clockwise.
- 2.4 Insert again the carbon brushes ③, paying attention to the instructions given on the reverse side.



B. Checking and Replacing Carbon Brushes

The carbon brushes of the motor and of the tacho generator are subject to wear. They must therefore be checked periodically with respect to ease of motion, wear and uniform spring tension all-round and they must be replaced as soon as the degree of wear described thereafter is approached. Deposits of carbon dust in the commutator compartment must be blown out with dry compressed air after all the carbon brushes have been removed.

Care must be taken to put back again each of the carbon brushes taken out into the same quiver and into the same fitting position.

Make sure that the locking caps are firmly and correctly seated atop the quivers so that proper contact between spring cap and quiver is ensured.

The carbon brushes must be replaced in sets only. Only genuine spares must be used.

Maintenance Intervals for Operation in:	Motor Brushes	Tacho Brushes
Machine Tools [h]	1000	2000
Coil Processing and Conversion Systems, Press Feeding Systems [h]	500	500

C. Checking and Replacing Air Filters

Internally ventilated motors include a fan with an air-filter plate in front of it. The filter plate cleans the cooling air drawn in of solid dirt particles. Depending on the degree of contamination of the cooling air drawn in the filter must be cleaned from time to time or it must be replaced, respectively.

Cleaning:

Rinse out in water (up to about 40°C, possibly with some fine detergent added) or - in extreme cases - rinse out in petrol. Beating out or blowing out with compressed air is possible as well! Avoid squeezing! Avoid solid water jets when flushing out with water!

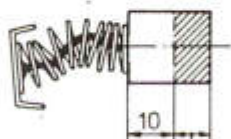
Please note when replacing air filters:

Dust-laden air side: Open texture - Clean air side: Closed texture, consolidated by means of a binding agent.

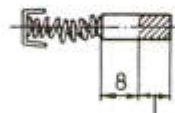
Designation for Ordering:

Filter Element, Type P 15/500, 100 diam., Catalog No. 216999/5

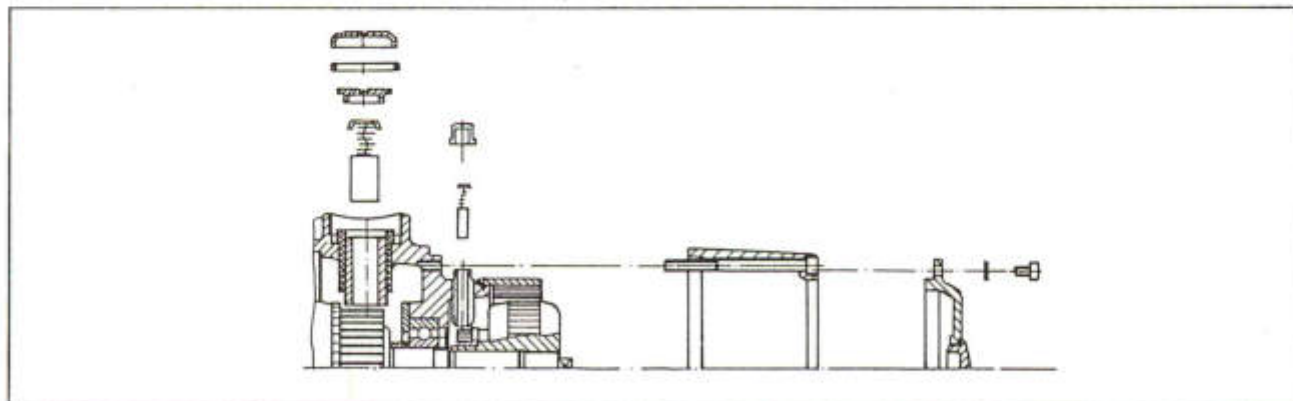
Set of Motor Carbon Brushes
Catalog No. ETP 015/217 609/9



Set of Tacho Carbon Brushes
Catalog No. ETP 016/217610/6



Maximum admissible wear



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