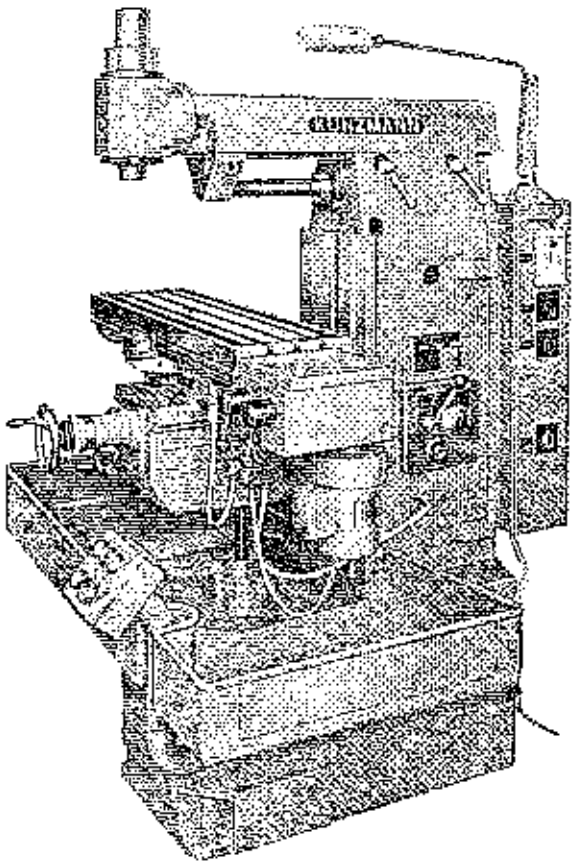
KUNZMANN®
FRÄSMASCHINEN

Operating Instructions

Universal Milling and Drilling Machine
UF6N Gear Box



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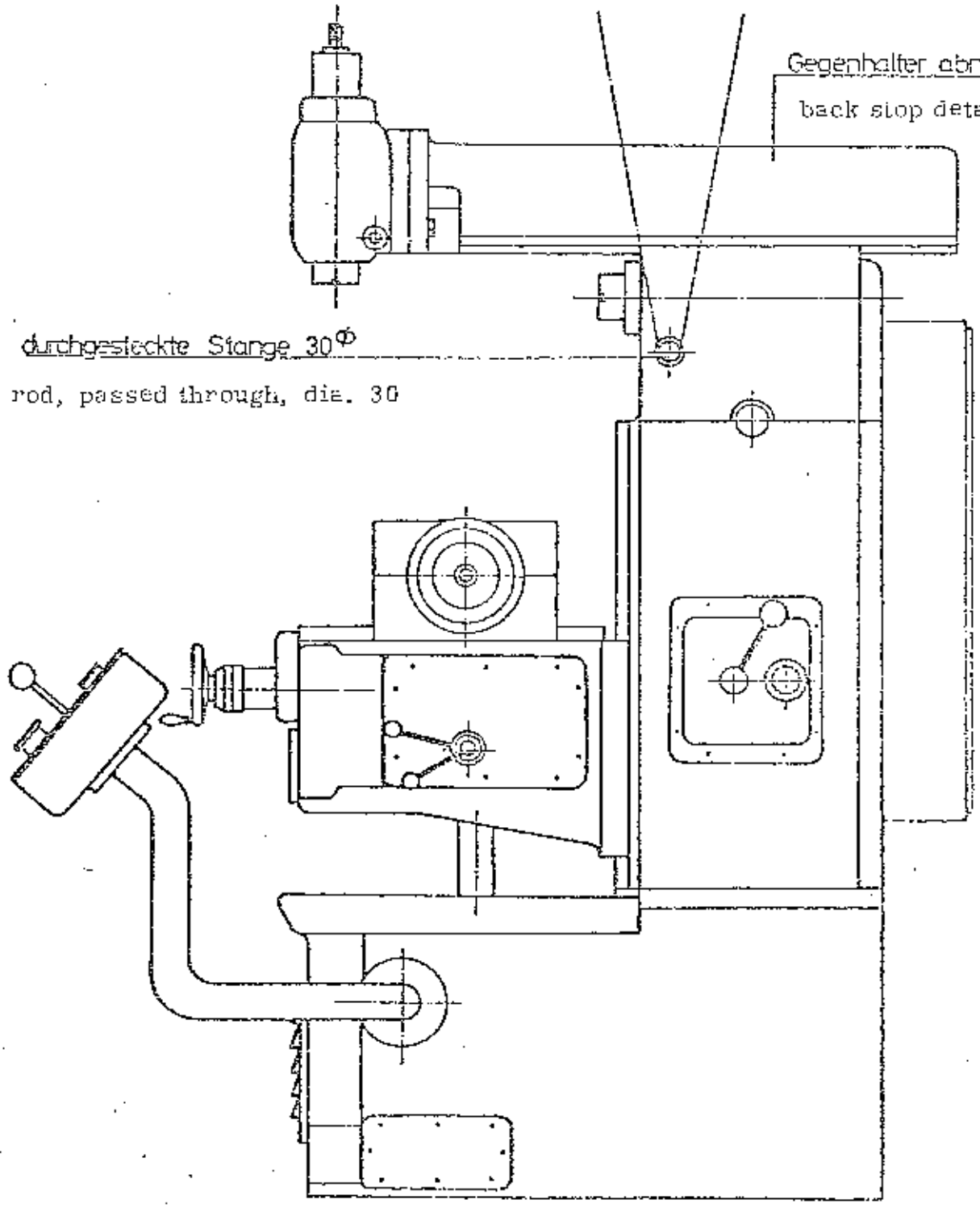
Für den Transport erforderlich:

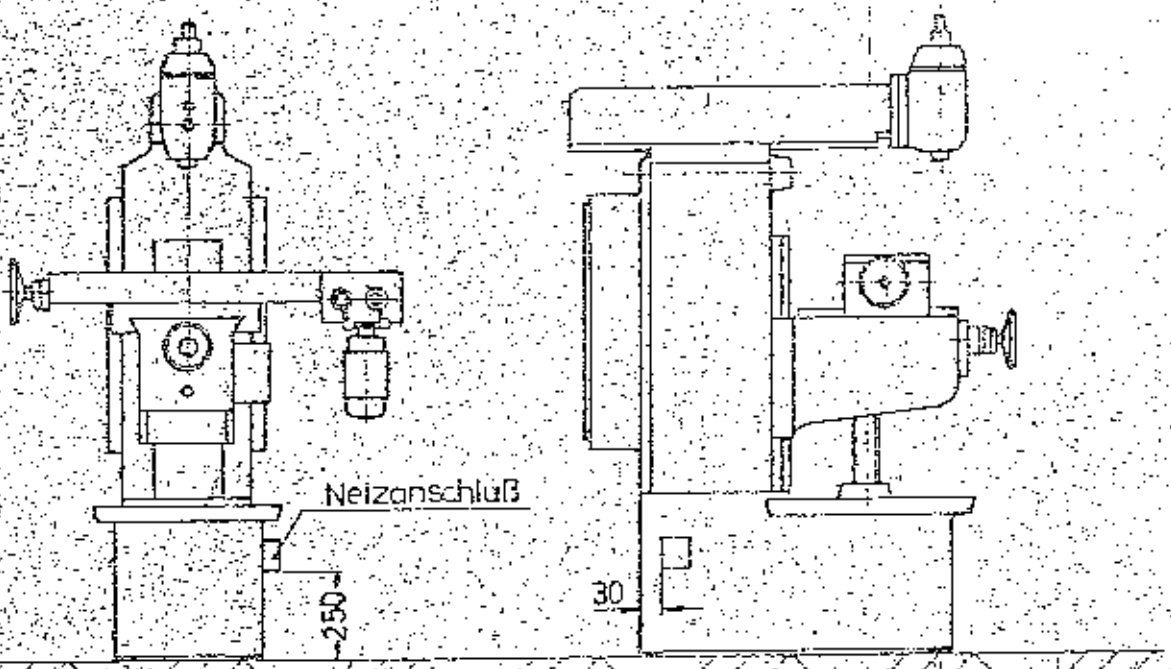
1 Stck. Rundstahl 30Φ 600 lang
1 Transportseil zul. Belastung mind. 2000 kg

Requirements for the transportation
1 piece of round steel, dia. 30, length 600
1 rope admissible load minimum 2000 kgs

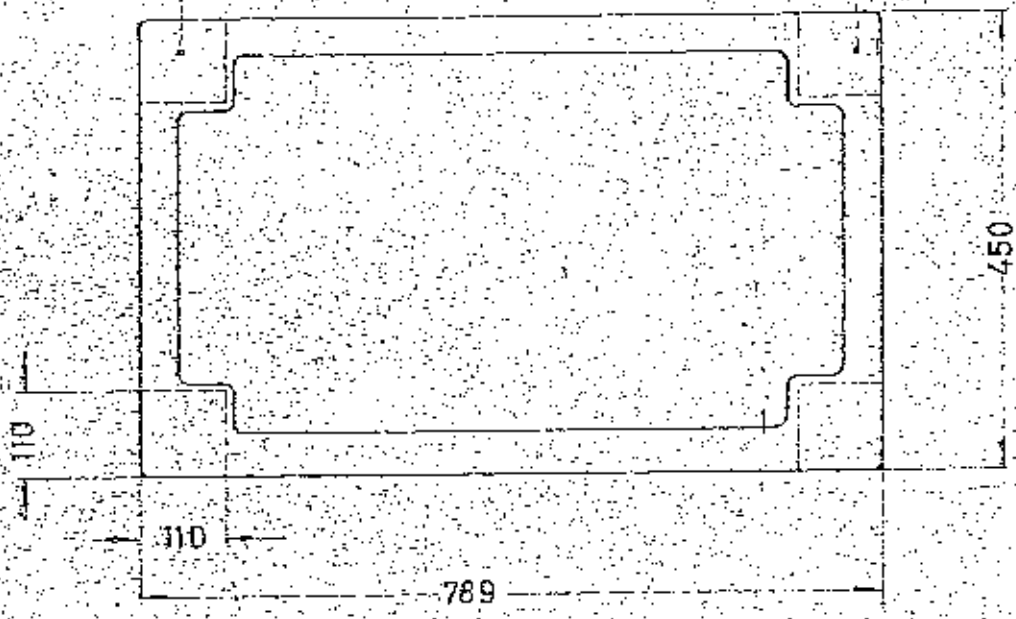


Zubehör und Bedienungsanleitung im Unterbau
Accessories and operating instructions in the substructure

Aufstellung der Maschine



Schwingungsdämpfende Platten
z.B. von Air-Loc Type 4174



Die Maschine kann auf jeden gut fundierten Boden aufgestellt werden. Ein Maschinenfundament ist dann nicht notwendig.

Zu Empfehlen ist die Aufstellung der Maschine auf schwingungsdämpfendem Plattenmaterial. Dadurch werden alle inneren und äußeren Vibrationen abgebaut.

Es ist zweckmäßig die Maschine mit einer Maschinenwasserwaage auszurichten. Das Ausrichten erfolgt in Längs- und Querrichtung durch Unterlegen von Blechen, die mit dem Fußboden fest verbunden sind. (z.B. geklebt)
Die Wasserwaage kann dabei auf die Tischoberfläche gelegt werden.

Schwingungsdämpfende Platten vibration absorbing plates

for instance of Air-Loc type 4174

(Text unter der Zeichnung)

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

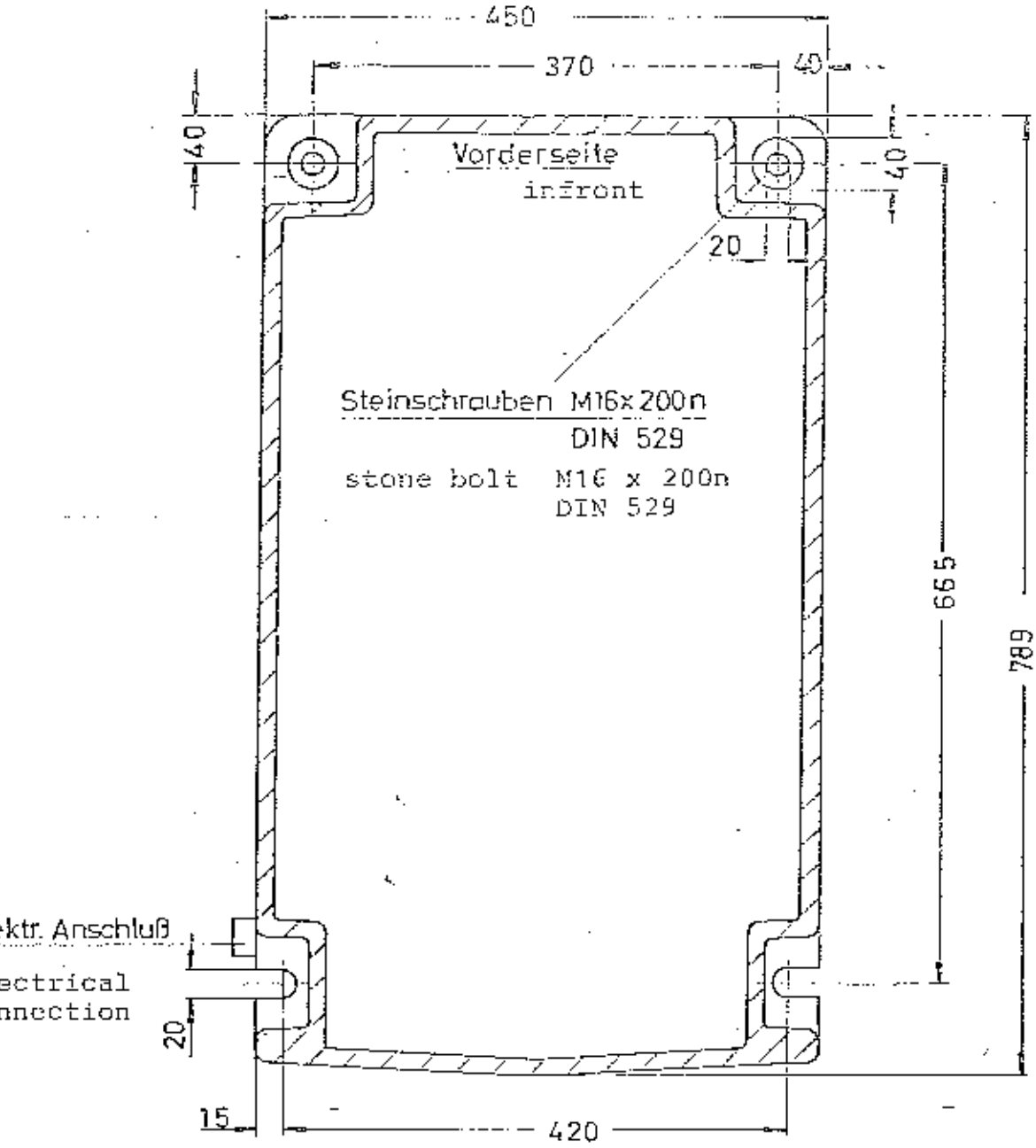
It is recommended to erect the machine on plates showing vibration absorbing properties. In this way, all internal and external vibrations are chiefly suppressed.

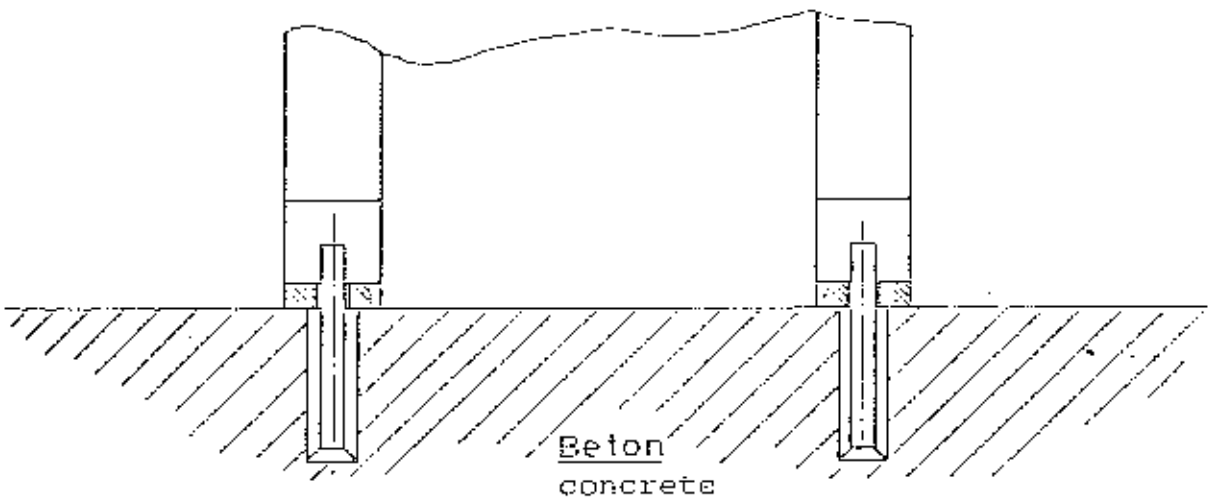
It is useful to align the machine by means of an air level. The alignment shall be carried out in longitundinal and cross directions, placing sheets underneath which are firmly connected to the ground (for instance glued). For this purpose, put the air level on the table surface.

Fundamentplan
Foundation plan

UF 6N

Blatt 3a
page

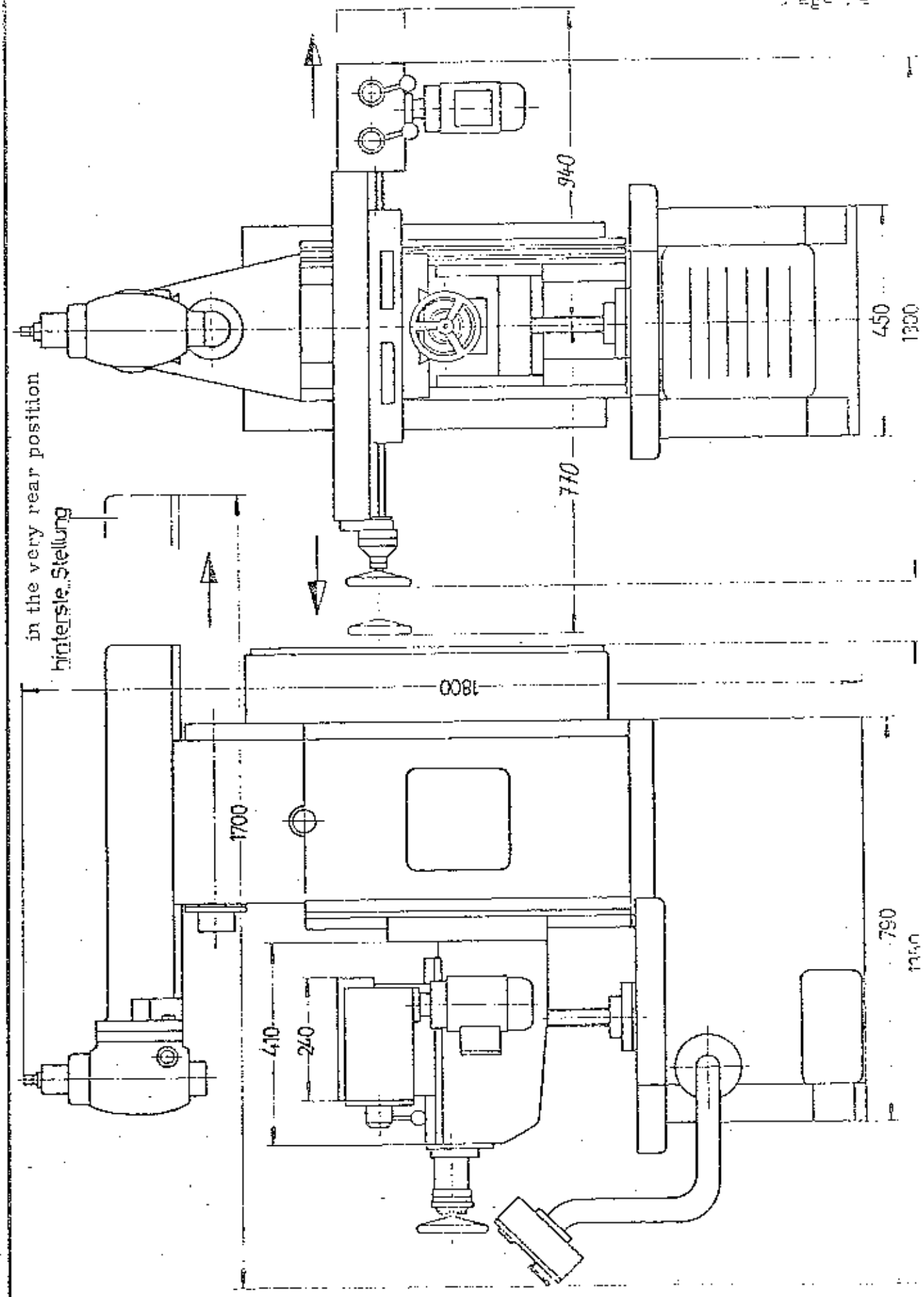




SUNZMANN

Die Abmessungen (Platzbedarf)

Dimensions (required space)



Die Aufstellung

Um ein einwandfreies Arbeiten der Maschine zu erreichen, ist es unbedingt erforderlich, daß diese auf ein gut ausgetrocknetes Fundament gestellt wird.

> Maschinen, die ohne ausreichende Befestigung aufgestellt werden, sind meist unerwünschten Schwingungen ausgesetzt, deren Ursache verschiedene Faktoren sein können.

Das Ausrichten mit einer Maschinenwasserwaage soll in Längs- und Querrichtung auf dem Maschinentisch erfolgen.

Die Befestigungsschrauben der genau ausgerichteten Maschine sind mit Zement-Sandgemisch (mind. 1:3) einzugießen, die Maschine selbst kann auch noch mit dem gleichen Zement-Sandgemisch untergossen werden. Letzteres ist jedoch nicht unbedingt erforderlich.

Der Netzanschluß (Bitte besonders beachten)

Die Maschine wird von uns für die bei der Bestellung aufgegebene Betriebsspannung ausgerüstet und geschaltet.

Die Zuleitung zum Netzanschlußkasten, welcher am Unterbau angebracht ist, soll in einem Stahlpanzerrohr mittels einer Zuleitung von 5 x 2,5 mm² Mindestquerschnitt erfolgen.

Der grüngelbe Schutzleiter der Zuleitung ist dabei an die entsprechende Schutzleiterklemme im Netzanschlußkasten anzuschließen.

Im Netzanschlußkasten sind die weiteren Klemmen der Reihenfolge nach, Mp - RST.

Steuerspannung und Speisestrom für die Magnetkupplungen werden einem eingebauten Transformator entnommen.

Primäre Anschlüsse und secundäre Abgänge des Transformators sind abgesichert.

Der Hauptmotor sowie der Vorschubmotor haben als Überlastschutz, zusätzlich zu den Sicherungen, an den entsprechenden Schaltschützen Bi-Metallrelais vorgeschaltet.

Mit einem besonderen Motorschutzschalter ist der Motor der Kühlmittelpumpe gegen Überstrom gesichert. Die Pumpe ist deshalb nicht mehr durch Schmelzeinsätze abgesichert.

Weitere Einzelheiten können von den nachfolgenden Blättern entnommen werden.

Erection and electrical installation

The erection

In order to ensure the irreproachable operation of the machine, it is essential to erect it on a well dried-out foundation.

> Machines being erected without sufficient fastenings are generally exposed to undesired vibrations due to various facts.

Align the machine on the machine table, using an air level, in longitudinal and transversal directions.

Cast-in the fastening screws of the exactly aligned machine with a cement-sand mixture (minimum ratio : 1 to 3). Using the same cement sand mixture, it is also possible to under-cast the machine. However, this precaution is not absolutely necessary.

Public supply (Please observe particularly)

The machine will be supplied ready equipped and wired in accordance with the working voltage given in the 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 $5 \times 2,5\ mm^2$ 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, Mp - RST.

Control voltage and feeding current for the magnetic clutches are supplied by an incorporated transformer.

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 motor and to the advance motor, at the corresponding contactors.

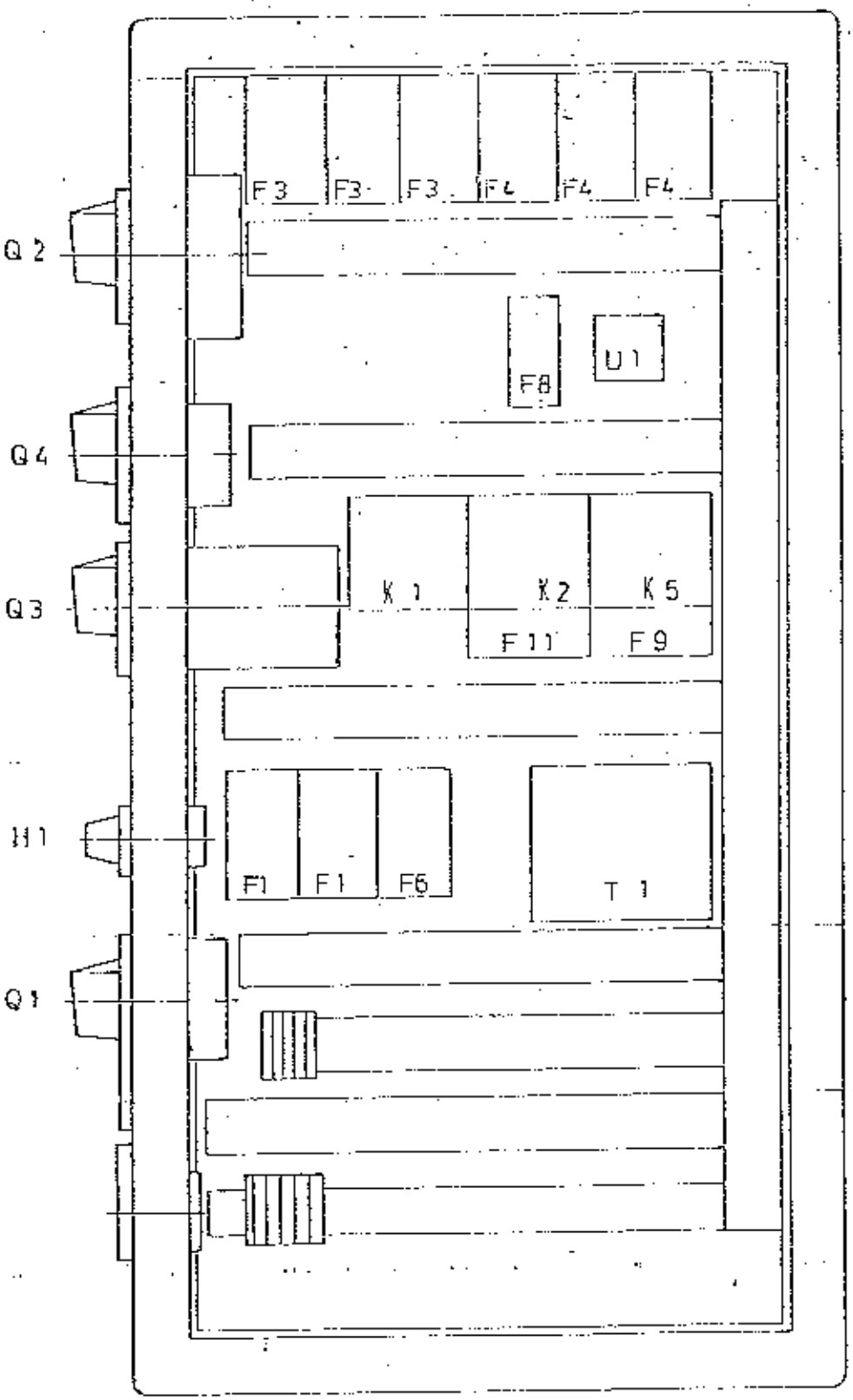
The motor of the cooling pump is protected against excess current by means of a special motor protecting switch. Therefore the pump is not protected anymore by fusible plugs.

With respect to further details, please refer to the following sheets.

Schaltgeräte im Elektrokasten

Switching instruments in the electric switch box

Blatt: 6



Reinigung und Schmierung

Bevor die Maschine in Betrieb genommen wird sind sämtliche blanken Teile, die von uns gegen Rost eingefettet worden sind, zu reinigen und die Maschine nach den einzelnen Hinweiszeichnungen, sowie dem Schmierplan dieser Betriebsanleitung durchzuschmieren.

Für das Spindelstockgetriebe wird Castrol ALPHA 617 SAE 90 oder eine dementsprechende Ölsorte verwendet.
Als Schmieröl empfehlen wir ein gutes Maschinenöl, mit einer Viskosität von ca. 3-5 Grad E bei 50 Grad C, z. B. Voltol Gleitöl II, oder ein dementsprechendes anderes Markenöl, soweit auf dem Schmierplan nichts anderes angegeben ist.

Die Wälzlagerschmierung erfolgt mit Fett. Hier sei die Verwendung von SKF-Wälzlagerfett (Wälzerol II) empfohlen. Natürlich kann auch ein anderes Wälzlagerfett, welches dem vorgenannten entspricht, verwendet werden.

ROT - gekennzeichnete Schmiernippel der Maschine nur mit Öl schmieren.

BLAU - gekennzeichnete Schmiernippel der Maschine nur mit Fett schmieren.

Inbetriebnahme

Zur ersten Inbetriebnahme ist eine der drei niedrigsten Drehzahlen am Vorwählgetriebe einzustellen, damit man sich vom einwandfreien Lauf der Lager und der Zahnradübersetzungen überzeugen kann.

Die sofortige volle Belastung der Maschine ist unzweckmäßig und soll deshalb vermieden werden.

Es ist zu empfehlen, beim ersten Mal alle Schaltungen vorsichtig auszuführen.

Bei den mit Kühlmitteleinrichtung ausgerüsteten Maschinen befindet sich der Kühlmittelschalter im Unterbau.
Das Einfüllen des Kühlmittels kann nach Abnahme der vorderen Jalousie leicht vorgenommen werden.
Nach dem Einfüllen kann die Pumpe eingeschaltet werden.

Ferner empfehlen wir die Beachtung der vom Hersteller beigegebenen Betriebsanleitung für Elektro-Kühlmittelpumpen.

Machen Sie sich nun zuerst mit den nachfolgenden Beschreibungen dieser Betriebsanleitung vertraut, und üben Sie alle Bedienungsgriffe an nicht eingeschalteter Maschine (Hauptschalter AUS) ein. Dabei ist auch besonders die Lage und Zuordnung der einzelnen Endschalter bzw. deren Nocken zu studieren.

Cleaning and lubrication

Prior to the initiation of the machine, clean all bare parts from grease which we had applied for rust prevention. Then grease the machine in accordance with the single plans and the lubrication scheme given in the present operating instructions.

Use Castrol ALPHA 617 SAE 90 or an equivalent oil for the headstock gearing.
For grease oil, we recommend a good machine oil with a viscosity of approx. 3 - 5 degrees E at 50°C., for instance Voltol sliding oil H or any other branded oil, unless stated otherwise in the lubricating scheme.

The anti-friction bearings shall be greased. For this purpose, we recommend the SKF anti-friction bearing grease (Wälzerol H). Naturally it is also possible to use any other grease, provided it will correspond with the aforementioned one.

Red-marked lubrication nipples of the machine shall be lubricated with oil only.

Blue-marked lubrication nipples of the machine shall be lubricated with grease only.

Initiation

With respect to the first initiation of the machine, adjust one of the three lowest revolution speeds on the pre-selecting device and check up the bearings and toothed wheel transmissions as regards their irreproachable running and operation.

As the immediate full load on the machine is not very useful, please abstain from it.

For this first time of running, please effect all switchings very carefully.

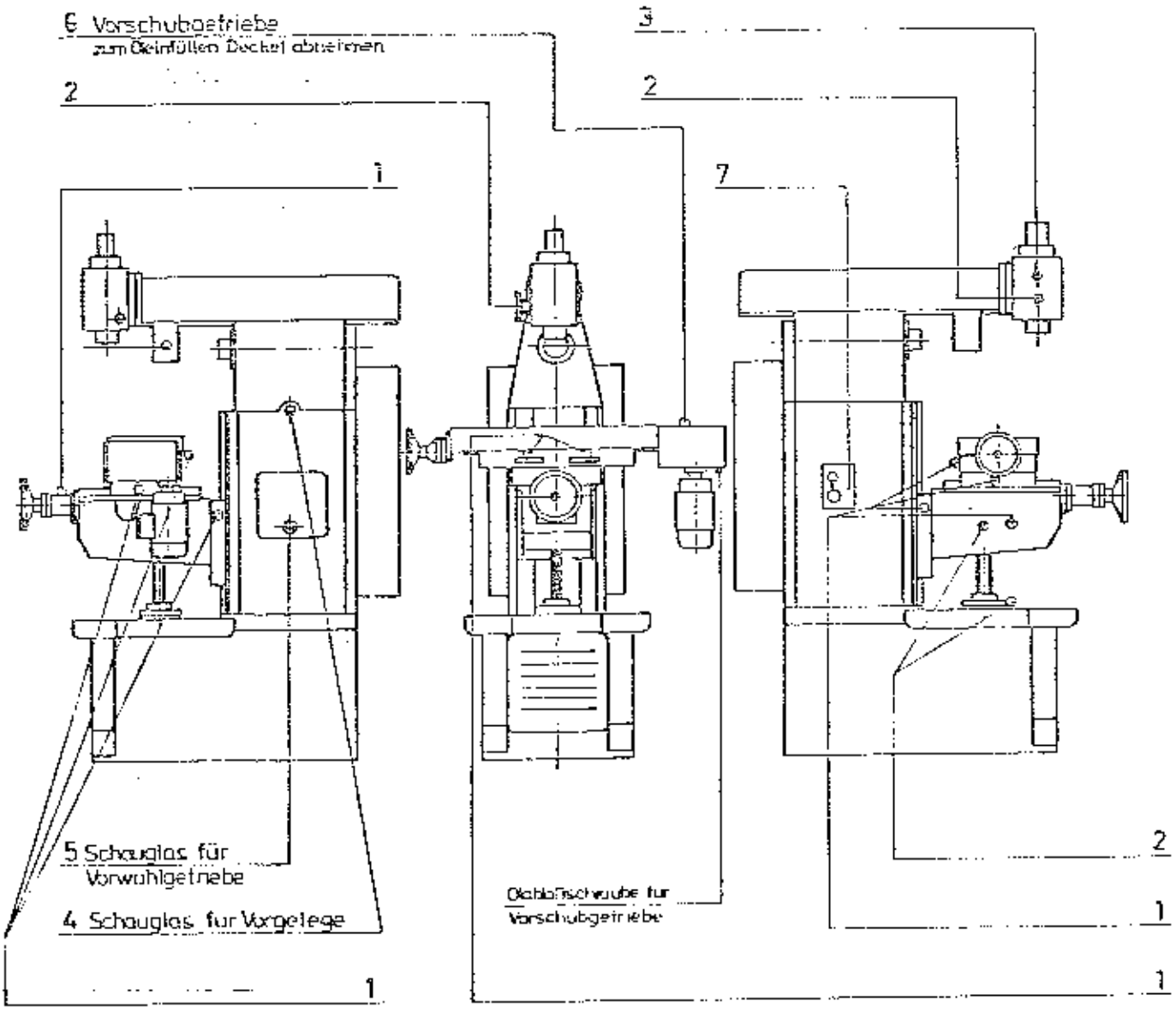
On machines with cooling device, the coolant switch is installed in the substructure.
The coolant is filled in easily when taking off the front jalousie.
After filling, switch on the pump.

In addition we recommend you to observe the operating instructions for electrical cooling pumps issued by the manufacturer.

Now get yourselves acquainted first with the following descriptions of these instructions and try all operating handles with the machine being switched off (main switch OFF). In this connection, please study also the position and the arrangement of the single interruptors (limit switches) respectively of their cams.

Hauptschmieranleitung

UF 6
Blatt: 8



Schmier-stelle	Schmier-häufigkeit	Schmierungsart	Schmierstoffmenge	Schmierstoff	DIN 51502	
(1)	Täglich	Schmiernippel	3-4 Hübe mit der Schmierstoffpresse	Castrol AWS 68	C-LP 36	rot
(2)	1/4 jährlich	Schmiernippel	3-4 Hübe mit der Schmierstoffpresse	Castrol AWS 68	C-LP 36	rot
(3)	1/4 jährlich	Schmiernippel	3-4 Hübe mit der Fettpresse	Castrol Spheerol AP 2	K 2K	violett
(4)	Jährlich	Ölwechsel siehe Bl. 22	5,00 Liter	Castrol SAE 90	C-LP 36	rot
(5)	Jährlich	Ölwechsel siehe Bl. 22	0,50 Liter	Castrol AWS 68	C-LP 36	rot
(6)	Jährlich	Ölwechsel	0,50 Liter	Castrol AWS 68	C-LP 36	rot
(7)	Täglich	Zentralschmierung	5-6 Hübe	Castrol AWS 68	C-LP 36	

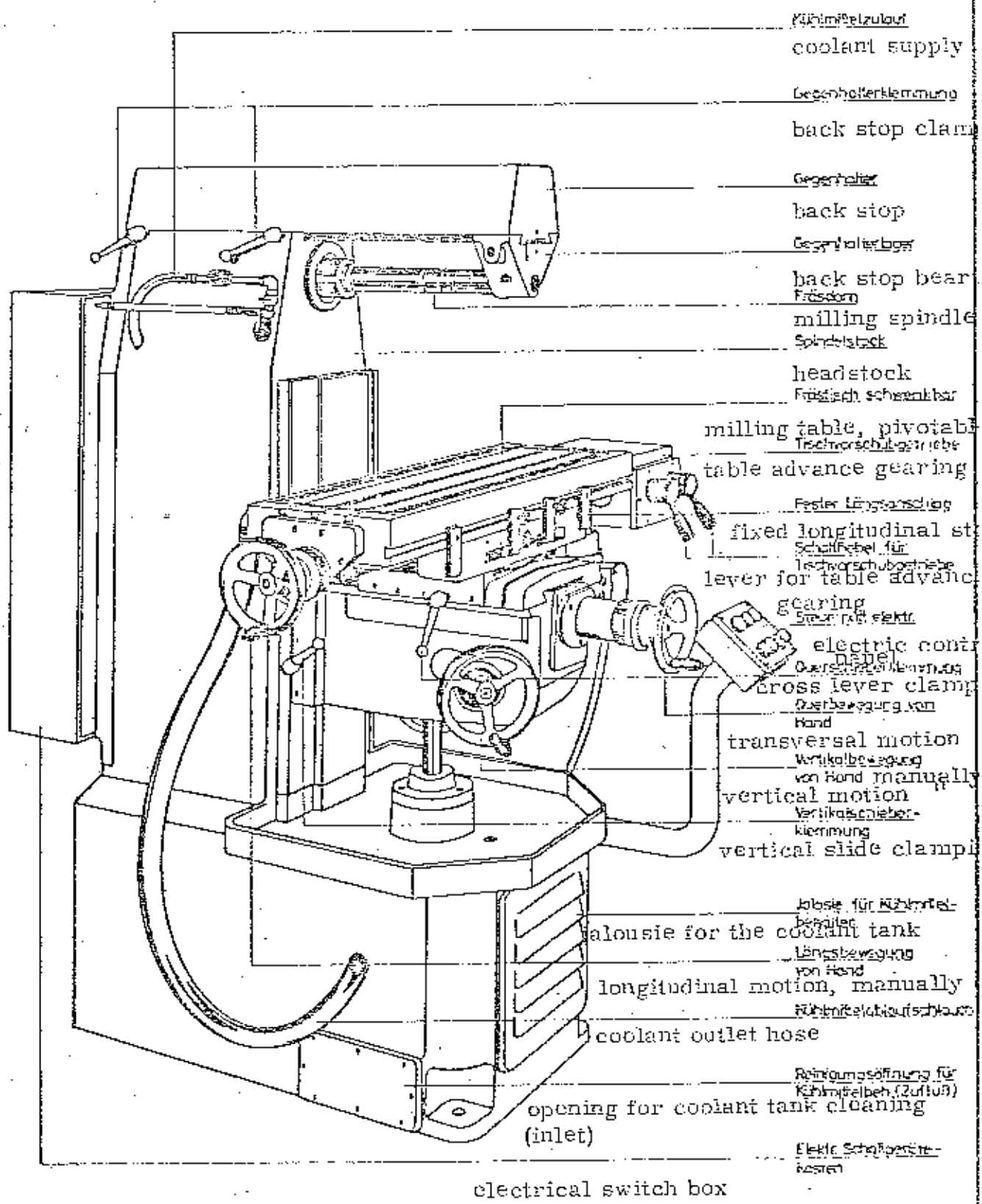
(6)Vorschubgetriebe =
(6)advance gearing filling in of oil

(5)Schauglas für Vorwählgetriebe =
(5)oil-level indicator for the proselector gear box

(4)Schauglas für Vorgelege =
(4)oil-level indicator for the gearing

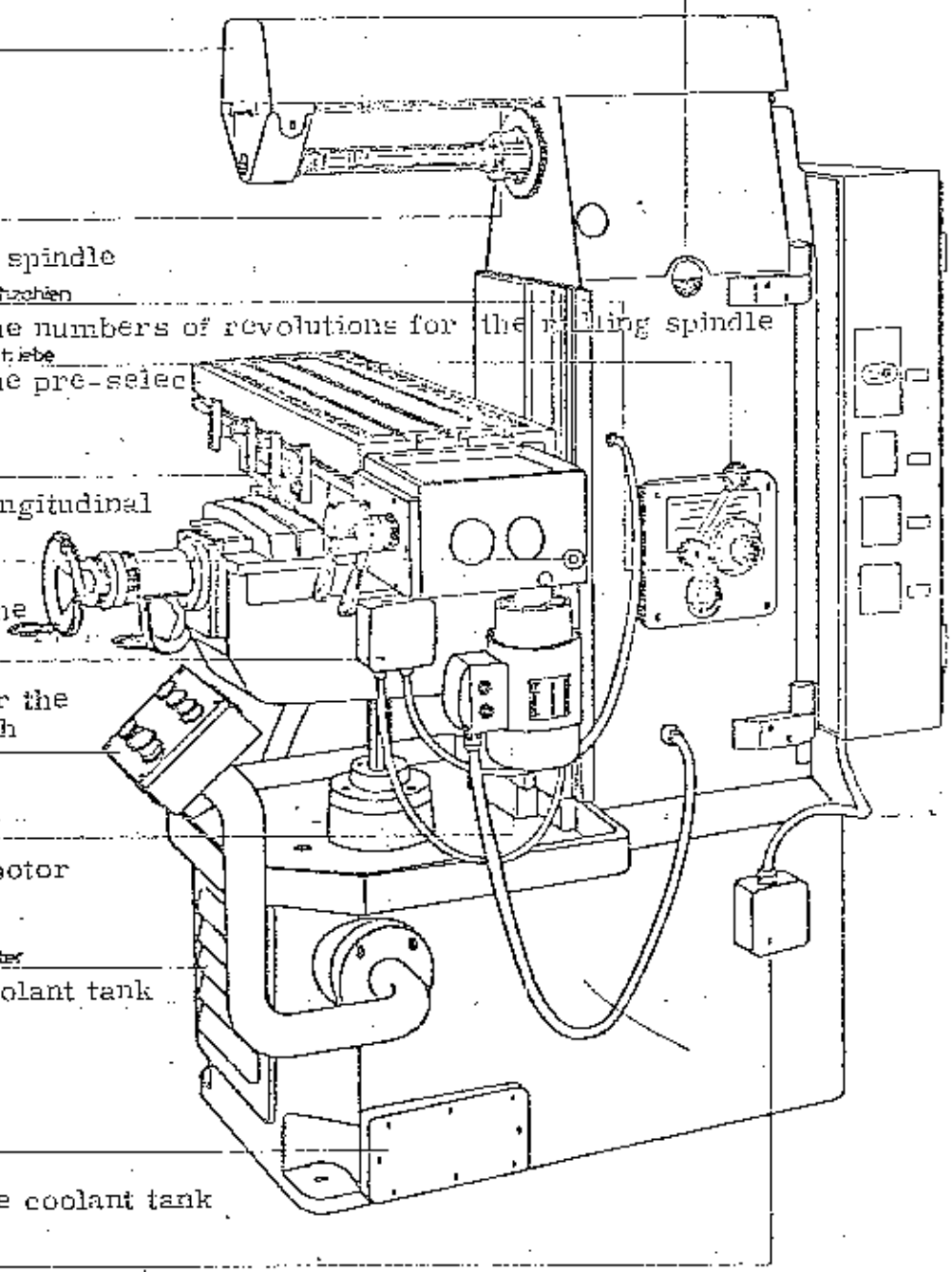
Ölablaßschraube für Vorschubgetriebe =
waste oil screw for advance gearing

grease point	frequency of lubrication	type of lubrication	quantity of lubricants	lubricants	notes
(1)	daily	lubricator nipple	3-4 strokes with the grease gun	Castrol AWS 68	red
(2)	every 3 months	lubricator nipple	3-4 strokes with the grease gun	Castrol AWS 68	red
(3)	every 3 months	lubricator nipple	3-4 strokes with the grease gun.	Castrol Spheerol AP 2	violet
(4)	yearly	oil change see page 19	5,00 litres	Castrol SAE 90	red
(5)	yearly	oil change see page 19	0,50 litres	Castrol AWS 68	red
(6)	yearly	oil change	0,50 litres	Castrol AWS 68	red
(7)	daily	central lubrication	5 - 6 strokes	Castrol AWS 68	


Kühlmittelzulauf
coolant supply
Gegenhalterklemmung
back stop clam
Gegenhalter
back stop
Gegenhalterbock
back stop bear
Fräsdorn
milling spindle
Spindelstock
headstock
Frästisch schwenkbar
milling table, pivotab
Tischvorschubgetriebe
table advance gearing
Fester Längsanschlag
fixed longitudinal st
SchaltHebel für Tischvorschubgetriebe
lever for table advanc
gearing
Steuerung elektr.
electric contr
Querschlittenklemmung
cross lever clamp
Querbewegung von Hand
transversal motion
Vertikalbewegung von Hand
manually
vertical motion
Vertikalschieber-klemmung
vertical slide clampi
Jalousie für Kühlmittelbehälter
alousie for the coolant tank
Längsbewegung von Hand
longitudinal motion, manually
Kühlmittelablaufschlauch
coolant outlet hose
Reinigungsöffnung für Kühlmittelbeh.(Zufluß)
opening for coolant tank cleaning
(inlet)
Elektr. Schaltanlage-kasten
electrical switch box

Bezeichnungen u. Bedienungen II

Markings and operations II



Ölstandsauge für Spindelstockgetriebe
oil level sight glass for the headstock gearing

Gegenhalter
back stop

Horizontalfrässpindel
horizontal milling spindle

Vorwahl für Frässpindeldrehzahlen
pre-selection of the numbers of revolutions for the milling spindle

Schalthebel für Vorwählgetriebe
switch lever for the pre-selection gearing

Längswegendschalter
limit switch for longitudinal motion

Ölstandsauge für Tischvorschubgetriebe
oil level sight glass for the table advance gear

Verteilerkasten für Kabel zum Endschalter
service cabinet for the cable leading to the limit switch

Steuerpult
control desk

Vorschub-(Bremse)-Motor
advance (brake)-motor

Jalousie für Kühlmittelbehälter
jalousie for the coolant tank

Reinigungsöffnung für Kühlmittelbehälter (Abfluß)
openings to clean the coolant tank (outlet)

Netzanschlußkasten
public supply box

Bedienungshinweise (elektr.)

1. Hauptschalter a 1 einschalten auf I, wodurch rote Kontrolleuchte b 1 am Steuerpult aufleuchten muß.

2. Drehrichtung und Drehzahl des Frässpindelmotors am Schalter a 3 einstellen.

3. Bei Arbeiten mit automatischem Vorschub danach auch Drehzahl des Vorschubmotors am Schalter a 4 (I oder II) einstellen.

4. Kühlmittelpumpe kann, nachdem Kühlmittel in die Behälter am Unterbau gefüllt wurde, jetzt ebenfalls eingeschaltet werden. (Schalter a 2)

   Alle bisher erwähnten Schaltgeräte sitzen seitlich am Schaltergehäuse auf der Maschinenvorderseite

5. Mittels Drucktaster b 3 am Steuerpult kann jetzt die Frässpindel eingeschaltet werden.

6. An beiden Drucktastern b 6 bzw. b 6/2 kann jetzt die gewünschte Vorschubrichtung eingeschaltet werden, vorausgesetzt natürlich, daß am Vorschubgetriebe ein Gang eingelegt ist.
   (Vorschubgetriebe hat auch Leerlaufstellung)

7. In jeder Stellung kann der Vorschub durch Knopftaster b 2 abgeschaltet werden. In jedem Falle jedoch wird, wenn Taster b 1 (Alles Aus) gedrückt wird, neben der Frässpindel auch der Vorschub mit abgeschaltet.

8. Um bestimmte, einstellbare Vorschubwege selbsttätig abzuschalten, ist der Endschalter (b 5) angebaut.

Die beiden fest angebrachten Maximalweganschläge dürfen keinesfalls entfernt werden, etwa um eine größere selbsttätige Tischlängsbewegung zu erhalten.
Unweigerlich wird bei Nichtbeachtung dieser Vorschrift eine Zerstörung im Vorschubsystem die Folge sein.

1. Set the main switch a 1 to I, making the red signal lamp h 1 on the control desk flashing up.

2. Adjust the direction of rotation and the number of revolutions of the milling spindle motor by switch a 3.

3. If operations are carried out by automatical advance, also adjust subsequently the number of revolutions of the feed advance motor on switch a 4 (I or II).

4. Once the coolant is filled in the coolant tank housed in the basement, also switch on now the cooling pump (switch a 2).

   All switching elements mentioned hitherto are mounted laterally to the switching element box which is fixed at the rear side of the machine.

5. Now it is possible to switch on the milling spindle by means of the push button b 8 at the control desk.

6. The required feed advance direction is switched on now by means of the two push buttons b 6 respectively b 6/2, on the condition, however, that a gear is put in the advance gearing.
   (The feed advance is also provided with an idle running gear).

7. It is possible to switch off the feed advance by a manual switch b 2. In any case, however, if the push button b 1 (everything off) is pressed, aside of the milling spindle the feed advance unit is switched off, too.

8. In order to switch off automatically certain adjustable advance ways, provision is made to the limit switch (b 3).

Never remove the two firmly fixed maximum path stops in order to obtain a longer automatical longitudinal motion of the table.
If this prescription is disregarded, the feed advance system will be inevitably destroyed.

Einstellungen der Frässpindeldrehzahlen

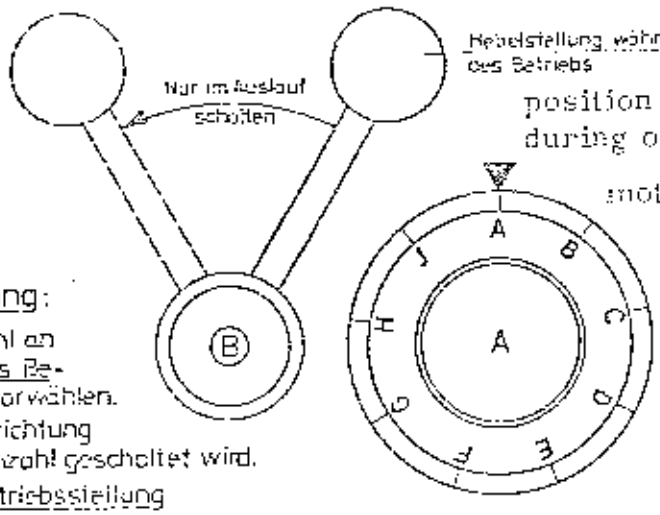
(Maschinen ohne sep. Vertikalkopfantrieb)

UF6u7

Blatt 14

horizontally

only switch during slowing down



position of lever during operation

motor degree

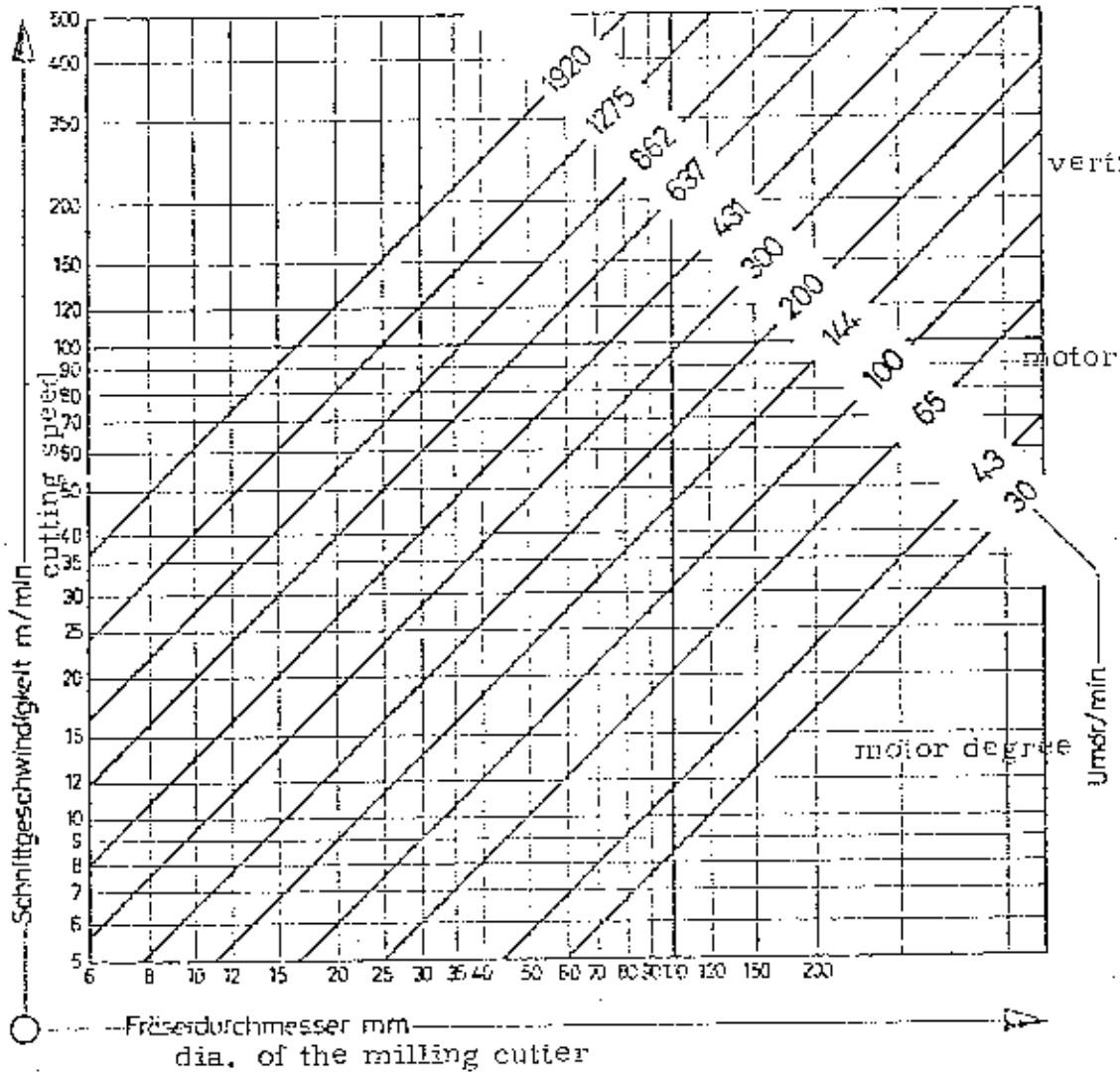
motor degree

Zur besonderen Beachtung:

1. Gewünschte Spindeldrehzahl an Wählscheibe „A" während des Betriebes oder im Stillstand vorwählen.
2. Im Auslauf Hebel „B" in Pfeilrichtung umlegen, womit vorgew. Drehzahl geschaltet wird.
3. Hebel „B" gleich wieder in Betriebsstellung (siehe oben) zurücklegen. Maschine einschalten.

Drehzahldiagramm

diagram of the numbers of revolutions



Vorwählscheibe RPM Umdr/min	Motorstufe I
A	30
B	43
C	65
D	100
E	144
F	212
G	302
H	431
J	637

	Motorstufe II
A	61
B	87
C	129
D	200
E	288
F	424
G	604
H	862
J	1775

Vorwählscheibe Umdr/min	Motorstufe I
A	66
B	98
C	142
D	224
E	322
F	452
G	674
H	960
J	1420

	Motorstufe II
A	132
B	196
C	284
D	448
E	644
F	904
G	1346
H	1920
J	2843

(machines without separate vertical head drive)

Attention :

1) Preselect the required number of revolutions of the spindle, using dial plate "A" during operation or during stoppage.

2) During slowing down, set the lever "B" in direction of arrow, thus switching the preselected number of revolutions.

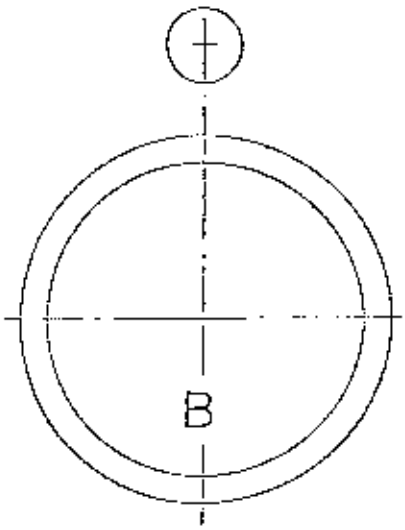
3) Reset lever "B" immediate in the position of operation (see above). Switch on the machine.

Diagram of the numbers of revolutions

(weitere Bezeichnungen auf dem Originalblatt)

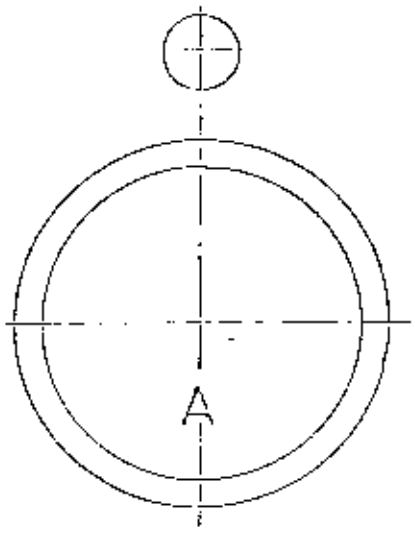
Einstellungen der Tischvorschübe

Adjustment of the table advance



Schaltung B

Vorschübe m/m		
B		A
2	328,00	3
1	153,60	3
2	91,00	2
1	42,66	2
2	56,00	1
1	26,24	1
B	Motor II	A
2	164,00	3
1	76,80	3
2	45,60	2
1	21,44	2
2	28,00	1
1	13,12	1
	Motor I	



Schaltung A

Richtwerte für Fräsgeschwindigkeiten I

Schnittgeschwindigkeit v in m/min Vorschubgeschwindigkeit s' in mm/min

Fräserart und zu zerspanender Werkstoff	Schlichten bis Frästiefe 1 mm		Schruppen bis Frästiefe 5 mm	
Walzenfräser DIN 884 Fräsbreite bis 100 mm	v	s'	v	s'
Stahl 90...100 kg/mm² Festigkeit	10...14	35...45	10...12	45...70
Stahl 70...80 kg/mm² Festigkeit	14...18	40...60	12...14	70...100
Stahl 50...70 kg/mm² Festigkeit	18...22	50...80	15...18	90...150
Gußeisen bis 200 Brinellhärte	14...18	70...90	12...14	100...170
Leichtmetall	200...300	100...150	150...250	150...280
Messing	40...60	100...160	30...40	150...220
Schaftfräser DIN 844/845 Fräsbreite bis 60 mm	v	s'	v	s'
Stahl 90...100 kg/mm² Festigkeit	16...18	40...50	12...14	15...25
Stahl 70...80 kg/mm² Festigkeit	15...20	55...75	14...16	25...40
Stahl 50...70 kg/mm² Festigkeit	20...24	75...90	15...18	35...55
Gußeisen bis 200 Brinellhärte	18...20	80...100	14...16	40...75
Leichtmetall	150...180	70...100	140...180	50...90
Messing	50...60	100...135	30...40	60...100
Walzenstirnfräser DIN 841 u. 883 Fräsbreite bis 100 mm	v	s'	v	s'
Stahl 90...100 kg/mm² Festigkeit	12...14	30...40	10...12	40...60
Stahl 70...80 kg/mm² Festigkeit	16...18	40...60	12...14	70...90
Stahl 50...70 kg/mm² Festigkeit	20...22	50...75	16...18	90...120
Gußeisen bis 200 Brinellhärte	16...18	70...90	12...15	100...150
Leichtmetall	200...300	90...135	150...220	140...280
Messing	40...60	60...155	30...40	150...250
Kunststoffe	25...30	40...70	15...22	60...80
Kunststoffe (Fräser m. Hartm. Schneid.)	30...40	40...70	25...35	60...80

Richtwerte für die zul. Spanmenge in cm^3/kW min

Werkstoffe	Zulässige Spanmenge
Legierte Stähle (vergütet)	8...10 cm^3/kW min
Legierte Stähle (geglüht)	10...12 cm^3/kW min
Unlegierte Stähle	12...15 cm^3/kW min
Gußeisen (mittelhart)	20...26 cm^3/kW min
Messing und Rotguß	30...40 cm^3/kW min
Leichtmetalle	40...60 cm^3/kW min

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Cutting speed v in m/min — feed advance speed 's' in mm/min

Type of the milling cutter and the material to be cut	finishing max. milling depth 1 mm	roughing max. milling depth 5 mm
Cylindrical cutter DIN 884 milling width max. 100 mm		
steel 90 ... 100 kg/mm^2 strength		
steel 70 ... 80 kg/mm^2 strength		
steel 50 ... 70 kg/mm^2 strength		
cast iron up to 200 max. Brinell hardness		
light metal		
brass		
shank-end mill DIN 844/845 milling width max. 60 mm		
steel 90 ... 100 kg/mm^2 strength		
steel 70 ... 80 kg/mm^2 strength		
steel 50 ... 70 kg/mm^2 strength		
cast iron up to 200 max. Brinell hardness		
light metal		
brass		
shell end mill DIN 841 and 883 milling width max. 100 mm		
steel 90 ... 100 kg/mm^2 strength		
steel 70 ... 80 kg/mm^2 strength		
steel 50 ... 70 kg/mm^2 strength		
cast iron up to max. 200 Brinell hardness		
light metal		
brass		
thermoplastic materials		
thermoplastic material (mill with carbide cutter)		

Approximate values for the admissible chip quantity in cm^3/kw min

Material	admissible chip quantity
alloyed steels (hardened)	
alloyed steels (annealed)	
unalloyed steels	
cast-iron (medium hard)	
brass and red brass	
light metals	

Richtwerte für Fräsgeschwindigkeiten II

VL5.6.Z.8
VF5.6.Z
Blatt: 17

Schnittgeschwindigkeit v in m/min | Vorschubgeschwindigkeit s' in mm/min

Fräserart (HSS) u. z. zersp. Werkstoff		Schlichten bis a 1mm		Schruppen bis a 5mm	
Messerköpfe DIN 1830 Fräsbr. ÷ 130mm		v	s'	v	s'
STAHL:	90 ... 100	15 ... 20	30 ... 60	16 ... 18	60 ... 7
Festigkeit kg/mm²	70 ... 80	20 ... 25	40 ... 70	20 ... 25	70 .. 10
	50 ... 70	25 ... 30	40 ... 80	18 ... 22	90 .. 12
GUSSEISEN Brinellhärte HB bis 200 (Werkzeuge mit Hartmetall)		60 ... 80	100 .. 150	60 ... 70	100 .. 15
LEICHTMETALL		200 .. 400	80 .. 150	200 .. 300	150 .. 28
MESSING		50 ... 80	90 .. 150	40 ... 60	180 .. 20

Scheibenfräser DIN 885 Fräsbreite ÷ 20 mm		Fertigfräsen bis a 40 mm		Vorschruppen bis a 10 mm	
		v	s'	v	s'
STAHL:	90 ... 100	10 ... 14	10 ... 20	10 ... 12	40 ... 6
Festigkeit kg/mm²	70 ... 80	14 ... 18	15 ... 25	12 ... 14	70 ... 9
	50 ... 70	18 ... 22	20 ... 45	16 ... 18	90 .. 12
GUSSEISEN Brinellhärte HB bis 200 (Werkzeuge mit Hartmetall)		14 ... 18	25 ... 50	12 ... 14	100 .. 15
LEICHTMETALL		200 ... 300	60 .. 120	150 .. 250	150 .. 30
MESSING		40 ... 60	40 ... 75	30 ... 40	140 .. 20

Metallkreissägen DIN 1838 Schnittbreite ÷ 3mm		Schnittiefe bis a 4 mm		Schnittiefe bis a 8 mm	
		v	s'	v	s'
STAHL:	90 ... 100	25 ... 30	30 ... 40	20 ... 25	20 ... 3
Festigkeit kg/mm²	70 ... 80	35 ... 40	45 ... 60	30 ... 35	35 ... 5
	50 ... 70	45 ... 50	60 ... 75	40 .. 45	45 ... 6
GUSSEISEN Brinellhärte HB bis 200		30 ... 40	60 ... 80	30 ... 35	45 ... 6
LEICHTMETALL		300 .. 400	200 .. 300	300 .. 350	150 .. 20
MESSING		300 .. 400	200 .. 300	300 .. 400	150 .. 28
KUNSTSTOFFE		200 .. 300	150 .. 200	150 .. 200	80 .. 14

Richtwerte für Vorschübe in mm/Fräserzahn

(FRÄSER HSS)

a = Frästiefe

		Walzenfräser			Stirnfräser			Scheibenf	
		Schruppen		Schlichten	Schruppen		Schlichten	Schruppen	Schli
		a ÷ 8mm	a ÷ 5 mm	a ÷ 1mm	a ÷ 8 mm	a ÷ 5 mm	a ÷ 1mm	–	a ÷ 1
STAHL:	bis 60	0,22	0,26	0,10	0,25	0,30	0,12	0,08	0,(
Festigkeit kg/mm²	60 ... 90	0,20	0,24	0,08	0,22	0,27	0,10	0,07	0,(
	90 ... 110	0,17	0,22	0,06	0,20	0,24	0,08	0,06	0,(
	über 110	0,10	0,12	0,04	0,12	0,14	0,05	0,05	0,(
GUSSEISEN:	bis 180	0,22	0,30	0,08	0,25	0,34	0,10	0,08	0,(
Härte Brinell (HB)	über 180	0,16	0,20	0,06	0,16	0,20	0,08	0,06	0,(
MESSING		0,24	0,28	0,10	0,25	0,30	0,10	0,08	0,
LEICHTMETALL		0,10	0,12	0,04	0,12	0,16	0,06	0,10	0,(
KUPFER		0,26	0,30	0,08	0,26	0,30	0,10	0,10	0,

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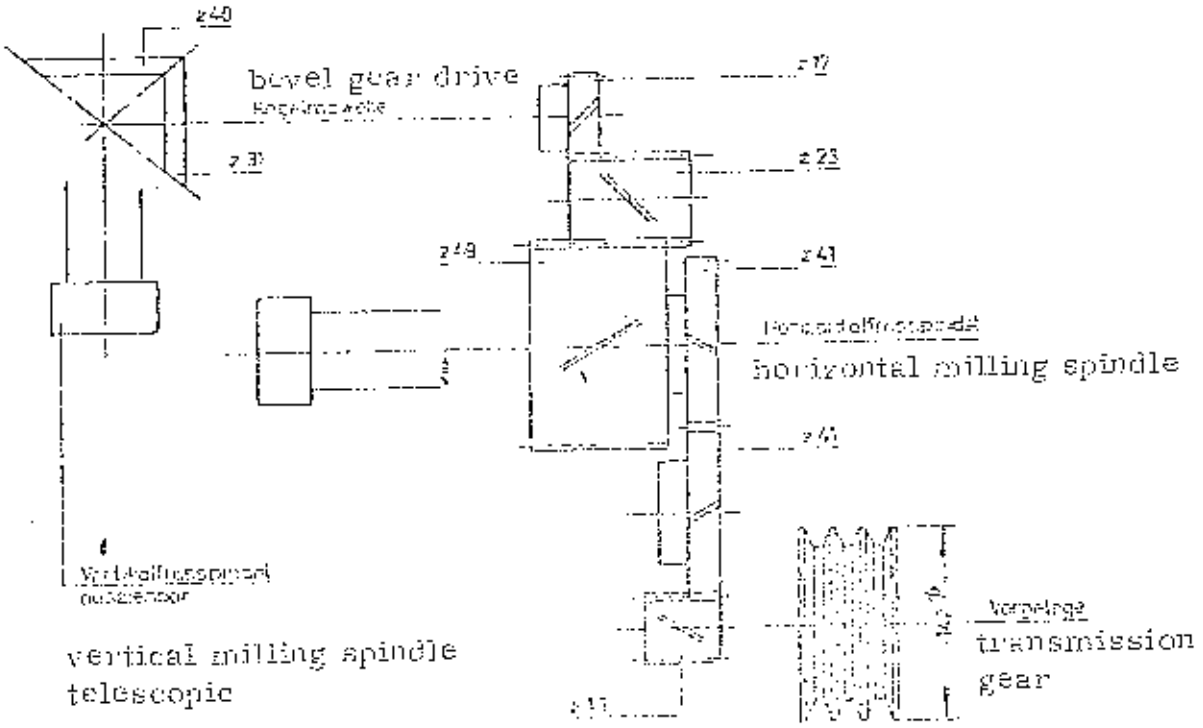
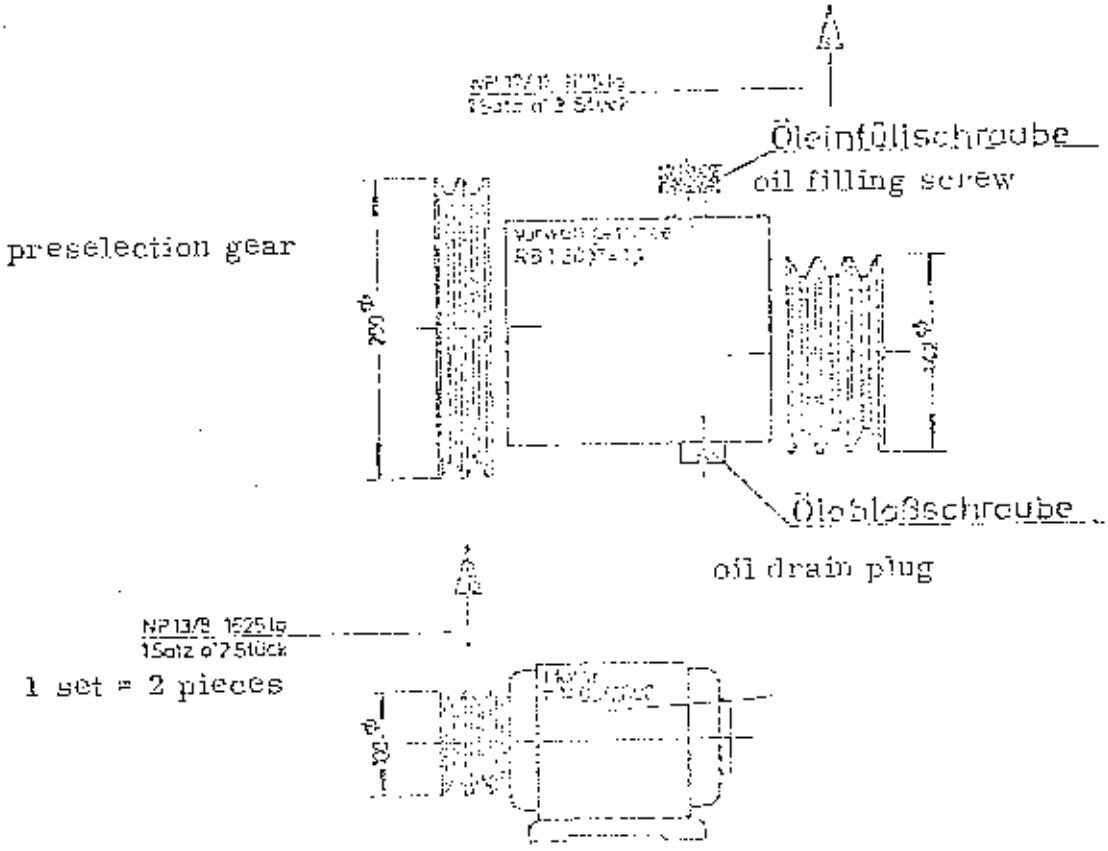
Cutting speed v in m/min	feed advance speed s^1 in mm/min	
type of the milling cutter (high-speed steel) and material to be cut	finishing max. 1 mm cutting depth	roughing max. 5 mm cutting depth
milling heads DIN 1830, cutter width ÷ 130 mm		
steel	90 ... 100	
strength kg/mm^2	70 ... 80	
	50 ... 70	
cast iron Brinell hardness HB up to 200 (tools with hard metal)		
light metal		
brass		
side milling cutter DIN 885 milling width ÷ 20 mm	finish milling max. 40 mm cutting depth	pre-roughing max. 10 mm cutting depth
steel	90 ... 100	
strength kg/mm^2	70 ... 80	
	50 ... 70	
cast iron Brinell hardness HB up to 200 (tools with hard metal)		
light metal		
brass		
metal circular saws DIN 1838 cutting width ÷ 3 mm	cutting depth max. 4 mm	cutting depth max. 8 mm
steel :	90 ... 100	
strength kg/mm^2	70 ... 80	
	50 ... 70	
cast iron Brinell hardness HB up to 200		
light metal		
brass		
thermoplastic materials		

Approximate values for feed advances in mm/miller tooth (mill of high-speed steel)		cylindrical cutter		end mill	side mill cutter
		roughing	finishing	roughing	finish. .....
steel	up to 60				
strength kg/mm^2	60 ... 90				
	90 ... 110				
	exceeding 110				

cast iron : up to 180

Brinell hardness (HB) exceeding 180
brass
light metal
copper


z40
z30
bevel gear drive
z17
z23
z49
z41
horizontal milling spindle
z41
vertical milling spindle
telescopic
transmission gear


Öleinfüllschraube
oil filling screw
preselection gear
Ölablaßschraube
oil drain plug
1 set = 2 pieces

Schema der Querbewegung des Frästisches

Scheme of the transversal motions of the milling table

Attention with parts projecting at the back when clamped, such as round tables, etc.

max. milling mandrel according to DIN 1355

max. internal table position

medium table position

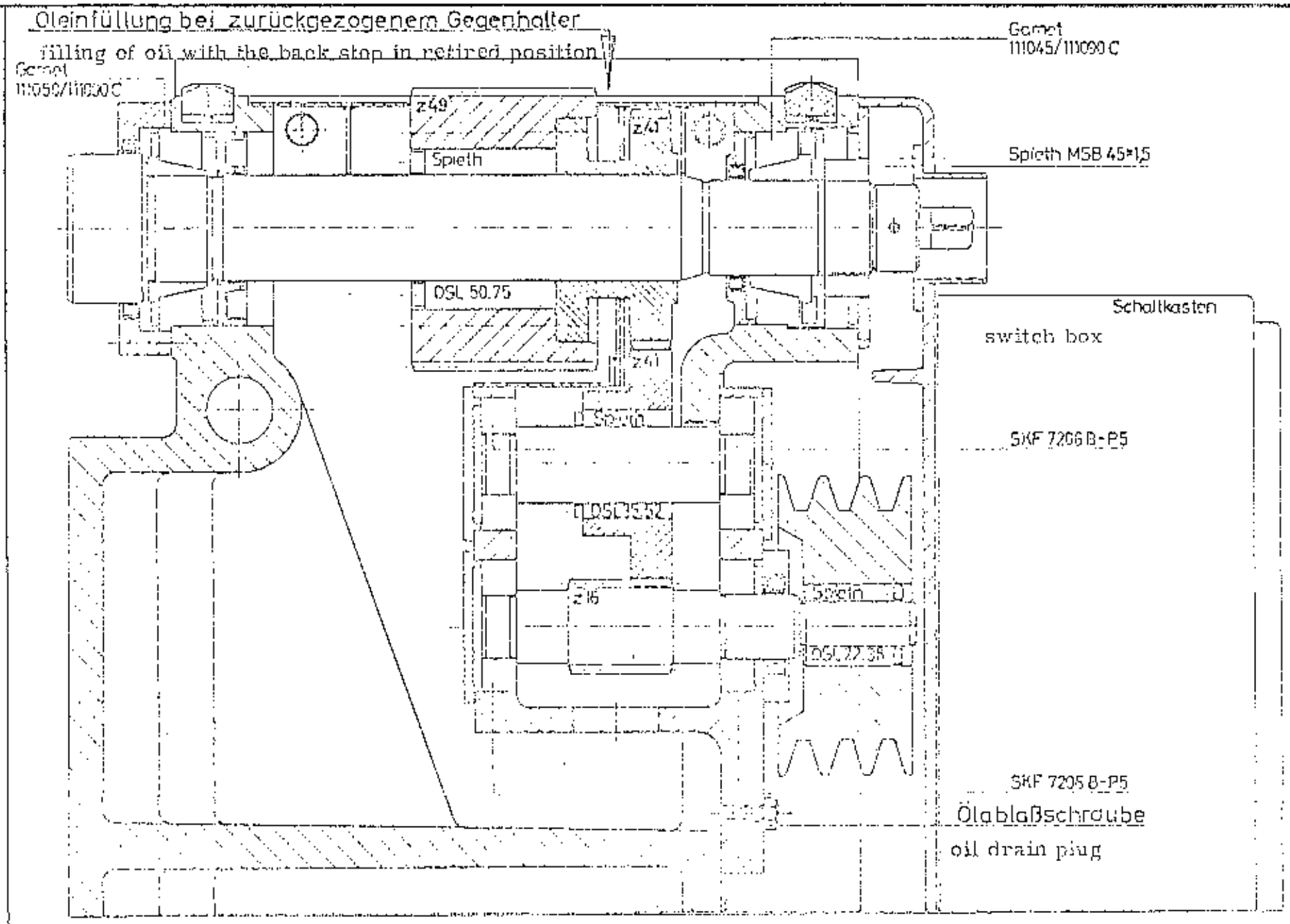
max. external table position

table transverse motion

milling head extreme turn

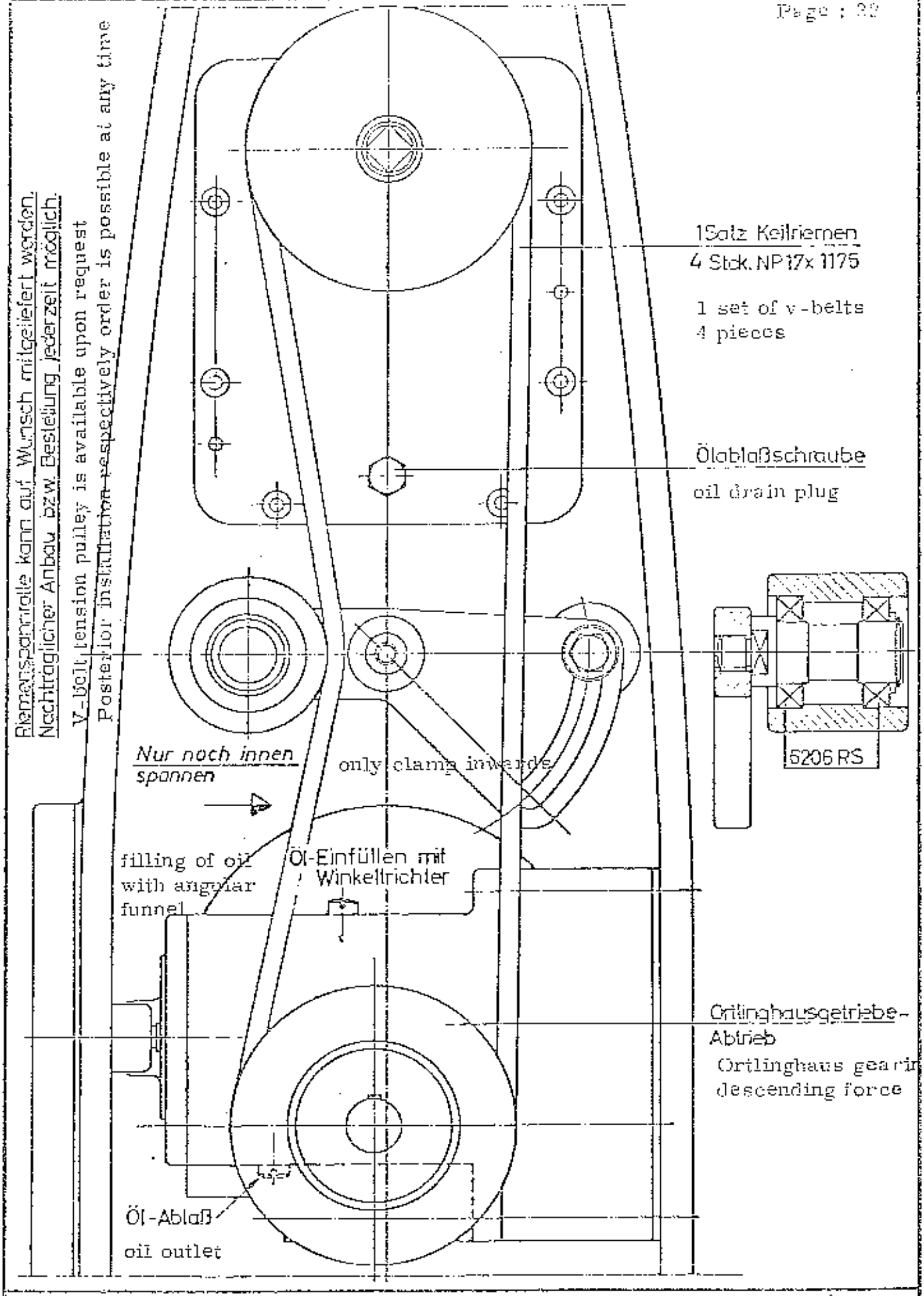
(head is not running)

with respect to the positions of back stop for vertical milling, please refer to p


Oleinfüllung bei zurückgezogenem Gegenhalter
filling of oil with the back stop in retired position
Gamet
111045/111090 C
Gamet
111050/111090 C
z49
z41
Spieth
Spieth M58 45*1,5
DSL 50.75
Schaltkasten
switch box
z41
Spieth
SKF 7206 B-P5
DSL 35.52
z16
Spieth
DSL 27.35.71
SKF 7205 B-P5
Ölablaßschraube
oil drain plug

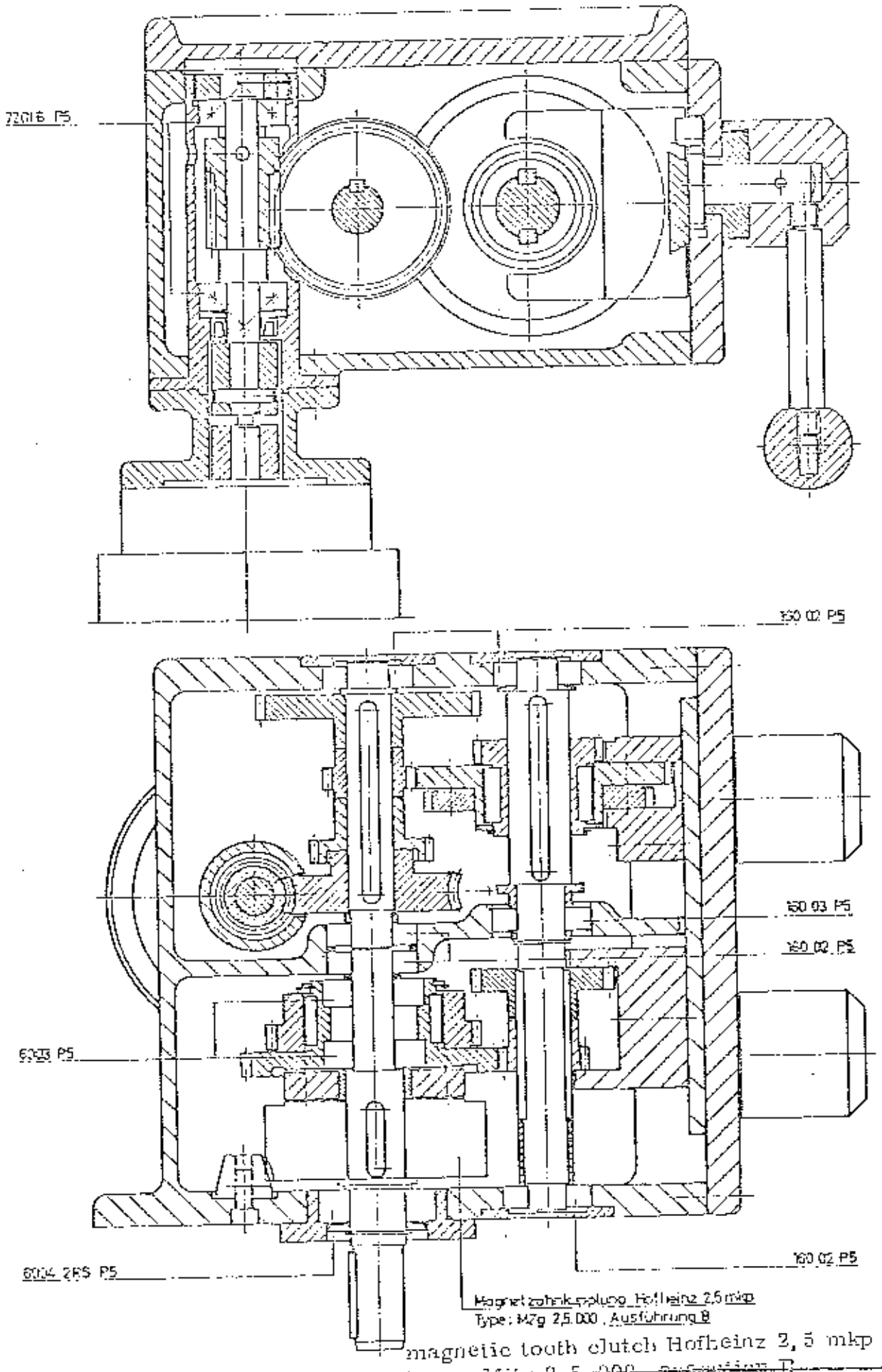
Keilriemenspannung
des Hauptantriebes

v-belt tension
of the main drive



Das Vorschubgetriebe

Feed advance gearing



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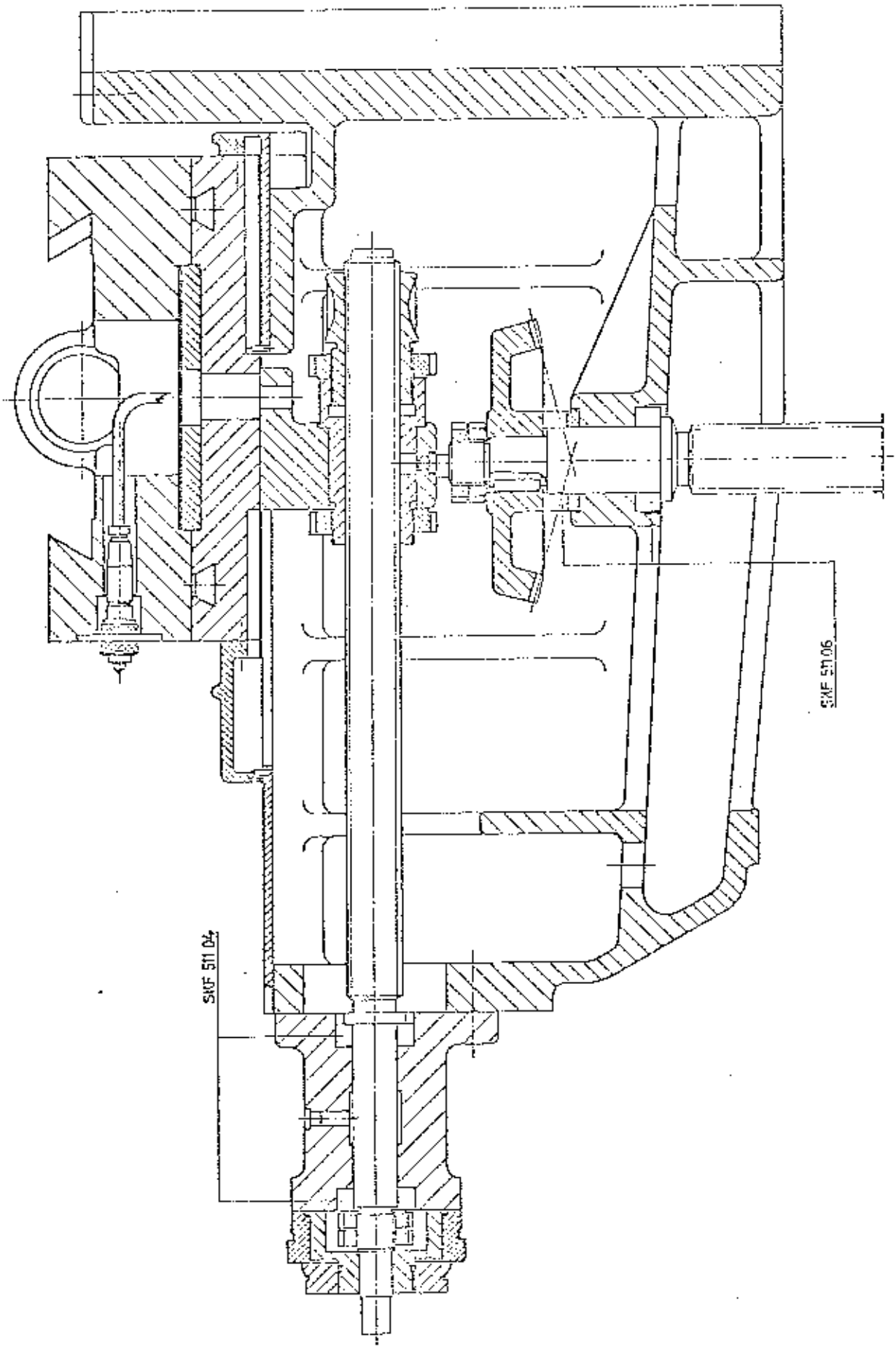
Vertikaler Längsschnitt Winkelkonsole

Vertical longitudinal section of the angle bracket

UF 6 : VF 6

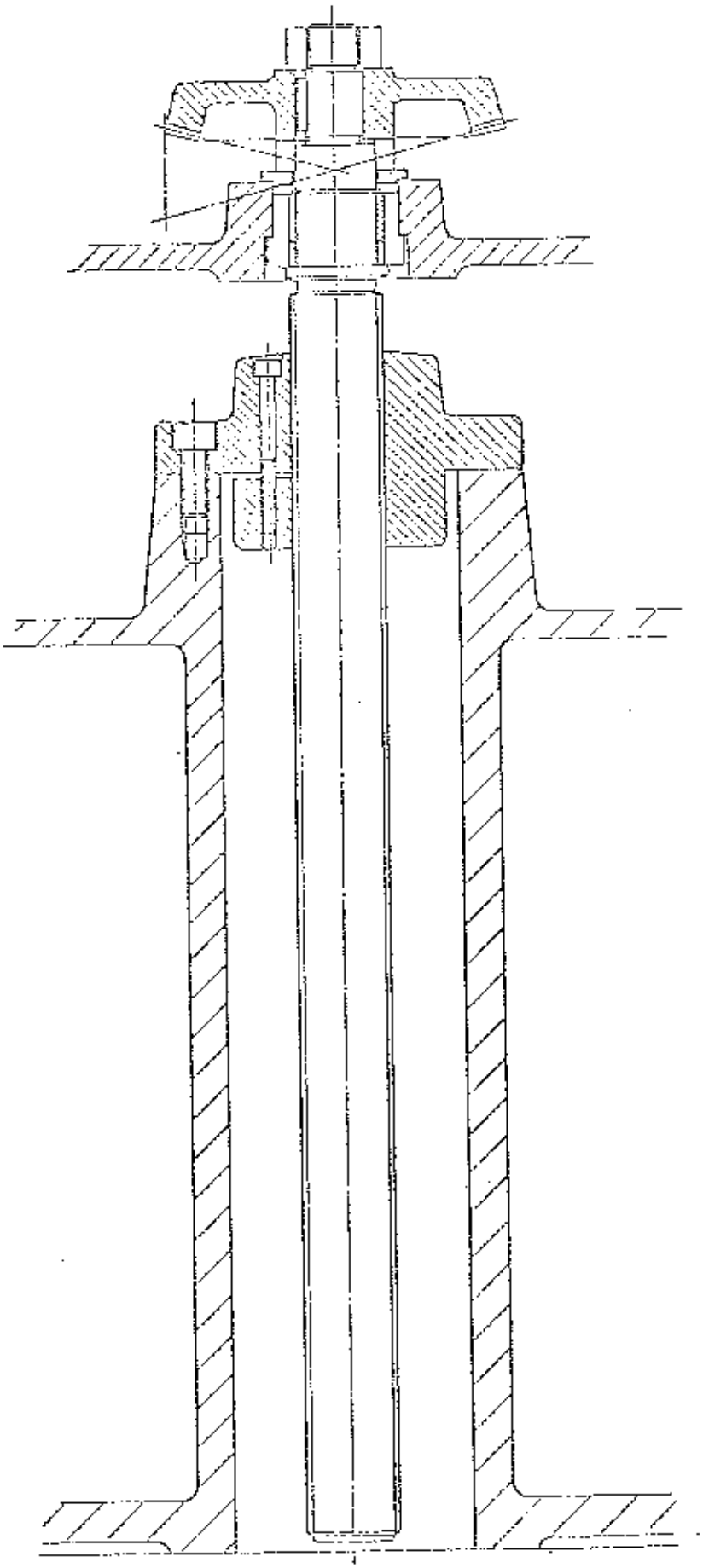
Blatt: 27

Page : 27



Die offene Höhengewindespindel

The open height threaded spindle



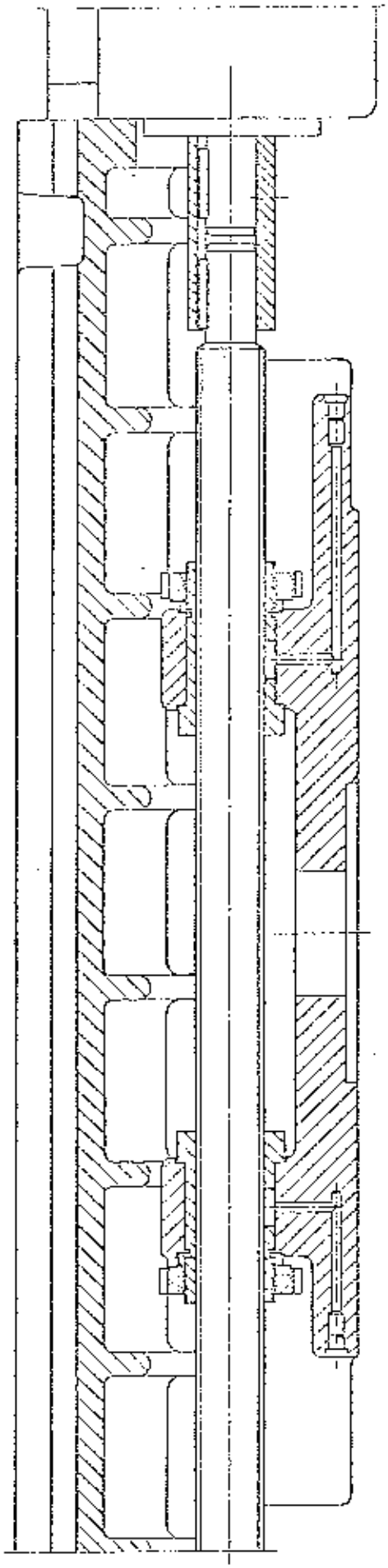
Längsschnitt durch den Frästisch

Longitudinal section of the milling table

UF 6/VF 6

Blatt 32

Page 1 22



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Frästisch linke Teilansicht

Milling table - left partial view

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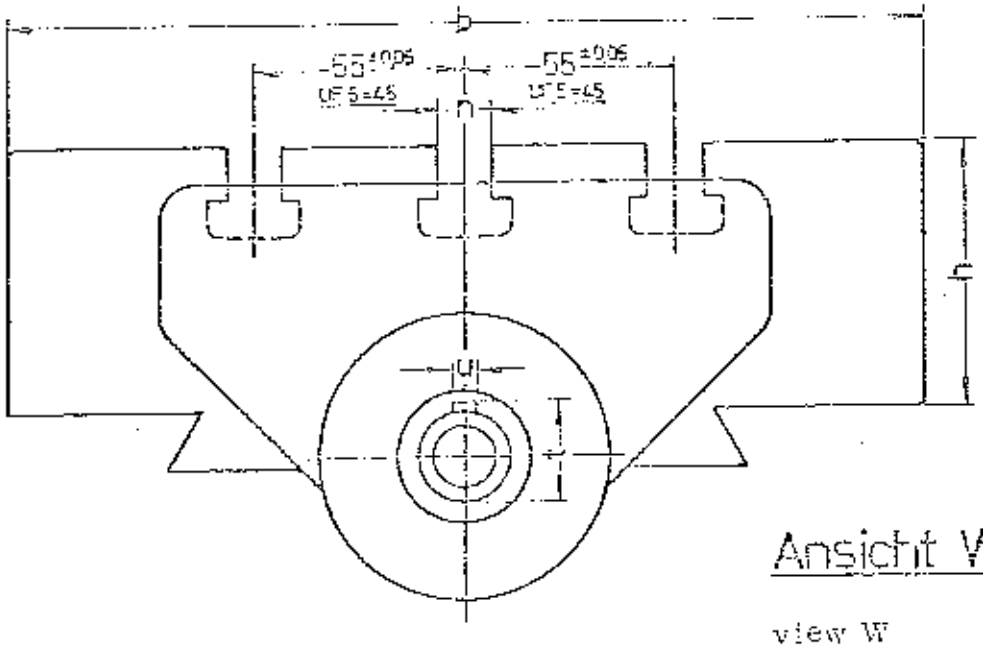
Anschlußmaße des Frästisches für Teilapparate

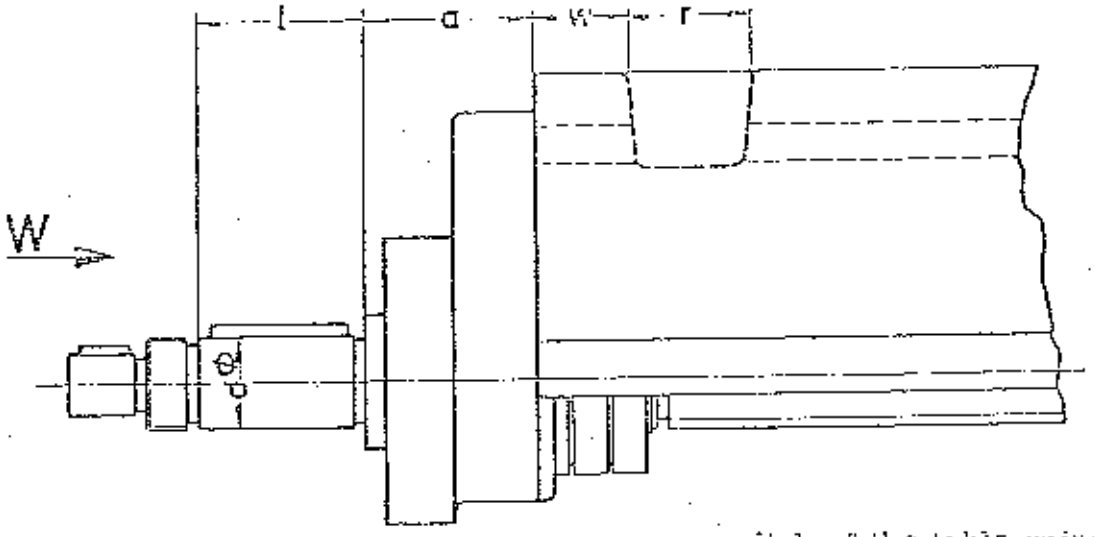
Jointing dimensions of the milling table for index apparatuses

UF 5/62
VF5/62
Blatt: 35



Ansicht W

view W



pitch of the table spindle thread

table size

UF 5/VF5

a	d_{h6}	l	t	u_{h9}	n^{H7}	b	w	r	Steigung des Tischspindelgewindes	h	Tischgröße
44	24	46	26,5	6	12	200	30	30	Tr 26x4	55	200x760

UF6/UF7/VF6/VF7

pitch of the table spindle thread

a	d_{h6}	l	t	u_{h9}	n^{H7}	b	w	r	Steigung des Tischspindelgewindes	h	Tischgröße
44	24	46	26,5	6	14	240	30	30	Tr. 26 x 4	70	240 x 880

Längsschnitt durch Fräskopfhalter kombiniert

Longitudinal section of the milling head support

HFA 0552

Bl-S 36

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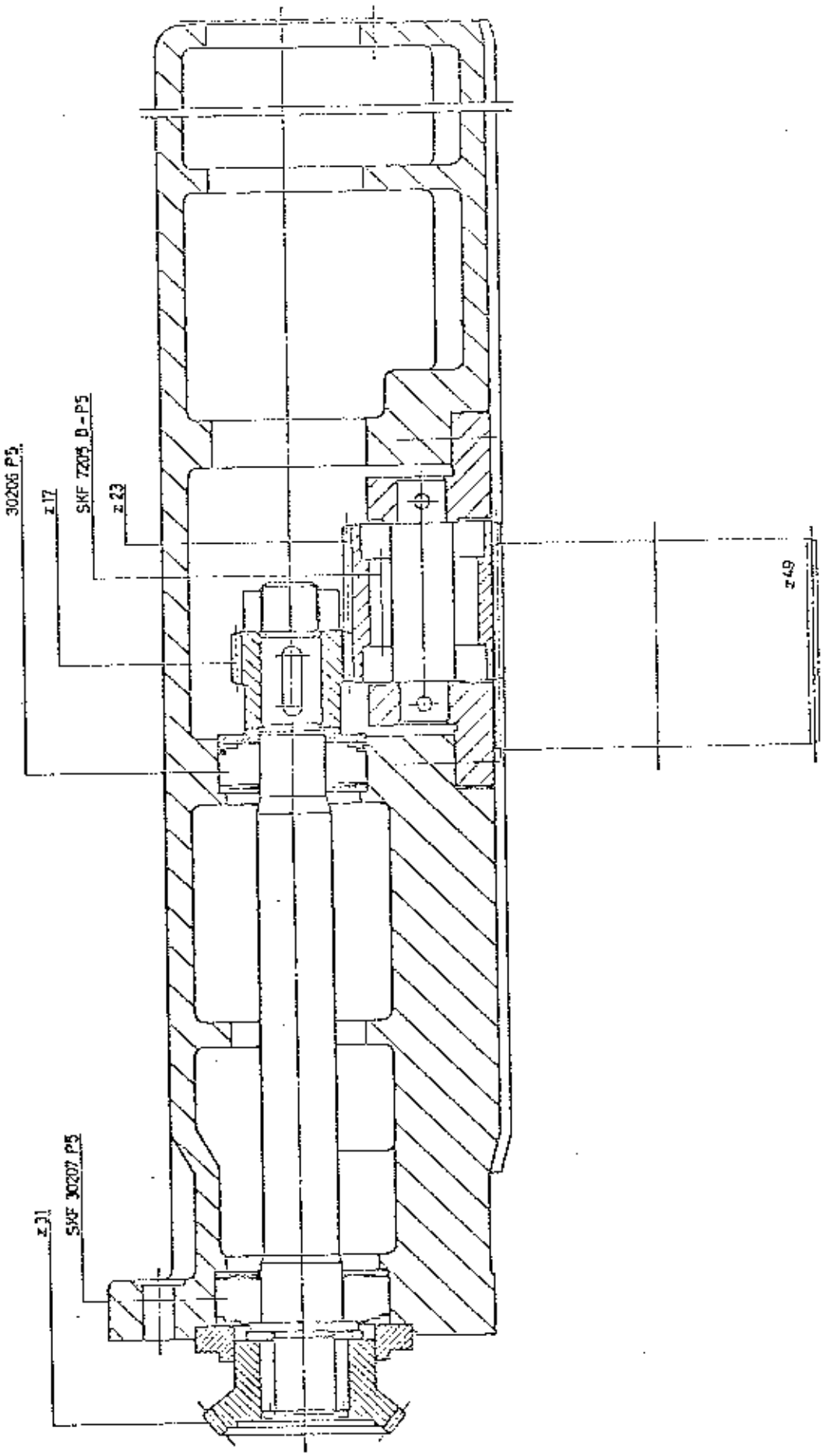

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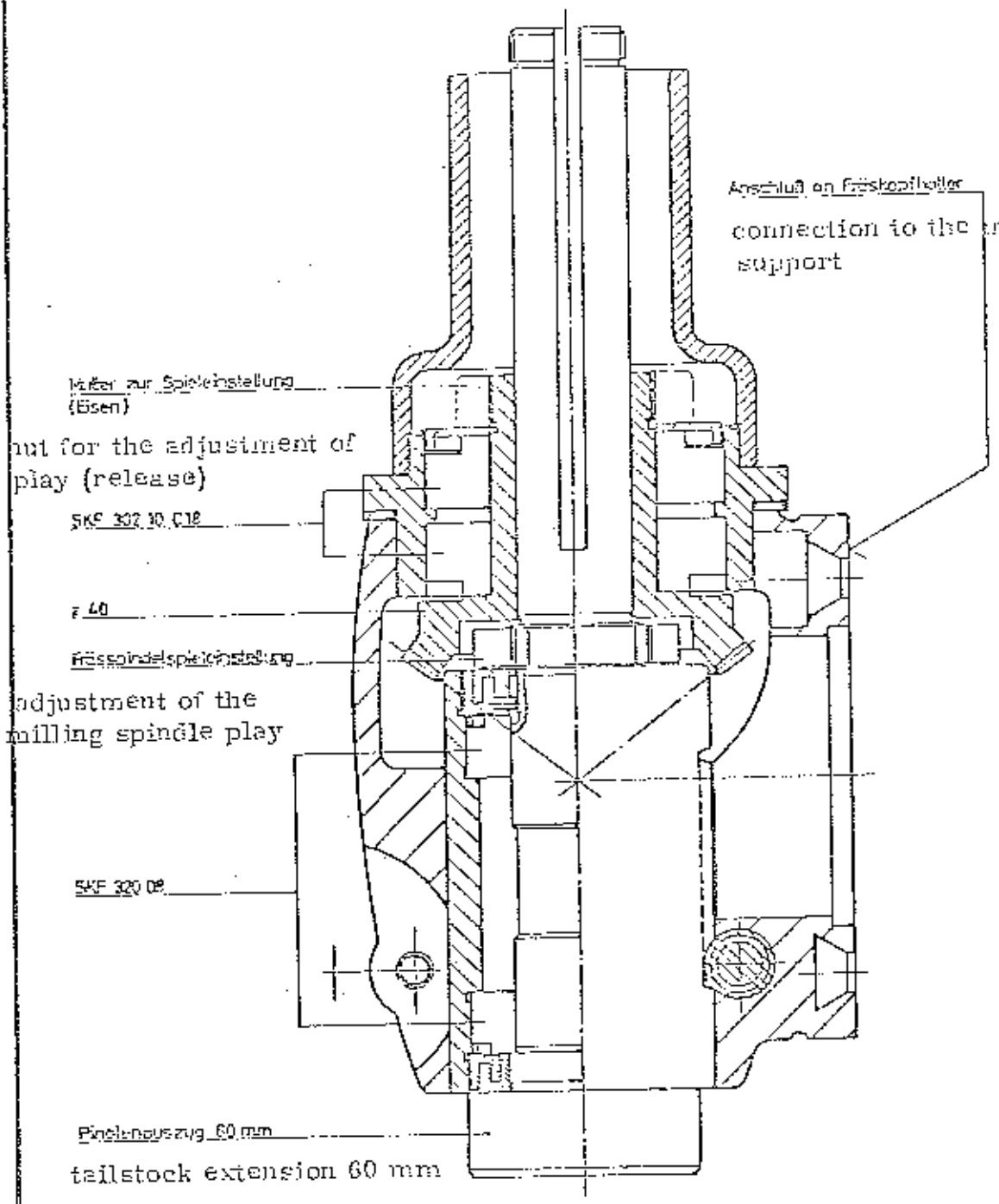
Antrieb u. Lagerung des Vertikalkopfes

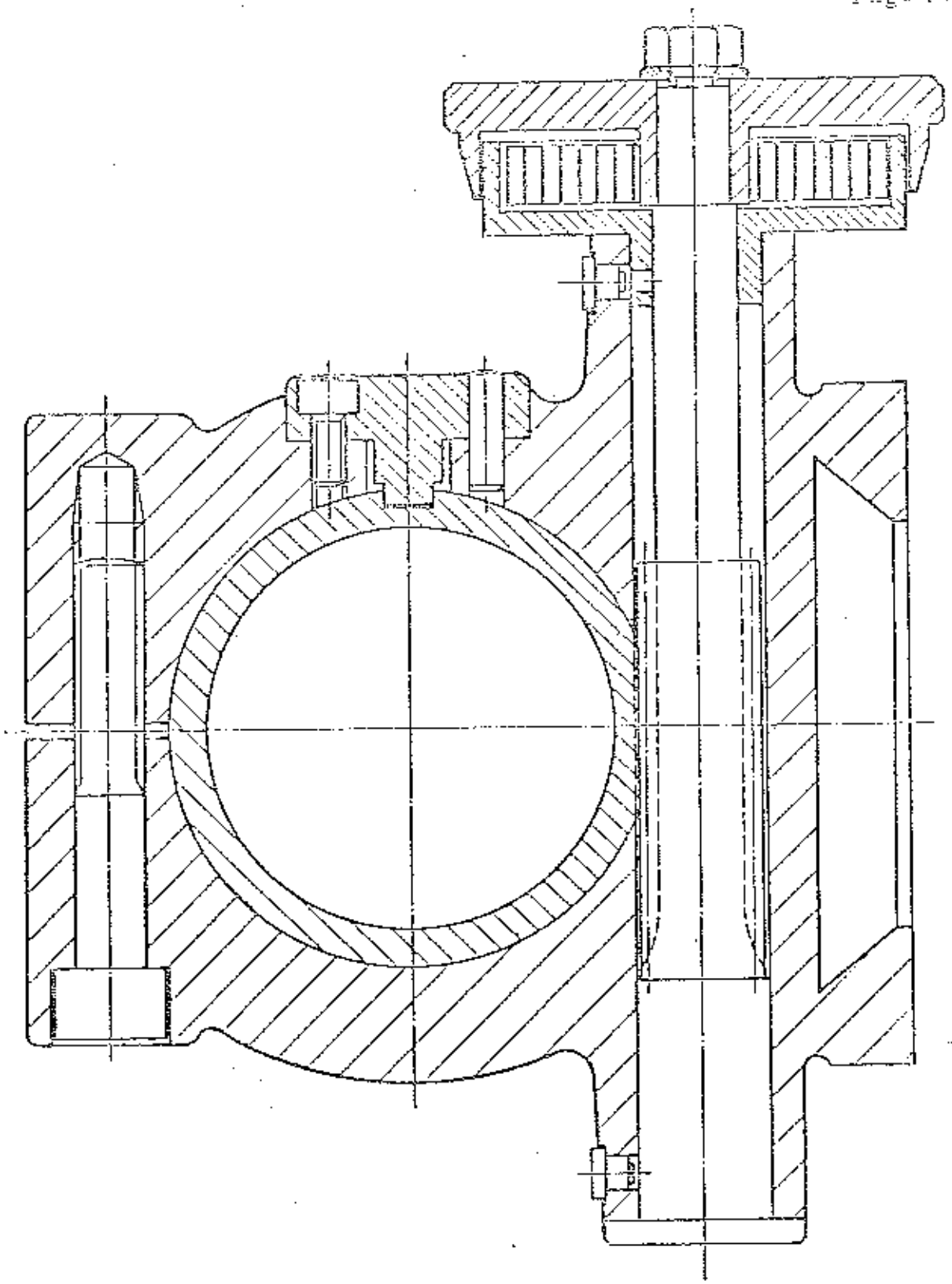
Drive and support of the vertical head



Querschnitt durch die Pinolenbewegung

Cross-section of the pinion sleeve motion

UF 5.5.7
Blatt 25
Page 1 25



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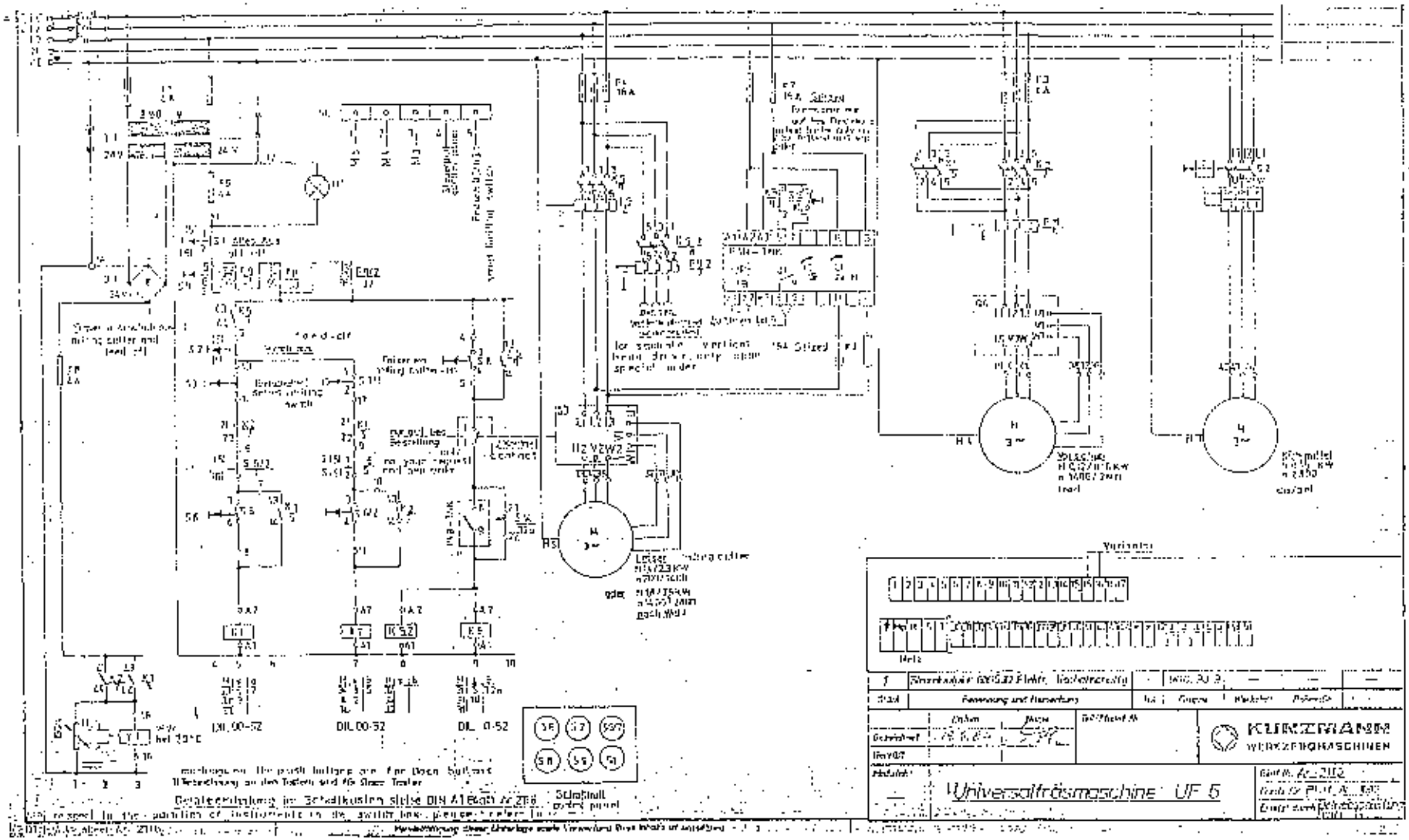
380V 60Hz 3ph



Stromlaufplan ... electric wiring diagram

Teil = part
Gruppe = group
Werkstoff = material
Rohmaße = raw dimensions
Datum = date
Name = name

gezeichnet = designed

sheet No. Ar 2115
replacing sheet No. Ar 1687
operating instructions page 39

Q 1	= Netzhauptschalter	VH 16 A4 Fib/HS/3S	Best.Nr.: 77 210	Elektra
Q 2	= Kühlmittelschalter	MPib/KA FB:0,2...0,3A	Best.Nr.: 72 209	Elektra
Q 3	= Fräserschalter	VH 16 WP Fib	Best.Nr.: 98 400	Elektra
Q 4	= Vorschubschalter	VH 16 P II Fib	Best.Nr.: 59 282	Elektra
S 1	= Drucktaster Not-Aus	1 Ö - 1 S AC 311 rot matt		Baco
S 2	= Drucktaster Vorschub-Aus	1 Ö - 1 S AC 01 rot matt		Baco
S 3	= Reihengrenztaster	SH 2 D 12 - 502		Euchner
S 3/1	= Reihengrenztaster	SH 2 D 12 - 502		Euchner
S 6	= Drucktaster Vorschub-Ein (links)	1 Ö - 1 S AC 01 grün		Baco
S 6/2	= Drucktaster Vorschub-Ein (rechts)	1 Ö - 1 S AC 01 grün		Baco
S 8	= Drucktaster Fräser-Ein	1 Ö - 1 S AC 01 grün		Baco
S 9	= Drucktaster Fräser-Aus	1 Ö - 1 S AC 01 rot matt		Baco
K 1	= Motorschütz für Drehrichtung links	DIL 00 - 52 C		Klöckner-Moeller
K 2	= Motorschütz für Drehrichtung rechts	DIL 00 - 52 C		Klöckner-Moeller
K 5	= Motorschütz für Fräsmotor	DIL 0 - 22 C		Klöckner-Moeller
K 6	= Zeitglied	CA 2-DN 122 / TA 3 - D 22		Telemechanique
F 1	= Schmelzsicherung	4 A träg		Siemens
F 3	= Schmelzsicherung	4 A träg		Siemens
F 4	= Schmelzsicherung	16 A träg		Siemens
F 6	= Schmelzsicherung	4 A träg		Siemens
F 8	= Schmelzsicherung	4 A träg		Siemens
F 9	= Bi-Metallrelais	Z0 - 6,7		Klöckner-Moeller
F 1	= Bi-Metallrelais	Z0 - 1,2		Klöckner-Moeller
H 1	= Meldeleuchte	220 V AS 50 weiß		Baco
	Glühlampe für Meldeleuchte	24 V 0,08 A		Osram
T 1	= Steuer - und Speisetrafo	165 VA	CX 35 b	Bürkle u. Schöck
M 3	= Kühlmittelpumpe	380 V 0,1 kW	T25/90	Brinkmann
M 4	= Vorschubmotor	380 V 0,12/0,18kW	KOD 446 pu	Kobold
M 5	= Frässpindelmotor	380 V 2,0/2,6kW	B2,2/4/2-7	Bauknecht
U 1	= Selen-Gleichrichter	MT 25 a 22/2 B 50/40-5		Siemens
Y 1	= Magnet-Zahnkupplung	MZ 2,5 001.20		Hoffhenz
U	= Variator	Typ 150/4		I.T.T.

Elektrische Geräteliste

Blatt 3

Q 1 = mains main switch
Q 2 = protective motor switch for the cooling pump
Q 3 = pole changing switch for the milling motor (horizontally)
Q 4 = pole changing switch for the advance motor

S 1 = push button "all off" for the milling spindle and the advance
S 2 = interruptor for the advance
S 3 = motion end switch for the longitudinal table motion
S 3/1 = motion end switch for the longitudinal table motion
S 6 = switch for the table advance to the left
S 6/2 = switch for the table advance to the right
S 8 = milling cutter on
S 9 = milling cutter off

K 1 = motor relay for the advance to the left
K 2 = motor relay for the advance to the right
K 5 = motor relay for the milling spindle motor (horizontally)
K 6 = time relay
F 1 = fuses 6 A for the transformer - primary
F 3 = fuses 6 A for the feed advance motor
F 4 = fuses 10 A for the milling motor
F 6 = fuses 4 A for the transformer 28 volts - sec.
F 8 = fuses 4 A for the direct current - magnetic clutch
F 9 = bi-metal relay as thermal protection for the milling spindle motor
F 11 = bi-metal relay as thermal protection for the advance motor

H 1 = signal lamp - red - for the main switch
Y 1 = advance clutch (magnetic tooth clutch)

T 1 = control and supply transformer
M 3 = cooling pump
M 4 = feed advance motor
M 5 = milling spindle motor

U 1 = selenium rectifier

U = varistor

Kühlmitteleinrichtung I

Cooling device I

Abstände am Kühlmittelbehälter

distances at the cooling tank

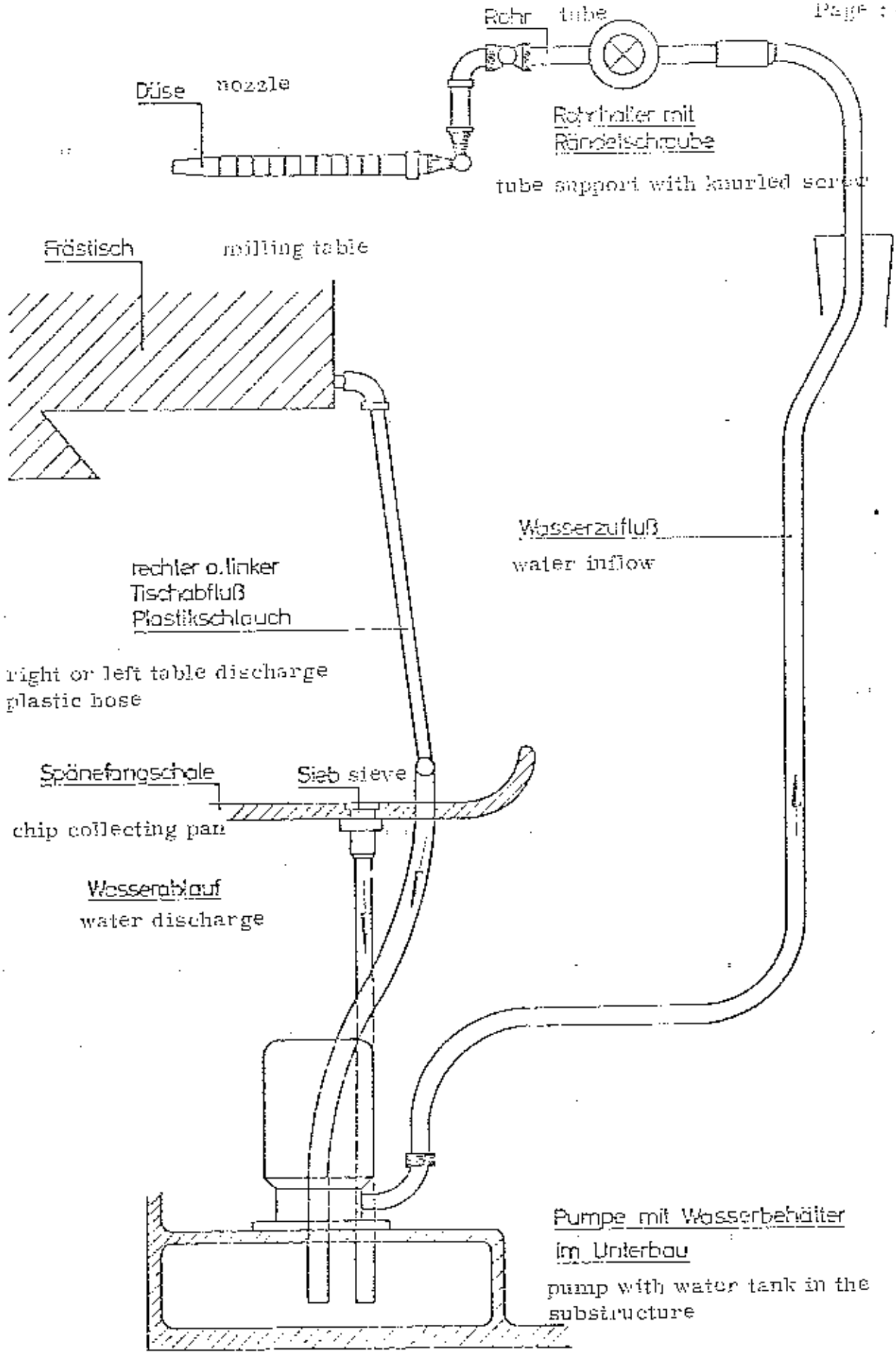
Brinkmann Kühlmittelpumpe
Type T25/90

Brinkmann cooling pump

Kühlmitteleinrichtung II

Cooling device II

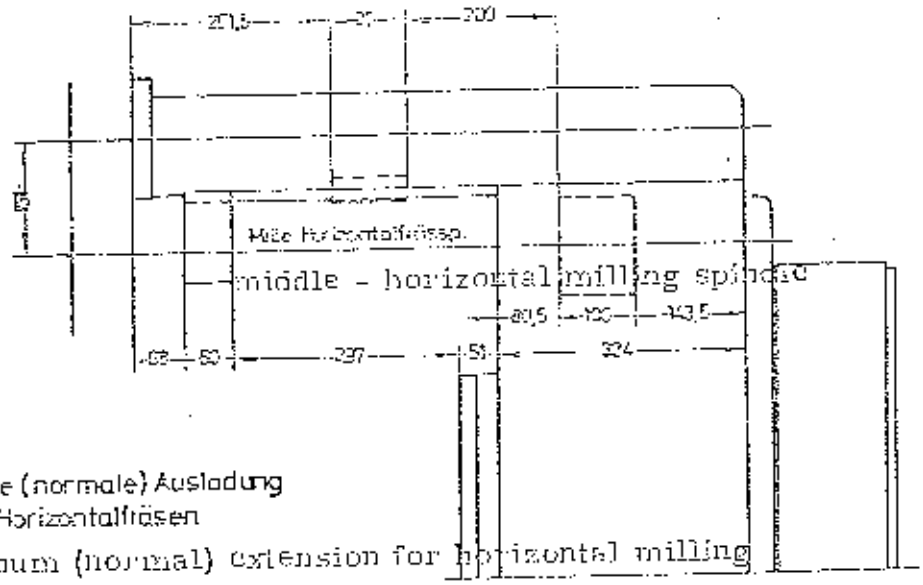
Page : 45



Gegenhalterstellung beim Horizontalfräsen

Back stop position for horizontal milling

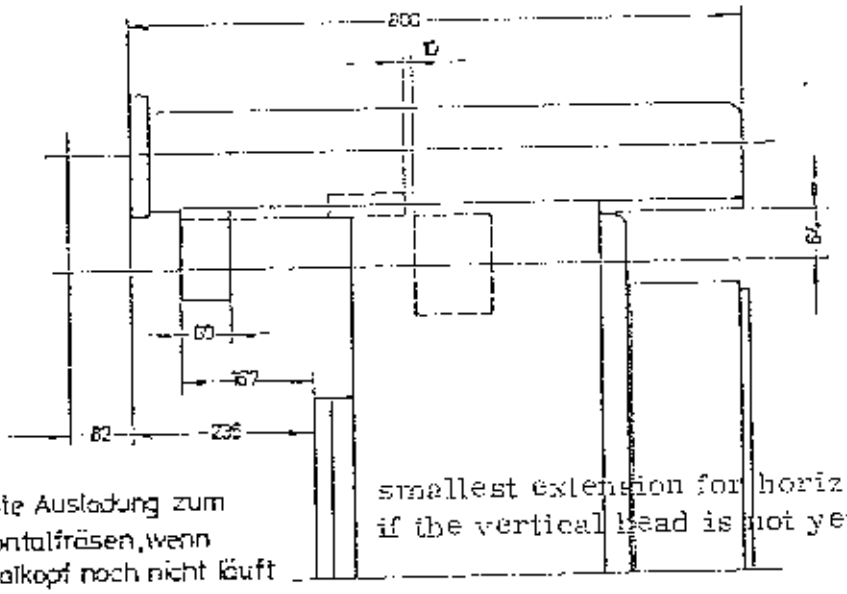
A



Größte (normale) Ausladung
zum Horizontalfräsen

maximum (normal) extension for horizontal milling

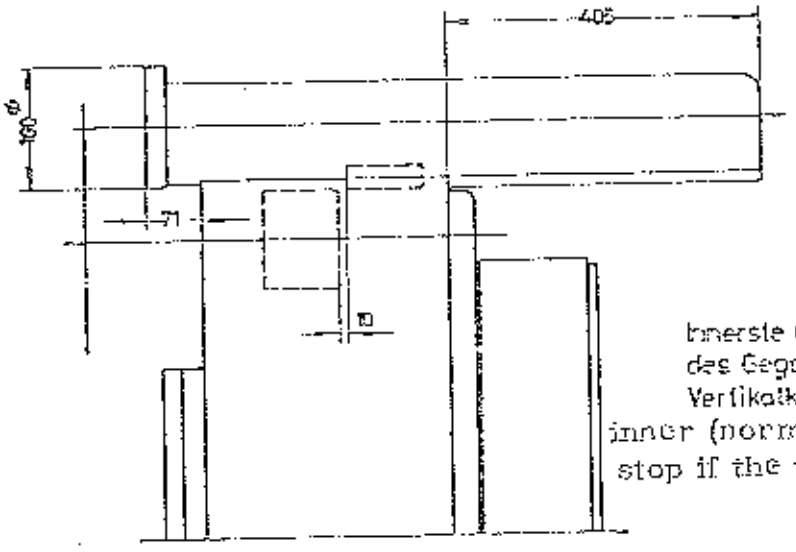
B



Kleinste Ausladung zum
Horizontalfräsen, wenn
Vertikalkopf noch nicht läuft

smallest extension for horizontal milling
if the vertical head is not yet running

C



innerste (normale) Stellung
des Gegenhalters, wenn
Vertikalkopf nicht läuft

inner (normal) position of the back
stop if the vertical head is not run

Gegenhalterstellung beim Vertikalfräsen

Back stop position for vertical milling

HF-Uffeln

Blatt 47

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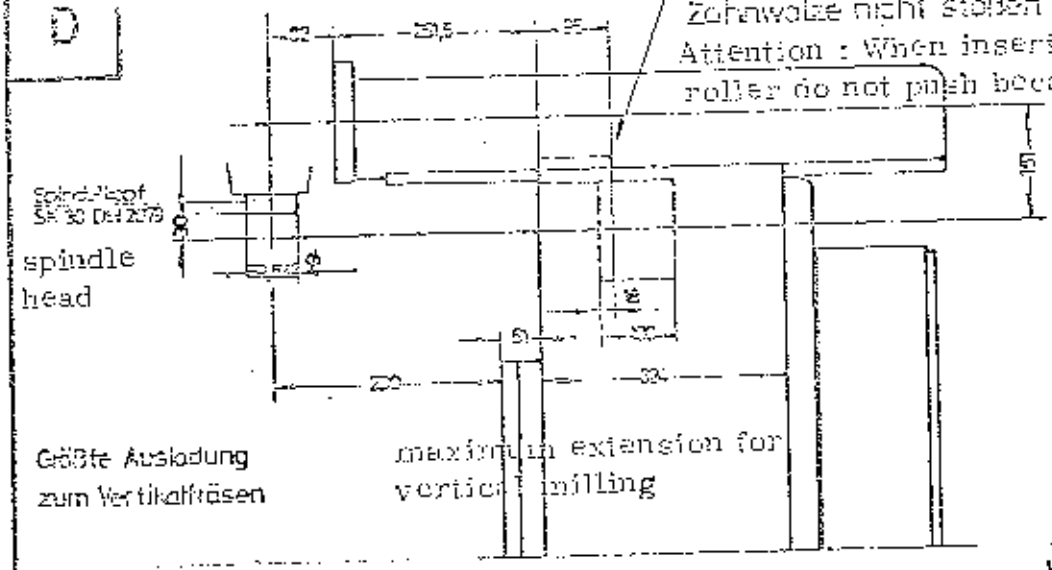
D

Achtung! Beim Einschieben in Zahnwalze nicht stoßen wegen Zahnkanten

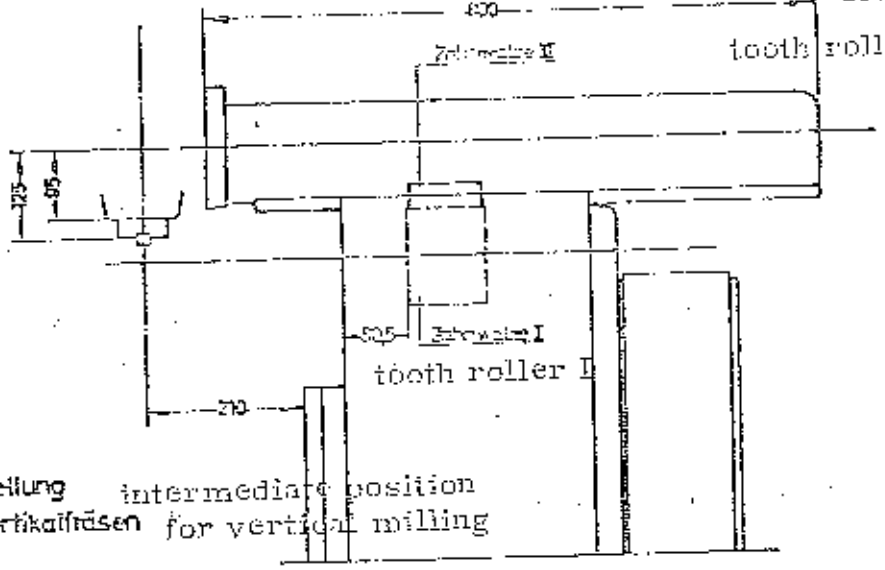
Attention : When inserting in the tooth roller do not push because of tooth edges



Verschiebeweg : 160

displacing way : 160

E



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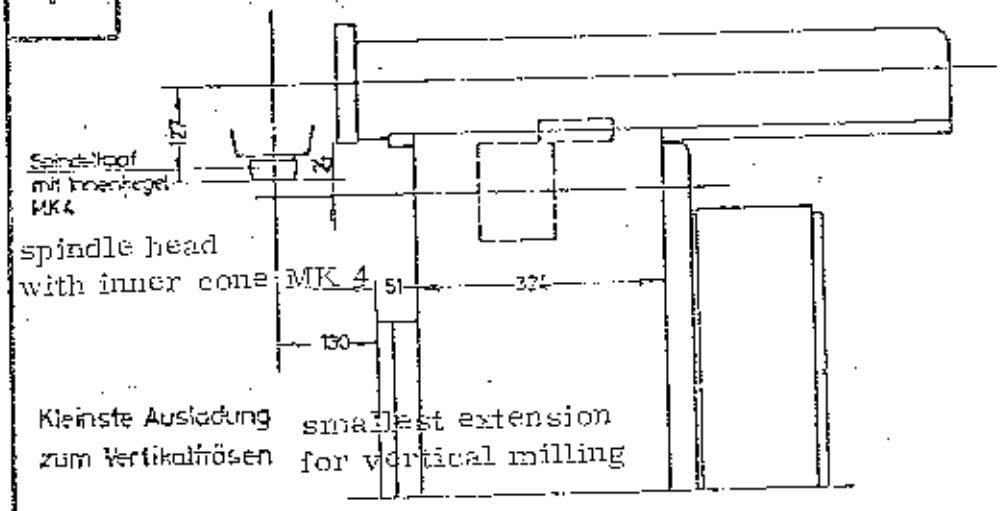
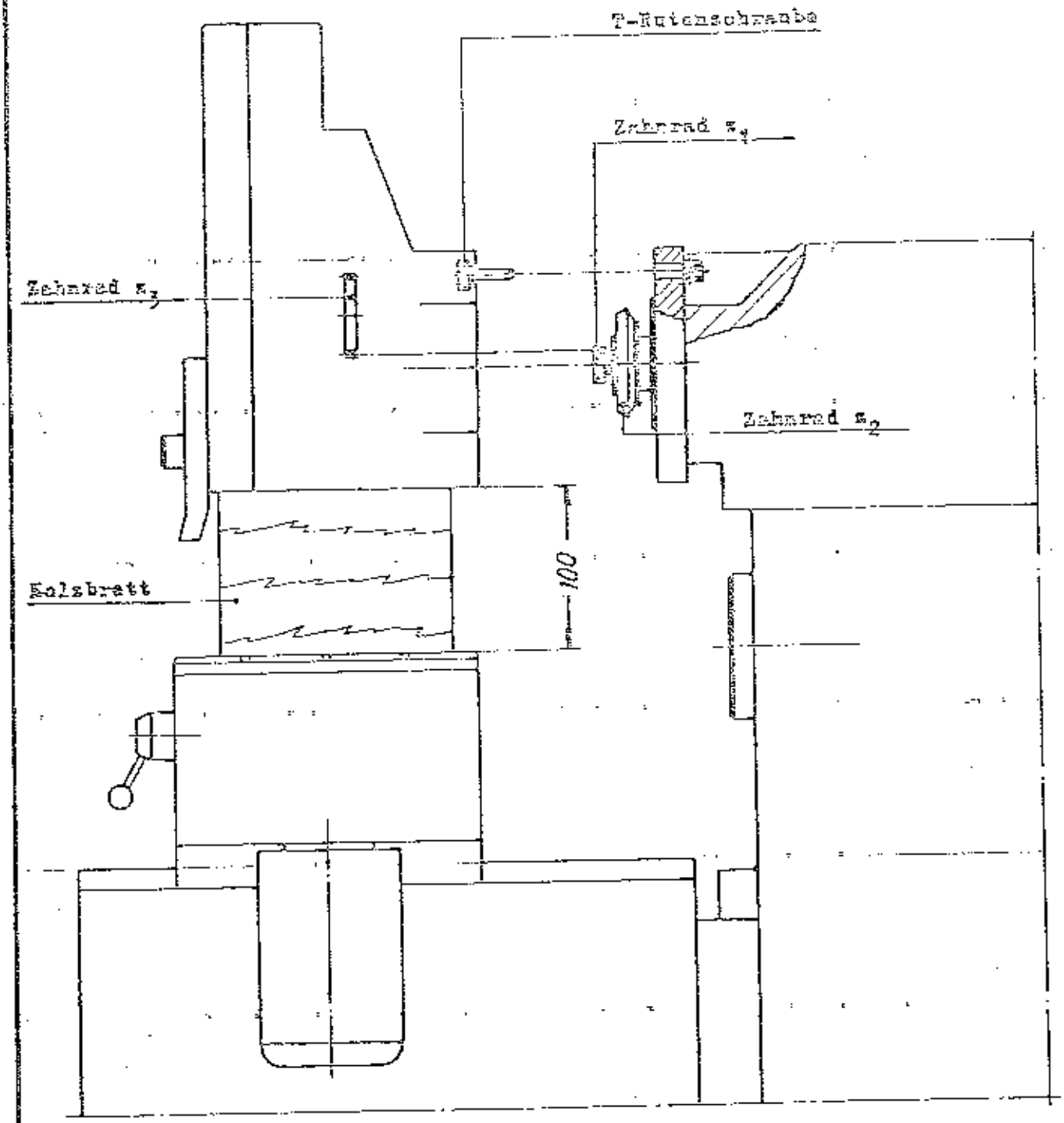


Erwin Rudolf Kunzmann Pforzheim-Nöttingen

Stoßkopfmontage

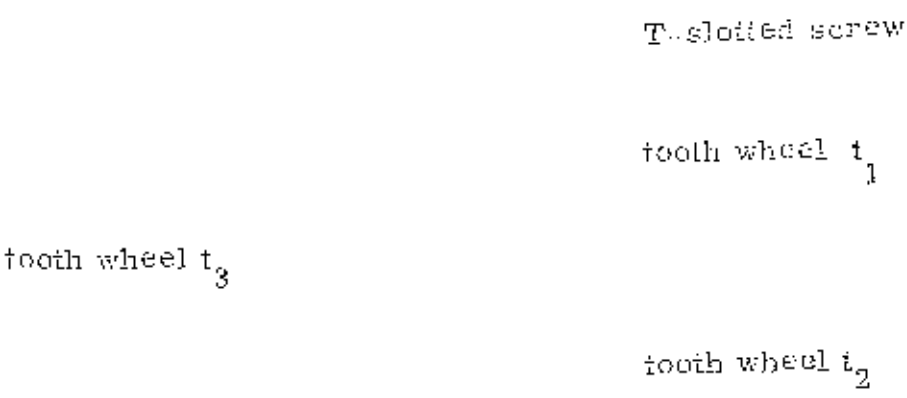
UF6
Blatt 48



1. Muttern für Kopfbefestigung am Gegenhalterflansch lösen und den Vertikalfräskopf abnehmen.
2. Zahnrad z1 mit einer Zylinderschraube M8x50 DIN 912 (dazu ein Federring A8 DIN 127) und drei Zylinderstiften 6m6x24 DIN 7 auf Zahnrad Z2 montieren.
3. Stoßkopf mit eingebauten T-Nutenschrauben auf den Frästisch aufsetzen (Holzbrett ca.100mm stark unterlegen) und an den Gegenhalterflansch heranfahren.
4. Stoßkopf an den Gegenhalter drücken, T-Nutenschrauben durch die Bohrung stecken und mit den Muttern anziehen.

Zahnrad Z1 und Z3 sind im Eingriff, der Stoßkopf ist betriebsbereit.

KUNZMANN



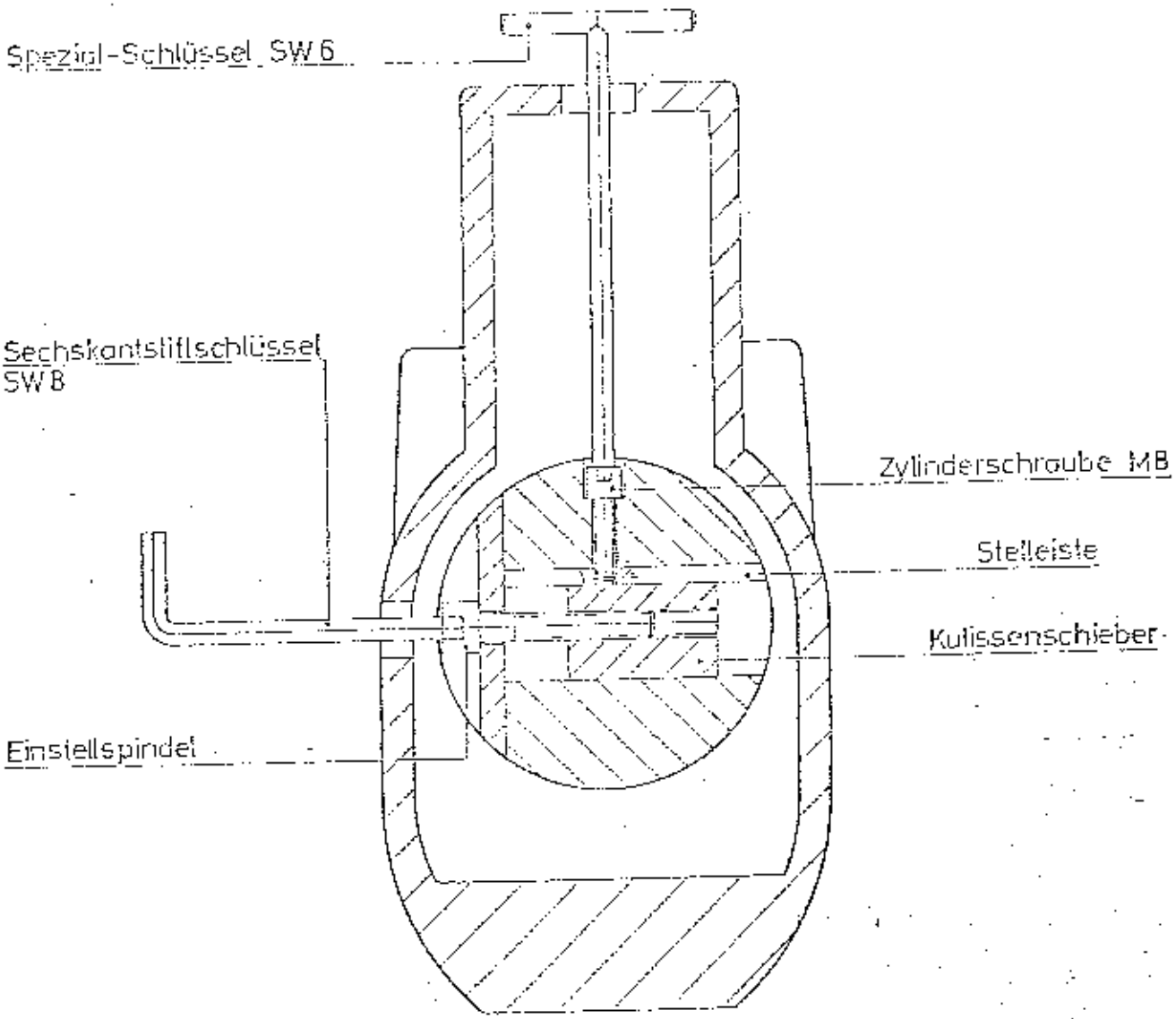
1.) Release the nuts on the back stop flange holding the vertical milling head and take it off.

2.) Fix the tooth wheel t1 by means of a cylindrical screw M8x50 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 t2.

3.) Put the percussion 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 percussion head to the back stop, put the T-slotted screws through the bore hole and tighten with the nuts.

Tooth wheel t1 and t3 are engaged, the percussion head is ready for operation.



HUBEINSTELLUNG AN STOSKOPF :

1. Den Stoßschieber verstellen bis die Einstellspindel mit Innensechskant SW8 durch die seitliche Bohrung am Stoßkopf sichtbar wird.
2. Mit Spezial-Schlüssel SW6 wird die Zylinderschraube M8 gelöst. (Stelleiste ist frei)
3. Mit Sechskantstiftschlüssel SW8 kann die Hublänge durch Verstellen des Kulissenschiebers eingestellt werden.
4. Nach dem Einstellen der Hublänge muß die Zylinderschraube M8 wieder fest angezogen werden.

special spanner SW 6

hexagon socket head wrench
SW 8

cylindrical screw M8

adjusting rail

adjusting spindle

link slide

Stroke adjustment at the percussion head :

1) Adjust the percussion slide until the adjusting spindle with the hexagon socket head wrench SW 8 gets visible through the lateral bore hole at the percussion head.

2) Release the cylindrical screw M 8 by means of the special spanner (Key) SW 6. (the adjusting rail is set free).

3) It is possible to adjust the stroke length by means of the hexagon socket head wrench 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 Electric Coolant Pumps"

General

rior to dispatch all pumps are tested for satisfactory operation
d density by means of high viscositiy 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 bey 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 overhoul 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, ist not to overly strained by deposited mud.

Ortlinghaus-Werke
G m b H
D-5632 Wermelskirchen

Fitting and Maintenance of Ortlinghaus Shift gear units

Instruction No. 231
Range 0-017

1. Description

1.1 Gearbox models with strengthened bearings (Main gear units)	0-017-000-15-000 0-017-001-15-000	$\varphi = 1{,}26$	Selection on box Remote selection	Box-type, totally enclosed, oilproof
	0-017-020-15-000 0-017-021-15-000	$\varphi = 1{,}41$	Selection on box Remote selection	
With cover on both ends Flange on input side Flange on output side	0-017-002-15-000 0-017-003-15-000 0-017-004-15-000	$\varphi = 1{,}26$	Remote selection	Round, open; h5 fit on location webs
With cover on both ends Flange on input side Flange on output side	0-017-022-15-000 0-017-023-15-000 0-017-024-15-000	$\varphi = 1{,}41$	Remote selection	

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

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.

245/6.76 engl.

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°.

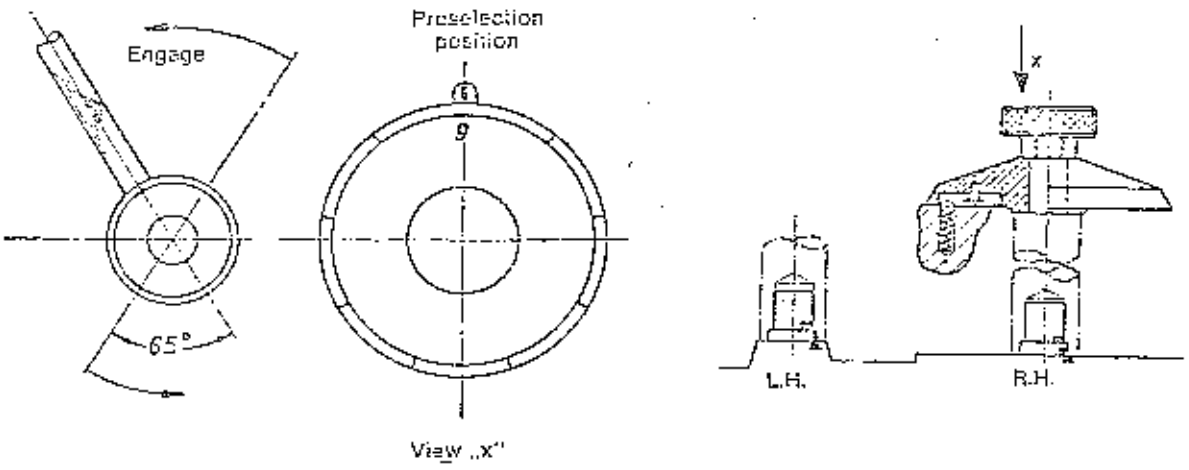
Attention! The gear unit is adjusted in state of delivery as follows:

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:

a) Provide a ball index for 5 mm dia. ball on a 60 mm dia. pitch circle.
b) Place selector dial in position on key (dial can be rotated) and transfer the 9th position dial mark to the machine frame.
c) Rotate index ring on selector dial through its elongated hole until the ball engages.
d) Tighten screws, drill fixing holes and secure ring by screws.
e) Place marked dial in position.
f) 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.



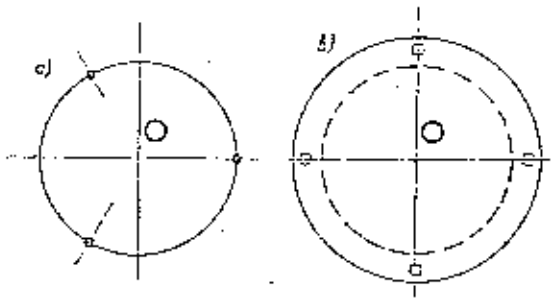
3.2. Round gearbox, open, h6 fit on location webs

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

a) by using grub screws around the periphery of gearboxes without flange.

b) 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.

a) Provide a ball index for 5 mm dia. ball on a 60 mm dia. pitch circle.

b) Place selector dial in position on key (dial can be rotated) and transfer the 9th position dial mark to the machine frame.

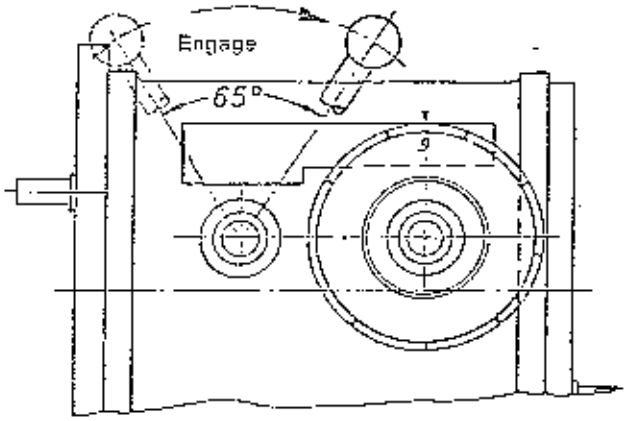
c) Rotate index ring on selector dial through its elongated hole until the ball engages.

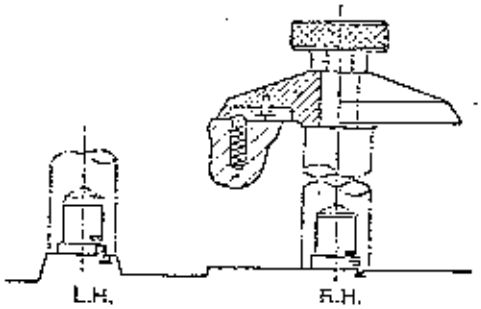
d) Tighten screws, drill fixing holes and secure ring by screws.

e) Place marked dial in position.

f) 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 28,5 cSt 50 (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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Ortlinghaus-Werke
G. m. b. H.
Wermelskirchen-Rhld.
Germany

Installation and Maintenance

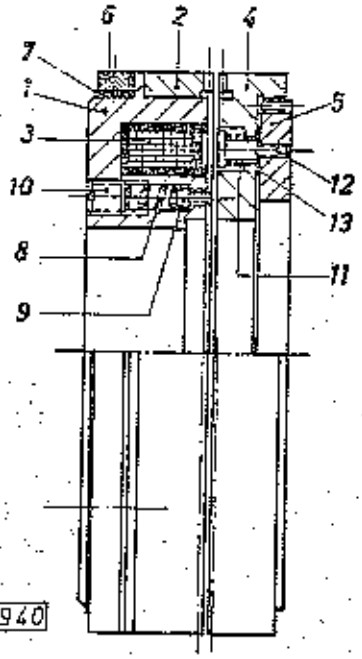
of Original-Ortlinghaus electro-magnetic tooth clutches with slip-ring

Instructions No. 241
Range 0—012

1. Description

The tooth ring 2 fitted to magnet body 1 is brought into engagement with the tooth armature plate 4 and driver plate 5 when magnet coil 3 is energized. Slip-ring tooth clutches have one coil end insulated and in contact with splipring 6, in turn insulated from the magnet body by insulation ring 7. The other coil end is connected to earth via the magnet body.

On clutch disengagement, strong springs 8 rapidly disconnect clutch drive via pressure pins 9. The springs are supported by screws 10 (DIN 551). The springs 11 and spring pins 12 interposed between armature plate and driver plate retain the armature plate when in the disengaged condition so that no friction can occur in the clutch components.



1 Magnet body
2 Tooth ring
3 Magnet coil
4 Armature plate
5 Drive plate
6 Slip ring
7 Insulation ring
8 Spring
9 Pressure pin
10 Grub screw
11 Spring
12 Spring pin
13 Brass washer

Fig. 1

Clutch size can be established from the following table.

0-012-... Size ...	03	07	11	15	23	31	43	51
Outside diameter of slip-ring	70	82	95	114	134	165	195	240

2. Spare parts

When ordering spare parts, please state serial number found on armature plate. To avoid error shipments please submit spare parts orders in writing or by telegram.

3. Design guidelines

Electro-magnetic tooth clutches of Range 0-012 are suitable for both wet and dry operation. Tooth clutches should preferably not be immersed in wet operation. Current supply assemblies in the form of sleeve and articulated brushes are available for both wet and dry operation. Tooth clutches must only be engaged at synchronized speeds or where relatively small relative speed differentials apply. In the case of relative speed differentials, system elasticity must be borne in mind.

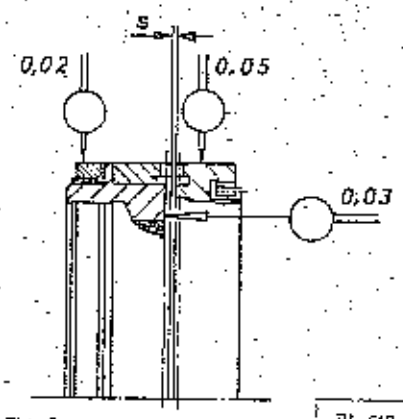


Fig. 2

Magnet body and armature section with driver plate must be perfectly located in axial direction and must be in accurate linear alignment free from axial and radial eccentricity errors. Where necessary, carry out a "run- out" check when assembled in situ. Especially when high speeds apply any alignment inaccuracies will unfavourably influence torque transmitted because such malalignments create permanent displacement of the peripheral tooth engagement. The axial air gap "s" between the two peripheral tooth faces is shown in the table below and should be checked after assembly. It is advisable to compensate for manufacturing errors by using spacer bushes.

Magnet body and armature plate must invariably be fitted in pairs as supplied.

Size	03	07	11	15	23	31	43	51
Air gap "s"	$0{,}4^{-0{,}2}$	$0{,}5^{-0{,}2}$	$0{,}5^{-0{,}2}$	$0{,}5^{-0{,}2}$	$0{,}5^{-0{,}2}$	$0{,}6^{-0{,}2}$	$0{,}8^{-0{,}3}$	$1{,}0^{-0{,}3}$

291 / 10. 72 · engl.

Fitting of armature section

The drive plate can be fitted after releasing the spring pins. Having drilled the dowel holes, again release drive plate then fitting armature plate complete with spring bolts and springs. The spring bolts should be tightened down fully and should then be safeguarded against rotation by centre-punching or bonding.

The drive plate is then bolted and dowelled to the armature plate once more. The armature plate must allow easy movement on the drive plate (Fig. 3a).

When flange-mounting the armature plate to machine components made from steel, the brass spacing washers supplied will have to be used (Fig. 3b).

When the clutch is supplied without drive plate, remove the hex. nuts prior to fitting. Note brass washers (Fig. 3c).

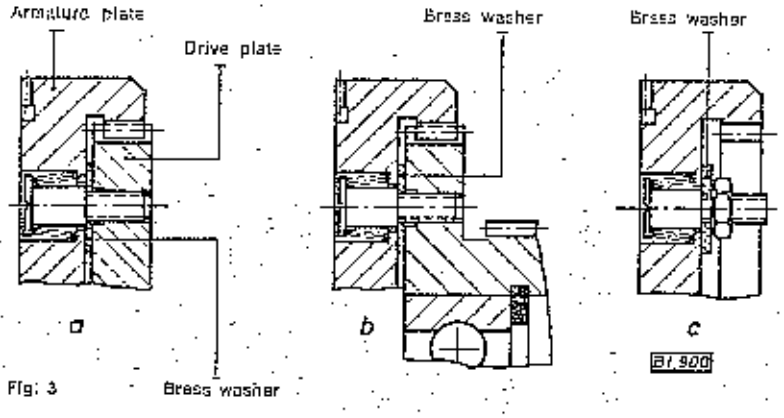


Fig. 3

Tooth clutches can be fitted both horizontally and vertically. When fitting in vertical position, the armature plate should preferably be positioned at the bottom.

4. Working data

4.1 These clutches are designed for 100 % continuous rating.
4.2 Depending on installation conditions, they will attain a permanent temperature of up to approx. 80° C (175° F).
4.3 Transmission of rated torques requires an input D. C. voltage of 24 Volt (+ 10%).
4.4 In most instances clutches are actuated from the D. C. side. It is here advisable to prevent contact burning by interposing a spark quench condenser in parallel circuit (no electrolytic condensers!).

Condenser sizes:

Clutch size	Condenser	µF
03 to 31	0 - 085 - 500 - 02 - 000	2
43 to 51	0 - 085 - 500 - 04 - 000	4

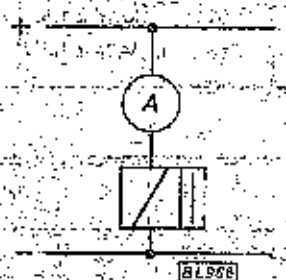
Circuits for clutches, protection resistors and spark quench condensers are given in circuit diagrams.

5. Installation/Maintenance errors and their rectification

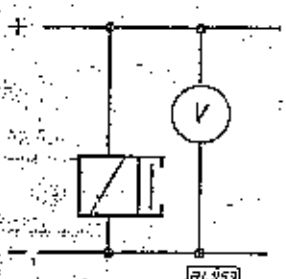
5.1 Clutch slips
Check whether 24 V supply is available as prescribed.

5.2 Clutch fails to engage
Check current path:
a) Check whether requisite voltage exists between slip-ring and body.
b) Check whether brush is in contact with slip-ring. If brush is worn out, renew brush also cleaning slip-ring.
c) Check whether coil has continuity. Interpose ammeter in circuit which should then show the following approximate amperages:

Clutch size	03	07	11	15	23	31	43	51
Amps at 20° C	0,29	0,55	1	1,8	2,5	3,3	3,4	4,2
Amps at 80° C	0,23	0,44	0,8	1,3	2	2,6	2,7	3,4



Current measurement



Voltage measurement

6. Accessories

Clutch size		Rectifier		Mains fuse	D.C. fuse	Protection resistor	
24V	03 and 07	0 - 085 - 000 - 24 - 008	0,8 A	T 0,25 / 250 B	F 0,8 / 250 G	0 - 085 - 400 - 25 - 150	0,25 A
	11	0 - 085 - 000 - 24 - 018	1,8 A	T 0,5 / 250 B	F 2 / 250 G		
	15 23	0 - 085 - 000 - 24 - 032	3,2 A	T 0,8 / 250 B	F 4 / 250 G	0 - 085 - 400 - 45 - 70	0,45 A
	31 - 51	0 - 085 - 000 - 24 - 050	5 A	T 1 / 250 B	F 5 / 250 G	0 - 085 - 400 - 70 - 40	0,7 A

6.1 Rectifiers

6.1.1 Rectifiers are normally equipped for connection to 220 Volt; 50 cycle A. C. The transformer has 3 tappings on the primary side: 0-200, 0-220, 0-242 Volt, i. e. 220 Volt ± 10 %. Unless otherwise expressly requested, rectifiers are shipped set for connection to 220 Volt mains supply. In the event of mains voltages deviating from 220 Volt, the rectifier can be switched accordingly. Here ensure that the A. C. voltage applied does not exceed the nominal voltage stated on the terminals **by more than 10 %.**
Rectifiers are protected by a fuse in the primary A. C. circuit and a fuse in the D. C. circuit. Fuse data overleaf. Other connection ratings are available on request.

6.1.2 Idle voltage
An idle rectifier has a no-load voltage of approx. 28 — 35 Volt, which then drops to approx. 24 Volt (÷ 10%) under full load. When several clutches are supplied simultaneously, make sure that rectifiers are designed for the sum of individual currents applicable (clutches plus protection resistors).

6.1.3 Operating conditions
Rectifiers of this type range are intended exclusively for wall mounting. Only when so mounted is adequate cool air ventilation and operational reliability assured. The area in which rectifiers are fitted must not exceed 35° C (95° F) temperature and should — as far as possible — be dry and free from chemically active gases and vapours. Rectifiers must not be installed above heating radiators.

6.1.4 Starting-up
Rectifiers are ready for operation after connection to the A. C. supply source.

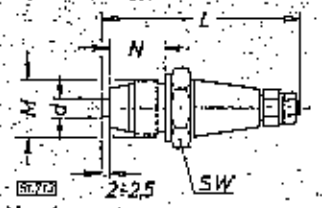
6.1.5 Failures
1. Rectifier delivers no current
   a) No mains supply voltage
   b) Interruption in mains or D. C. lines
   c) Rectifier fuses burnt out.
2. Rectifier fails to produce full rating:
   Mains supply has sub-normal voltage.
   Use 200 Volt transformer tapping.

6.2 Protection resistors

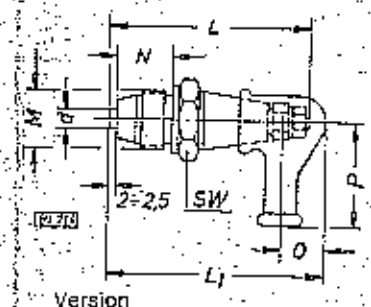
The fitting of protection resistors (for circuit sketches see Page 4) is recommended at least for clutches with a consumption > 60 W to protect against damaging high inductive voltages.

6.3 Current supply brush assemblies

Depending on size and running conditions the clutches require different types of brushes for current supply.



Version
without protective cap



Version
with protective cap

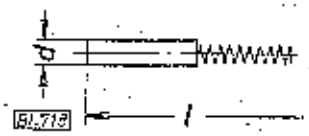
Order numbers for complete plug-type brushes

	Type of brush: Copper graphite for dry-running	Type of brush: Woven bronze for wet-running	Size	Thread M	Brush dia. d
without protective cap	0-085-102-00-001	0-085-122-00-001	00	M 18 x 1,5	6
	0-085-102-01-000	0-085-122-01-000	01	M 16 x 1,5	6
	0-085-102-03-000	0-085-122-03-000	03	M 14 x 1,5	4
with protective cap	0-085-103-00-001	0-085-123-00-001	00	M 18 x 1,5	6
	0-085-103-01-000	0-085-123-01-000	01	M 16 x 1,5	6
	0-085-103-03-000	0-085-123-03-000	03	M 14 x 1,5	4

Dimensions

Size	Thread M	Brush dia. d	L	L_1	N	O	P	SW
00	M 18 x 1,5	6	61	64	17	13	32	22
01	M 16 x 1,5	6	67	72	20	13	32	19
03	M 14 x 1,5	4	52	56	12	13	32	17

Order numbers for replacement brushes



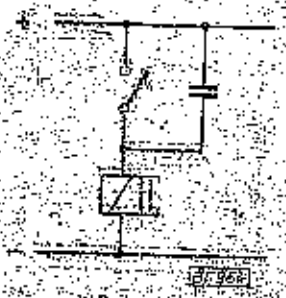
Type of brush		Size	Brush dia. d	l
Copper graphite for dry-running	Woven bronze for wet-running			
0-085-210-00-001	0-085-231-00-001	00	6	73
0-085-210-01-000	0-085-231-01-000	01	8	73
0-085-210-03-000	0-085-231-03-000	03	4	56

The current supply brushes should be secured so as to be free from vibrations and the spacing between brush holder and slipring (approx. 2 mm) is here of particular significance because only when this is maintained will correct brush pressure exist. The wear rate must be kept under observation. Replacement brushes are available separately.

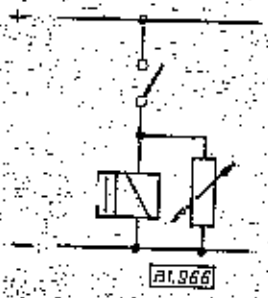
The permissible peripheral speed of slip-rings is approx. 20 m/sec. depending on operation conditions. Higher peripheral speeds, alternating directions of rotation or high oil volumes make the incorporation of two current supply brush assemblies per slip-ring advisable.

In certain cases brushes in extended version ($l_{max.}$ = 145 mm) or caliper-type brushes (max. peripheral speed 15 m/sec.) can be delivered on request.

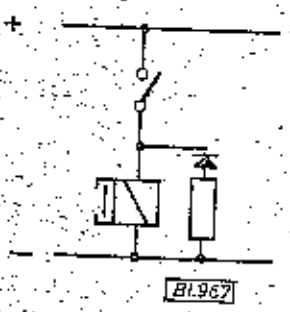
Circuit diagrams for electro-magnetic clutches



Circuit with spark quench condenser

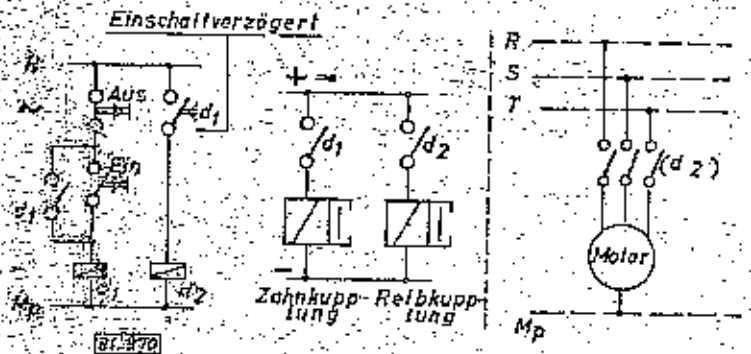


Circuit with resistor or varistor



Circuit with diode and varistor or diode and resistor

Einschaltverzögert (= switched on with retardation)
Aus = off
Ein = on
Zahnkupplung = tooth clutch
Reibkupplung = friction clutch



Circuit for tooth clutch in connection with friction clutch or motor

ORTLINGHAUSWERKE GMBH · D-5672 WERMELSKIRCHEN · GERMANY
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Service Instructions
for

"Brinkmann Electric Coolant Pumps"

I. General

Prior to dispatch all pumps are tested for satisfactory operation and density by means of high viscositiy 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 bey 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 = ster-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 overhoul 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, ist not to overly strained by deposited mud.