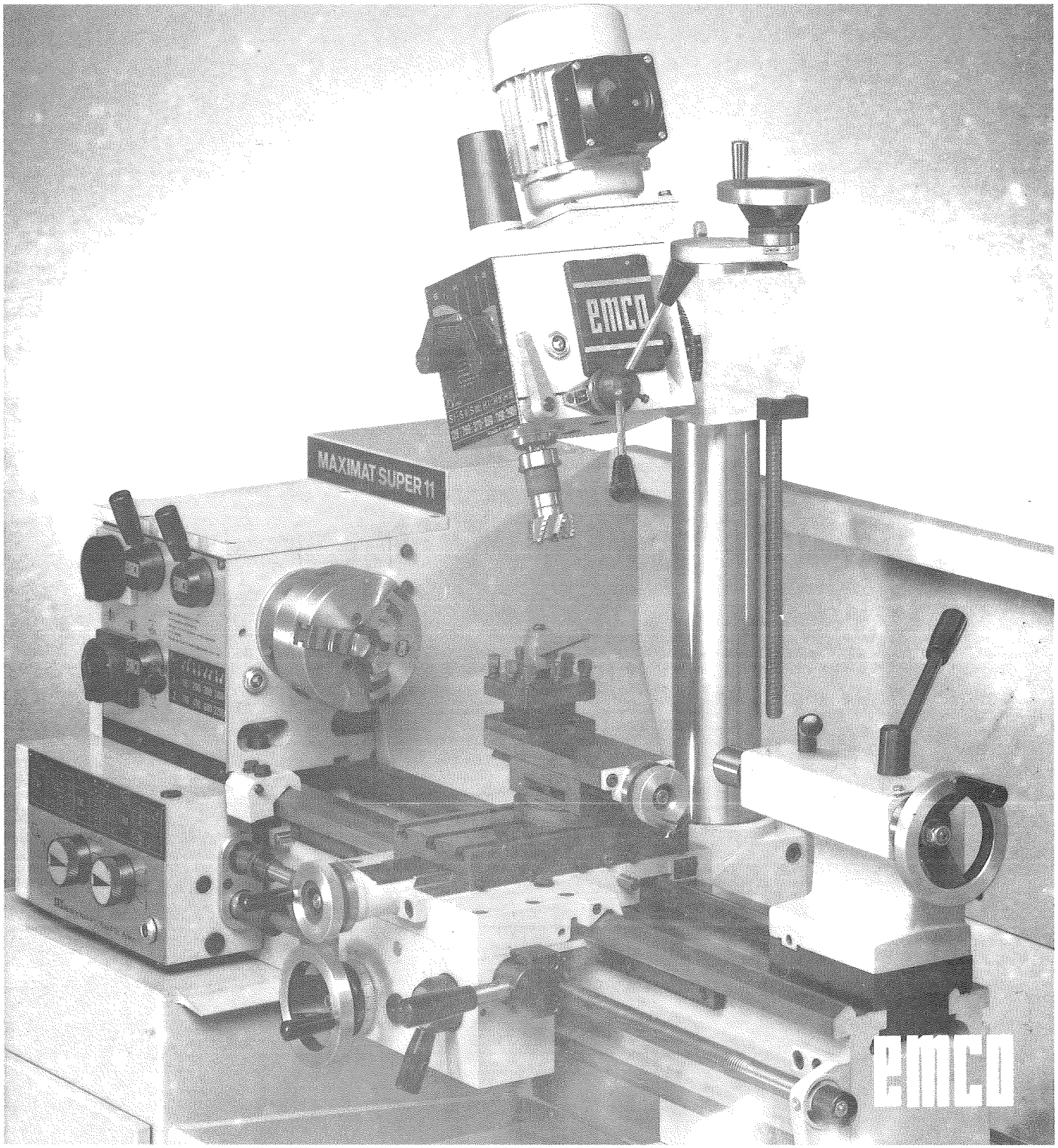
MAXIMAT SUPER 11

Instruction book
Service parts



Englisch Order No. EN5 810

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Maier + Co.
A-5400 Hallein/Austria

CAUTION: READ THIS! BEFORE TURNING HAND-WHEELS OR CRANKS . . .

- Avoid damaging precision surfaces and parts.
- Carriage and tailstock are LOCKED TO BED and should not be moved until bed is cleaned.
- Check bags and cartons for parts.
- Read all instructions – a few minutes now may save hours later.
- Clean the lathe – machined surfaces are coated with rust preventive which must be removed – see CLEANING.
- Handle with care – this lathe is a precision machine.

- Follow safety rules for power tools.
- Turn off motor before attempting adjustments or maintenance.
- Be sure work piece is firmly supported on the lathe.
- Keep the lathe clean, lubricated, and adjusted as instructed.
- Do not leave cleaning rags, tools or other materials on lathe bed or around moving parts of the lathe.

Before operating the machine, fill oil into head-stock and gearbox, 0,5 Liter each.
Oil quality: EMCO Special Oil (Order No. 751 000, 4 bottles)
or oils as recommended in the lubrication chart.

SAFETY RULES FOR POWER TOOLS

1. KNOW YOUR POWER TOOL
Read the owner's manual carefully. Learn its application and limitations as well as the specific potential hazards peculiar to this tool.

2. GROUND ALL TOOLS
If tool is equipped with three-prong plug, it should be plugged into a three-hole receptacle. If adapter is used to accommodate two-prong receptacle, the adapter wire must be attached to a known ground. Never remove third prong.

3. KEEP GUARDS IN PLACE
and in working order.

4. REMOVE ADJUSTING KEYS AND WRENCHES
Form habit of checking to see that keys and adjusting wrenches are removed from tool before turning on tool.

5. KEEP WORK AREA CLEAN
Cluttered areas and benches invite accidents.

6. AVOID DANGEROUS ENVIRONMENT
Don't use power tools in damp or wet locations. Keep work area well illuminated.

7. KEEP CHILDREN AWAY
All visitors should be kept a safe distance from work area.

8. MAKE WORKSHOP KID PROOF
— with padlocks, master switches, or by removing starter keys.

9. DON'T FORCE TOOL
It will do the job better and be safer at the rate for which it was designed.

10. USE RIGHT TOOL
Don't force tool or attachment to do a job it was not designed for.

11. WEAR PROPER APPAREL
No loose clothing or jewelry to get caught in moving parts.

12. USE SAFETY GLASSES
Also use face or dust mask if cutting operation is dusty.

13. SECURE WORK
Use clamps or a vise to hold work when practical. It's safer than using your hand, frees both hands to operate tool.

14. DON'T OVERREACH
Keep your proper footing and balance at all times.

15. MAINTAIN TOOLS IN TOP CONDITION
Keep tools sharp and clean for best and safest performance. Follow instructions for lubricating and changing accessories.

16. DISCONNECT TOOLS
before servicing and when changing accessories such as blades, bits, cutters.

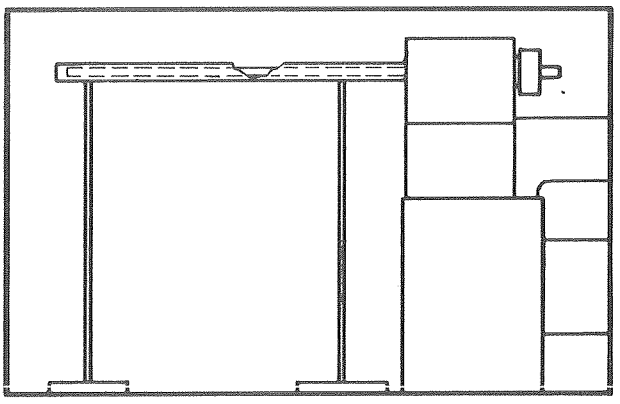
17. AVOID ACCIDENTAL STARTING
Make sure switch is "OFF" before plugging in cord.

18. USE RECOMMENDED ACCESSORIES
Consult the owner's manual. Use of improper accessories may be hazardous.

19. TURN SPINDLE BY HAND BEFORE SWITCHING ON MOTOR
This ensures that the workpiece or chuck jaws will not hit the lathe bed, saddle or crosslide, and also ensures that they clear the cutting tool.

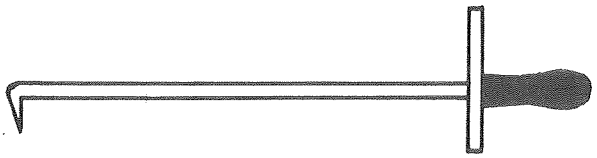
20. CHECK THAT ALL HOLDING, LOCKING AND DRIVING DEVICES ARE TIGHTENED

21. COVER EXTENDING PARTS
When working on tubes or pipes which extend to the side of the headstock, these must be covered over the whole lenght.



22. REMOVING CHIPS

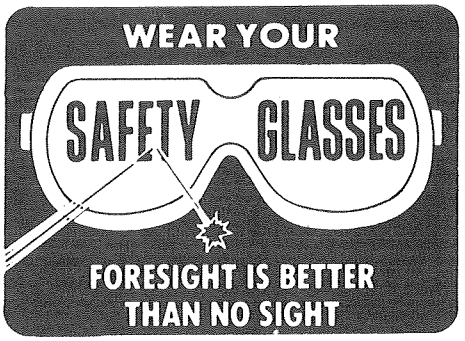
For removing chips, use a chip hook.
For reasons of better illustration, the chip guard and chuck guard are not always mounted. Chuck guard and chip guard should, however, be used whenever possible.



23. DISMOUNTING COVERS

Before dismounting electrical housing cover, front plate on headstock and front plate on gearbox, disconnect electrical supply.

The operation of any power tool can result in foreign objects being thrown into the eyes, which can result in severe eye damage. Always wear safety glasses or eye shields before commencing power tool operation. We recommend **Wide Vision Safety Mask** for use over spectacles, or standard safety glasses.



The machine is built in different versions so, if there is no influence on explanations, the photos do not always correspond with the machine delivered.

Lubricate machine regularly to lubrication plan (see page 32—34).

Technical Data – Lathe

Center height	(5,5") 140 mm
Distance between centers	(25,6") 650 mm
Swing over bed	(11") 280 mm
Swing over cross slide	(6,7") 170 mm
Width of lathe bed	(6,1") 155 mm
Travel of the top slide	(3,9") 100 mm
Travel of cross slide	(5,3") 135 mm
Leadscrew diameter	(0,8") 20 mm
Self-centering chuck diameter	(5,5") 140 mm
Independent chuck diameter	(6,0") 152 mm
Faceplate diameter	(10") 254 mm
Net weight (without machine stand)	approx 170 kg
Net weight (with machine stand)	approx 243 kg
Headstock	
Hole through spindle	(1,0") 26 mm
Spindle taper	MT 4
Centre taper	MT 4
Spindle nose according to DIN 55021	size 3
Number of spindle speeds	8
Range of speeds	55–2200 r.p.m.
Tailstock	
Center sleeve diameter	(1,2") 30 mm
Stroke of center sleeve	(3,1 ") 80 mm
Inside taper	MT 2
Set-over	(+0,4–0,3") +10 mm–8 mm

Feeds	
Metric machine:	
14 longitudinal (0,00118–0,0118 inch/rev.)	0,03–0,3 mm/rev.
14 transversal (0,00059–0,0059 inch/rev.)	0,015–0,15 mm/rev.
Inch type machine:	
15 longitudinal	0,0018–0,0128 inch/rev.
15 transversal	0,0009–0,064 inch/rev.
Thread pitches metric machine:	
14 metric threads (0,01–0,1")	0,25–2,5 mm (M 1–M 22)
9 inch threads	9–96 t.p.i.
with change gear set additionally:	
13 metric threads (0,005–0,19")	0,125–5 mm
29 inch threads	29–76 t.p.i.
12 Module threads	0,25–2,5
25 Diam. pitch	96–11
Thread pitches inch type machine:	
6 metric threads (0,0059–0,078")	0,15–2 mm
15 inch threads	64–9 t.p.i.
with change gear set additionally:	
21 inch threads	126–4 t.p.i.
13 metric threads (0,01–0,24")	0,25–6 mm
29 Diam. pitch	128–9
7 Module threads	0,5–2,0
Drive Motor	
Motor rating (3-phase version) (S6–60%)	1,1 kW/1,4 kW
Motor rating (1-phase version) (S6–60%)	0,75 kW/1,0 kW
Speeds	1450/2820 r.p.m.
Required floor space (59x35")	1500x900 mm

Vertical Milling and Drilling Unit

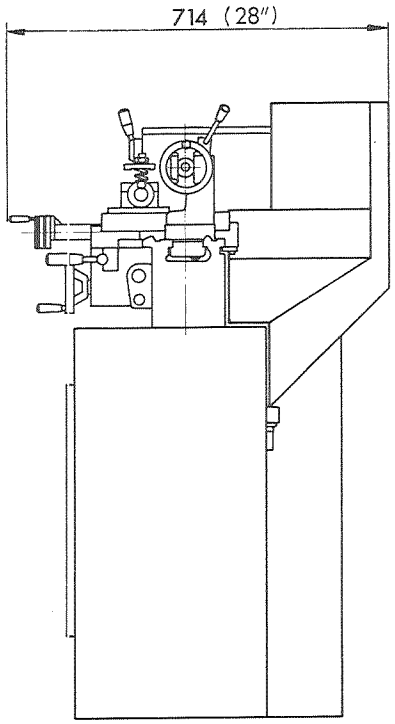
Drive Motor	
Motor rating, 1-phase* (S 3–60%)	0,22 kW
Motor rating, 3-phase* (S 3–60%)	0,30 kW
Range of spindle speeds	120–2000 r.p.m.
Weight	approx. 43 kg

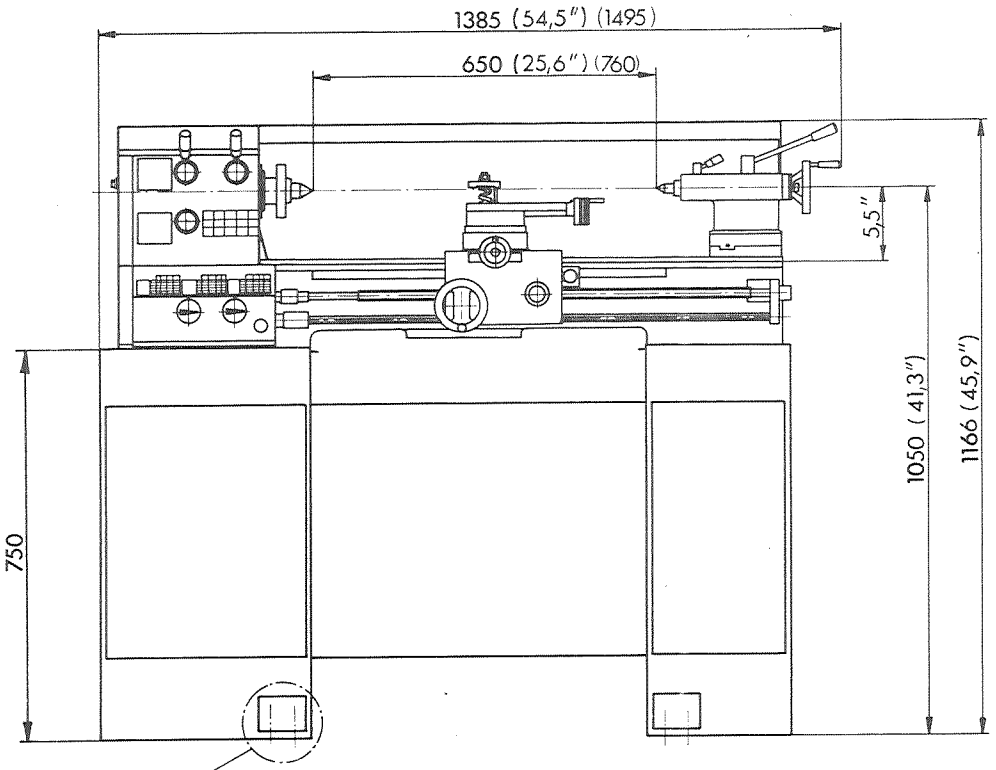
* Please state voltage and frequency when ordering

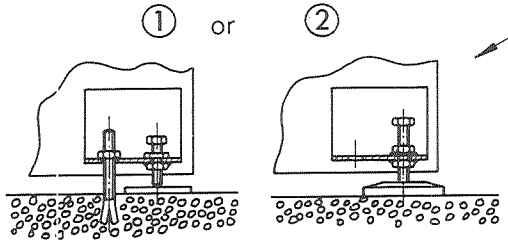
Maximum height between table (cross slide) and spindle nose	(12") 305 mm
Throat	(6,4") 163 mm
Spindle taper	MT 2
Stroke of quill	(1,6") 40 mm

Data subject to change.

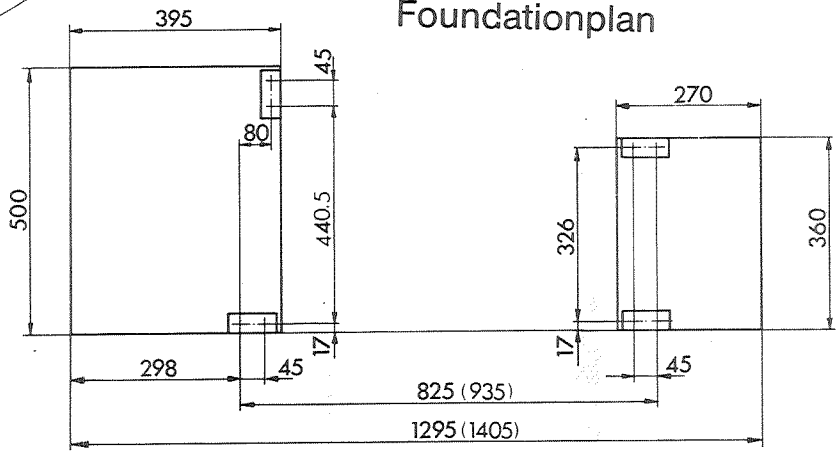
Dimensions







Foundationplan



Different Versions of the Basic Machine

The mechanical elements of the MAXIMAT SUPER 11 basic machine are the same on all machines. Due to the different electrical safety regulations in the countries supplied, three different versions are available.

I. "Standard" Electric Version

1. Switch for two speeds and two turning directions
2. Clamping strip for:
   - power supply
   - connection of Vertical milling and drilling unit
   - connection of coolant attachment
   - connection of machine lamp
3. Motor

II. "VDE" Electric Version

1. Switch for two speeds and two turning directions
2. Clamping strip for:
   - power supply
   - connection of Vertical milling and drilling unit
   - connection of coolant attachment
   - connection of machine lamp
3. Motor

+

4. Lockable main switch with Emergency Stop function and low-volt release

III. "Special Safety" Electrical Version

1. Switch for two speeds and two turning directions
2. Clamping strip for:
   - power supply
   - connection of Vertical milling and drilling unit
   - connection of coolant attachment
   - connection of machine lamp
3. Motor
4. Lockable main switch with Emergency Stop function and low-volt release

+

5. Thermal overload relay for main motor
6. Thermal overload relay for vertical unit motor
7. Thermal overload relay for coolant attachment
8. Fuse for short circuit protection of machine lamp
9. Fuse for short circuit protection of control circuit.
10. Microswitch preventing unintentional opening of gear cover.

Basic Equipment

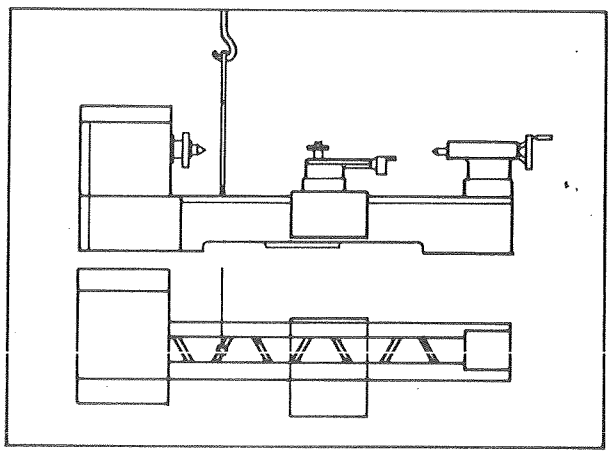
Bed with Vee-guideways
Headstock
Tailstock
Longitudinal, cross and top slide
Single toolpost
Gearbox
Leadscrew
Feedshaft
Set of wrenches

Drive motor completely installed, with operating switches and electrical housing
1 Center MT4
1 Center MT2
Lathe dog
Dog pin
Grease gun
Instruction Book
Service Parts List

Unpacking the Machine

The machine is delivered packed in a wooden crate. After receipt check all parts for completeness. The machine can best be lifted out of the crate with a belt or rope, which is fixed around the diagonal rib of the lathe as illustrated.

Note: weight of machine: ap.167 kg (368 pounds)



Cleaning the Machine

All blank surfaces of the machine are coated with a rust-protective. This must be carefully removed with petrol or similar material; do not use nitrobezine. After this, all parts must be coated with a rust-preventive oil.
For transport reasons, the longitudinal slide is clamped to the lathe bed and must not be moved before the rust-protective is removed.

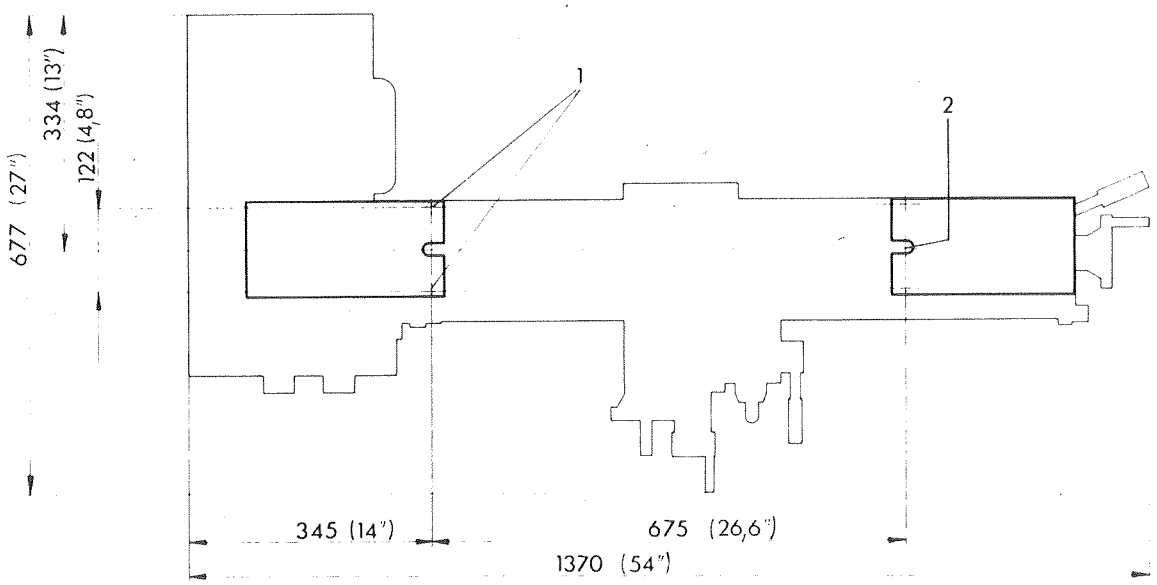
Setting-up the Machine

General

Only an accurately aligned machine guarantees maximum precision. The lathe bed must be levelled exactly in longitudinal and cross directions.
Levelling devices with the accuracy noted below have to be used.
Allowable deviations:
o,o2 - o,o5 mm/m

Note: Workbench or support area must be comparable to the weight of the machine.

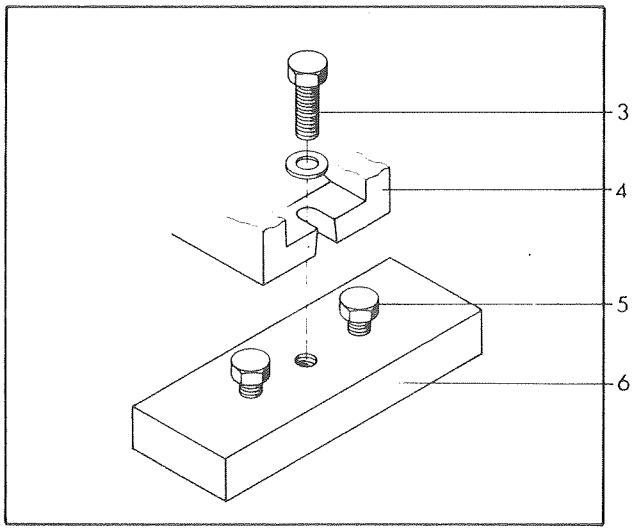
Mounting the Machine to an Already Existing Workbench



Four casting extensions are provided on the bottom of the lathe bed.
These are used for supporting and levelling the machine be means of set screws in longitudinal and cross directions.
Recommended size of set screws: M1o (3/8")

Recommended Method of Fastening the Machine:

① Casting extensions for set screws
② "U" on the lathe bed for tightening the machine

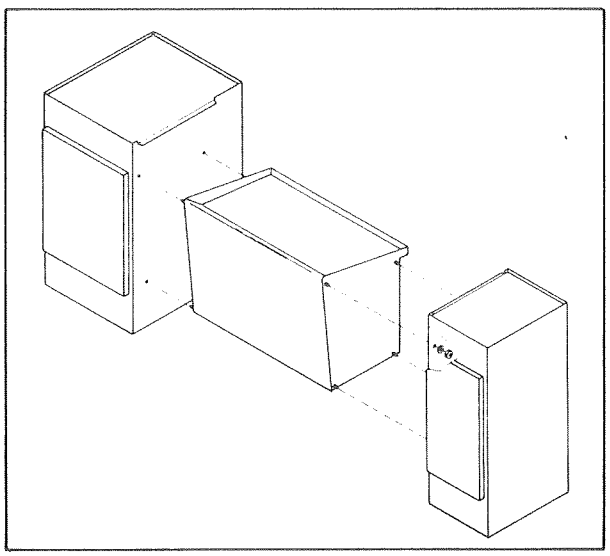


③ Tightening screw,
recommended size: M1o (1/2")
④ Base of lathe bed
⑤ Setting screw
⑥ Steel plate
Recommended thickness of steel plate: ca.2omm (o,8")
These 2 steel plates must be fixed to the workbench.

Note: Before bolting down the machine, be sure that all 4 set screws rest against the lathe bed, otherwise the bed would be distorted or bent through the bolting down.

Mounting: Machine to Machine Stand, Vertical Milling and Drilling Unit and Splashguard.

1. Assembly of the Machine Stand

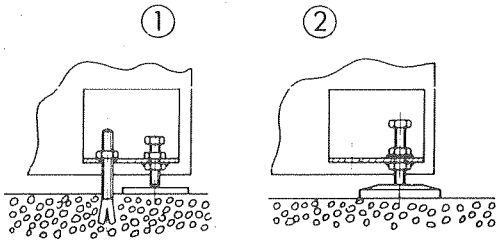


The sizes of the screws, nuts and washers as well as way of assembly are indicated in Spare Parts List.

2. Aligning and Fixing the Machine Stand:

Method 1:
The machine stand is aligned by means of the hexagon screws under which steel plates must be placed.
Then the machine stand is fixed with dowel bolts or similar.

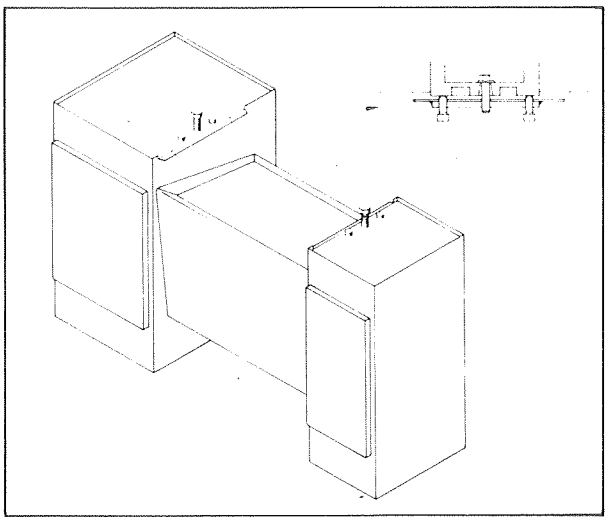
Method 2:
The machine stand is aligned with levelling elements.
The levelling elements replace bolting to the floor.



3. Mounting the Machine to the Machine Stand:

The machine is placed onto the machine stand and is levelled in longitudinal and cross directions by means of the 4 levelling bolts at exact horizontal position. Then the machine is fixed to the stand with the 2 hexagon bolts.

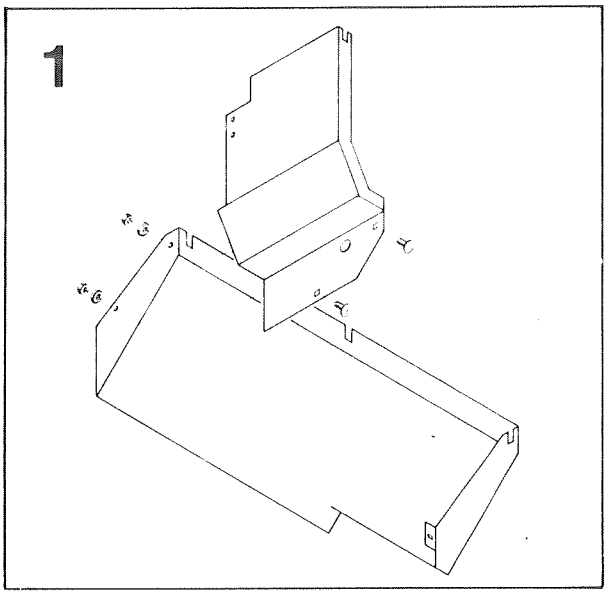
Note:
Before bolting down the machine, all 4 levelling bolts must rest against the casting extensions, otherwise the bed would be distorted or bent.

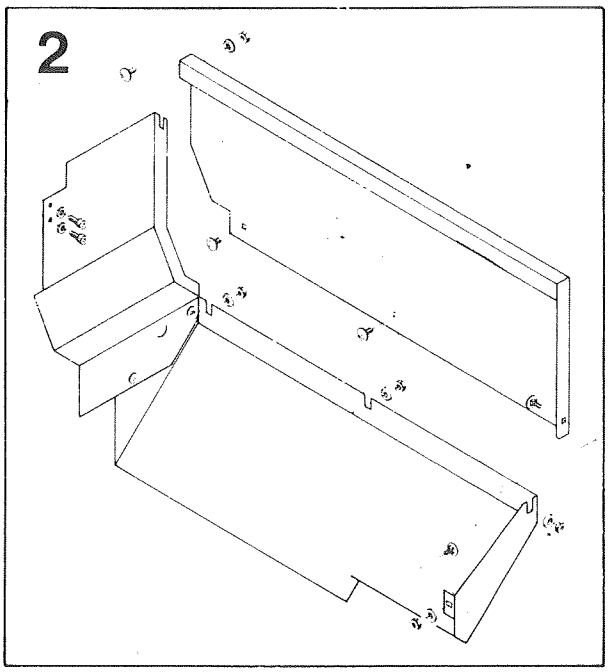


4. Mounting the Vertical Milling and Drilling Unit

The vertical milling and drilling unit is delivered with its own Instruction Manual and Spare Parts List. In this Instruction Manual the mounting, service, tools and accessories are described in detail.
For the electrical connection of the vertical unit, see page 12

5. Mounting the Splashguard





The sizes of screws, nuts and washers are indicated in the Spare Parts List.

Electrical Connections

NOTE: THE ELECTRICAL CONNECTIONS MUST BE CARRIED OUT PROFESSIONALLY.

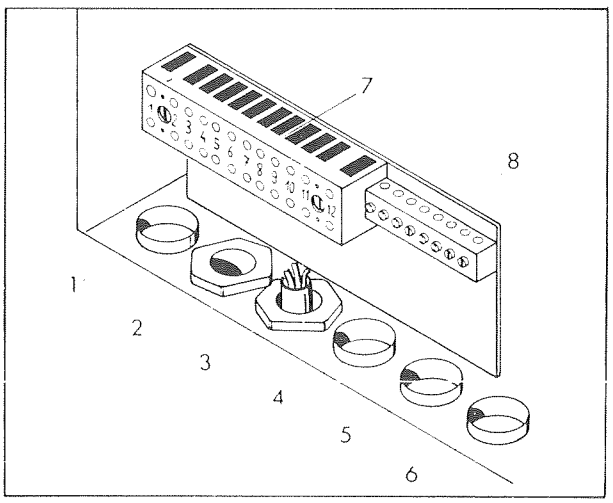
A GROUNDING RECEPTACLE MUST BE AVAILABLE. SHOULD AN ELECTRICAL FAILURE OCCUR IN THE MOTORS, THE GROUNDING PLUG AND RECEPTACLE WILL PROTECT THE USER FROM ELECTRICAL SHOCK.
IF A GROUNDING RECEPTACLE IS NOT AVAILABLE, USE A GROUNDING ADAPTOR TO ADAPT TO PROPERLY GROUNDED RECEPTACLE.

NOTE: NEVER USE THE MACHINE IF IT IS NOT PROPERLY GROUNDED!

Fitting bores are provided on the bottom of the electrical housing for the electrical connections. One of them is provided with a screw-type conduit fitting.

The other four bores are for the connection of the accessories and are plugged.

The screw-type conduit fitting provided in the electrical housing is intended for the power supply of the machine. Screw-type fittings for the vertical unit and other accessories are packed with the separate accessories.

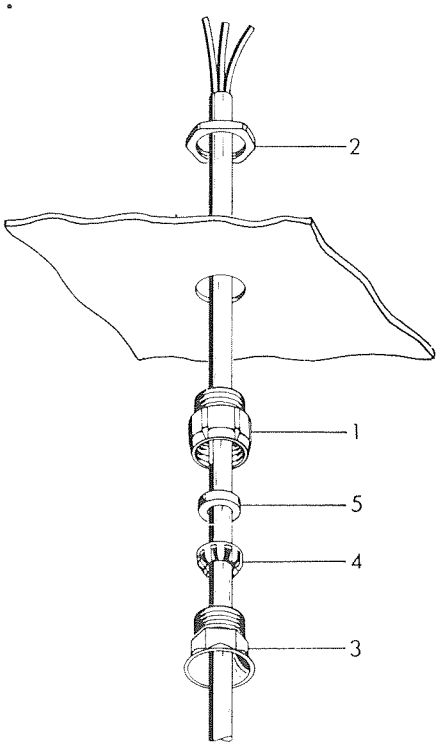


Bores for:

1. Vertical milling and drilling unit
2. Power supply
3. Cable for main motor, already installed
4. Coolant attachment
5. Machine lamp
6. Extra
7. Clamping strip (note the numbers on the strip)
8. Grounding strip

CORRECT MOUNTING OF THE SCREW-TYPE CONDUIT FITTING

The basic element (1) and the nut (2) are mounted to the electrical housing. The thread lock nut (3), the cone element (4) and the rubber ring (5) are threaded onto the cable. After clamping the cable ends, the rubber ring and the cone element are pressed into the basic element; the cable is then fixed by tightening the thread lock nut.



Electrical Connection – **Single-phase**

1. POWER SUPPLY

Required cable section:
3 x 1,5 mm^2 (
(up to 1o m cable length)

3 x 2,5 mm^2 (
(over 1o m cable length and with voltages 1oo V, 11o V and 115 V)

Wiring:

+ Remove cover
+ Clamp wire R (L1) to contact point 1, clamp wire MP (N) to contact point 2.
Clamp the grounding wire SL (yellow/green) to the grounding strip.
+ Remount cover

2. ELECTRICAL CONNECTION OF THE VERTICAL MILLING AND DRILLING UNIT

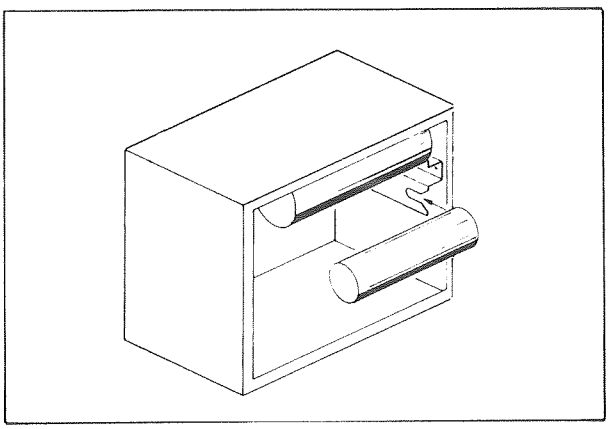
+ Remove plug, mount screw-type conduit fitting

Clamp wires 1,2 and 3 of the vertical unit motor cable to contact points 3,4 and 5.
Clamp grounding wire (yellow/green) to grounding strip.

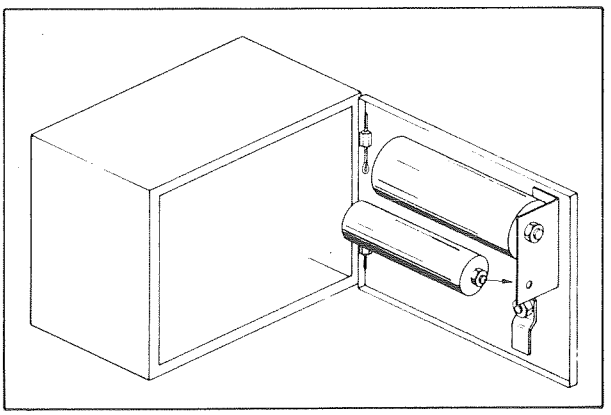
+ Mounting the condensor for the vertical milling and drilling unit

One cable is clamped to to contact point 6, the other to contact point 7.

Mounting the condensor with Standard and VDE electrical versions



Mounting the condensor with Special Safety electrical version



3. ELECTRICAL CONNECTION OF THE COOLANT PUMP

Clamp wire R (L1) and wire Mp (N) to contact points 9 and 1O.
Clamp the grounding wire SL (yellow-green) to the grounding strip.

4. ELECTRICAL CONNECTION OF THE MACHINE LAMP

Clamp wire R (L1) and wire Mp (N) to contact points 11 and 12.
Clamp the grounding wire SL (yellow-green) to the grounding strip.

Electrical Connection – **Three-phase**

1. POWER SUPPLY

   Required cable section:
   5 x 1,5 mm^2

Wiring:

+ Remove cover
+ Clamp wires R (L1), S (L2), T (L3) and MP(N) to contact points 1,2,3 and 4. Clamp grounding wire SL (yellow/green) to grounding strip.
+ Remount cover

Note: Compare switching symbol with the turning direction of the spindle.

If the motor runs in the wrong direction, interchange 2 wires, for example R (L1) and S (L2).

2. ELECTRICAL CONNECTION OF THE VERTICAL MILLING AND DRILLING UNIT

   Clamp wires 1,2 and 3 (black) to contact points 5,6 and 7. Clamp the grounding wire SL (yellow/green) to the grounding strip.

Check running direction of the vertical unit.

If the motor runs in the wrong direction, (see arrow on gear cover), interchange 2 wires, for example wires 1 and 2.

3. ELECTRICAL CONNECTION OF THE COOLANT PUMP

   Clamp wires R (L1), S (L2) and T (L3) to contact points 8,9 and 1o.
   Clamp the grounding wire (yellow/green) to the grounding strip.
   The coolant pump functions equally in either running direction.

4. ELECTRICAL CONNECTION OF THE MACHINE LAMP

   Clamp wire R (L1) and wire MP (N) to contact points 11 and 12.
   Clamp the grounding wire SL (yellow/green) to the grounding strip.

Before operating the machine, check oil levels in headstock and gearbox (feed gear).

Important Guidelines for Operation

1. All levers must be switched so that they rest in the bores.

2. Change speeds and feed only when machine is not running.

3. The shearing pin is made of a special alloy; do not use other materials to replace it, when it is broken through overloading or incorrect handling.

4. Do not clean machine with compressed air - dust and chips would damage precision guideways and bearings!

5. After working with coolant, clean and oil the machine.

6. The multi-spline flat belt must be tensioned correctly.

7. Do not hammer the main spindle (high-precision bearings)!

8. Lubricate according to lubricating instructions.

9. When working with the toolpost grinder, cover all guideways. The swarf could damage the precision guideways.

Starting the Machine

1. The machine must be connected professionally; voltage and frequency must correspond with motor specifications.

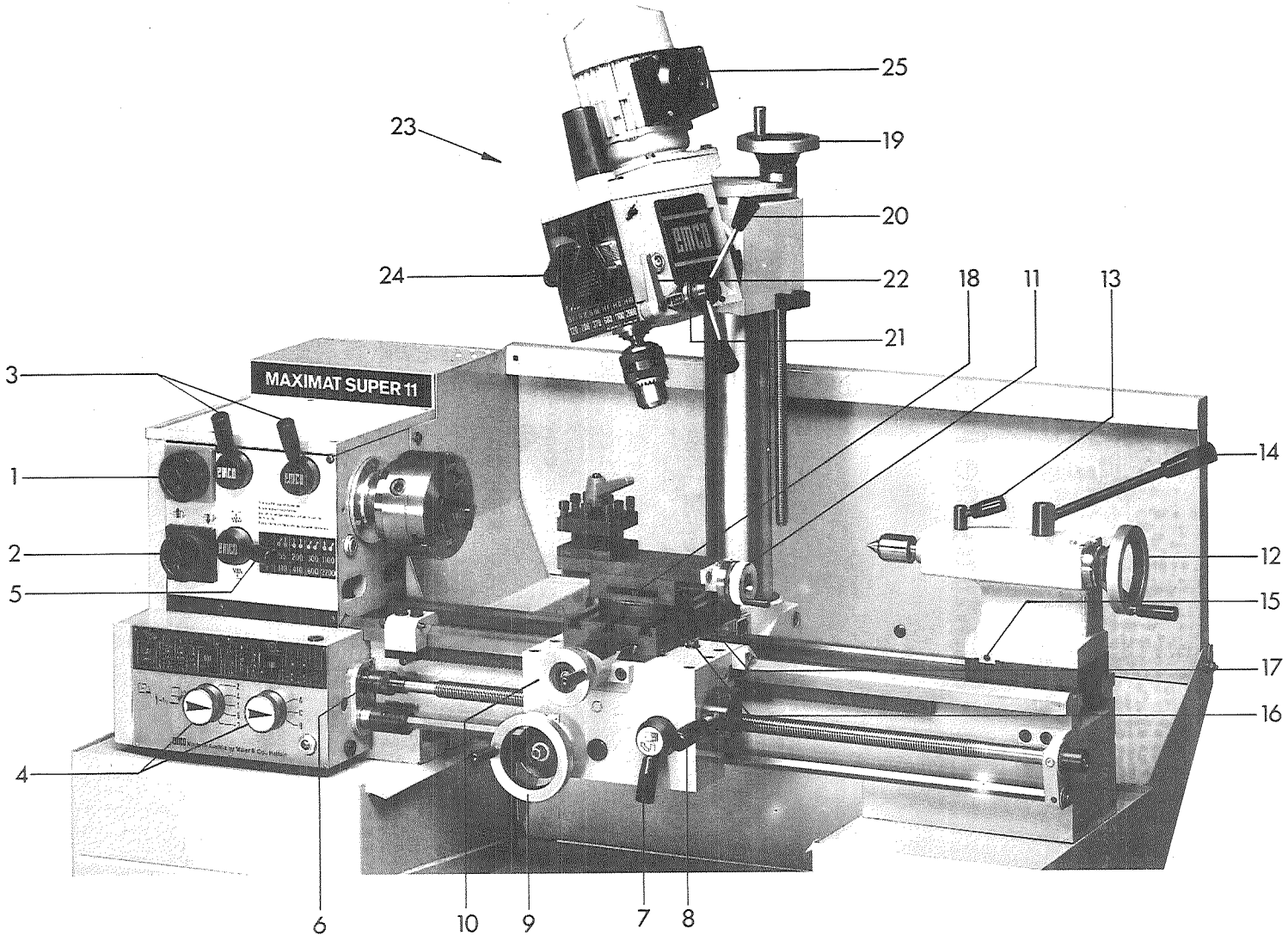
2. Set the required main spindle speed, feed direction and size.

3. The main and emergency-off switch is switched on (does not apply to standard electrical version).

   Note: Switch can only be switched-on when electrical current is present.

4. Switch motor to required revolving direction and speed.

Controls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Controls – Lathe

1 Lockable main switch with low-volt resp. no-volt release

2 Switch for selecting motor speeds and direction of revolutions

3 Levers for selecting spindle speeds

4 Knobs for selecting feeds resp.pitches

5 Reversing gear lever

6 Coupling for lead screw

7 Half-nut lever

8 Feed lever for longitudinal and cross feed

9 Longitudinal slide handwheel

1o Cross slide handwheel

11 Top slide handwheel

12 Handwheel for tailstock ram

13 Convertible clamping lever for tailstock ram

14 Convertible clamping lever for tailstock

15 Bolts for setting-over tailstock

16 Clamping screw for longitudinal slide

17 Clamping screw for cross slide

18 Hexagon nuts for fixing top slide a the required angle

Controls – Vertical Milling and Drilling Unit

19 Handwheel for vertical slide

2o Lever for lowering pinion

21 Adjustable depth stop for pinion

22 Clamping lever for pinion

23 Clamping lever for vertical slide

24 Levers for switching spindle speeds

25 Switch for vertical motor

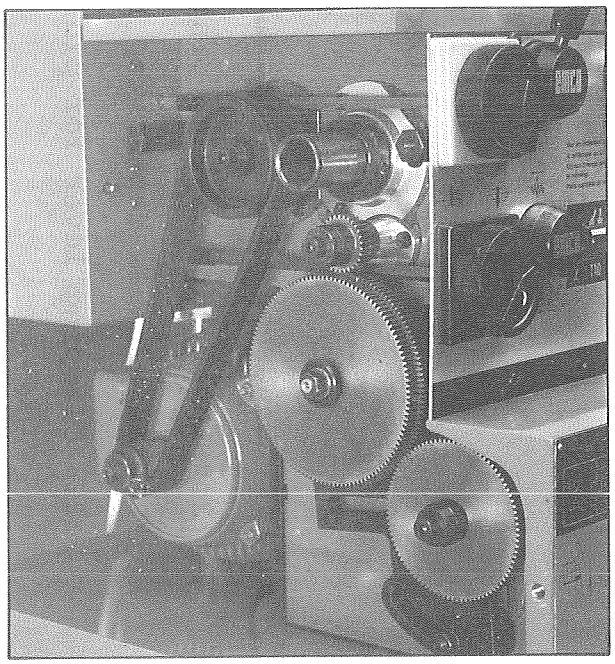
Controls

Lathe Bed

The lathe bed is made of high-grade cast-iron. The combination of high cheeeks with strong diagonal ribs gives a bed, which has low vibration and rigid qualities.
Two high-precision ground Vee-guideways, one for the carriage and one for the tail-stock assure accurate travel.
Four bores are provided at the back of the lathe bed for mounting the vertical milling and drilling unit.

Power Transmission
Drive Motor – Gearbox

From motor via multi-spline flat belt to intermediate shaft over sliding gears to main spindle. From main spindle over reversing mechanism over gears in universal quadrant to gear-box.



Headstock

The headstock is made of vibration-free, strongly ribbed cast-iron. It is tightly fixed to the lathe bed. The main spindle is supported by two highly-precise adjustable taper roller bearings. The high rigidity of the main spindle (Ro 48 daN µm) guarantees highly-precise results.

All gear wheels in the headstock are made of steel alloy; they are heat treated and scraped.

The sloped sliding gears facilitate switching speeds. All gears of main spindle and the reversing mechanism run in an oil bath.
The front plate on the headstock indicates lever positions and the corresponding speeds and the feed directions, as well as the turning direction of the main spindle.

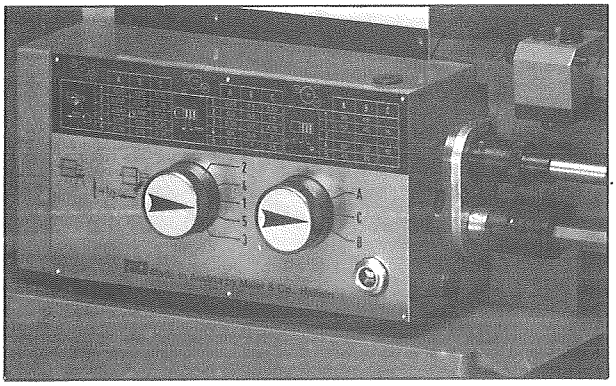
Switching the Spindle Speeds

During the switching operation, the main spindle is slightly turned by hand.

Switching the Reversing Gear

During the switching operation, the main spindle is slightly turned by hand.

Gearbox

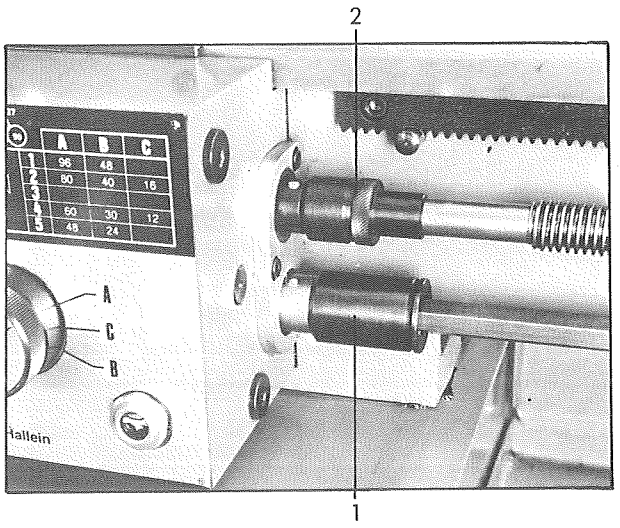


The housing is made of cast-iron and is fitted to the front of the bed. The large-dimensioned sliding gears are sloped for facilitated switching the feeds and thread pitches. All gears run in an oil bath. Pitches and feeds are set according to the chart on the front of the gearbox.

The leadscrew and the feed shaft are positioned to the right of the gearbox.

Switching the Feeds and Pitches

During the switching operation, the main spindle is slightly turned by hand.



1 Slipping clutch on the feed shaft (1)

The slipping clutch on the feed shaft protects the machine against overload and makes it possible to turn to a stop in longitudinal and cross directions.

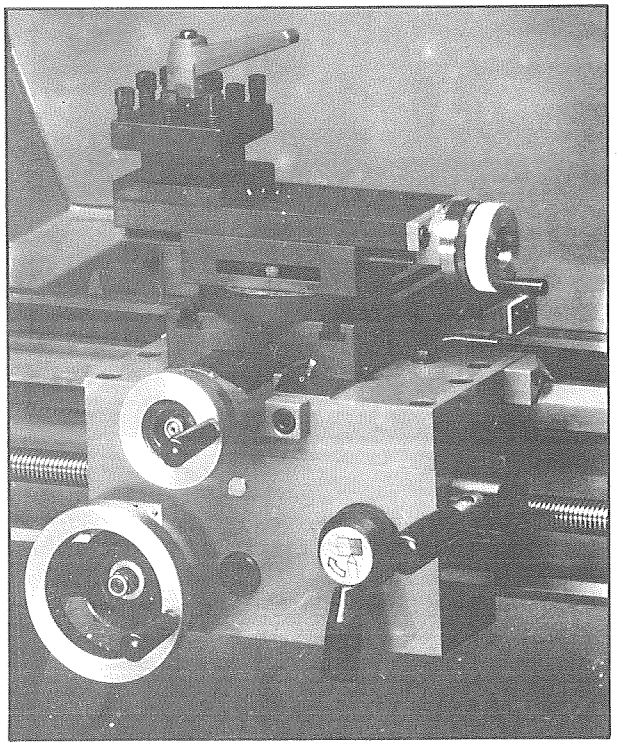
2 Coupling on the leadscrew (2)

If the coupling sleeve is pulled to the right, the leadscrew is disengaged.

The leadscrew is engaged only for thread cutting and should be disengaged by means of its coupling (2) during normal turning.

Note:
Do not switch spindle speeds, reversing gears or feeds while machine is running!

Apron



The apron is fitted to the longitudinal slide. The worm gear and toothed gears are greased. A lock is fitted in the feed lever to prevent an accidental movement from longitudinal feed to cross feed.

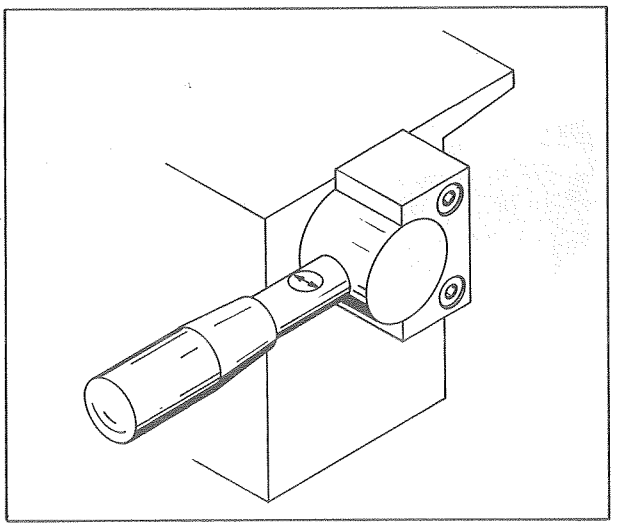
Half-nut lever and feed lever are also interlocked, so that only one at a time can be engaged.

Engaging the Feeds

Only the direction, which is shwon with an arrow-symbol on the feed lever, can be obtained. In order to change to the other feed, the lever has to be pulled out and turned 180°.

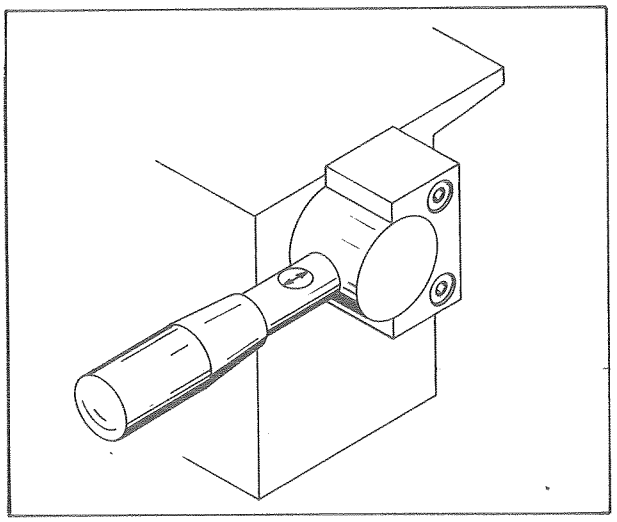
Setting the Longitudinal Feed

1. Pull out feed lever and turn to longitudinal feed (see arrow
2. Pull out feed lever and swing upwards



Setting the Cross Feed

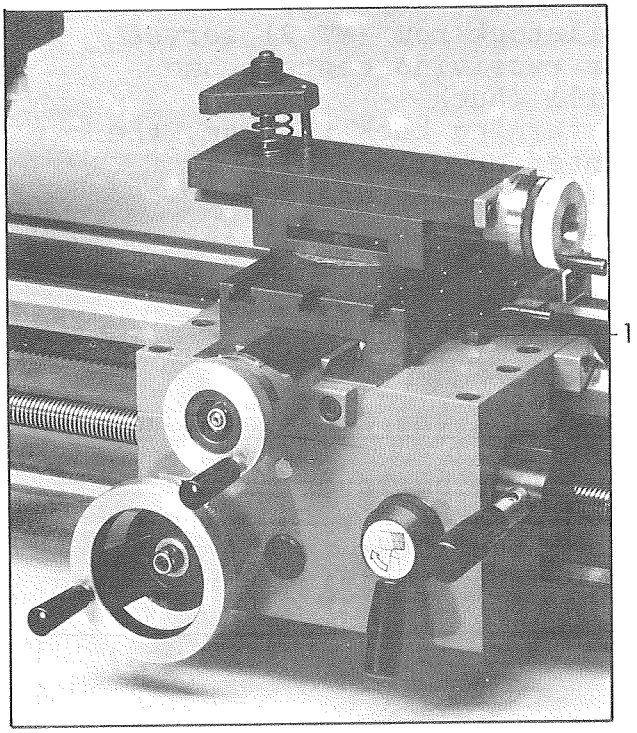
1. Pull out feed lever and turn to cross feed (see arrow)
2. Pull out feed lever and swing downwards.



Coupling the Half-Nut for Threadcutting

By swinging the half-nut lever clockwise, the half-nut engages with the leadscrew.
When leadscrew is not moving, the longitudinal slide is slightly moved by means of the handwheel, until the half-nut can be engaged easily.

Slides



1. The Longitudinal Slide

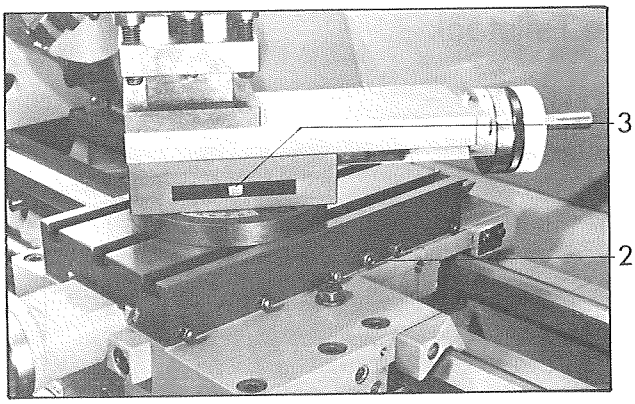
The longitudinal slide runs on the ground Vee of the bed without play. The optimal ratio of guidance guarantees extreme accuracy and smooth movement. The large-dimensioned longitudinal slide handwheel is provided with a scale ring.

The longitudinal slide can be clamped with the hexagon screw (1). When precise cross turning is being done, it is recommendable to clamp the longitudinal slide.

2. The Cross Slide

The cross slide runs in an adjustable dovetail guide without play. It can be clamped with a socket head screw (2). The three t-slots serve for mounting the top slide and other tools or accessories (tool-post grinder, dividing head, angle plate, milling table, etc.). The adjustable scale ring (divisions 0,025 mm with metric machines, 0,001" with inch type machines) on the cross slide enables accurate feeding.

3. The Top Slide



The top slide is mounted to the cross slide with 3 t-nuts and socket head screws. After loosening the 2 hexagon nuts (3), the top slide can be turned to any required angle.
The graduated scales enable exact angle positioning. Internal and external tapers in any required angle and up to a length of 100 mm can be machined.
The top slide runs in an adjustable dovetail guide without play.
The adjustable scale ring (divisions 0,025 mm with metric machines, 0,001" with inch type machines) on the top slide enables accurate feeding.

Mounting the Turning Tools

1. Directly with the clamp

   The distance between top slide and center height is 23 mm (0,905"); for this reason, steel spacers of corresponding size must be placed under the turning tool to set it to exact center height.

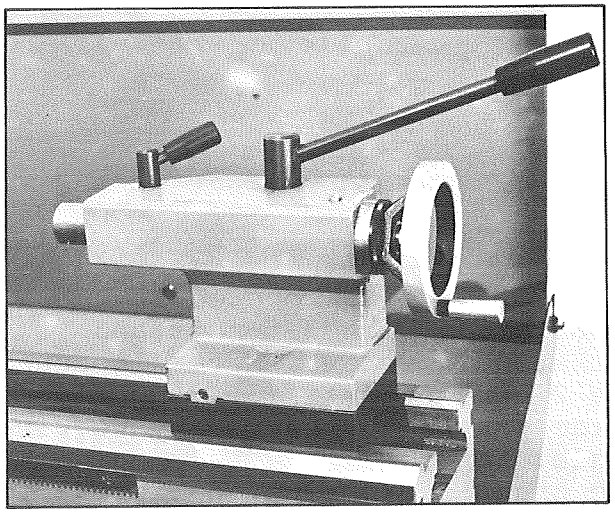
2. With the fourway toolpost or the quick-change toolholder

   The fourway toolpost resp. the quick-change toolholder is mounted on the top slide.

Note:

The main cutting edge of the turning tool must be exactly at center height.

The Tailstock



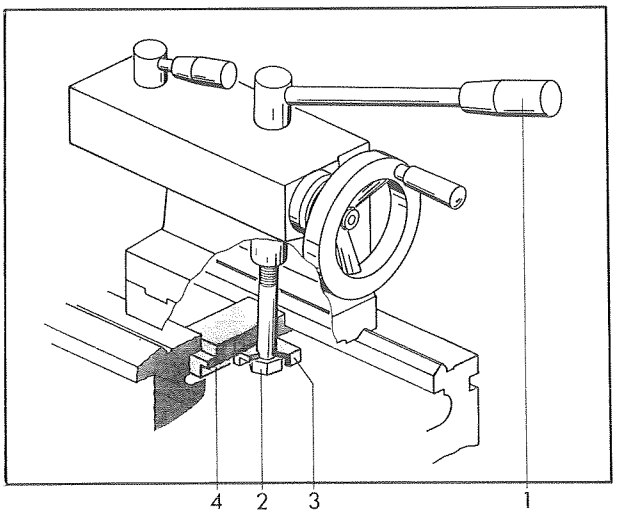
The tailstock is set on the rear Vee of the lathe bed and is made of high-grade vibration-free cast-iron.
The tailstock ram is moved via the handwheel (travel of tailstock ram 9o mm (3,54").
A graduated scale is engraved into the tailstock ram.
Accurate feed is guaranteed by a scale ring on the tail-stock handwheel
Scale graduations on metric machines O,025 mm, on inch type machines O,OO1".

Note:
Tailstock ram should always be clamped, exept during drilling work.

The inside taper of the tailstock ram (MT 2) serves for receiving centers and drill chuck.
By turning back the ram, the center or drill chuck is automatically ejected.
The tailstock itself is clamped to the lathe bed with the large and powerful clamping lever.

Resetting the Clamping Lever

The clamping lever can be reset from 6o° to 6o°, in order to place the lever in the most convenient position for working.

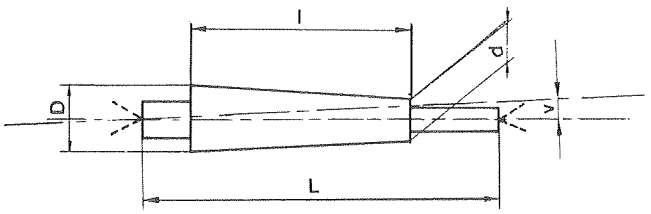


Resetting:

The clamping lever (1) is turned out so far, until the hexagon screw (2) can be turned in the slot of the wedge (3).

Taper Turning Using the Tailstock Set-Over

Long and narrow tapers can be machines also with automatic feed, by setting-over the tailstock.
The workpiece must be clamped between centers.



Tailstock set-over: $v = \frac{D-d}{2} \times \frac{L}{l}$

Example: D = 7o mm; d = 65 mm;
L =4oo mm; l =2oo mm

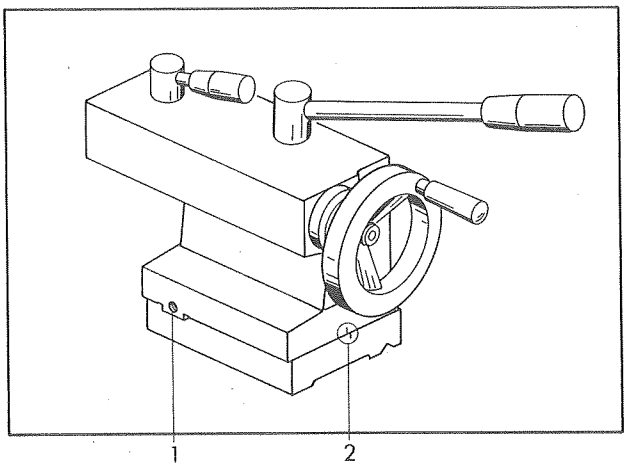
results:

$v = \frac{7o-65}{2} \times \frac{4oo}{2oo} = \frac{5}{2} \times 2 = 5$ mm

Setting-over the Tailstock

Example: Setting-over the tailstock to the front:

The rear screw is loosened.
By turning the front screw (1) clockwise, the tailstock is moved to the front.
When the required set-over position is achieved, the rear screw is tightened again.

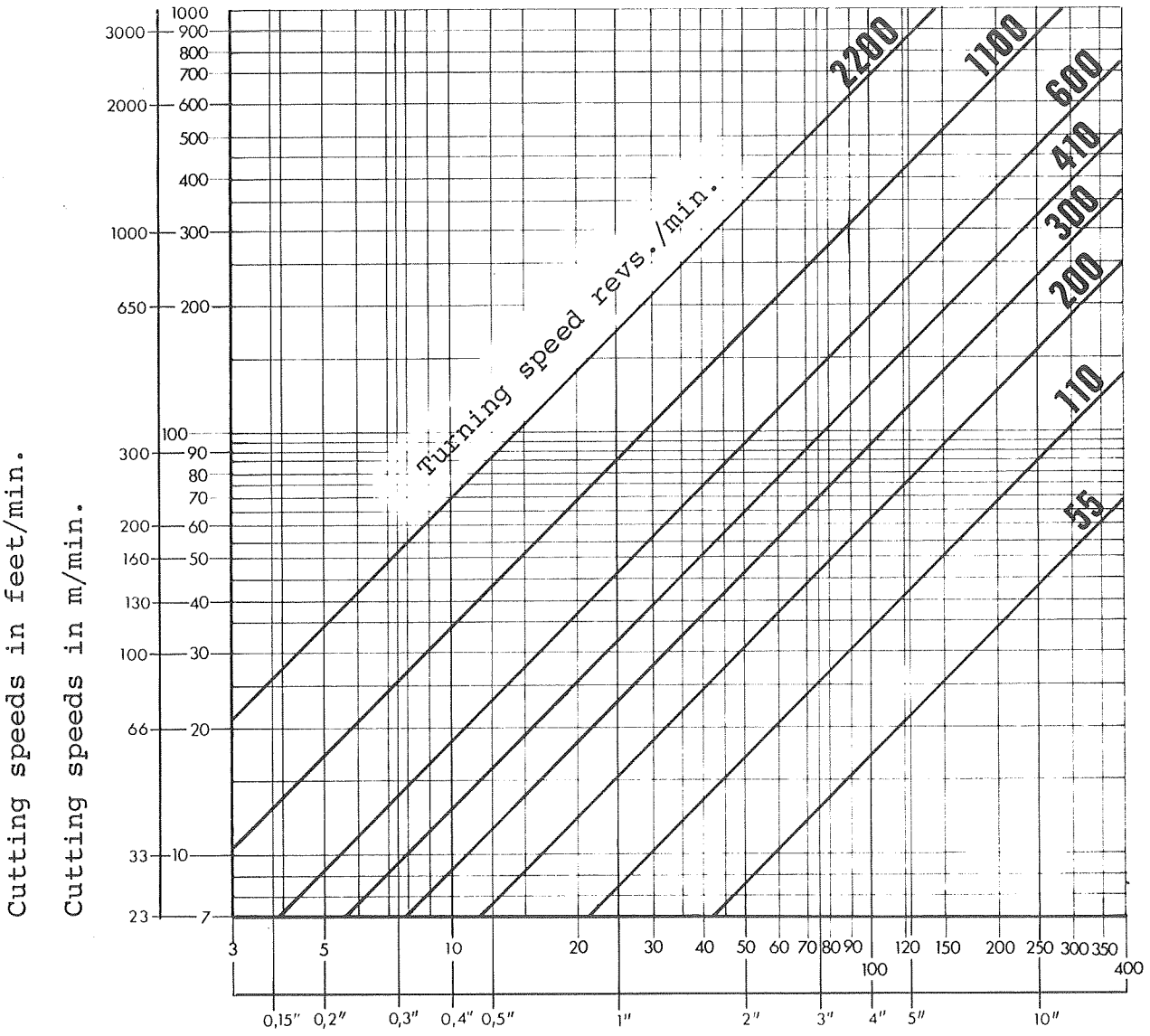


With the aid of the line marks (2), the tailstock can again be brought to the required position.

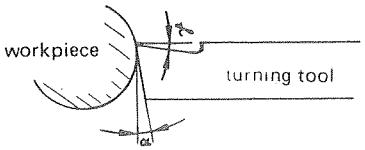
Note:

Front and rear screw must be tightened against each other.

Cutting Speeds



Approximate values for cutting speed – Cutting angle – Lubricant



Values valid for dry cutting with:

High - speed steel tools for cutting speed v60 (age 60min.)
Carbon tipped tools for cutting speed v240 (age 240min.)
Side angle $\varkappa$ =45°, point angle ε = 90°, angle of inclination λ = 0...8°,
for light alloy and plastic λ = 5...10°.

Cutting speed

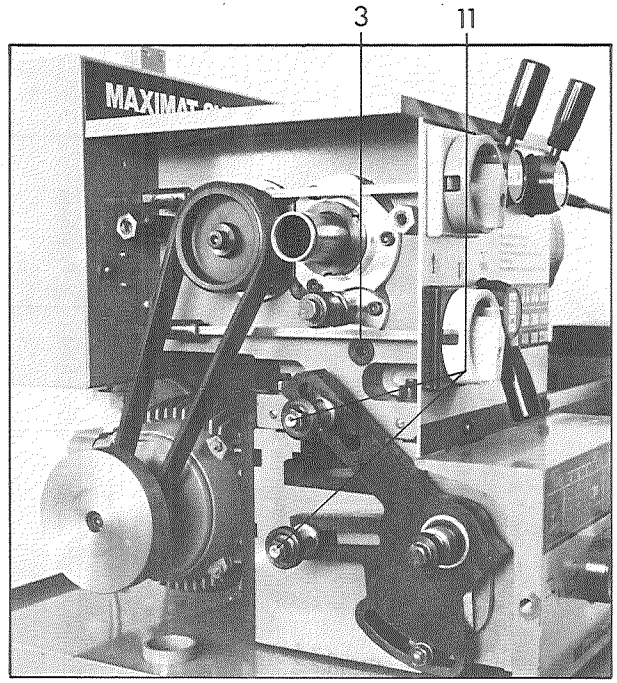
These values hold good for cuts up to 5mm deep, over 5mm the cutting speed should be reduced by 10 - 20%.

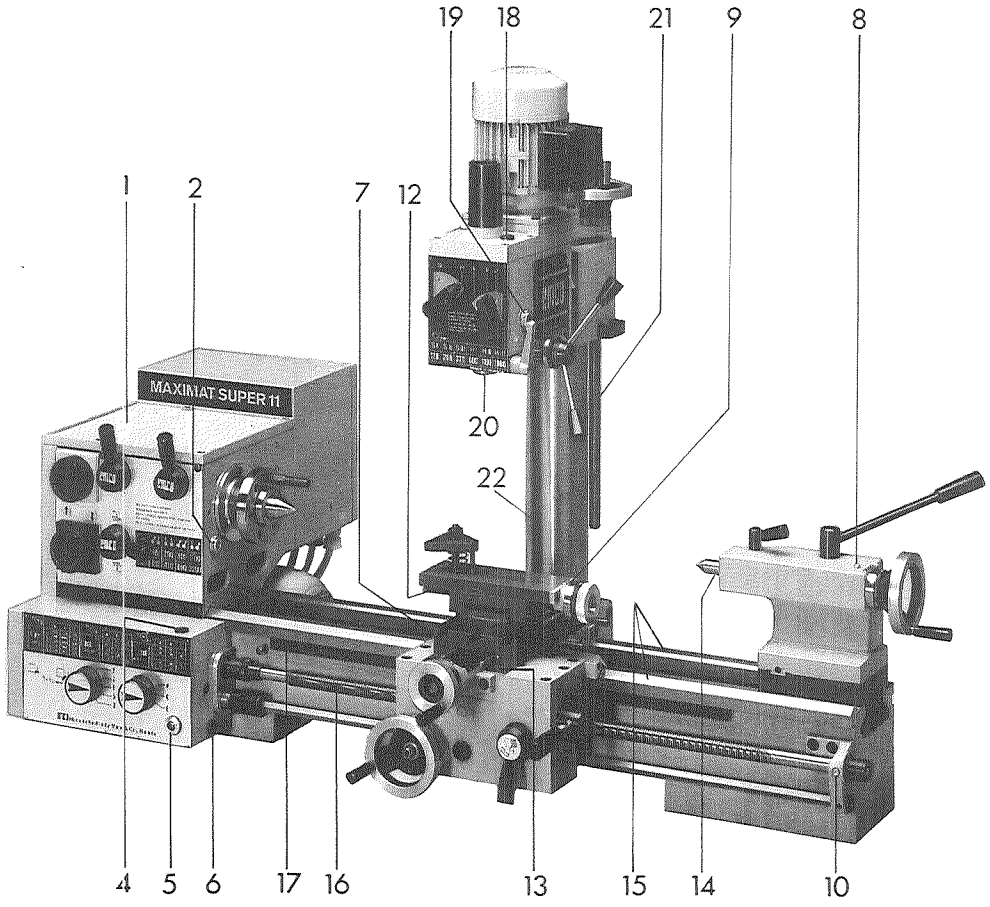
[1]) SS = high speed steel S_1 H_1 G_1 = tipped tools E = Cutting emulsion P = paraffin L = air

Workpiece material	Tensile strength in kp/mm²	[1]) Tool	Cutting angle clearance/top $\alpha°$	$\gamma°$	Feed in mm/rev. 0,1	0,2	0,4	0,8 cutting speed v m/min	Coolant and Lubricant Roughing	Finishing
Steel St 34, St 37, St 42	up to 50	SS	8	14		60	45	34	E	E or P
		S_1	5	10	280	236	200	170		
St 50, St 60	50...70	SS	8	14		44	32	24	E	E or P
		S_1	5	10	240	205	175	145		
St 70	70...85	SS	8	14		32	24	18	E	E or P
		S_1	5	10	200	170	132	106		
Cast steel	50...70	SS	8	10		34	25	19	E	dry
		S_1	5	6	118	100	85	71		
Alloyed steel	85...100	SS	8	10		24	17	12	E	E or P
		S_1	5	6	150	118	95	75		
Mn-Steel, Cr-Ni-steel, Cr-Mo-steel	100...140	SS	8	6		16	11	8	E	E or P
		S_1	5	6	95	75	60	50		
other alloyed steels	140...180	SS	8	6		9,5	6		E	E or P
		S_1	5	6	60	48	38	32		
Tool steel	150...180	SS	8	6					E	Colza oil or P
		S_1	5	6	50	40	32	27		
C.I.20,C.I.25	hardness Brinell 200...250	SS	8	0		32	18	13	dry or E	dry
		H_1	5	0	106	90	75	63		
Copper alloys	hardness Brinell 80...120	SS	8	0		125	85	56	dry,EorL	dry
		G_1	5	6	600	530	450	400		
Cast bronze		SS	8	0		63	53	43	E or L	dry
		G_1	5	6	355	280	236	200		
Light alloys aluminium		SS	12	30	400	300	200	118	E or P soap spirit	E or P soap spirit
		G_1	12	30	1320	1120	950	850		
Aluminium alloys (11...13%Si)		SS	12	18	100	67	45	30	E	Oil S II or P
		G_1	12	18	224	190	160	140		
Magnesium alloys*		SS	8	6	1000	900	800	750	dry or with non-combustible oil	dry or with non-combustible oil
		G_1	5	6	1800	1500	1250	1060		
Platics and hard rubber		SS	12	10					dry	dry
		G_1	12	10	300	280	250	224		
Bakelite. Novo-text,Pertinax hard plastic		SS	12	14					dry	dry
		G_1	12	14	280	212	170	132		

* Do not use with water or water mixtures (DANGER OF FIRE!)

Lubrication





1 Headstock (remove cover for oil change)
2 Oil sight glass on headstock
3 Drain plug on headstock
4 Filling screw in gearbox
5 Oil sight glass on gearbox
6 Drain plug on gearbox
7 Grease nipple for carriage
8 Grease nipple for tailstock spindle

9 Grease nipple on cross slide

1o Grease nipple for leadscrew support

11 Grease nipples for change gear bolts

12 Top slide guideway

13 Cross slide guideway

14 Tailstock ram

15 Bed guideways

16 Leadscrew

17 Toothed rack

18 Oil filling and draining screw on the vertical unit

19 Oil sight glass on the vertical unit

2o Pinion of the vertical unit

21 Vertical spindle

22 Vertical column

Lubrication table

Machine part	Lubrication Pos.	Control Pos.	Material	Type of Lubrication	Quantity	Frequency
Spindlestock	1	2	Oil	Oil bath	ap.0,4 l	approx. 500 hours
Gear box	4	5	Oil		ap.0,4 l	
Carriage	7	-	Grease	Greasegun		approx. 24 hours
Tailstock spindle	8	-				
Top slide spindle	9	-				
Leadscrew	10	-				
Change gear bolt	11	-				
Top slide	12	-	Oil	Oil can		Several times a day, especially leadscrew when thread-cutting
Cross slide	13	-				
Tailstock ram	14	-				
Bed guideways	15	-				
Leadscrew	16	-				
Toothed rack	17	-	Grease			approx. 24 hours
Vertical unit	18	19	Oil	Oil bath	ap.0,5 l	approx. 300 hours
Pinion	20	-	Oil	Oil can		Weekly
Spindle	21	-				
Column	22	-				

Recommendations for Lubrication

The machine should be serviced according to the lubrication plan. The temperature referred to with the viscosity data is 40°C (100° F - ISO STANDARD).

1. HEADSTOCK, GEAR BOX

Resistant to aging, non-foaming, corrosion, preventive with good viscosity temperature coefficient.

With normal temperature conditions:

oil with viscosity 46 mm^2/sec. (cSt) at 40°C (100°F).

For example CASTROL HYSPIN AWS 46

For extreme temperatures:

a) under 0°C, viscosity 34 mm^2/sec. (cSt) at 40°C (100°F)

   For example CASTROL HYSPIN AWS 32

b) Over 0°C, oil with viscosity 68 mm^2/sec. (cSt) at 40°C (100° F).

   For example CASTROL HYSPIN AWS 68

2. GUIDEWAYS

Pressure absorbing, Corrosion-protective oil with Stick-Slip reducing qualities.

73 mm^2/sec. (cSt) at 40°C (100°F)

For example CASTROL MAGNA BD 68

This oil corresponds with the Cincinnati-Milling Specifications P47.

3. GREASING POINTS

Lithium-reinforced multi-purpose grease with high dropping point. Penetration approx. 285 (consistency Nr.2)

For example CASTROL SPHEEROL EPL 2

This grease has an operating temperature from -30°C to +110°C.

4. COOLANT

For close tolerance work with high surface quality, combined with long tool use, we recommend emulsions such as

CASTROL CLEAREDGE EP

Recommended mixing ratio 1:30. The transparent microemulsion with EP-additives is extremely resistant to attack by microorganisms. It offers good corrosion resistance, does not stick, does not offend the skin. The smell of this coolant is pleasant.

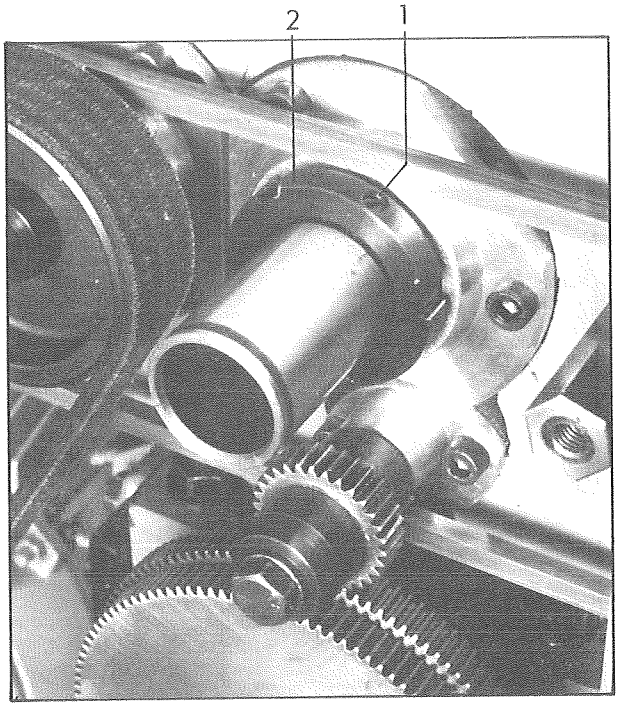
SPECIAL GUIDELINE

The required lubricating oils and greases are available from professional sources (representatives of oil companies).
These recommended oils, resp. greases are basically different from those available at gas stations.

Adjustments

1. ADJUSTMENT OF THE MAIN SPINDLE BEARINGS

The precision main spindle bearings are correctly adjusted and preloaded at the factory, so that the main spindle runs without play. If play becomes evident after considerable use, the bearing must be adjusted.



Adjustment of the Bearings:

Loosen set screw (1), tighten slotted clamping nut (2) clockwise with a "C" spanner. Then re-tighten the set screw again to secure nut.

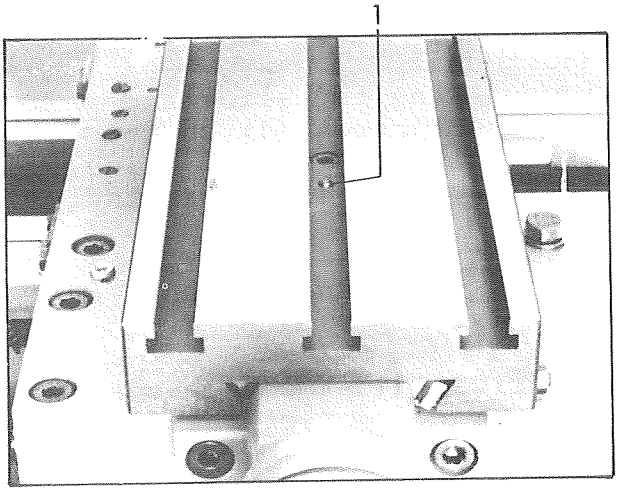
Checking the Correct Adjustment

Disengage sliding gears in the headstock. Set reversing gear into neutral (0) position. If the chuck is turned strongly by hand, then the spindle should make one more free revolution.

Note: Excessive preloading of the bearings will cause unnecessary heating-up and wear of the bearings.

2. COMPENSATING PLAY OF THE CROSS SLIDE SPINDLE IN THE CROSS SLIDE NUT

Necessary when cross slide does not move when the handwheel is turned a certain angle.



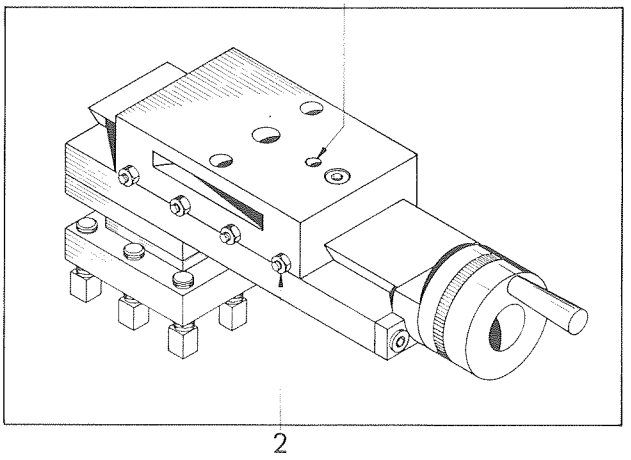
Adjustment:
Dismount the top slide and adjust set screw until backlash is compensated.

Checking:
The cross slide should run smoothly.

Excessive adjustment causes unnecessary wear of the cross slide nut.

3. COMPENSATING PLAY OF THE TOP SLIDE SPINDLE IN THE TOP SLIDE NUT

Cross and top slides are equipped with gibs. Adjustment of play-free guidance is done with the set-screws (1), which press onto the gib via the pressure pins.



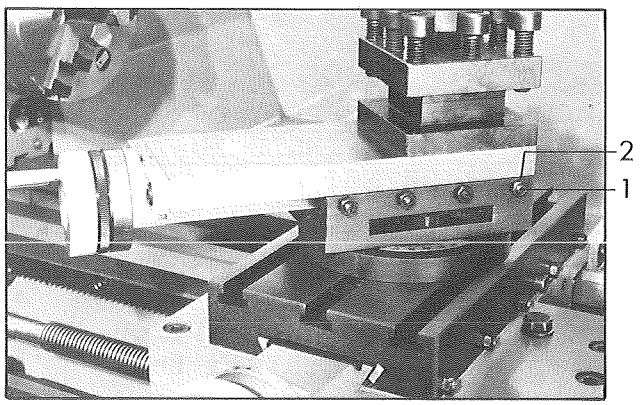
Adjustment:
Dismount the top slide and adjust set screw (1) on the bottom side of the top slide, until backlash is eliminated.

Checking:
The top slide should run smoothly.

Excessive adjustment causes unnecessary wear of the top slide nut.

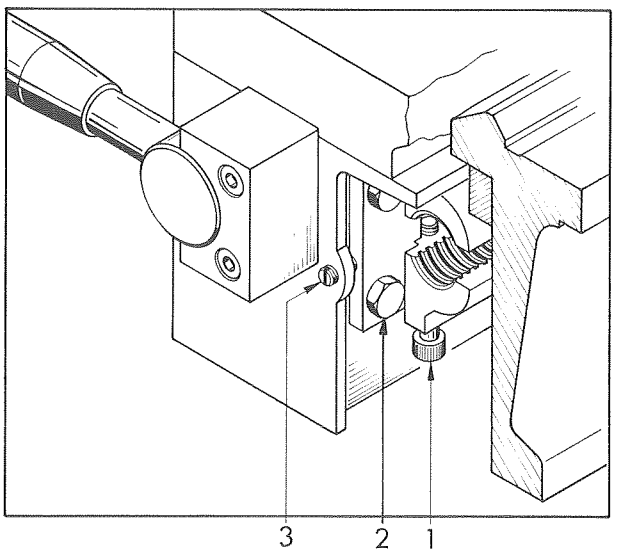
4. ADJUSTMENT OF THE DOVETAIL GUIDEWAYS OF CROSS AND TOP SLIDES

Cross and top slides are equipped with gibs. Adjustment of play-free guidance is done with the set screws(1),which press onto the gib via the pressure pins.
The hexagon nuts (2) are for securing the set screws (countering).



Adjustment:
Loosen hexagon nuts and adjust set screws until slides run without play, but smoothly. When countering hexagon nuts, hold the set screw with a screwdriver in the adjusted position, to prevent further turning of the set screw. Further turning would clamp the slides.

5. COMPENSATING OF TOO MUCH PLAY BETWEEN HALF-NUTS AND LEADSCREW



Unscrew the socket head screw (1) 2 or 3 turns. Engage the half-nut completely with leadscrew by means of half-nut lever.
Now turn in the socket head screw until the other part of the half-nut is touched, but not moved.
Now make a further half turn of the socket head screw and the correct play will exist between half-nut and leadscrew.

Note:
This correct play does not influence the precision of cut threads. Without this play, there is the danger of rubbing and unnecessary wear.

6. ADJUSTMENT OF HALF-NUT GUIDANDE

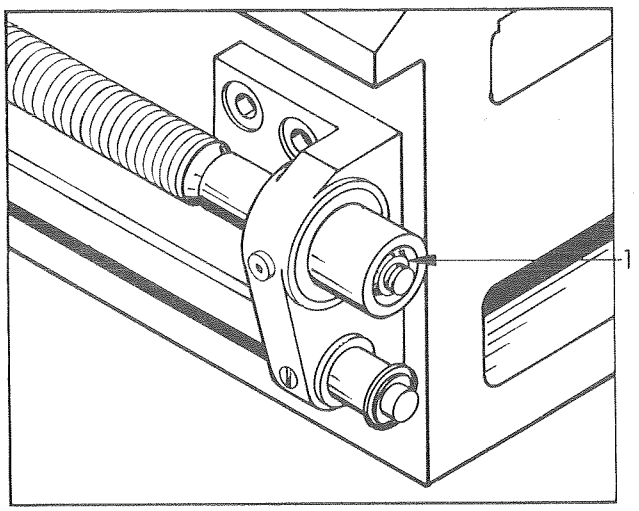
If the half-nut lever turns downwards by itself during thread cutting, the guidance must be adjusted.

Adjustment:
Loosen hexagon head screws (2), adjust set secrew (3). Re-tighten hexagon head screws again.

Checking:
The operation of the half-nut lever must be smooth.

7. ADJUSTING AXIAL PLAY OF THE LEADSCREW

Necessary when the leadscrew can be moved axially by hand.

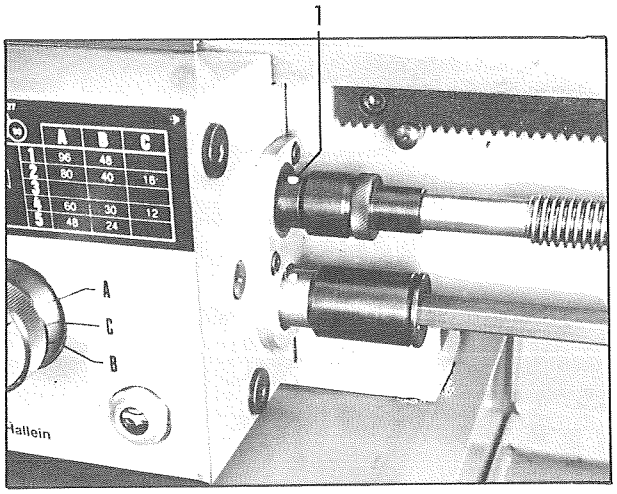


Adjustment:
Adjust the securing nut(1) until the axial play is not more than 0,05 mm (0,002"). For holding the leadscrew when adjusting, engage the half-nut.

Checking:
If you cannot turn the lead-screw by hand, the securing nut is too tight.

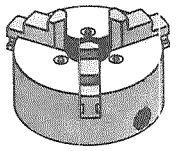
8. REPLACING THE SHEARING PIN (1) ON THE LEADSCREW

If the shearing pin breaks through overloading or in-correct handling of the machine, replace it only with an original shearing pin.

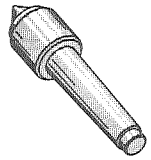


Procedure:
Remove the rest of the shear-ing pin with a punch; insert a new one.

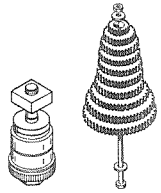
Accessories – Lathe



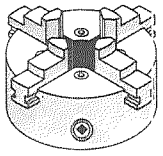
Lathe chuck, self-centering
140 mm (5,5") dia, 2x3 jaws
according to DIN 55021
Ord. No. V3V 336
Set of three soft blanc jaws
Ord. No. T1D 013



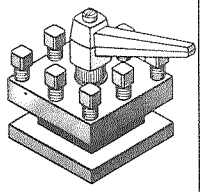
Revolving center MT 2
Ord. No. 732 000



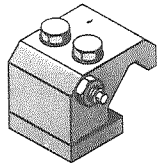
Set of change gears
for cutting additional threads
Ord. No. 584 200



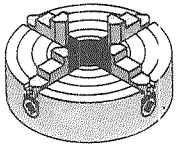
Lathe chuck, self-centering
140 mm (5,5") dia, 2x4 jaws
according to DIN 55021
Ord. No. V3V 338
Set of four soft blanc jaws
Ord. No. T1D 014



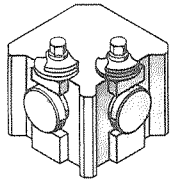
Fourway toolpost
for tools up to max. 12 mm height
Ord. No. 584 190



Longitudinal stop
Ord. No. 584 030



Independent chuck
152 mm (6") dia., with 4 invidually adjustable and reversable jaws, according to DIN 55021
Ord. No. P3E 334

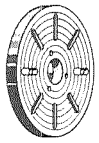


Quick-change toolpost
with toolholders (1 standard toolholder for tools of square section, 1 parting-off toolholder with blade) and 2 operating keys
Ord. No. 544 000

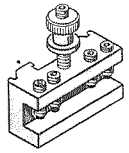
Boring bar holder
for quick-change toolpost, with prism for tools with round section
Ord. No. 511 200

Parting-off holder with blade
for quick-change toolpost
Ord. No. 511 400

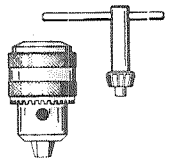
Parting-off blade only
Ord. No. 511 600



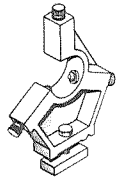
Clamping plate
254 mm dia.
Ord. No. 584 080



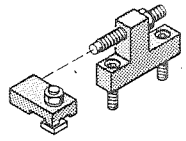
Standard toolholder
for quick-change toolpost, for tools with square section
Ord. No. 511 000



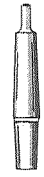
3-jaw drill chuck
1–13 mm capacity
Ord. No. 250 000



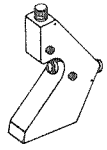
Fixed steady
for workpieces from 4–70 mm dia.
for machine 140 mm
Ord. No. 584 420
ditto, for machine 135 mm
Ord. No. 584 240



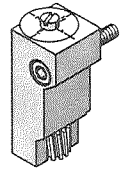
Lateral stop
Ord. No. 548 000



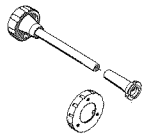
Morse taper arbor MT 2
for 3-jaw drill chuck
Ord. No. 251 000



Travelling steady
for workpieces from 4–60 mm dia.
for machine 140 mm
Ord. No. 584 320
ditto, for machine 135 mm
Ord. No. 584 230

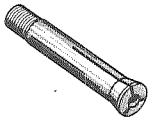


Thread dial indicator
for mounting on the slide
Ord. No. 584 210



Collet holder
DIN 55021, type L 20

Ord. No. 584 040



Set of 37 collets
type L 20, 2–20 mm,
in steps of 0,5 mm

Ord. No. 713 600

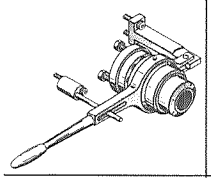
Set of 23 collets
type L 20, $^{3}/_{32}$–$^{25}/_{32}$" in steps of $^{1}/_{32}$"

Ord. No. 713 650

Individual collets

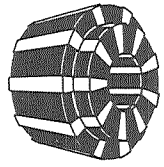
Ord. No. 713 6..*

* Please state sizes when ordering



Quick act. collet chuck
type SSF 20

Ord. No. 584 070



Set of 8 rubberflex collets
4–20 mm, in steps of 2 mm

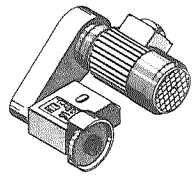
Ord. No. 445 100

Individual rubberflex collets
4–20 mm, steps 2 mm

Ord. No. 445 1..

Ordering example: 445101, 445 102

dia (mm)	4-6	6-8	. . .	18-20
Ord. No.	01	02	. . .	08

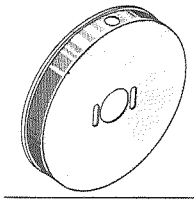


Toolpost grinder (185 Watt)
Ord. No. 584 0 . . *

* Please state voltage and frequency when ordering

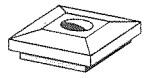
Set of 3 grinding wheels
grit 60/80/100

Ø 80x10xØ20 mm	Ord. No. 585010
Ø 20x10xØ 6 mm	Ord. No. 585020
Ø 45x30xØ20 mm	Ord. No. 585030



Safety lathe dog

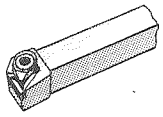
Ord. No. 585 120



Set of 4 levelling elements

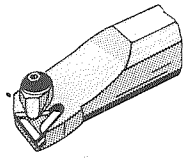
Ord. No. 585 110

Tools – Lathe



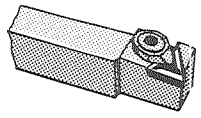
Facing toolholder
to be used with indexable insert
Ord. No. 513 200

Ord. No. 585 210



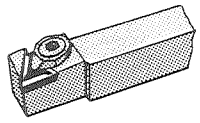
Boring toolholder
to be used with indexable insert
Ord. No. 585 260

Ord. No. 585 220



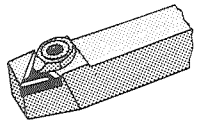
Turning toolholder left
to be used with indexable insert
Ord. No. 513 200

Ord. No. 585 230



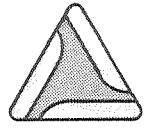
Turning toolholder right
to be used with indexable insert
Ord. No. 513 400

Ord. No. 585 240



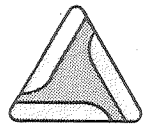
Roughing toolholder right
to be used with indexable insert
Ord. No. 513 400

Ord. No. 585 250



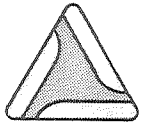
Set of 10 carbide tips
indexable inserts left

Ord. No. 513 200



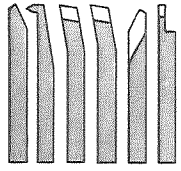
Set of 10 carbide tips
indexable inserts right

Ord. No. 513 400



Set of 10 carbide tips
indexable inserts for boring toolholder

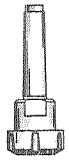
Ord. No. 585 260



Box of 6 ground SS Tool bits

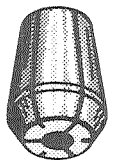
Ord. No. 585 200

Accessories – Vertical Milling and Drilling Unit



Collet holder MT2
with key for double conical collets E25

Ord. No. 721 000



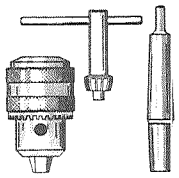
12 double conical collets E 25
metric type, in sizes 2–13 mm, in steps of 1 mm
Ord. No. 242 100

25 double conical collets E 25
metric type, in sizes 2–14 mm, in steps of 0,5 mm
Ord. No. 242 101

17 double conical collets E 25
inch type, in sizes 1/16"–9/16", in steps of 1/32"
Ord. No. 242 145

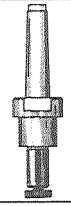
7 double conical collets E 25
inch type, in sizes 1/8"–1/2", in steps of 1/16"
Ord. No. 242 150

Individual double conical collet E 25
* Please state sizes when ordering Ord. No. 242 1..*



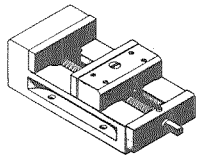
3-jaw drill chuck
1–13 mm capacity
Ord. No. 250 000

Morse taper arbor
MT 2, for drill chuck
Ord. No. 251 000



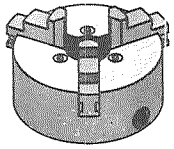
Shell end mill arbor
with MT 2, to suit 16 mm cutter bore dia.

Ord. No. 763 000

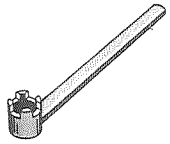


Machine vice
width of jaws 110 mm, max. opening 110 mm, can also be mounted without swivel base

Ord. No. 761 310

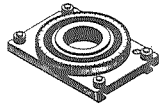


Lathe chuck, self-centering
140 mm (5,5") dia, 2 x 3 jaws, according to DIN 55021
Ord. No. V3V 336
Set of three soft blanc jaws
Ord. No. T1D 013



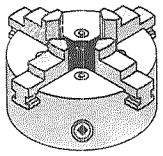
Spanner
for shell end mill arbor

Ord. No. 763 900

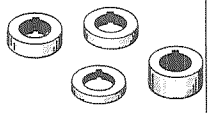


Swivel base
for use with machine vice

Ord. No. 761 320

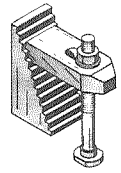


Lathe chuck, self-centering
140 mm (5,5") dia, 2 x 4 jaws according to DIN 55021
Ord. No. V3V 338
Set of four soft blanc jaws
Ord. No. T1D 014



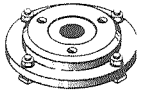
Set of 4 spacing collars,
hardened and ground, for shell end mill arbor, 4 mm, 6 mm, 8 mm and 12 mm

Ord. No. 763 100



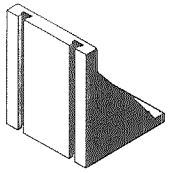
Stepped clamping shoe
complete with clamping bolt, gripping capacity to 60 mm

Ord. No. 465 100

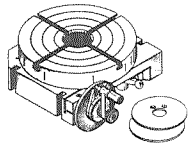


Support backplate
125 mm dia., for mounting lathe chuck to cross slide, milling table or angle plate

Ord. No. 584 250

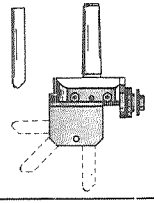


Angle plate
dividing head, swivel base, stepped clamping shoes, machine vice and lathe chuck can be mounted onto the angle plate by using the support backplate Ord. No. 760 020



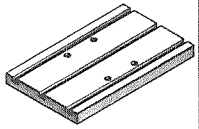
Dividing head
with circular table for direct and indirect dividing, circular table 150 mm dia.

Ord. No. 745 000



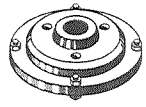
Boring and facing head
(fly cutter) in box with toolholder, cutter 6x6x40 mm and servicing tools

Ord. No. 525 330



Milling table
can be mounted on cross slide for fixing angle plate or for clamping large-surfaced work-pieces (400x230 mm)

Ord. No. 565 350



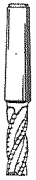
Adaptor plate
125 mm dia., for mounting the lathe chuck to the dividing head

Ord. No. 584 170

Tools – Vertical Milling and Drilling Unit

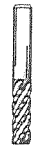
25 twist drills, HSS
in box, DIN 338, 1–13 mm,
in steps of 0,5 mm

Ord. No. 764 000



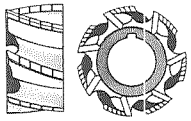
Heavy-duty taper shank
end mill
for roughing cut, shank MT 2,
draw-in screw thread M 10, dia.
of cutter 15 mm HSS

Ord. No. 764 100



Heavy-duty straight
shank end mill,
for roughing cut, cylindrical
shank, dia. of cutter 8 mm, HSS

Ord. No. 764 200

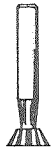


Heavy duty shell end mill
with spiral for roughing/
finishing, bore 16 mm, length
20 mm, dia. of cutter 40 mm,
HSS (DIN 841, 7 teeth)

Ord. No. 764 410

End mill cutter, HSS
with cylindrical shank

Ø 3 mm	Ord. No. 764 301
Ø 4 mm	Ord. No. 764 302
Ø 5 mm	Ord. No. 764 303
Ø 6 mm	Ord. No. 764 304



Dovetail mill, HSS
with cylindrical shank 12 mm dia.,
60°, 16 mm dia.

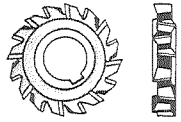
Ord. No. 764 400

T-slot cutter, HSS
with cylindrical shank, dia. 10 mm
for T-slot 12,5x6 mm

Ord. No. 764 510

ditto, for T-slots 16x8 mm

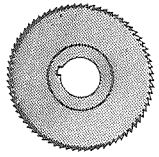
Ord. No. 764 520



Staggered tooth side
mill, HSS
bore 16 mm, width 5 mm, dia.
of cutter 35 mm, HSS

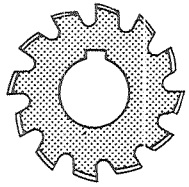
Ord. No. 764 900

ditto, width 6 mm, dia. of cutter
50 mm, HSS Ord. No. 764 910



Circular saw blade
fine tooth, bore 16 mm, width
0,8 mm, dia. 60 mm

Ord. No. 123 100



8 gear mills
relieved, for 20° pressure angle,
bore 16 mm, dia. of cutters 40 mm,
HSS, module 0,5, mill no. 1–8

Ord. No. 764 600

8 gear mills
relieved, for 20° pressure angle,
bore 16 mm, dia.
of cutters, 50 mm, HSS module 1,
mill no. 1–8

Ord. No. 764 700

8 gear mills
relieved, for 20° pressure angle,
bore 16 mm, dia. of cutters
50 mm, HSS, module 1,25, mill
no. 1–8 Ord. No. 764 800

Individual gear mill
module 0,5

Ord. No. 764 6.

Individual gear mill
module 1

Ord. No. 764 7.

Individual gear mill
module 1,25

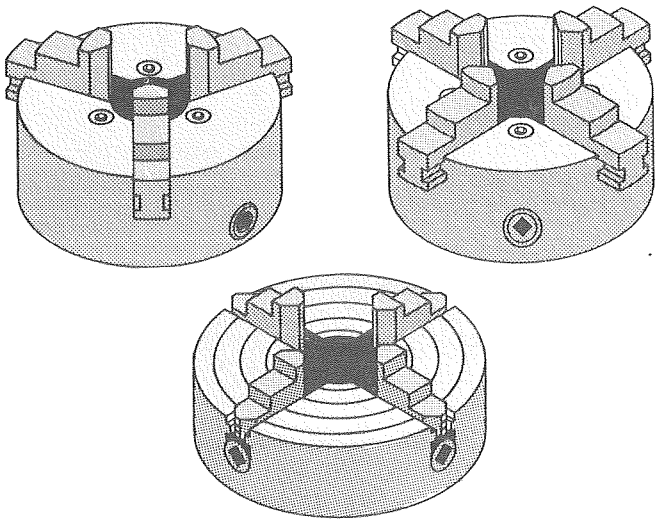
Ord. No. 764 8.

Ordering Example: . . 764 601,
764 602

Teeth:	12–13	14–16	17–20	21–25
Order No.:	01	02	03	04

Teeth:	26–34	35–54	55-134	135–∞
Order No.:	05	06	07	08

Mounting – Working Tips



THE 3-JAW CHUCK

Self-centering, dia. 125 mm (5")

For centrical clamping of round, three-sided and six-sided workpieces.

Mounting

Insert the shorter threaded end of the three taped bolts into the chuck. Tighten the chuck with the hexagon nuts on the spindle nose.

Exchanging the Chuck Jaws

Each chuck is provided with a set of internal and external jaws. When exchanging the jaws, note, that jaw no.1 is placed in groove no.1, jaw no.2 in groove no.2 etc.

Clamping the Workpiece

One pinion is marked with a zero (O). Always tighten workpieces with this pinion; the workpiece is clamped with the highest-running accuracy.

Accident Prevention

Always remove tightening keys (also when machine is not in operation).

Do not reach over rotating chuck.

Be aware of extending jaws.

THE 4-JAW CHUCK

Self-centering, dia. 125 mm (5")

For clamping round, square and octogonal workpieces centrically.

Mounting, etc. - see 3-Jaw Chuck.

THE INDEPENDENT CHUCK

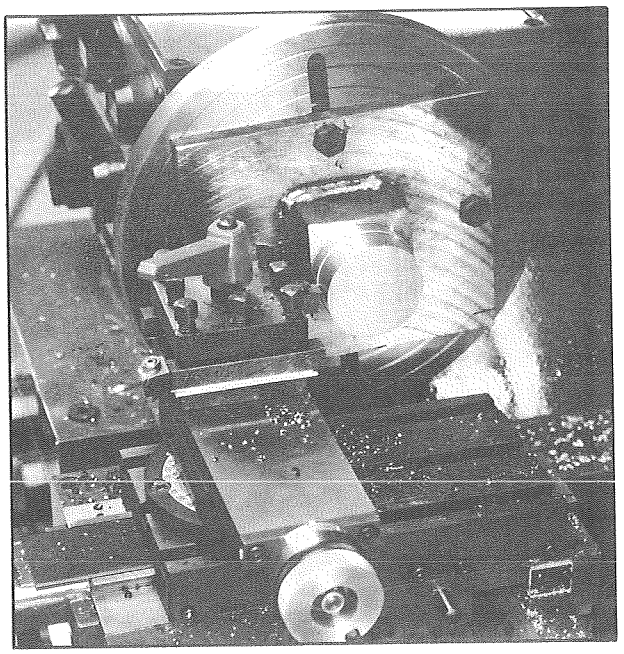
Diameter 152 mm (6")

For both centrical and eccentrical clamping. Each jaw can be adjusted individually. The jaws are reversible.

THE CLAMPING PLATE

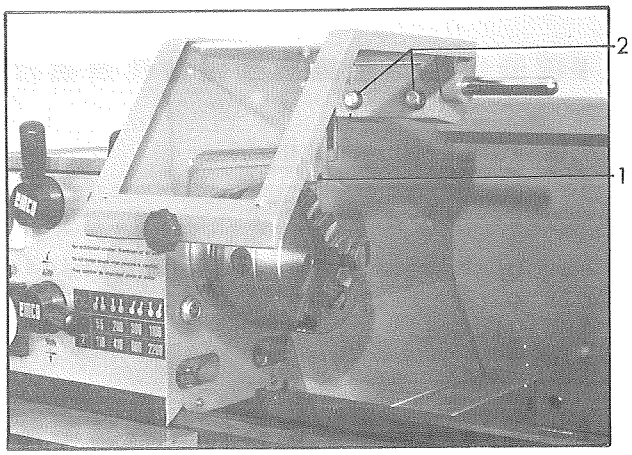
Diameter 254 mm (10")

The workpieces are fixed to the clamping plate with bolts and nuts. When workpieces are mounted unbalanced, mount a counterbalance weight to the clamping plate, especially when you are working with high speeds.



THE CHUCK GUARD

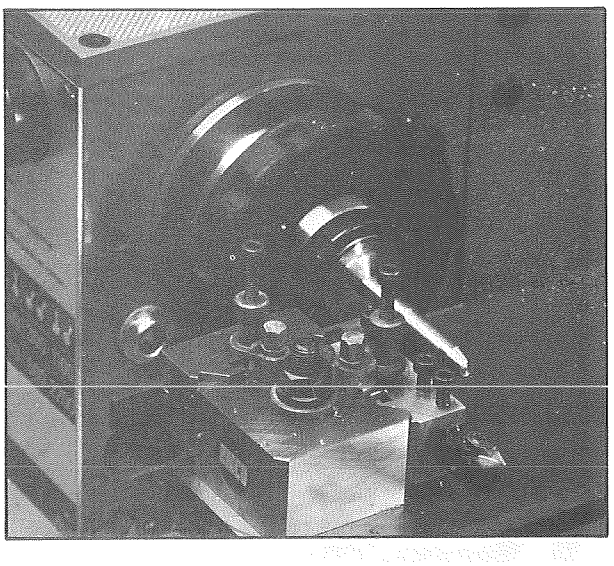
The chuck guard is mounted with two socket head screws (1) to the headstock.
When loosening the two hexagon bolts (2), you can move the chuck guard axially.
The two positions (chuck guard opened and chuck guard closed) are altered by turning clamping body.



Note:
Use chuck guard whenever possible. Before starting the machine, be sure that the chuck guard does not rub against any rotating part.

THE COLLET HOLDER

With the collets workpieces can be clamped with highest round-run accuracy.
Even on the softest workpieces, there are no pressure points made by the collets.



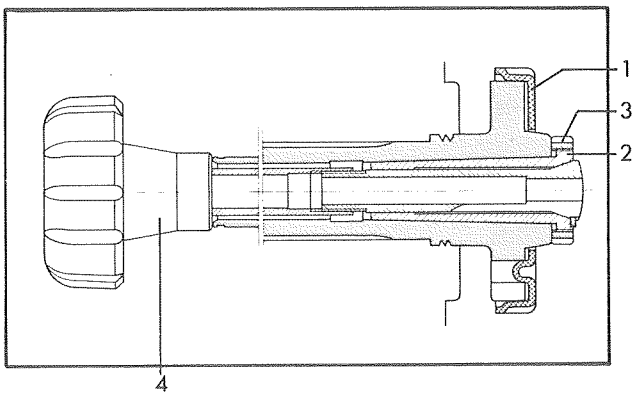
Collets Type L20 necessary.

Clamping capacity of the collets is from 2 - 20 mm dia. in steps of 0,5 mm or 3/32" - 25/32" in steps of 1/32".

Note:
The clamping diameter is engraved on each collet. Workpieces with other diameters may not be clamped.

Mounting

Put the holding ring (1) onto the spindle nose and insert the reduction sleeve (2) into the spindle. The pressure nut (3) must not touch the spindle nose.



Clamping the workpieces

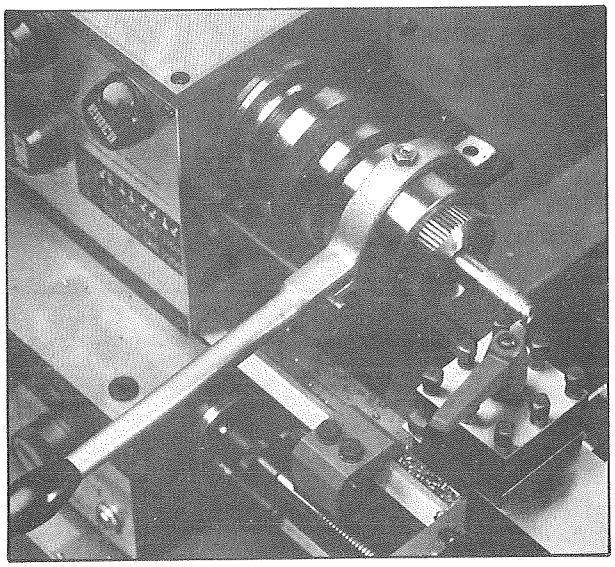
Insert workpiece into the collet and tighten with the draw bar (4). The holding ring serves for holding the spindle while tightening the workpiece with the draw bar.

Dismounting the reduction sleeve

Turn the pressure nut towards the spindle with the hook wrench; through this, the reduction sleeve is ejected.

THE QUICK-ACTION COLLET CHUCK

Type SSF 20



The quick-action collet chuck is used primarily for serial work. Workpieces can be mounted and dismounted without stopping the machine.

Collets

Rubber-flex collets

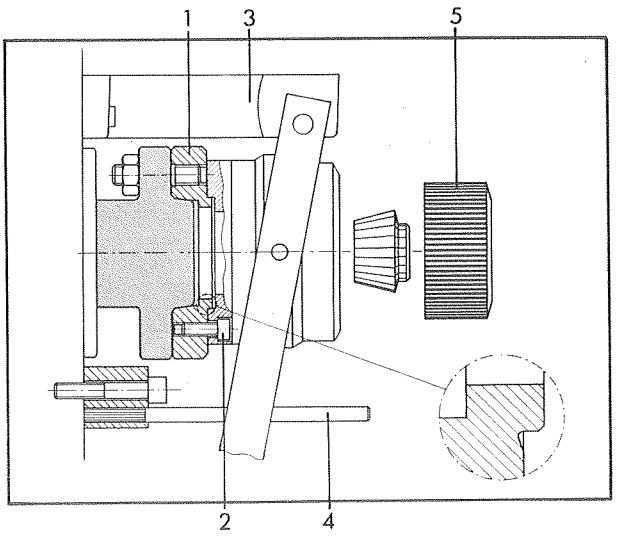
Each rubber-flex collet has a clamping capacity of 2 mm diameter (0,08"). These collets can be obtained in a set of 8 pieces (total clamping capacity 4 - 20 mm, 0,15" - 0,80") or individually (capacity 4 - 6 mm, 6 - 8 mm etc. - see catalog).

Mounting the quick-action collet chuck

1. Mount the backplate (1) onto the main spindle with the stud bolts and the hexagon nuts. Turn the centering diameter to the exact measurement. The quick-action collet chuck must fit onto the backplate without play. Afterwards turn the face of the backplate smooth.

2. Mount the collet chuck with the socket head screws (2) onto the backplate. If the socket head screws cannot be placed, turn the serated ring counterclockwise, but do not dismount the ring.

3. Place the bracket (3) with its groove onto the pin of the spanner and fix it with the two socket head screws to the headstock. Insert the bolt (4) into the groove of the spanner and mount it also to the headstock.



Mounting the rubber-flex collets

Dismount the serated ring (5) by turning it counterclockwise and insert the required rubber-flex collet.

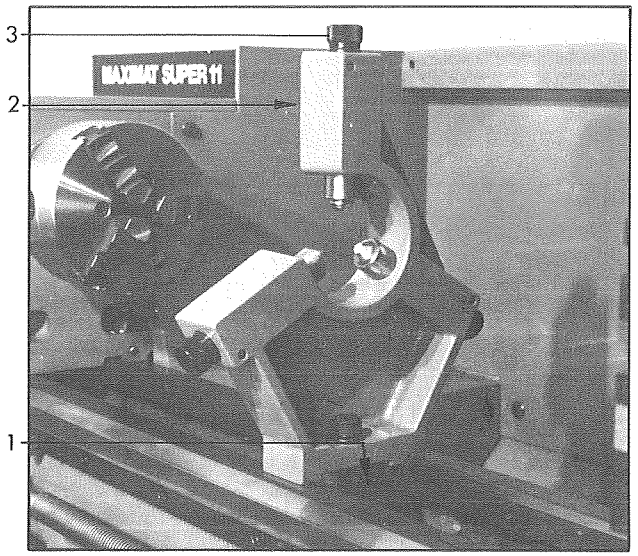
Clamping the workpiece

Insert workpiece into rubber-flex collet. Turn the serated ring (5) clockwise, until the workpiece is clamped tightly, when the clamping lever is swivelled toward the front.

THE FIXED STEADY

Maximum size of workpiece held:
70 mm (2,75")
Minimum size of workpiece held:
4 mm (0,15")

With some types of work (drilling, internal turning etc.) the tail-stock cannot be used for supporting the workpiece. In such cases the fixed steady is used to support and center the workpiece.



Mounting

Mount the fixed steady on the lathe bed with the clamping plate (1), washer and hexagon head screw.

Adjusting the slide-blocks to the workpiece

Loosen the clamping screws (2) and adjust the slide-blocks to the workpiece via the knurled screws (3), so that the workpiece is centered. The slide-blocks must be set against the workpiece to be play-free, but must not clamp the workpiece.
Fix the slide-blocks with the clamping screws.

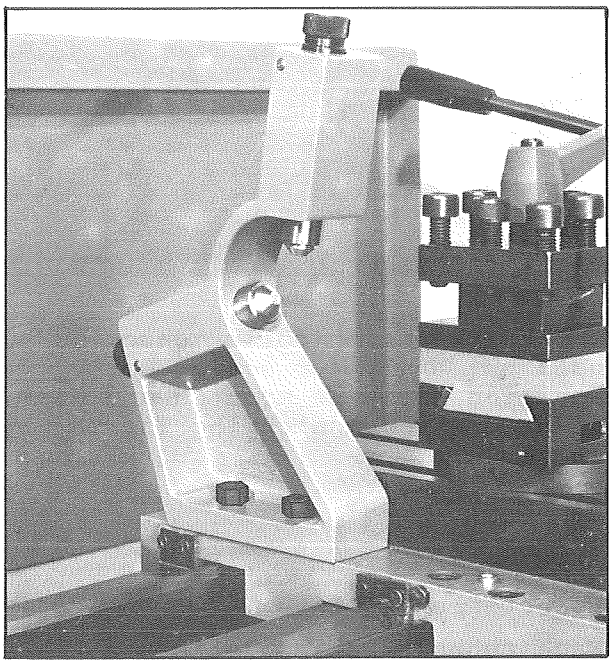
Working Tip

Continually lubricate sliding points with oil.

THE TRAVELLING STEADY

For cylindrical workpieces from 4 - 60 mm diameter (0,15"-2,35").

Narrow workpieces would bend through the pressure of the turning tool. The travelling steady prevents this spring-like action. The travelling steady is mounted on the longitudinal slide and therefore moves along with the turning tool.



Mounting

Remove two set screws M8 from the longitudinal slide and mount the travelling steady with the two washers and hexagon screws.
When dismounting the travelling steady, replace the set screws. Through this, the ingress of dust/swarf is prevented.

Adjusting the slide-blocks

When setting the slide-blocks, note that the workpiece is not defected. Do not forget to clamp the guide pins before starting work.

Working Tip

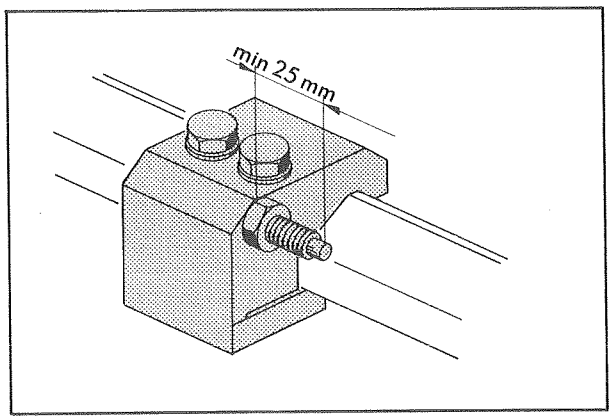
Continually lubricate between slide-blocks and workpiece.

THE LONGITUDINAL STOP

Practical Use:

1. Turning to a dead length with a high repeatable accuracy.
   With the automatic feed you can also turn toward the longitudinal stop, enabled by the slipping clutch on the feed shaft.

2. It is recommended that not very experienced operators use the longitudinal stop to prevent accidental collisions of the turning tools, slides with the rotating chuck, etc.

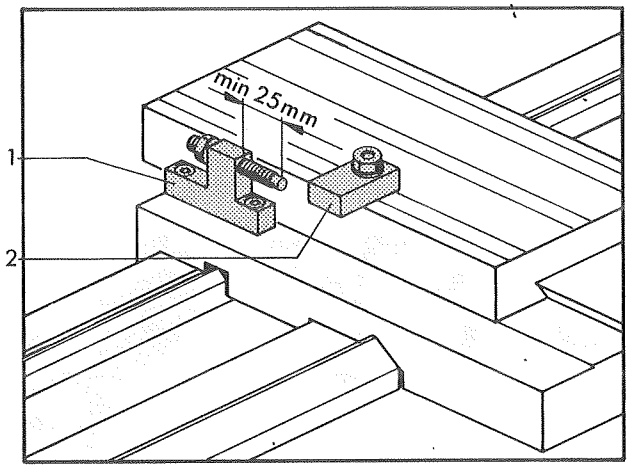


Mounting

Clamp the longitudinal stop with the two hexagon screws on the front of the front Vee of the lathe bed.

THE LATERAL STOP

With the lateral stop you can also turn to a dead length and prevent accidental collisions. If you turn with the automatic feed toward the stop, the slipping clutch is activated.



Mounting

1. Remove the two set screws from the longitudinal slide and stop element (1) with the two socket head screws.
   Note: When dismounting the lateral stop, the two set screws should be re-inserted to prevent the ingress of swarf,etc.

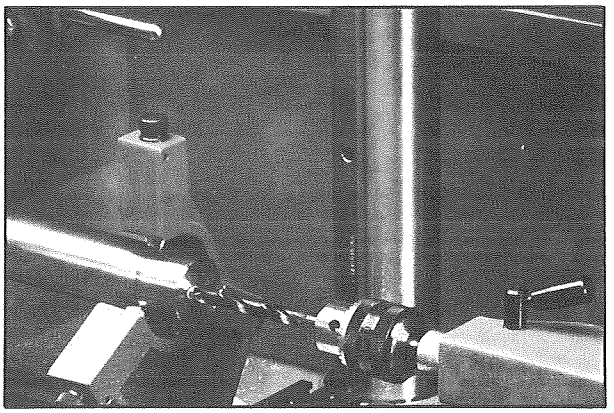
2. The stop (2) is mounted with the T-nut screw, washer and hexagon nut on the cross slide in the required position.

ACCIDENT PREVENTION

The stop bolt of the longitudinal and lateral stops must be clamped so that the distance between the stop element and the bolt ends is at least 25 mm (1").

THE DRILL CHUCK

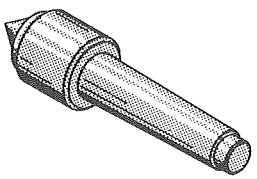
The morse taper arbor is required for mounting the drill chuck. Clamping capacity 1 - 13 mm (0,04"-5").



The drill chuck serves for clamping twist drills and center drills. Feed is achieved by turning the tailstock handwheel. Accurate feed is enabled by the scale on the pinion and the graduated scale ring on the tailstock handwheel.

THE REVOLVING CENTER

When working at speeds over 500 rpm., it is highly recommendable to use the revolving center.



THE TURNING TOOLS

Cross section: 12 x 12 mm

SET OF 6 GROUND SS-TOOLS

1 roughing tool, right, for removing a large amount of material in a short time

1 planing tool, right, to obtain a smooth surface

1 facing tool

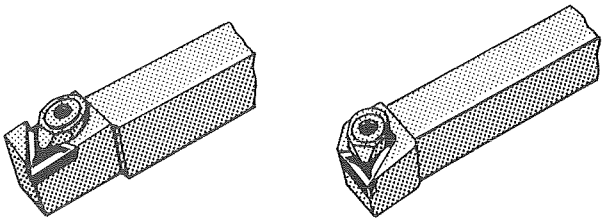
1 side tool, right

1 parting-off tool, for grooving and parting-off workpieces

1 external thread cutting tool, 60°

Note:
Only correctly sharpened turning tools guarantee optimum turning results.

THE TURNING TOOLHOLDER FOR CARBIDE TIPS



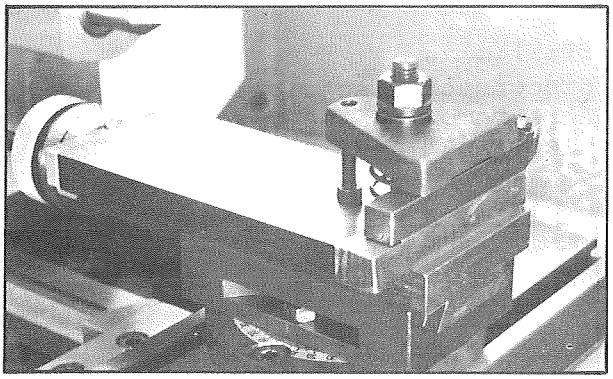
Carbide tips are considerable more wear-resistant than the SS tools.

They must not be sharpened. Each carbide tip has 3 cutting edges on each side. If one cutting edge is worn or broken, turn the carbide tip 120° and reclamp.

The turning toolholders and their corresponding carbide tips are illustrated and described in the catalog.

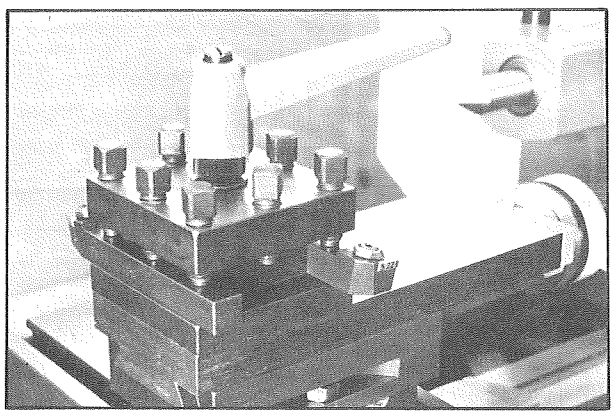
CLAMPING THE TURNING TOOLS

Turning tools have to be clamped so that the main cutting edge is at exact center height. Therefore with the single toolholder and the fourway toolpost, metal sheets with the required thickness must be placed under the tools.
Distance from top slide to center height: 23 mm (0,9").



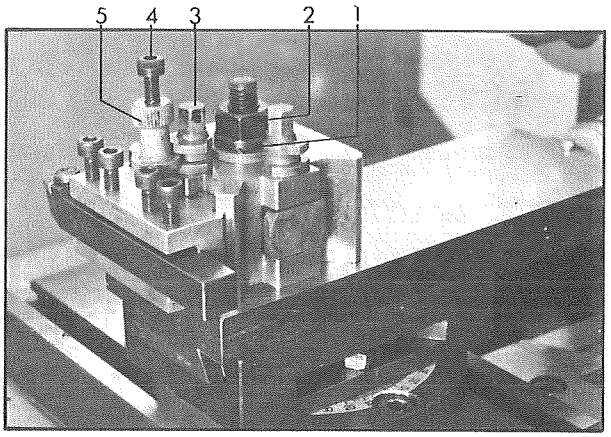
THE FOURWAY TOOLPOST

The fourway toolpost is placed on the top slide and fixed with the reversible clamping lever. To reset the clamping lever, lift it and turn to the convenient position.



THE QUICK-CHANGE TOOLPOST

With the quick-change toolpost, tools can be adjusted to center height simply and changed quickly.



Mounting

1. The basic element is placed onto the centering bolt of the top slide and tightened with the collar bush (1) and the hexagon nut (2).

2. Turn the clamping bolt (3) counterclockwise and insert the toolholder from the top.

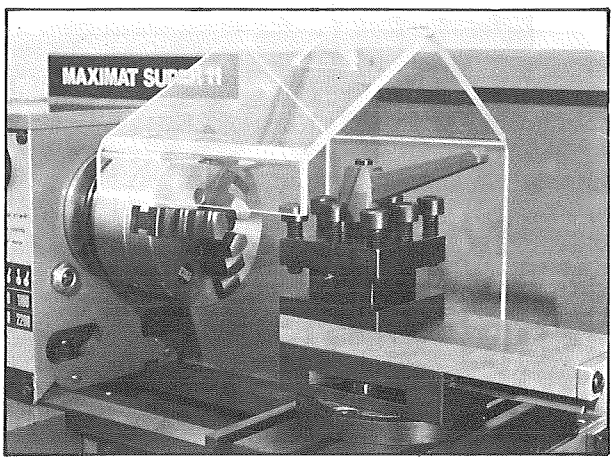
3. Loosen the socket head screw (4) and turn the knurled nut (5) until the main cutting edge of the tool is at exact center height. By retightening the socket head screw (4), the knurled nut is countered.

4. Clamp the toolholder with the clamping bolt (turning it clockwise).

Note:
Clamp the tools with as little overhang as possible. If the tools extend too far, they are deflected by the cutting pressure and would cause an irregular workpiece surface.

THE CHIP GUARD

For assembly instructions, see spare parts list.



Mounting to longitudinal slide

Remove the two set screws from the longitudinal slide and mount the chip guard with the two socket head screws.

The two set screws on the longitudinal slide prevent the ingress of swarf, etc. and should be replaced again when chip guard is dismounted.

THE COOLANT EQUIPMENT

Assembly instructions are packed with the coolant equipment.

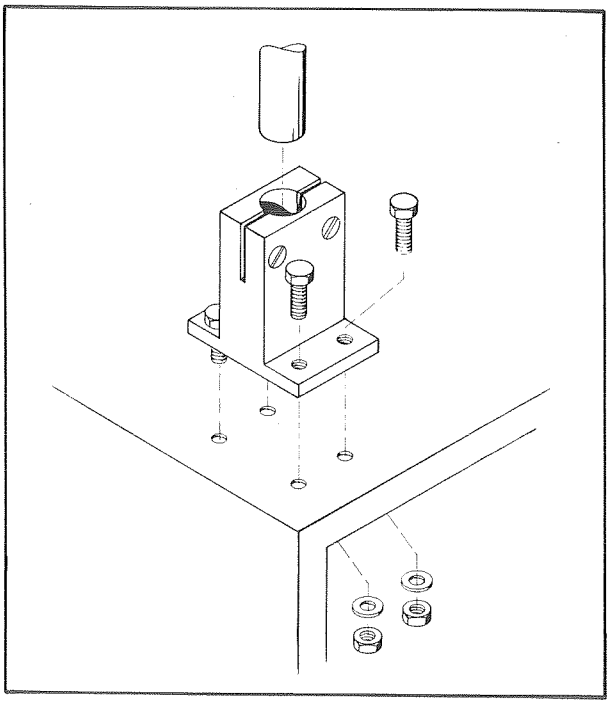
Clamp the flexible metal hose to the cross slide with the T-nut screw and hexagon nut.
Electrical connection, see page 11 - 13.

MOUNTING THE MACHINE LAMP

Open the cover of the electrical housing, remove the 4 plugs on the top of it. Mount the holder with the hexagon nut screws, washers and bolts. Insert the lamp into the holder and tighten it in the required position.
Electrical connection of the machine lamp, see page 11 - 13.

Safety tip

Disconnect electrical supply before removing the cover of the electrical housing.



The Toolpost grinder

Technical Data

Spindle speeds: 13,ooo rpm
10,ooo rpm
7,ooo rpm

Distance between mounting base and grinding base 23 mm
(o,9")

Motor: IEC-Standardized motor,

Motor capacity: 185 Watt

Intermittant Duty: 6o%

Dust- and splashproof according to: IP 54

Grinding wheels - Speeds

Straight grinding wheel for outside grinding: dia. 8o x 1o x 2o mm

Corresponding speed: 7,ooo rpm

Straight grinding wheel for internal grinding: dia. 2o x 1o x 6 mm

Corresponding speed: 13,ooo rpm

Cup grinding wheel for face grinding: dia. 45 x 3o x 2o mm

Corresponding speed: 1o,ooo rpm

Equipment

Toolpost complete with drive motor power supply cable, grinding arbors, service tools and a set of 3 grinding wheels, grit 8o.

Electrical Connection

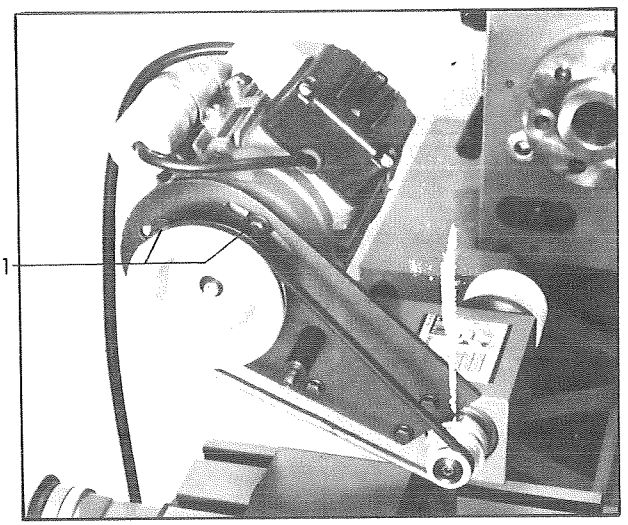
There is no connection strip for the toolpost grinder in the electrical housing of the lathe. Connect it to a separate plug (single-phase). The plugs must be provided with a grounding contact.

Mounting the Toolpost Grinder

Dismount the toolholder and fix the toolpost grinder on the top slide with the hexagon nut. Axis of grinding spindle and lathe must be parallel.

Adjustment of Spindle Speeds

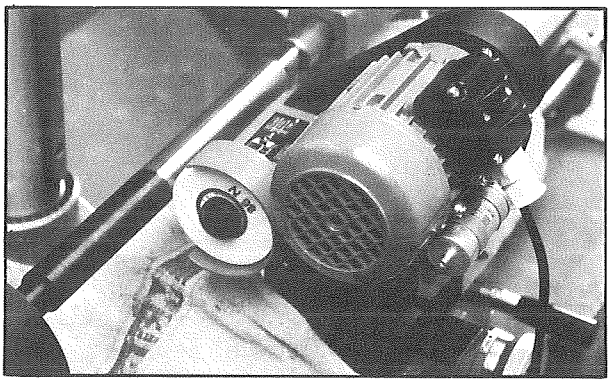
There is a speed plate mounted on the main base which shows the belt positions with the corresponding speeds.



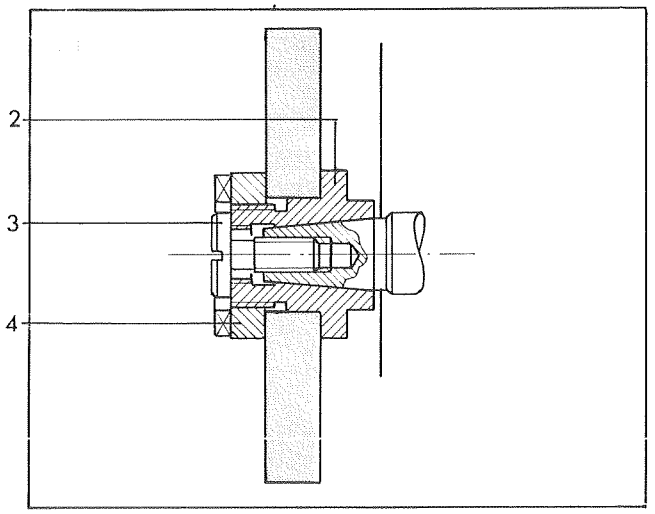
1. Dismount the belt guard and loosen the two hexagon bolts (1).
2. Swivel motor toward the front and shift belt to the position for the required speed.
3. Swivel motor toward the back and clamp the motor so that the belts are tensioned correctly and tighten the two hexagon bolts.
Remount belt guard.

Mounting the Grinding Wheels

Straight grinding wheel:
dia. 8o x 1o x 2o mm
Cup grinding wheel:
dia. 45 x 3o x 2o mm

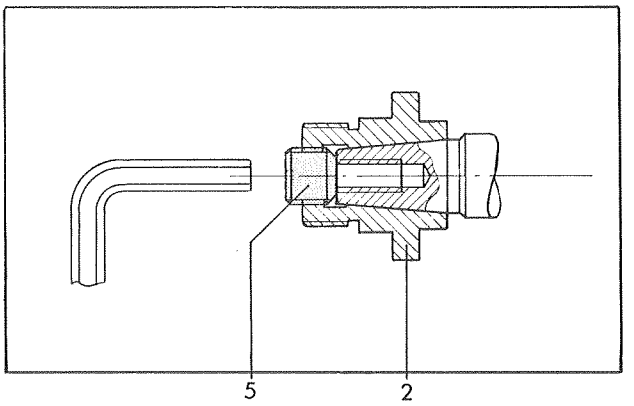


1. Mount wheel guard.
2. Fix the wheel arbor (2) with the tensioning screw (3). The key face on the belt pulley serves for counter-holding.
3. Mount the grinding wheel onto the arbor and tighten it with the nut (4). The key face on the arbor serves for counter-holding.



Dismounting the Arbor (2) from the Grinding Spindle

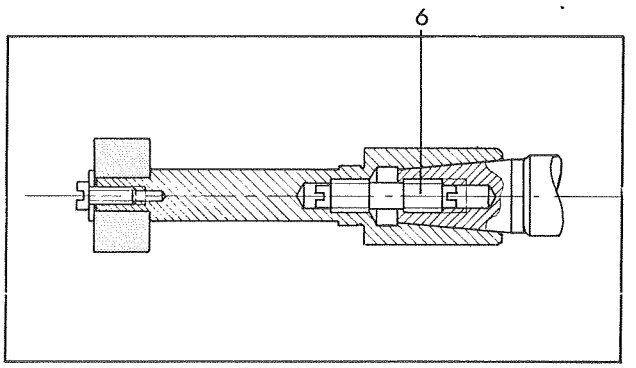
Turn the pressure screw (5) into the inside thread of the arbor; this causes the arbor to be ejected. The key flats on the belt pulley serve for counter-holding.



Mounting the Internal Grinding Arbor

1. Turn the stud (6) into the grinding spindle.
2. Screw the arbor onto the extending end of the stud so that it fits tightly on cone of the grinding spindle. The key flats on the arbor and on the belt pulley serve for tightening.

The grinding wheel is mounted as illustrated.



Accident Prevention

Always wear eye protection during grinding.

Never work without pulley and disc guards.

Read instructions carefully before mounting discs.

Grinding discs must be stored so that they are protected from any possible impact.

The bore of the grinding wheel may not be further enlarged, as this would cause breakage.

A reasonance test should be carried out before mounting the grinding wheel.

Before using a new grinding disc, a test run should be carried out.

Dress discs which run out of balance.

Follow general rules for Accident Prevention.

Important Tips:

Speed of the workpiece: max.11o rpm

Feed of the Toolpost Grinder should be approximately 2 mm (o,1") per revolution of the workpiece clamped in the lathe.

Dress grinding wheels.

The guideways of the lathe must be carefully covered before grinding. The grinding dust would damage the precision guideways.

Thread Cutting

The pitches which can be cut without the change gear set are indicated on the cover of the gearbox.

For thread cutting, only the leadscrew is used; it is engaged for this purpose.

A thread is cut in several work operations. The half-nut is not disengaged at the end of the thread, as it would then be difficult to find the cut thread path again without the thread dial indicator. For this reason, at the end of a thread, the cross slide is turned back. By switching the direction of motor revolution, the longitudinal slide is again brought back to the beginning position.

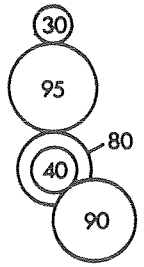
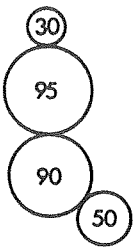
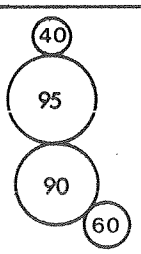
The number of thread pitches, the type of pitch (Module, Diametral, etc.) and the range of pitches can be increased as required with the set of change gears.

The following charts indicate all standard pitches which are required.

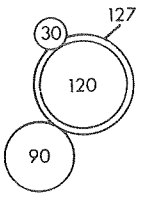
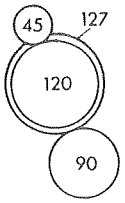
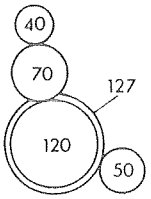
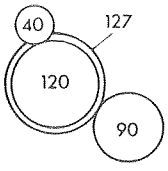
Calculating special pitches is not always easy, even for experienced machinists.
If such pitches are required, our technicians would be glad to be of assistance in the calculation upon request.

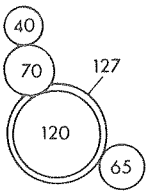
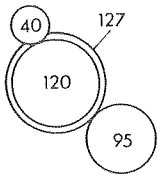
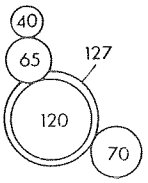
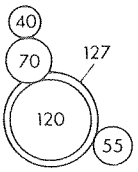
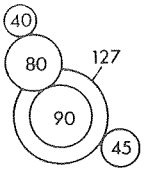
Additional threads and pitches with change gear set (metric machine)

1. ADDITIONAL METRIC THREADS ON METRIC MACHINE:

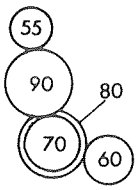
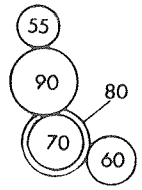
	Pitch (mm)	Lever Position
	0,125 0,15 0,175 0,2 0,75	A1 A2 A3 A4 C2
	0,45 0,9 2,25 4,5	A1 A5, B1 C1 C5
	3,0 3,5 4,0 5,0	C2 C3 C4 C5

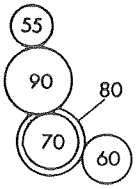
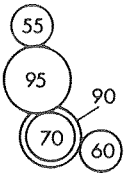
2. ADDITIONAL INCH THREADS ON METRIC MACHINE:

	Pitch (TPI)	Lever Position
	12	C3
	16	C2
	24	B5
	30	B4
	40	B2
	48	B1, A5
	60	A4
	80	A2
	96	A1
	32	B1, A5
	64	A1
	4	C5
	5	C4
	8	C1
	10	B5
	20	B1, A5
	9	C4
	18	B5
	36	A5, B1
	72	A1

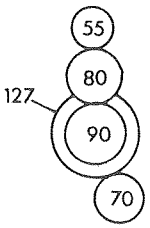
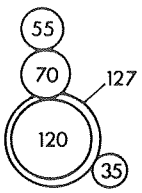
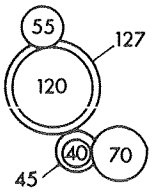
	Pitch (TPI)	Lever Position
	6 1/2	C4
	13	B5
	26	B1, A5
	52	A1
	9 1/2	C4
	19	B5
	38	B1, A5
	76	A1
	7	C4
	14	B5
	28	B1, A5
	56	A1
	5 1/2	C4
	11	B5
	22	B1, A5
	44	A1
	27	A1
	4 1/2	C2

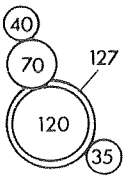
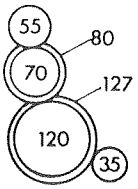
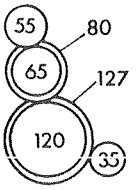
3. MODULE PITCHES ON METRIC MACHINE:

	Modul	Lever Position
	0,25 0,3 0,4 0,5	A1 A2 A4 A5, B1
	0,7 1,0 1,25 1,5	B3 B5 C1 C2

	Modul	Lever Position
	1,75 2,0 2,5	C3 C4 C5
	2,25	C4

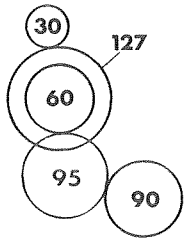
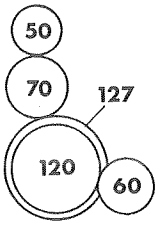
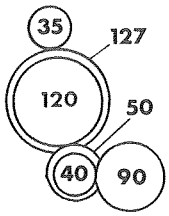
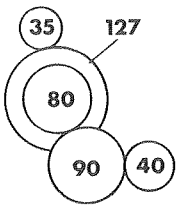
4. DIAMETRAL PITCHES (DP) ON METRIC MACHINE:

	DP	Lever Position
	12 16 24 30 40 48 60 80 96	C4 C2 B5 B4 B2 B1, A5 A4 A2 A1
	20 32 64	B4 B1 A1
	18 36 72	C4 B5 B1, A5

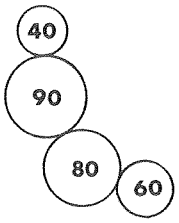
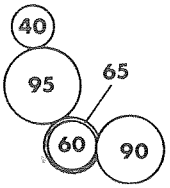
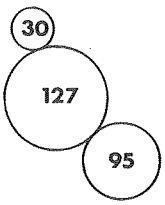
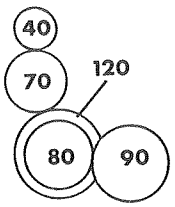
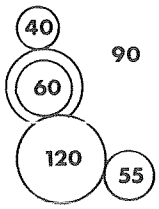
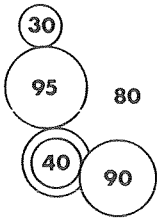
	DP	Lever Position
	11 22 44 88	C4 B5 B1, A5 A1
	14 28 56	B5 B1 A5 A1
	13 26 52	B5 B1, A5 A1

Additional threads and pitches with change gear set (inch type machine)

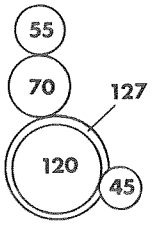
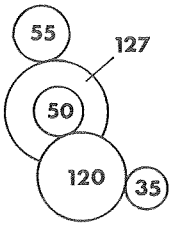
1. ADDITIONAL METRIC THREADS ON INCH TYPE MACHINE:

Gear combination	Pitch (mm)	Lever position	Gear combination	Pitch (mm)	Lever position
	0,25 0,3	A3 A4		1,25 2,5 3 5 6	A3 B3 B4 C3 C4
	0,35 0,4 0,7 0,8	A1 A2 B1 B2		1,75 3,5	B3 C3

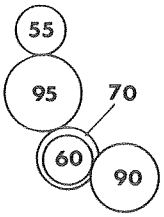
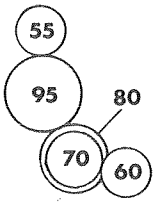
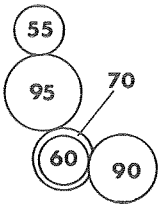
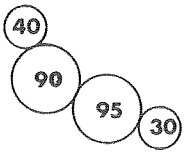
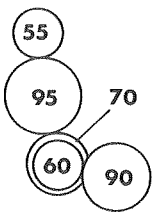
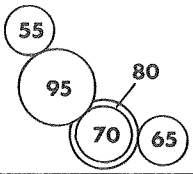
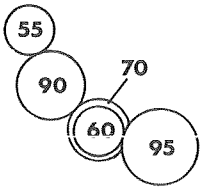
2. ADDITIONAL INCH THREADS ON INCH TYPE MACHINE:

Gear combination	Threads per inch	Lever position	Gear combination	Threads per inch	Lever position
	4 1/2 5 6 7 8	C5 C4 C3 C2 C1		13 26 52	C1 B1 A1
	9 1/2 19 38	C5 B5 A5		27 54	B3 A3
	11 22 44	C1 B1 A1		72 80 96 112 128	A5 A4 A3 A2 A1

3. MODULE PITCHES ON INCH TYPE MACHINE:

Gear combination	Module	Lever position	Gear combination	Module	Lever position
	0,5 0,7 1 1,75 2	A2 A4 B2 C1 C2		1,25 1,5	C3 C4

4. DIAMETRAL PITCHES ON INCH TYPE MACHINE:

Gear combination	DP	Lever position	Gear combination	DP	Lever position
	18 20 24 28 32	C5 C4 C3 C2 C1		9 10 12 14 16	C5 C4 C3 C2 C1
	36 40 48 56 64	B5 B4 B3 B2 B1		11 22 44	C2 B2 A2
	72 80 96 112 128	A5 A4 A3 A2 A1		13 26 52	C3 B3 A3
				19 38 76	C5 B5 A5

Mounting the Change Gears

General:

There should be a small amount of clearance between gears; this does not reduce accuracy.

The number of teeth is engraved on each gear wheel.

EXAMPLE OF MOUNTING (METRIC MACHINE):

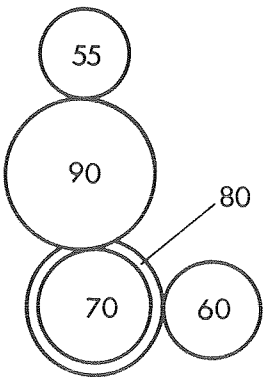
Required thread:

Module thread: m o,5

(actual pitch=

m x π = o,5 x 3,14 =

1,57 mm

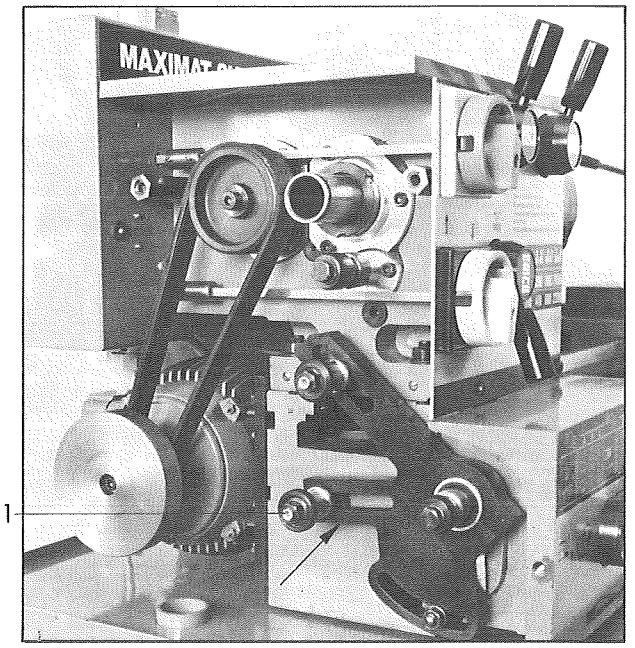


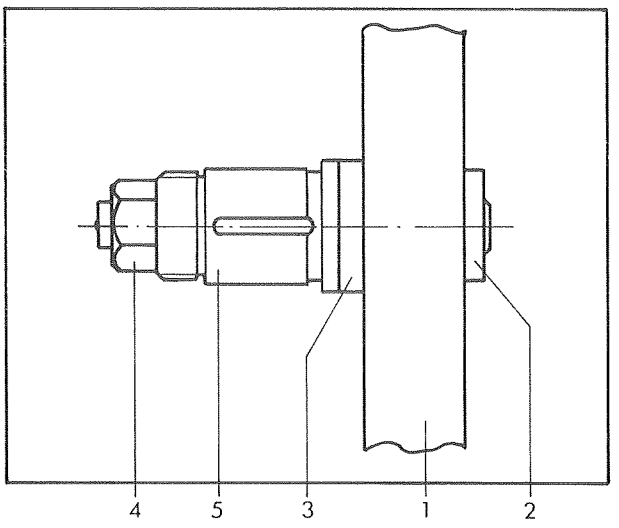
From the chart on page 37 we can see:

1. gear 55 drives gear 9o
2. gear 9o drives gear 7o; gear 7o and gear 8o are on the same bush and therefore have the same speed
3. gear 8o drives gear 6o, which is mounted on the primary shaft of the feed gear
4. levers are switched to positions A5 or B1

Mounting

1. The presently-mounted gears are dismounted. The axis with the change gear set (1) is mounted to the bottom arm of the quadrant (see arrow).





1. quadrant
2. T-nut
3. pressure washer
4. axis
5. bearing bush

2. Gear 55 is mounted onto the spline shaft; gear 6o is mounted onto the primary shaft.

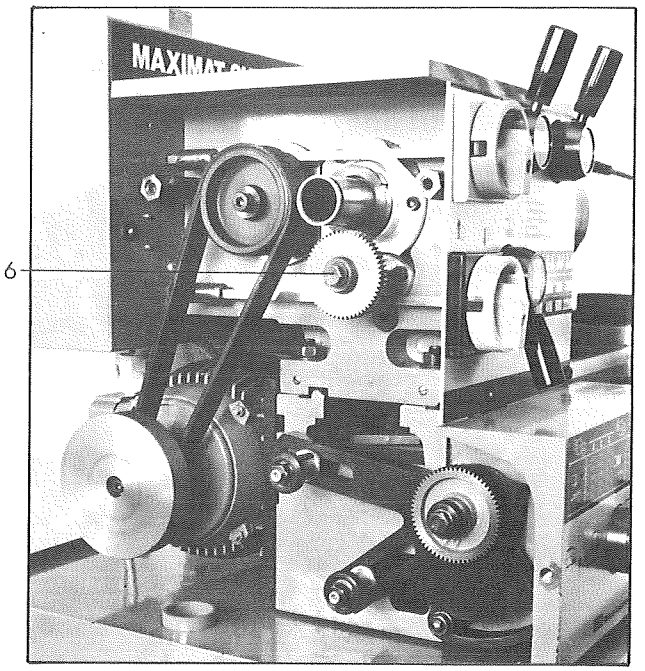
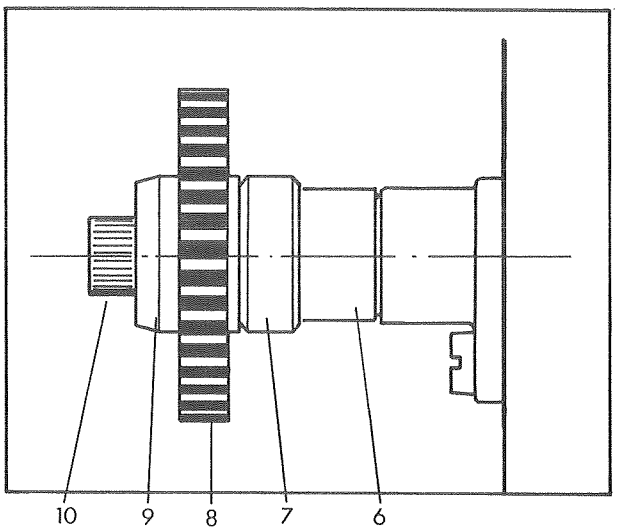
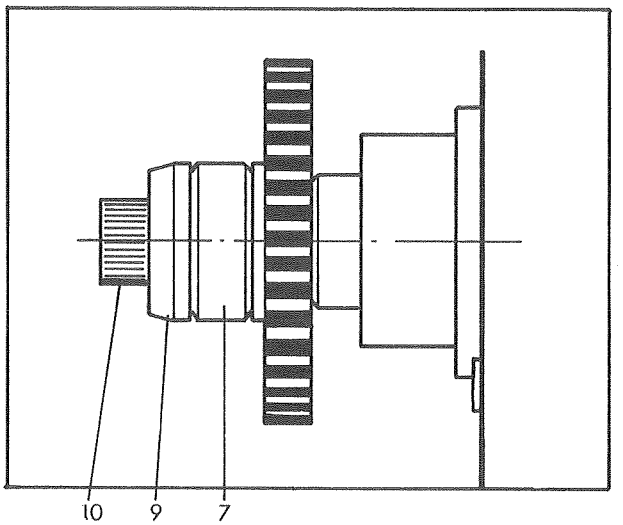


Illustration of mounting gear 55 onto the spline shaft



6. spline shaft
7. spacer
8. gear 55
9. tightening washer
1o. socket head screw

Illustration of mounting gear 6o onto the primary shaft

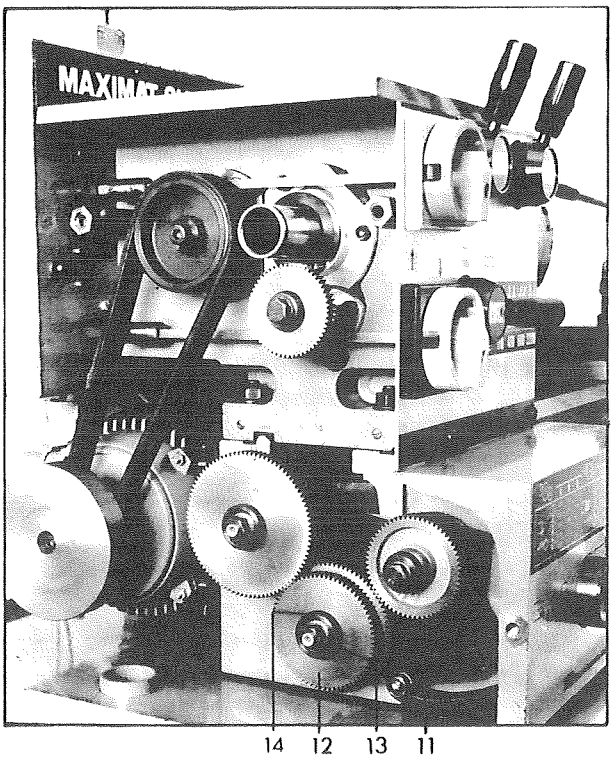


3. Gears 8o (11) and 7o (12) are mounted onto the bearing bush of the bottom arm of the quadrant and axially fixed with the compensating washer (13) and the knurled nut (14).

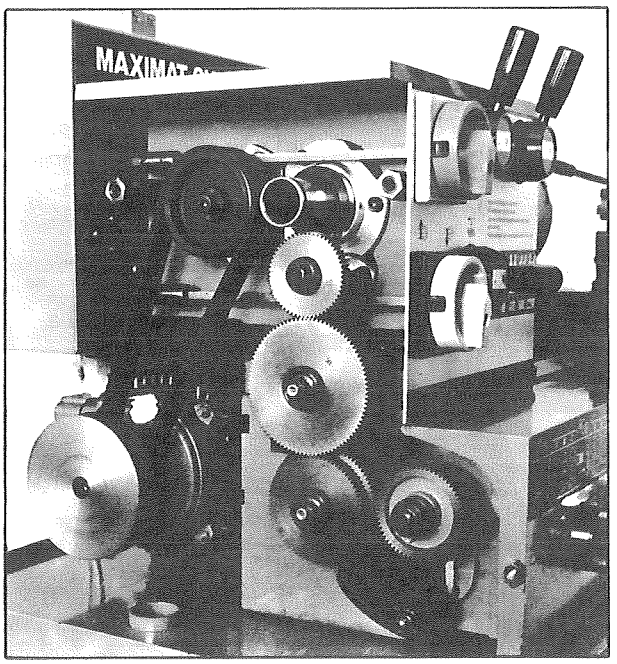
   The axis is now tightened, so that gears 6o and 8o mesh.

   A spacer is placed onto the second bearing bush and then gear 9o is mounted onto this bush and then axially tightened as described above with compensating washer (13) and knurled nut (14).

   Gear 9o is brought to mesh with gear 7o.



4. Gear 9o is brought to mesh with gear 55 by swivelling the quadrant.
   The quadrant is then fixed with the hexagon nut.



Foot Brake, Ref. No. 584 530

Function:

By operating the foot brake the main motor is switched off and the main spindle is stopped by a mechanic brake.

Note:

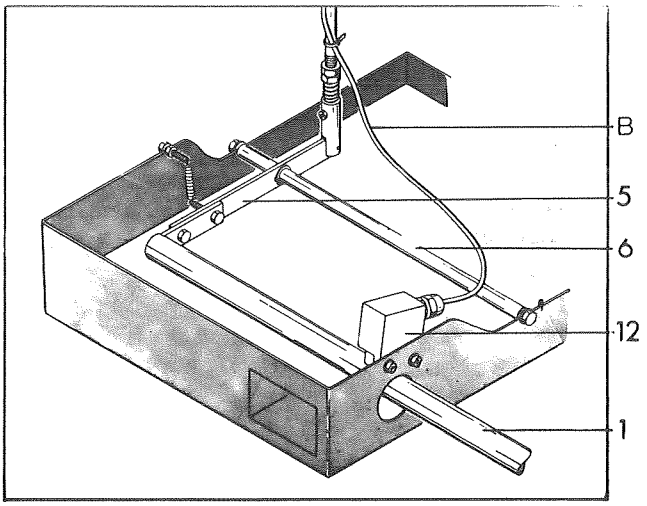
The foot brake can only be mounted to machines with the "special safety" electric version.

MOUNTING THE FOOT BRAKE

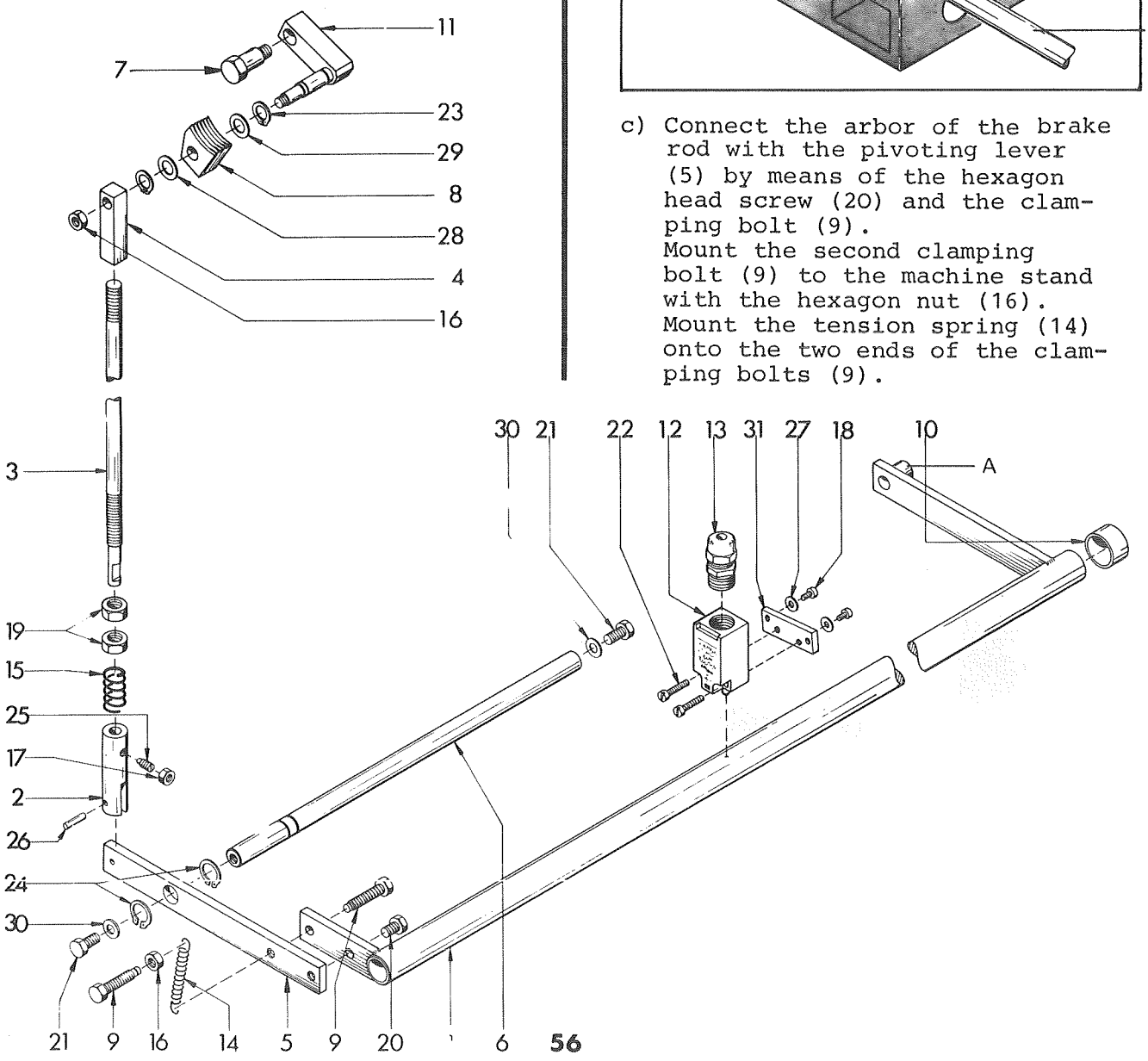
Groups of the foot brake are re-assembled. In the exploded drawing every part is shown single.

a) Insert the rod brake (1) into the left machine stand and its pin (A) into the hole of the right machine stand.

b) Assemble the pivoting lever (5) to the bearing rod (6) with the two retaining rings (24). Mount the bearing rod (6) with the two washers (30) and hexagon head screws (21) to the machine stand.



c) Connect the arbor of the brake rod with the pivoting lever (5) by means of the hexagon head screw (20) and the clamping bolt (9).
Mount the second clamping bolt (9) to the machine stand with the hexagon nut (16).
Mount the tension spring (14) onto the two ends of the clamping bolts (9).



d) Insert the pressure rod (3) through the top hole of the machine stand, put the compression spring (15) on the pressure rod and mount it to pressure bolt (2) with the set screw (25).
The hexagon nut (17) is for securing the set screw.

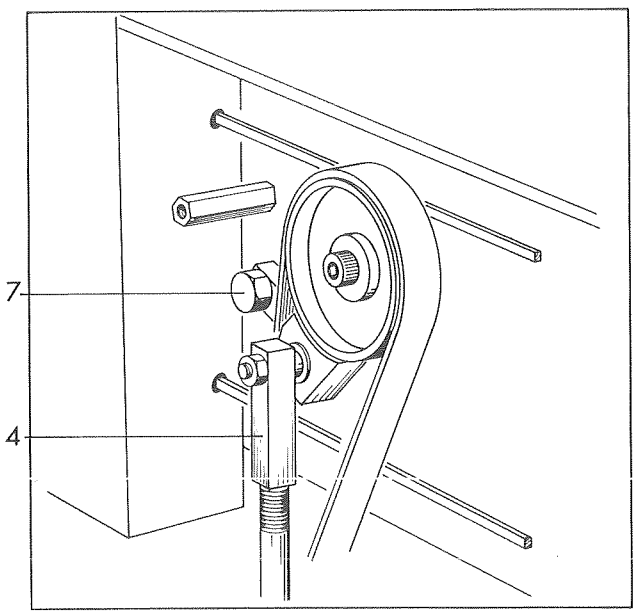
Note:

1) The set screw must fit into the groove of the pressure rod.

2) The pressure rod must not be fixed with the set screw. The set screw must only secure the pressure rod from slipping out of the pressure bolt.

e) Preload the compression spring by screwing down the hexagon nut on the pressure rod (19) so that the distance pressure bolt - hexagon nut is approx. 20 mm.
Secure the hexagon nut by countering the second one.

f) Dismount the change gear cover. Mount brake mechanism with bolt (7). Remove the premounted adjusting nut (4) and thread it so far onto the pressure rod that space between brake block (8) and wheel is 1-2 mm in remounted condition. Therefore several trials will be necessary.



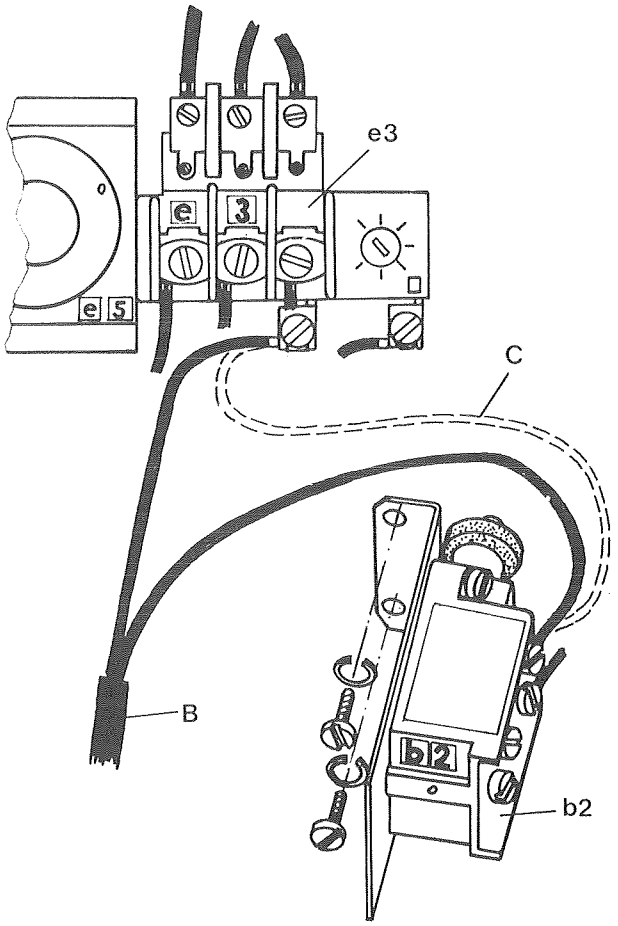
g) Mount the limit switch (12) with flat head screws (22) to the adaptor plate (31). Fix adaptor plate to machine stand with bolts (18) and washers (27). Fix the cable (B) of the limit switch to the pressure rod.

Electrical connection of the limit switch

Dismount cable C which is clamped between limit switch of gear cover (b2) and e3.

Mount cable B of limit switch/foot brake

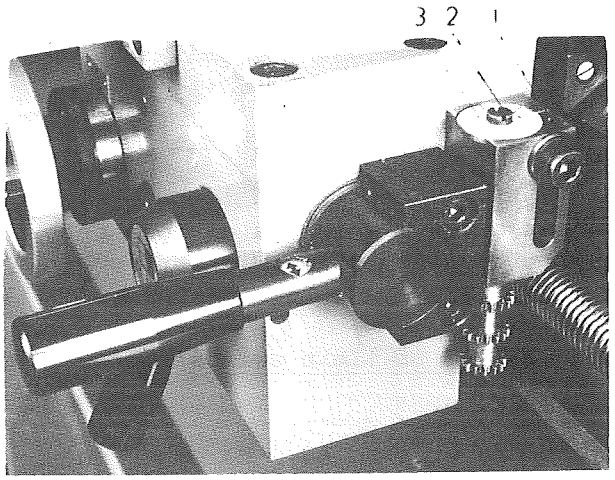
Connect one wire to e3, the other one to b2 (to the same contacts of the removed cable C).



Adjustments:

The space of brake block can be adjusted with the nut (4). Completely worn brake blocks must be replaced.

Thread dial indicator
Maximat Super 11



1. Engage the required gear of the thread dial indicator with the lead screw. Do not tighten the socket head screw (1) tightly yet

2. Engage the lead screw nut. Tighten socket head screw.

3. Loosen flat head screw (2) and turn the disc (3) so that the mark on the disc of the required number matches with the mark on the thread dial indicator. Tighten flat head screw.

Thread cutting

Open lead screw nut at the end of a cutting operation and move slide back. Engage lead screw nut when the disc shows the indicated number.

Example

Pitch = 0,8 mm, gear 16 is engaged. The lead screw nut can be engaged at mark 1,2 or 4.

Table for metric machine

(lead screw pitch 3 mm)

	Markings		
Pit	z_1=14	z_2=15	z_3=16
0,175	1,2		
0,35	1,2		
0,4			1,2,4
0,45		1	
0,7	1,2		
0,8			1,2,4
0,9		1	
1,25		1,3	
1,75	1,2		
2			1,2,4
2,25		1	
2,5		1,3	
3,5	1,2		
4			1,2,4
4,5		1	
5		1,3	

Table for inch machine

(lead screw pitch 1/8")

Pitch n/"	Markings Gear z=16
6,8,22,26,38,44 52,54,72,80,96, 112,128	1,2,4
5,7,11,13,19,27	1,2
4 1/2, 9 1/2	1

Note: With pitches not shown in the table the lead screw nut can be engaged in every position

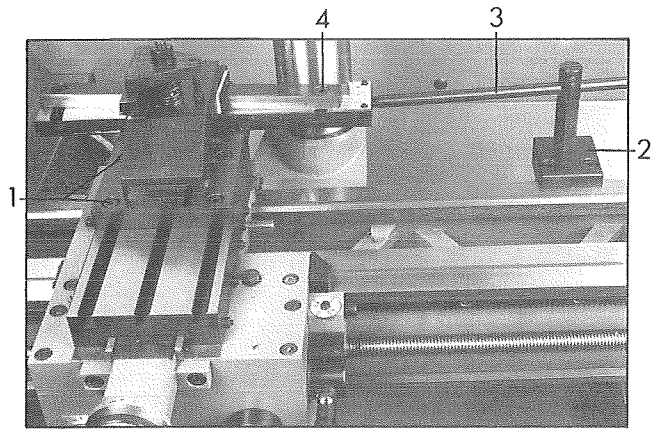
The Taper Turning Attachment

Technical Data:

Maximum taper length: 210 mm
Maximum taper diameter: 80 mm
Taper: (α /2) $\pm$ 9°

Assembly:

1. Fit the compound slide (1) onto the machine cross slide, with 4 T-slot tongues and cheese head bolts M8 x 20.
2. Fasten the clamping table (2) to the base, with the clamping plate. The clamping plate grips into the base undercut.
3. The turning tool can be fitted blade upwards or vice versa. Ensure that the direction of spindle rotation is correct!



Adjusting to the diameter:

- Adjust the cross slide of the lathe.
- Adjust the compound slide po - sition on the machine cross slide.

Adjusting the taper position in the longitudinal direction:

Clamp the connecting rod (3) accordingly.

Adjusting the taper angle:

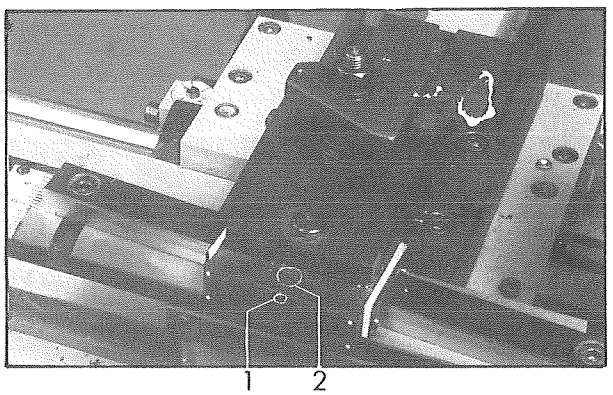
Loosen the cheese head bolts on the straight edge (4), and adjust the straight edge according to the graduated scale.
Tighten the cheese head bolts.

Readjusting the guides

- The saddle and cross slides of the taper turning attachment are equipped with adjustable strips. Adjustments can be made as for the cross slide of the lathe
- The cross slide of the taper turning attachment is guided along the straight edge by 3 support rolls.

Readjusting the guide:

Loosen the threaded stud (1), turn the eccentric bolt (2), so that the cross slide is guided without clearance. Tighten the threaded stud.



Working note:

For heavier cuts, clamp the lathe cross slide.