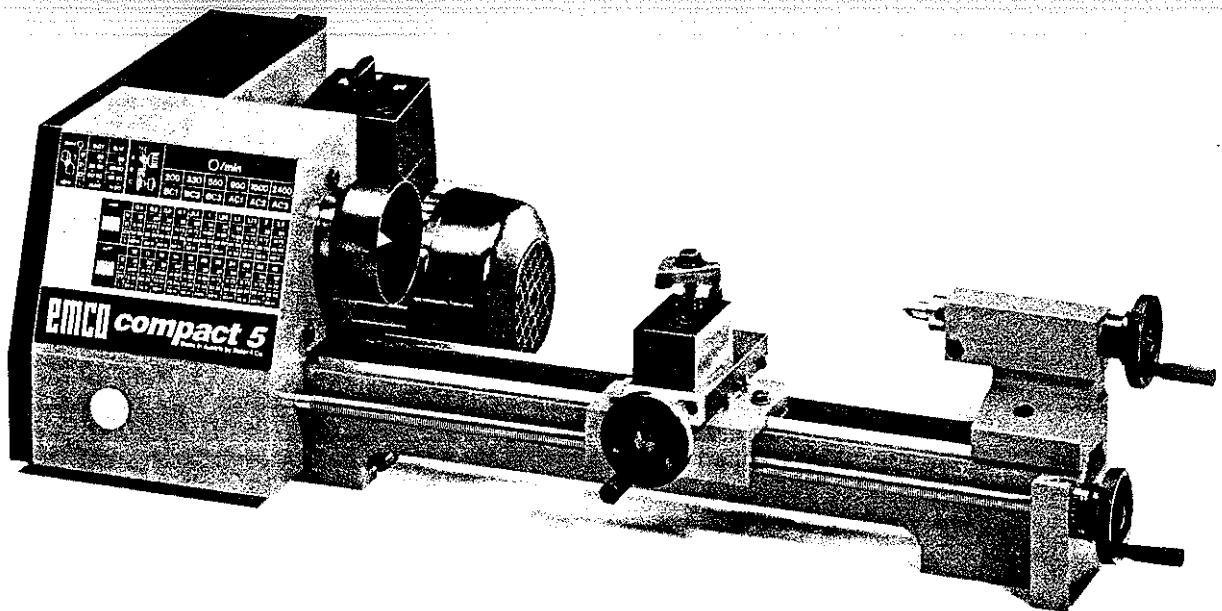


Instruction book

Service parts

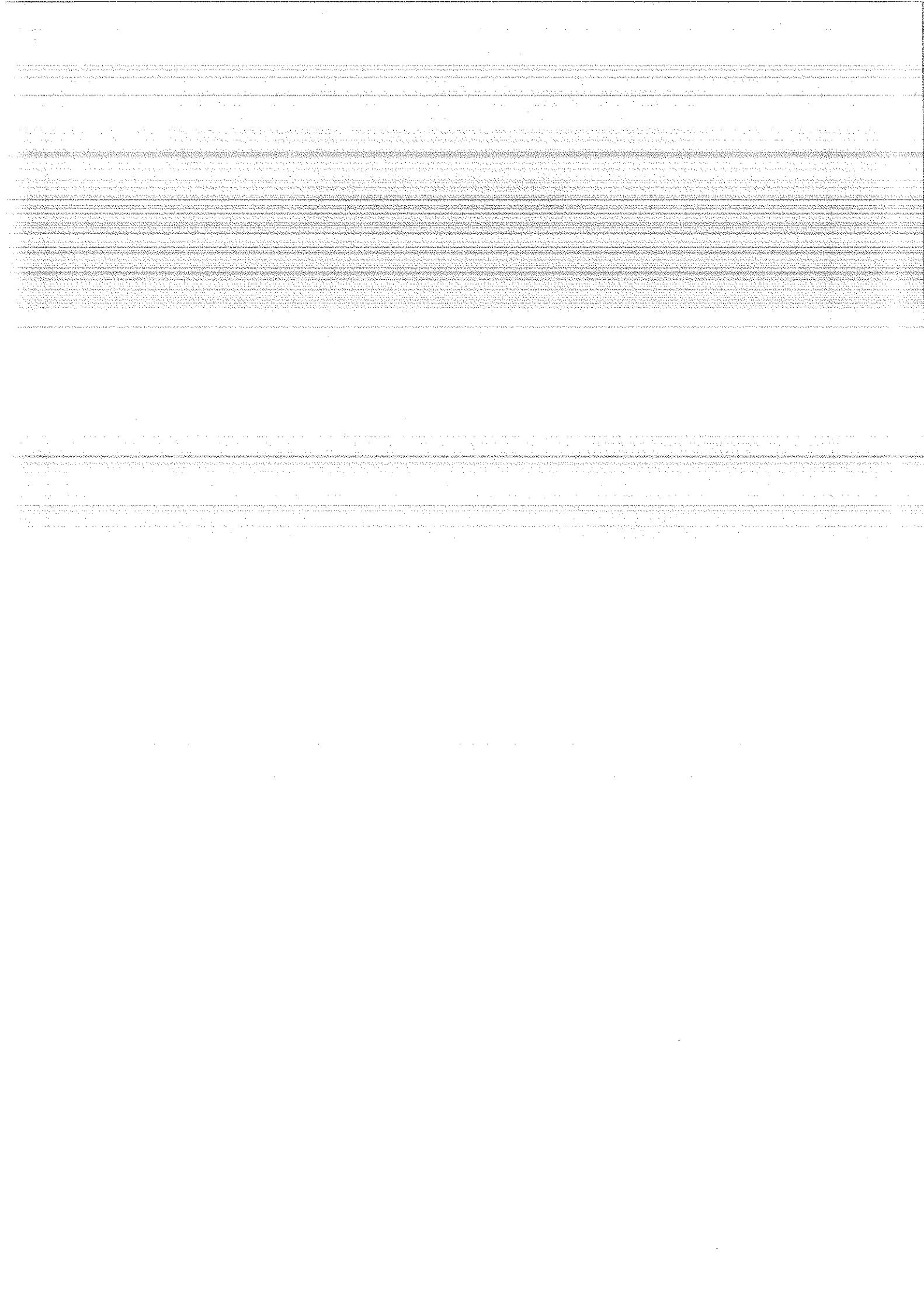
EMCO compact 5



Englisch Order No. EN 2001

Auflage: 10. 9. 8. 7. 6. 5. 4. 3. 2. 1.
92 91 90 89 88 87 86 85 84 83

EMCO
Holz + Hobbymaschinen



Addition Package

EMCO COMPACT 5

Lathe

Edition 1994-11

Complementations to the Instruction book

EMCO COMPACT 5

Ref. No. EN 2001

EC conformity



The CE sign certifies together with the EC declaration of conformity that the machine and the manual correspond to the EC guideline for machines 89/392/EEC and its modifications 91/368/EEC and 93/68/EEC.

emco
Holz+Hobbymaschinen

Profi Heimwerkermaschinen Ges.m.b.H. – A-5082 GRÖDIG, Hauptstraße 31 – Telefon (00 43) 62 46/78 787 – Telefax 0 62 46/78 787-1

Adequate Use

The machine is designed for turning of machinable metals.
Machining of other materials is not admitted and may be carried out in particular cases only after consultation with the machine manufacturer.

Adequate use also includes compliance with the operating and maintenance instructions indicated by the manufacturer.

The machine may exclusively be operated by persons familiar with operation, maintenance and repair and who know about the hazards.

All regulations for the prevention of accidents and safety instructions for work with machine tools have to be complied with at any time.

In case of inadequate use of the machine the manufacturer renounces any liability and the responsibility is transferred exclusively to the user.

Warranty Conditions for New EMCO Machines

1. The warranty period for new EMCO machines is, without limitation of operating hours, 12 months after initial shipment of the machine from EMCO or its authorized representative. Should the installation be completed by EMCO or its authorized representative, the warranty period begins with the completed installation of the machine.
If a delay of installation occurs which is not caused by EMCO or its representative, the warranty period becomes invalid 12 months after scheduled installation date.
2. The warranty extends to the elimination of all defects in material or workmanship which affect the regular function of the machine.
3. Occurring defects must be immediately reported to the EMCO representative or the next EMCO service department with detailed description of the defect in written or oral form, followed by a written verification.
4. Defects which are correctly reported and under warranty will be corrected by either repair or replacement delivery to the original buyer free-of-charge; defective parts are to be returned to EMCO or the EMCO authorized representative, freight prepaid, if requested.
5. Warranty for spare parts: Emco guarantees to the original buyer that, only those parts sold directly by Emco or through an authorized representative will be free from defects, which render part commercially unacceptable in material and workmanship, for a period according to applicable national law, at least three (3) months, but not to exceed six (6) months from the date of initial shipment or installation by Emco or its representative.
In the case of repeated claims for the same part: Warranty replacement does not extend the period of the original warranty.
6. There is no claim of warranty for defects which occurred by:
Negligence of operating instruction manuals, safety and handling regulations or other instructions regarding delivery, installation, set-up or usage of the machine, incorrect set-up resp. installation, as well as, unauthorized, not expressed regulated or allowed alterations or modifications of the machine by the original buyer or third parties, natural wear, improper or negligent handling, chemical, electro-chemical or electrical influences, inadequate energy supply or force majeure.
7. Any service performed by EMCO or its authorized representative beyond warranty will be charged at EMCO's or its authorized representative's regular rates.

Safety recommendations - Lathe

Read documentation

Read this documentation completely before you start up the machine.

Electrical connection

The electrical connection of the machine must only be carried out by electrics experts.

Authorized operation

The machine may only be operated by authorized persons.

Protect the machine against unauthorized start-up (main switch which can be locked).

Start-up

Make sure that prior to each start-up the machine is in perfect maintenance state and that no safety features have been removed.

No modifications on machine

Modifications on your own on safety features, bridgings of control features as well as any interference with the electric/electronic part of the machine is prohibited.

In case of hazards EMERGENCY-OFF

In case of hazards immediately actuate EMERGENCY-OFF key to stop machine.

Safe tool-clamping

Prior to start of operation check if workpiece and tool are clamped safely.

Remove chuck key

Prior to start of operation check if chuck key has been removed.

Observe speed limits

Clamping devices are subject to speed limits. Thus observe the maximum speed of the clamping devices used by you.

Clamp only short workpieces in cantilevered mode

Support longer workpieces (> clamping diameter 3x) by means of collar plate or revolving center punch.

Do not clamp too short

Avoid small clamping diameters with large turning diameters.

The workpiece should fit tightly.

Use chip hook

Remove chips only with machine switched off and by means of a chip hook.

Do not reach into running machine!

Use protection for projecting parts

During machining of rod material the parts projecting over the headstock should be covered by a fixed protection device along the entire length.

Tool change

Change machining tools only during standstill of machine.

Measurement work

Carry out measurement work only during standstill of the machine and with EMERGENCY-OFF key actuated.

Wear body protection

Mind that your hair does not get caught in the machine - hair protection to be worn.

Protect your eyes with safety-glasses.

Do not wear loose working clothes. Mind that the working clothes are tight around the wrists and hips.

Machine supervision

Never leave running machine unattended.

Before leaving the working place switch off machine.

Maintenance and readjustment work

All maintenance and readjustment work may be carried out only with machine switched off and EMERGENCY-OFF key actuated.

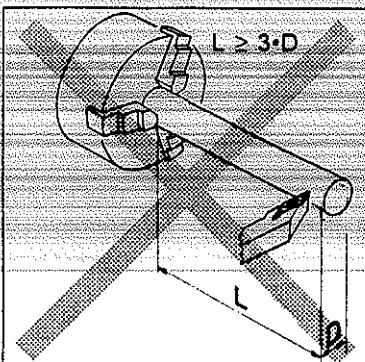
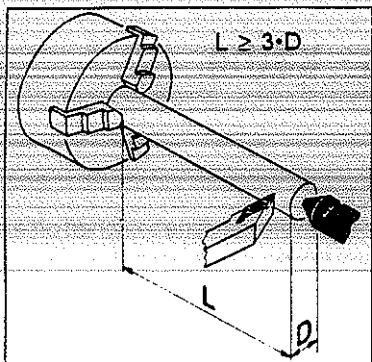
Claim

In the event of a collision or instance of damage, contact the representative or manufacturer.

In case of complaints, damage, confusions and spare parts orders always indicate the machine number.

For parts not supplied by EMCO, EMCO will not assume liability.

Safe Clamping



Clamp only short workpieces in cantilevered mode

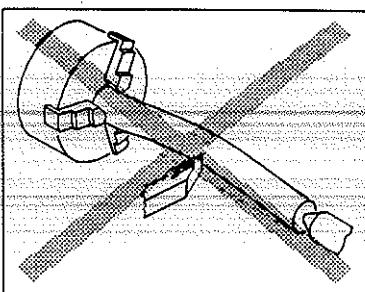
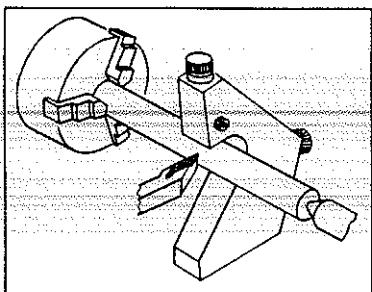
If the outstanding workpiece length L is longer than the triple diameter, the workpiece must be supported with the tailstock (with live centre) or with the steady.

Cause:

Otherwise the workpiece will be bended by the cutting pressure and start chattering.

Result:

Bad turning result, breaking of the tool, bending or catapulting out of the workpiece.

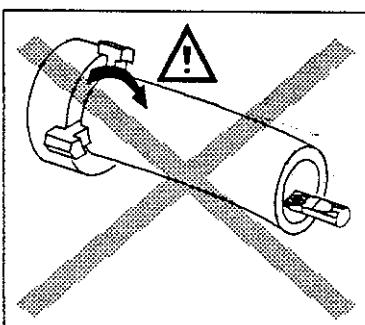
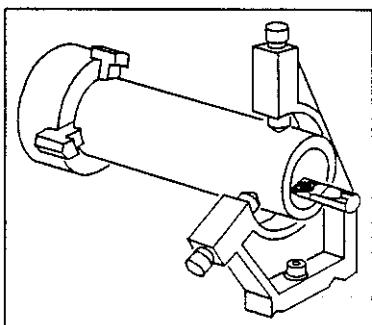


Travelling steady

Slender workpieces will be bended by the cutting pressure.

Use the travelling steady as support.

The travelling steady will be mounted on the longitudinal slide.



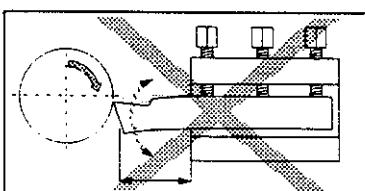
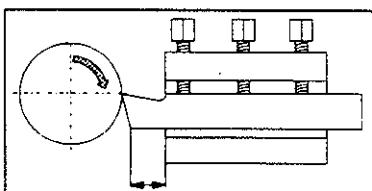
Fixed steady

If the outstanding length of the tool is too long and supporting by the tailstock is not possible, use the fixed steady.

The fixed steady will be mounted at the machine bed.

Dangers without fixed steady:

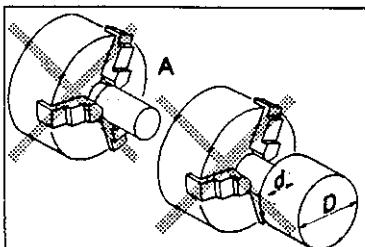
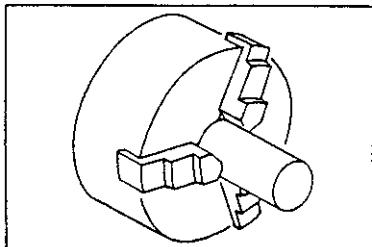
Bad turning result, breaking of the tool, bending or catapulting out of the workpiece.



Clamp the tool as short as possible!

A tool which is clamped too long will bend, starts vibrating and will break. The fragments will shoot out like gun bullets.

The tool tip must be exactly at turning centre height.

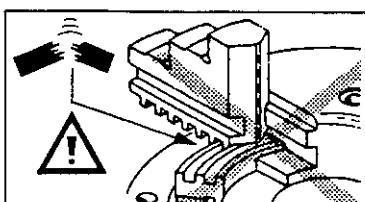
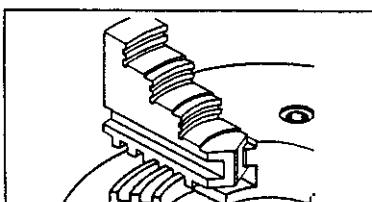


Never clamp the workpiece too short (A).

The workpiece must be well attached, otherwise it will be catapulted out of the chuck.

Avoid small clamping diameters (d) with large turning diameters (D).

The clamping forces at the small diameter would get too small, the workpiece will be catapulted out.



Never exceed the clamping range of the chucks!

Too far outstanding jaws will break and shoot out like gun bullets.

The maximum clamping range of a chuck is determined by the chuck manufacturer.

EMCO COMPACT 5

Addition to Technical Data

SOUND PRESSURE LEVEL

Max. sound pressure level Lathe	64,5 dB(A)
Max. sound pressure level Milling and drilling equipment	65,3 dB(A)

With the following conditions:

- * **Measurement method** enveloping surface method according to DIN 45 635
- * **Measured point** distance 1 mm and 1.6 m above ground
- * **Operating mode** maximum speed with idle running

Declaration of conformity

Product:	Lathe	
Machine data:	Model	Type
	EMCO	COMPACT 5
Address of manufacturer: Emco Maier Ges.m.b.H Friedmann-Maier-Str. 9 A-5400 Hallein		
Bases of standards: EN 60204-1 (6/93)		
Regulations: MSV (BGBI. Nr. 306/1994, 27.4.94)		
Test certificates:		
Particular notes , enclosures: Electrical documentation as applicable		

We herewith declare that the above-mentioned product referring to the subject declaration is in conformity with the currently valid stipulations of the directive of the Council dated June 14th, 1989 for the alignment of the legal stipulations of the member states for machines (89/392/EEC) and its modifications dated June 20th, 1991 (91/368/EEC), June 14th, 1993 (93/44/EEC) and July 22nd, 1993 (93/68/EEC).

Furthermore, the conformity of the subject product with the above-mentioned standard bases and regulations is effective.

Place, date: Hallein, 02.01.95

Authorized person: Head of quality department Dr. Wilfried Brugger

(Annex to Instruction Manual COMPACT 5)

Starting with machine ref.no. 85 06 001 we shall supply COMPACT 5 machines with adjustable screw nuts for longitudinal and cross slides. Therefore the following information has to be added to instruction book and spare parts list:

1. Compensating play of lead screw in the lead screw nut (annex to chapter "Adjustments", page 32)

Note: Necessary when the handwheel is turned a certain angle, without moving the longitudinal slide.

- a) Adjusting the handwheel clamping: see instruction book page 32
- b) Adjusting the nut: Adjust hexagon head screw (39) in lead screw nut until play is eliminated.

Checking:

It should be possible to move longitudinal slide without play smoothly. A too rough adjustment causes unnecessary wear off the lead screw nut.

2. Compensating play of cross screw in cross nut

Note: Necessary when cross slide handwheel is turned a certain angle and cross slide does not move.

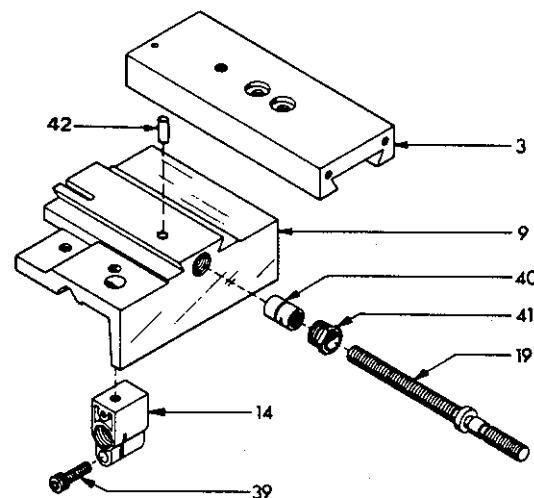
- a) Adjusting the handwheel clamping: see instruction book page 32
- b) Adjusting the nut: Adjust setting screw (41) until play is eliminated.

Checking:

It should be possible to move cross slide without play smoothly. A too rough adjustment causes unnecessary wear off the cross nut.

3. Changed reference numbers in service parts list (page 6)

Pos.	Ref. Nr.
3	A5A 020 021
9	A5A 020 011 A5B 020 011
14	A5A 000 091 A5B 000 091
19	A5A 021 021 A5B 021 021
39	ZSR 12 0516
40	A5A 020 060 A5B 020 060
41	A5A 020 050
42	ZHL 81 0214



Leveling Device for COMPACT 5

(Ref. No. 200 210)

If you demand highest precision work from a lathe, the machine has to be put on a leveling plate and aligned by means of a leveling device. Without such an alignment it may occur that you do not succeed in turning cylindri-

Use of leveling device:

This device serves for alignment of the COMPACT 5.

1. Drill 4 holes dia. 4 x 35 mm into the ground plate (see drill template).

A stable, torsion-free wood or wood-fibre board approx. 50 mm thick can be used as ground plate. If you use an old chip pan, then rough-drill it accordingly.

2. Screw leveling bolt (1) into leveling plate (2). The bolts should stand out some 2 mm. Use leveling plate (2) such that free thread chamfer is like on drawing.

3. Place washers (3) underneath and tighten leveling plate with screws (4) onto ground plate. Put a drop of oil between screws (4) and leveling bolt.

4. Put down COMPACT 5 and screw tightly.

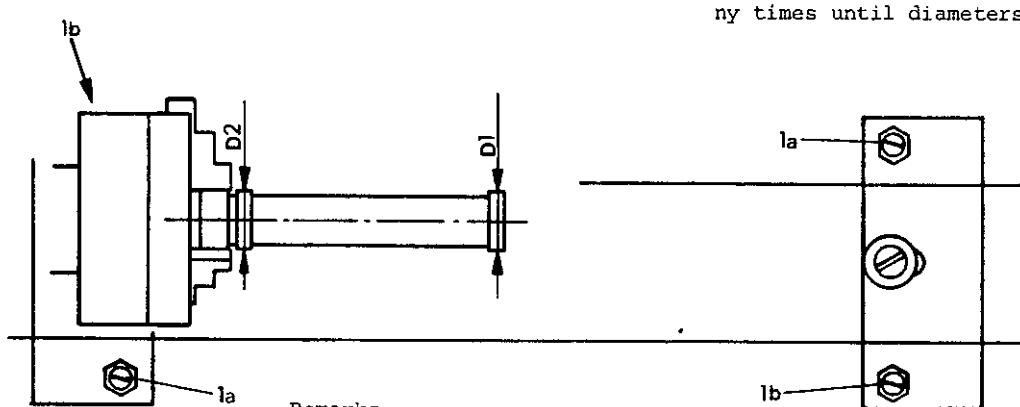
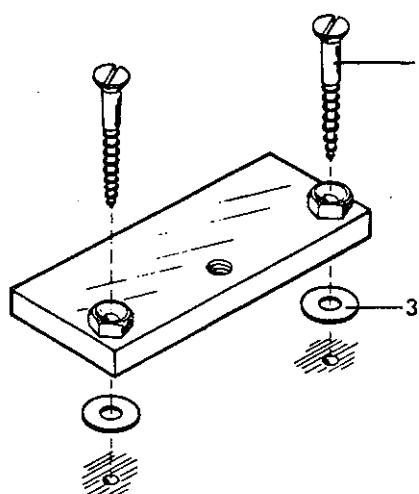
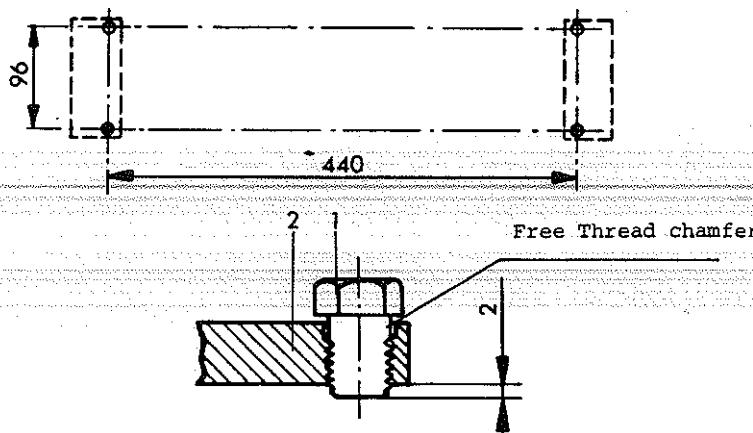
5. Alignment:

- 5.1. Mount ready-turned workpiece (comes with leveling device) in 3-jaw chuck and tighten slightly, support workpiece using tailstock, tighten firmly, move tailstock away and turn without tailstock support.

- 5.2. Use right hand side tool and turn off at both diameters D1, D2. Depth of cut 0,1 mm.

- 5.3. Measure diameters by one-hundredth of mm. If D2 is bigger than D1, screw in leveling bolts 1a or screw out leveling bolts 1b. - Thereby, screw (4) must not be turned round. If D1 is bigger than D2, your proceed vice-versa.

- 5.2. and 5.3. have to be repeated so many times until diameters are identical.



Remarks:

Without the leveling device the machine can be aligned by placing metal sheets under the lathe bed.

Inch version of Compact 5 (60 cycles)

In the instruction manual the metric version is described. The inch version has the following basic differences:

Pitch of leadscrew, cross slide spindle have inch pitches. This causes another gear combination for feeds and thread pitches as well as different readings on the dials. In the spare parts list you find the metric and inch numbers for parts which differ.

Differences concerning the inch version

Page 4

Technical Data:

Pitch of leadscrew: 16 tpi

Pitch of cross slide spindle: 20 tpi

Range of speeds: 50 cycles 200-2400 rpm
60 cycles 250-2800 rpm

Feeds: 0,003" per revolution
0,004" per revolution

Thread pitches with accessory automatic feed mechanism (on inch type machine)

16, 20, 24, 32 tpi

Thread pitches with change gear set (on inch type machine)

Inch threads: 10, 12, 13, 14, 15, 18,
26, 28, 36, 40, 48, 56, 64

Metric threads: 0,25/0,3/0,45/0,5/0,6/
0,75/0,8/1,0/1,25/1,5/1,75 mm

Page 8

The chart shows speeds for 50 cycles
0,003" and 0,006" equals approx. 0,07 mm
and 0,14 mm so that you can read out recommended speeds.

Page 13

Illustrations and examples show 50 cycles machine.

The corresponding speed of BC3 (550 rpm) is 650 rpm on a 60 cycle machine.

Page 14/15/16

Handwheel for longitudinal slide

As the spindle has a pitch of 16 tpi, the longitudinal slide moves 0,0625" when you make a full revolution of the handwheel. Turning the handwheel one graduation, the slide moves 0,00125".

Handwheel on cross slide

The cross slide spindle has a pitch of 20 tpi.

Turning the handwheel a full revolution, the slide moves 0,05".

The scale and its divisions relate to the diameter. It shows 0,1" with a full

revolution. So if you turn the handwheel one revolution, the diameter is reduced 0,1".

Turning the handwheel one graduation, the diameter will be reduced 0,02".

Top slide:

With one revolution the slide moves 0,04". One graduation is 0,002".

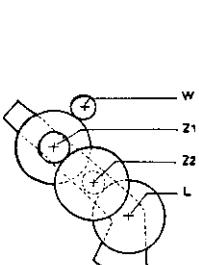
Page 29/30

The feed sizes on the inch machine differ (see plate on your machine), but the gear combinations are the same for this example.

66 / 0	0,003	0,006
W	20	20
Z1	25 60	50 60
Z2	60 20	60 20
L	H 60	H 60

Page 30

Thread sizes and gear combinations shown on the chart (inch version)



n/1"	10	12	14	16	18	20	24	28	32	40	48
W	20	20	20	20	20	20	20	20	20	20	20
Z1	H 72	H 72	H 72	H 60	H 72	H 60	H 60	H 72	H 60	H 40	H 60
Z2	40 20	60 25	40 20	60 20	40 25	60 25	50 25	60 35	25 20	60 50	20 25
L	25 H	36 H	35 H	60 H	36 H	60 H	60 H	60 H	50 H	60 H	H 60
mm	0,25	0,3	0,45	0,5	0,6	0,75	0,8	1,0	1,25	1,5	1,75
W	20	20	20	20	20	20	20	20	20	20	20
Z1	H 60	H 60	H 72								
Z2	34 60	34 50	34 40	34 36	34 36	34 36	30 34	34 30	40 30	34 20	50 35
L	72 H	72 H	60 H	60 H	50 H	40 H	35 H	36 H	34 H	36 H	26 H

Additional thread pitches not shown on the chart

n/1"	8	13	15	26	36	56	64
W	20	20	20	20	20	20	20
Z1	H 60	H 72					
Z2	50 20	40 25	40 25	20 25	40 36	20 35	25 40
L	25 H	26 H	30 H	26 H	50 H	40 H	50 H

Page 38

Speeds for 60 cycle machine: 450, 800, 1900 rpm.

Page 41/45

Concerning speed chart:

Take instead of 1600 - 1900

700 - 800

380 - 450

if you have a 60 cycle machine.

Forward

This Instruction Manual contains a general description of the machine and its operating elements, mounting instructions for the accessories, working tips and rules for accident prevention. The chapters "Basics about Turning, Drilling and Milling" and the numerous working tips actually exceed the usual contents of an Instruction Manual. We feel, however, that these chapters convey the necessary basic information to the aspiring professional and draw the professional's attention to special features and the universality of the machine.

The working tips are indicated with the mosaic screen pattern. The sizes of screws, nuts, bolts, etc. are not always indicated in the mounting instructions. These dimensions can be found in the Service Parts List.

Always follow the rules for accident prevention!

The construction of the Compact 5 and the accessories meets all current safety regulations in industry and schools, but improper or careless working methods can lead to injuries.

Read the Instruction Manual carefully before starting the machine - a few minutes now can save valuable time and frustration later. Only proper operation can guarantee the desired results.

Index – Turning

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Independent chuck	23
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Lubrication	33
Troubleshooting chart	34
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Wiring diagram	55
Spare parts list follows!	

Accident Prevention: Milling – Drilling

- + **FOLLOW ALL ACCIDENT PREVENTION RULES!** Read instruction manual before working with the machine.
- + **ELECTRICAL CONNECTION:** The electrical connections must be carried out professionally. A grounding receptacle must be available. Mounting of the plug (if not already mounted) must also be carried out professionally.
- + **DO NOT ALTER GUARDS!** When turning between centers, mount lathe dog guard. Close belt guard before starting machine. Never open belt guard while machine is running.
- + **KEEP CHILDREN AND VISITORS AWAY!** The machine should be stored so that children and visitors not acquainted with the use of the machine cannot start it.
- + **ALWAYS WEAR SAFETY GOGGLES!** Be also aware that some materials (for examp. brass) spray while being worked on. Therefore, it is important that all persons near the machine are protected.
- + **WEAR PROPER APPAREL!** Loose sleeves could get caught in chuck or workpiece.
- + **KEEP WORK AREA CLEAN!** Cluttered areas and benches invite accidents.
- + **REMOVE ADJUSTING KEYS AND WRENCHES,** even when machine is not being used. The chuck keys should never be attached to the machine with chains or similar.
- + **USE CHIP HOOK for removing chips!**
- + **NEVER TOUCH RUNNING MACHINE PARTS!** Never try to stop workpiece or chuck with the hand.
- + **DO NOT SURPASS THE CLAMPING CAPACITY OF THE LATHE CHUCK!** The maximum clamping capacities are indicated on page 11 and 14.
- + **BE CAREFUL OF EXTENDING CHUCKS!** Never reach over running (rotating) chucks.
- + **SWITCH MACHINE OFF BEFORE SERVICING!** Remove plug from socket.
- + **TURN OFF MOTOR BEFORE ATTEMPTING** adjustments, maintenance or measuring work.
- + **USE ORIGINAL SPARE PARTS!**

Technical Data

Center height	65 mm
Distance between centers	350 mm
Swing over bed	130 mm
Swing over cross slide	80 mm
Travel of cross slide	50 mm
Travel of top slide	45 mm
Leadscrew diameter	12 mm
Leadscrew pitch	1,5 mm
Approx. net weight	20 kg

HEADSTOCK:

Spindle nose	Factory standard
Spindle bore	16 mm
Spindle inside taper	MT 2
Number of spindle speeds	6
Range of speeds (50 cyc.)	200-2400 rpm
<u>MOTOR (220 V, single-phase):</u>	
Input power (P1)	500 W, S3-60%
Output power (P2) at 2800 rpm	300 W, S3-60%

TAILSTOCK:

Center sleeve diameter	22 mm
Inside taper	MT 1
Stroke of center sleeve	35 mm

FEEDS (with accessory automatic feed mechanism)

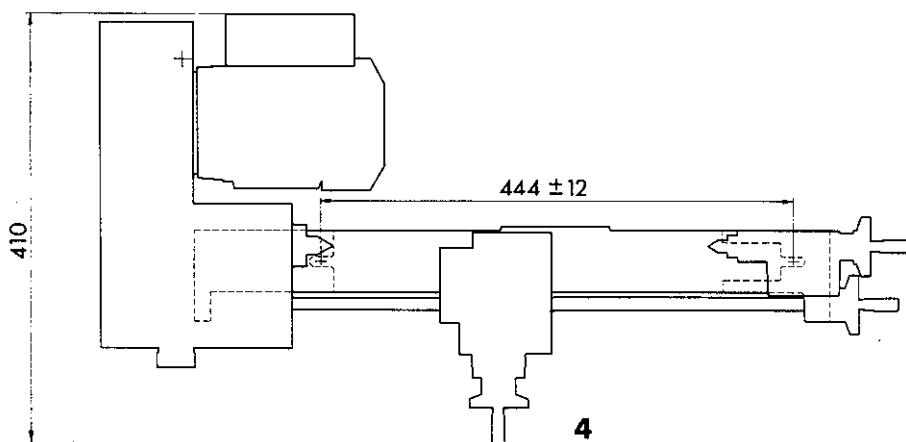
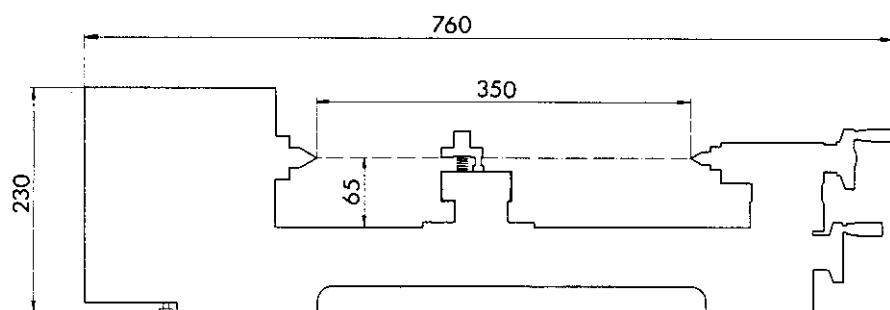
2 longitudinal feeds: 0,07 mm/rev,
0,14 mm/rev

THREADS (with accessory automatic feed mechanism)

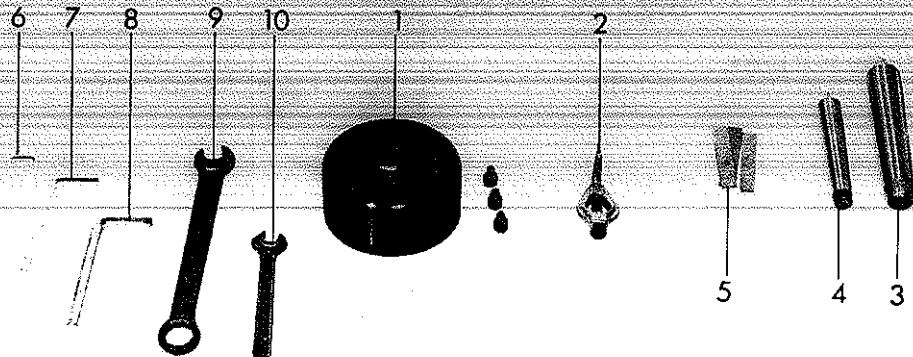
5 metric threads: 0,4/0,6/1,0/1,25/
1,5 mm

With Set of Change Gears:

Additional 10 metric threads: 0,25/0,3/
0,35/0,5/0,7/0,75/0,8/1,75/2,0/2,5 mm
and 14 inch threads: 48/40/36/32/28/24/
22/20/18/16/14/12/11/10 tpi



Basic Equipment



Lathe bed, headstock, tailstock, longitudinal and cross slide with single toolholder and clamping shoe, motor with belts and pulleys, instruction book, spare parts list.

BASIC EQUIPMENT

- 1 Safety driving plate
- 2 Lathe dog
- 3 MT 1 center
- 4 MT 2 center
- 5 Tool spacers

SERVICE TOOLS

- 6 Hexagon key 3 mm
- 7 Hexagon key 4 mm
- 8 Hexagon key 5 mm
- 9 Key 10/13 mm
- 10 Single-ended spanner 8 mm

Unpacking, Cleaning the Machine

Check the machine for possible transport damages and for completeness of the delivered parts. - See "Basic Machine".

The blank surfaces of the machine are coated with a rust-protective. Remove this substance carefully with petrol and oil machined surfaces with light machine oil.

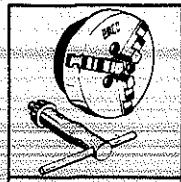
Care of Machine

The Compact 5 is a precision machine tool. Exact care of the machine is a pre-requisite for the long-lasting precision and efficiency.

Have a look to the professionals operating their machines and how they care about it - and you will do it all right.

- Clean and oil all machine surfaces regularly!! (light machine oil) For cleaning use a brush or a cloth. Chips and dirt on the leadscrew cause quick wear of the leadscrew nut.
- Clean the spindle nose and threads before mounting the chuck or independent chuck.
- Never use force!

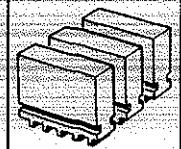
Accessories Lathe



Three-jaw lathe chuck

80 mm dia., with scroll, reversible jaws, and tee-handle pinion key

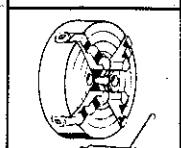
Order No. 200 410



Set of three soft jaws

for three-jaw chuck Order No. 200 410

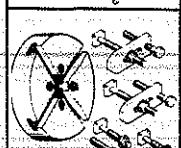
Order No. 200 430



Four-jaw independent chuck

90 mm dia., with reversible jaws

Order No. 200 420



Clamping plate

90 mm dia., with 4 chucking grooves, 2 clamps.
Technical tip: Fits on spindle of headstock and on
divider Order No. 200 320 and support flange
Order No. 200 250

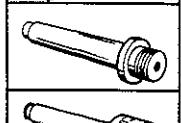
Order No. 200 360



Three-jaw drill chuck

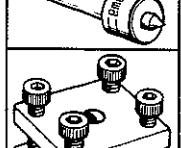
capacity 1-8 mm, with M 14x1 mounting thread

Order No. 152 500



Morse taper arbor MT 1

with M 14x1 mounting thread (for mounting drill chuck to tailstock)
Order No. 200 280



Revolving center MT 1

Order No. 200 270

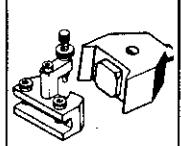


Double tool holder

for square tools up to a maximum cross-section of 6x6 mm.

Technical tip: Fits on top slide Order No. 200 500

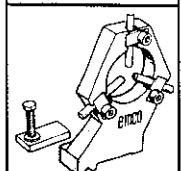
Order No. 200 010



Quick-change tool holder

consisting of tool holder body, 3 standard tool
holders, 1 operating key. For square tools up to a
maximum cross section of 8x8 mm.

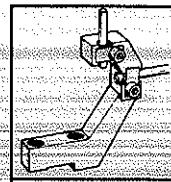
Technical tip: Fits on top slide Order No. 200 500
(200 550) **Order No. 202 000**



Fixed steady

for workpieces from 2-40 mm dia.

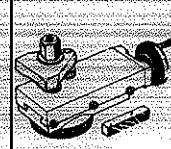
Order No. 200 240



Travelling steady

for workpieces from 4-25 mm dia.

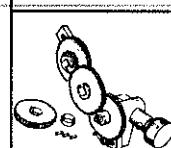
Order No. 200 230



Top slide

for taper turning

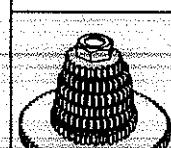
metric version **Order No. 200 500**
inch version **Order No. 200 550**



Automatic feed mechanism

consisting of gear quadrant with six change gear-wheels and clutch for two longitudinal feeds and five thread pitches (four thread pitches on inch type machine)

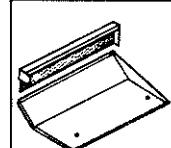
Order No. 200 300



Set of change gears

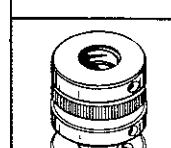
consisting of seven change gears for thread cutting,
10 metric pitches from 0.25-2.5 mm and 14 inch pitches
from 48 to 10 tpi (11 metric pitches from 0.25 to
1.75 mm and 13 inch pitches from 64 to 10 tpi on inch
type machine)

Order No. 200 200



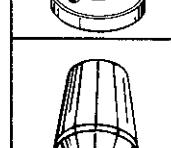
◀ Splash guard with chip tray
can also be mounted at later stage

Order No. 200 150



Safety goggles

Order No. 152 120



Collet attachment

consisting of collet holder and union nut. For collets
type ESX-25, capacity 1.5-14 mm

Order No. 200 040



Set of 14 collets ESX-25

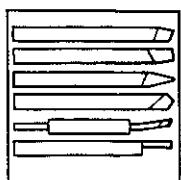
in wooden case, gripping capacity 1.5-14 mm

Order No. 225 000

Individual collets ESX-25

Nominal diameter in mm	Chuck capacity in mm	Chuck capacity in inches	Order No.
2,0	1,5-2,0	1/16-5/64	225 020
2,5	2,0-2,5	5/32	225 025
3,0	2,5-3,0	7/64	225 030
4,0	3,0-4,0	1/8-9/64-5/32	225 040
5,0	4,0-5,0	11/64-3/16	225 050
6,0	5,0-6,0	13/64-7/32-15/64	225 060
7,0	6,0-7,0	1/4-17/64	225 070
8,0	7,0-8,0	9/32-19/64-5/16	225 080
9,0	8,0-9,0	21/64-11/32	225 090
10,0	9,0-10,0	23/64-5/8-25/64	225 100
11,0	10,0-11,0	19/32-27/64	225 110
12,0	11,0-12,0	7/16-29/64-15/32	225 120
13,0	12,0-13,0	31/64-1/2	225 130
14,0	13,0-14,0	33/64-17/32-35/64	225 140

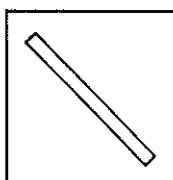
Tools Lathe



6 turning tools

assorted, ground

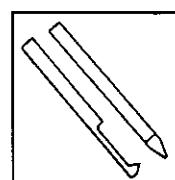
Order No. 111 500



5 turning tools

unground

Order No. 110 010



2 threading tools

external and internal

Order No. 111 600

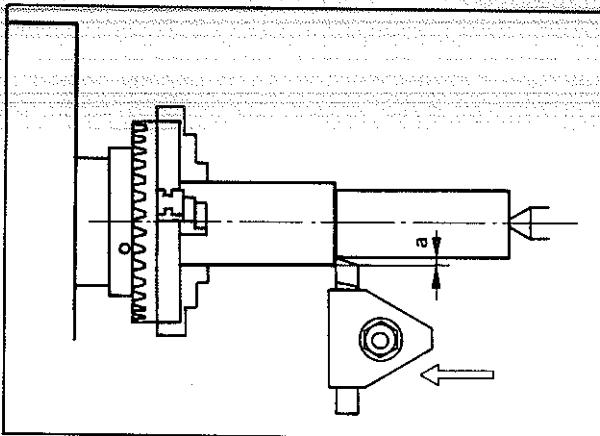
Some Basic Terms About Turning

Longitudinal Turning

The turning tool is moved parallel to the axis of rotating workpiece and removes material (feed direction of the tool is parallel to the axis).

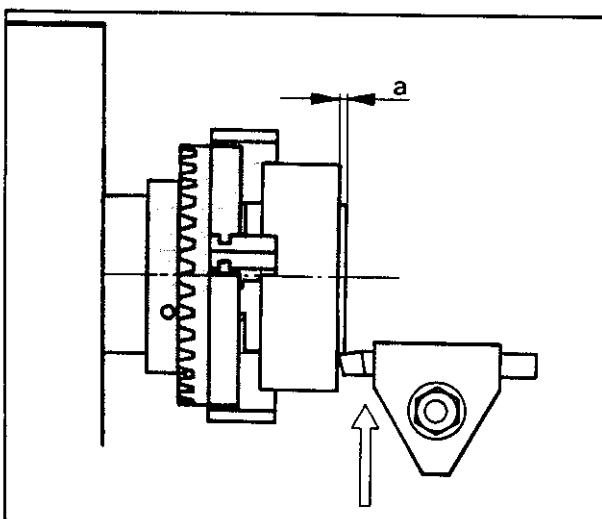
"a" is the depth of cut.

If the feed is carried out from left to right (in the direction of the headstock), then a righthand tool must be used.



Facing

The tool is moved at a right angle to the axis of rotation (feed direction: at a right angle to the axis). - The illustration shows a left turning tool.
"a" is the cutting depth.



Taper Turning

The top slide is clamped at an angle in relation to the axis of rotation. Feed direction is in this adjusted angle.

The Feed (s)

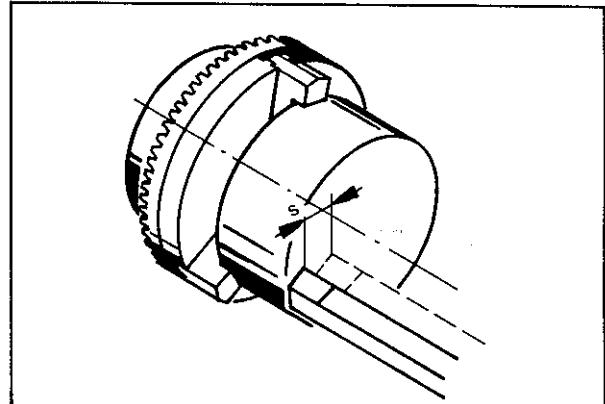
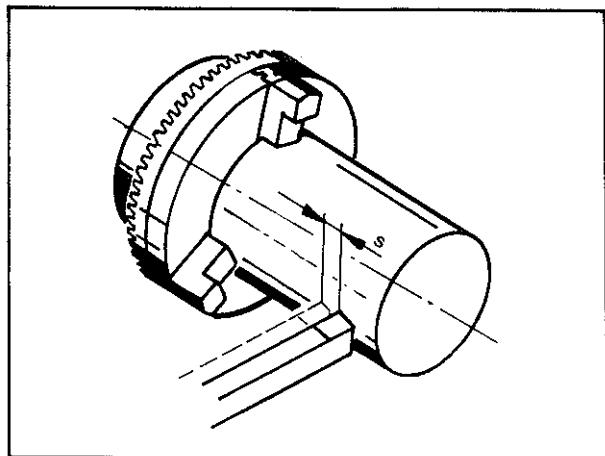
The size of feed (s) is the path of the turning tool during one revolution of the workpiece.

SIZE OF FEED IS CALLED FEED FOR SHORT

Large feed: → Rough surface

Small feed: → Smooth surface

Feeding is done by turning the respective handwheels. With the accessory "automatic feed mechanism" you can turn with automatic feeding in longitudinal directions with two feed sizes (0,07 and 0,14 mm/rev). - Adjustment see pages 16,17,18.



Spindle Speeds

On the Compact 5 six spindle speeds can be set:
200/330/550/950/1500/2400 revolutions per minute. - Adjusting the speeds see page 7.

Why different main spindle speeds?

1. Torque:

When turning large diameters or hard materials you need a higher torque than for small diameters or soft materials.

As the motor power is constant, you achieve the different torques by changing the spindle speeds. Low spindle speeds mean higher torque.

2. Heating of the turning tool:

- The higher the spindle speed (with equal diameters of the workpiece),
- the harder the workpiece,
- the larger the depth of cut (a),
- the larger the feed (s),

the more the temperature of the tool will increase. - High speed tool steel (HSS) loses sharpness at a temperature of approx. 600°C.

As the workpiece diameter is assumed as existing, you have to regulate the spindle speed, the depth of cut, the feed as not to overheat and damage the cutting tool.

Cutting Speed Chart

The Speed Chart

The chart shows the recommended speeds considering the parameters

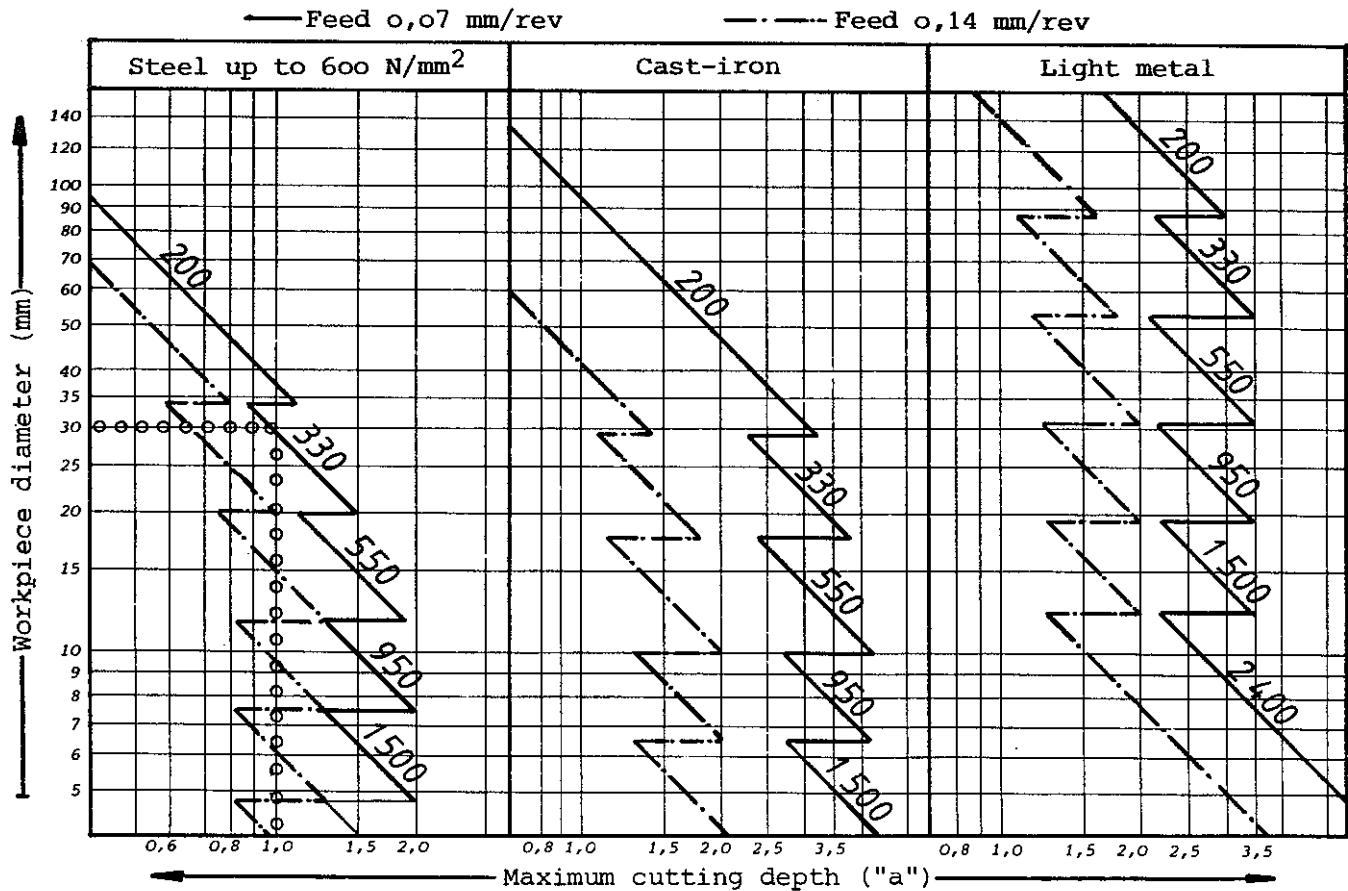
- diameter of workpiece
- material of workpiece
- depth of cut "a" and
- feed "s"

The values are valid for carbon tool steel. Using high speed tools you can increase the speed one step but you must reduce the cutting depth then.

Example:

Tool: Carbon tool steel
Workpiece material: Steel
Diameter of workpiece: 30 mm
Feed: 0,07 mm/rev

shows a speed of 330 rpm with a cutting depth (a) of 1 mm.



The Turning Tools

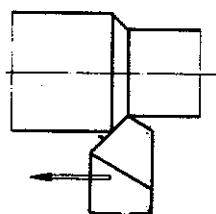
With the Compact 5, various turning work, such as longitudinal turning, facing, grooving, parting-off, internal turning, form turning and thread-cutting can be done.

For each type of work, the corresponding turning tool is required. - The arrows on the illustrations indicate the possible feed directions.

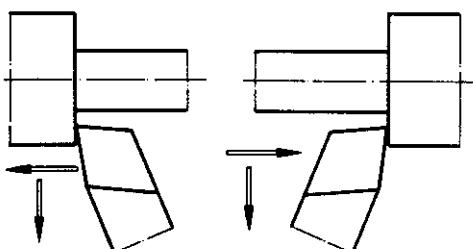
Longitudinal feed 

Cross feed (transverse) 

Note the different clamping angles of the turning tools (see illustration).

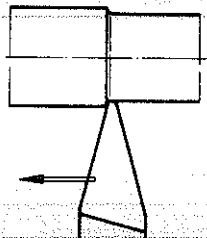


Side Tools they are used for longitudinal and transverse turning and for turning acute corners.

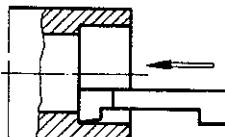


Planing Tool for a smooth surface

The depth of cut (a) may not be too big.

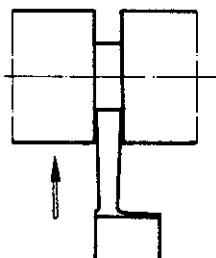


Boring Tool



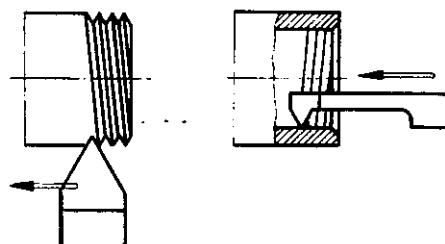
Parting-Off Tool it is used for grooving and parting-off.

When parting-off, you must note: exact center height of tool bit point, low spindle speed, lubrication.

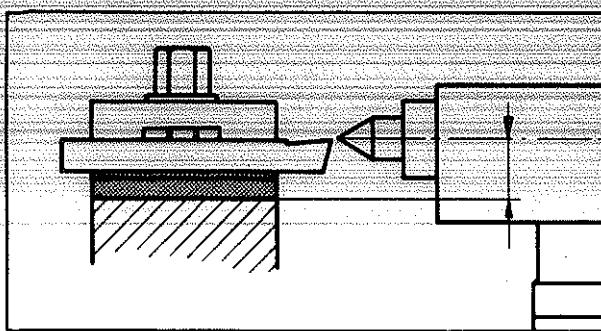


Thread-Cutting Tools

External and internal thread-cutting tool, angle 60°

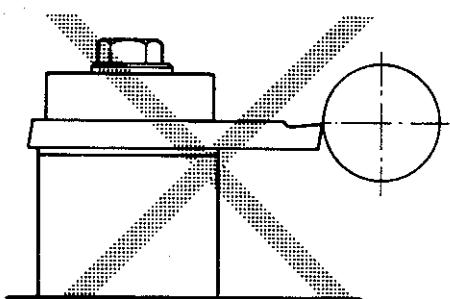


Correct Mounting of Tools



1. Mounting tools at center height:

The turning tools must be clamped so that the main cutting edge is exactly at center height. For this purpose, spacers of steel are used.



2. Overhang:

Clamp the turning tool with as little overhang as possible; a tool with too much overhang bends and causes rattling and an uneven workpiece surface.

Sharpening Tools

After longer use or when turning with too high cutting speed, the cutting edge of the turning tool is worn-off. Worn-off turning tools cause rough and uneven surfaces, as well as unnecessary wear and overload of the machine. - For this reason the worn-off turning tools should be sharpened immediately.

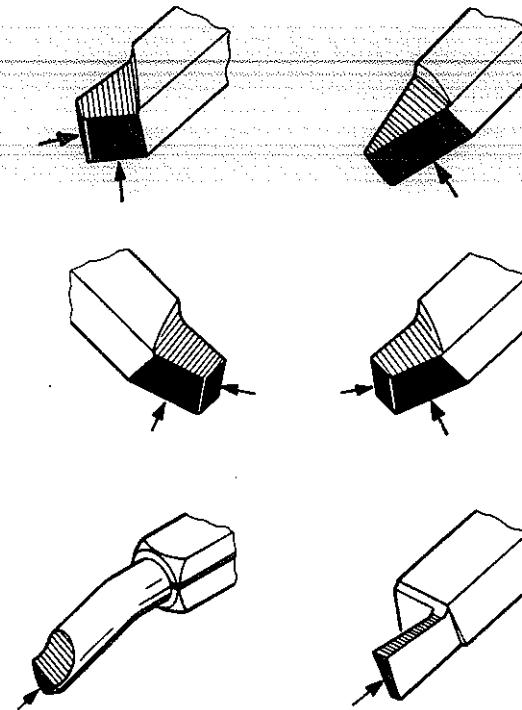
Sharpening with oilstone:

Sharpen only the blackened surfaces of the tools, in no case the ribbed ones. Note that the angles of the surfaces are not changed.

Grinding Tools

Strongly worn-off turning tools must be ground. Grinding requires some practice and feeling.

- Grind only blackened surfaces
- Note that the angles of the surfaces are not altered.



Care of Tools

The tools must be stored so that the cutting edges are not damaged.

WORKING TIP:

Note that your turning tools lose their cutting ability when the cutting speed is too high. - See cutting speed chart, page B.

Setting-Up the Machine

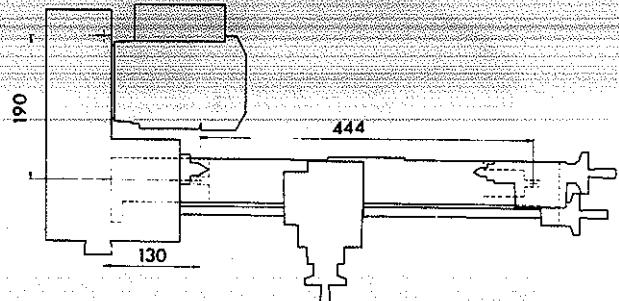
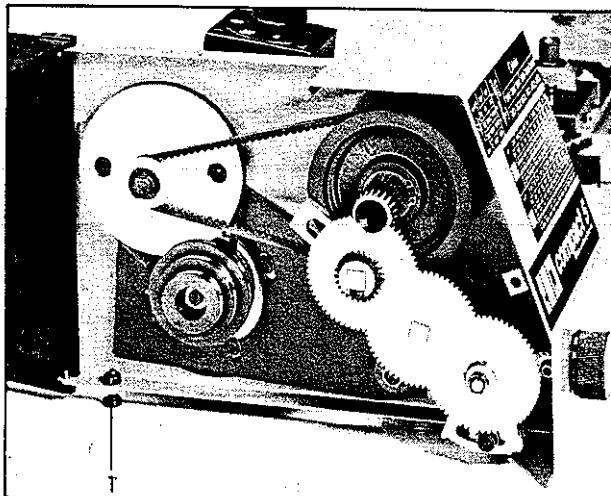
Mount the machine on an appropriately stable and absolute uneven workbench, fastening with screws, or if the working area should be variable, on an even wooden board resp. plywood board (3-4 cm thick).

If the machine is not fastened with screws, vibrations could occur, which would encourage a negative turning result.

The sketch indicates the distance between holes for bolting down the machine and the distance of the support screw.

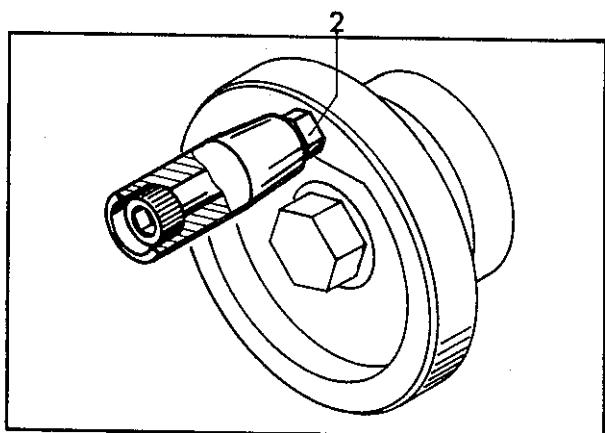
Recommended size of screws: 6-8 mm dia.

Support the carrier plate with the hexagon screw (1). The hexagon nut serves for tightening the screw.



MOUNTING THE HANDLE ON THE LONGITUDINAL SLIDE HANDWHEEL AND CROSS SLIDE HANDWHEEL

Mount handle with allen screw and tighten hexagon nut (2) so that the handle turns freely and does not have too much axial play.

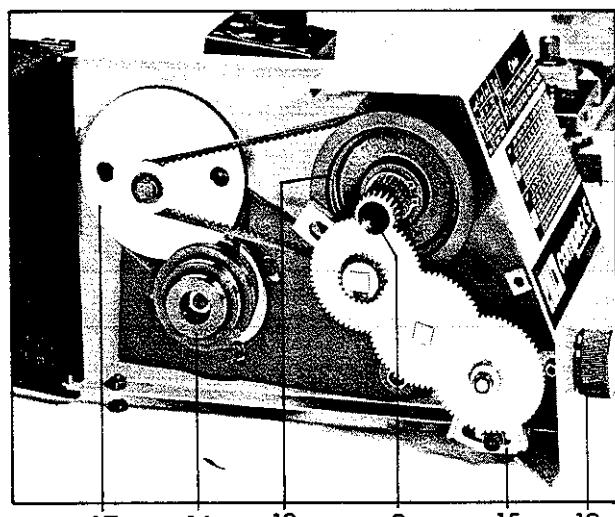
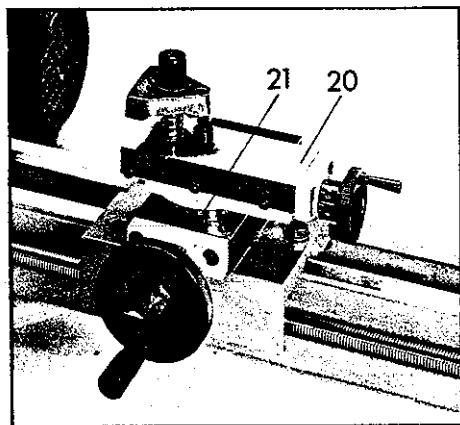
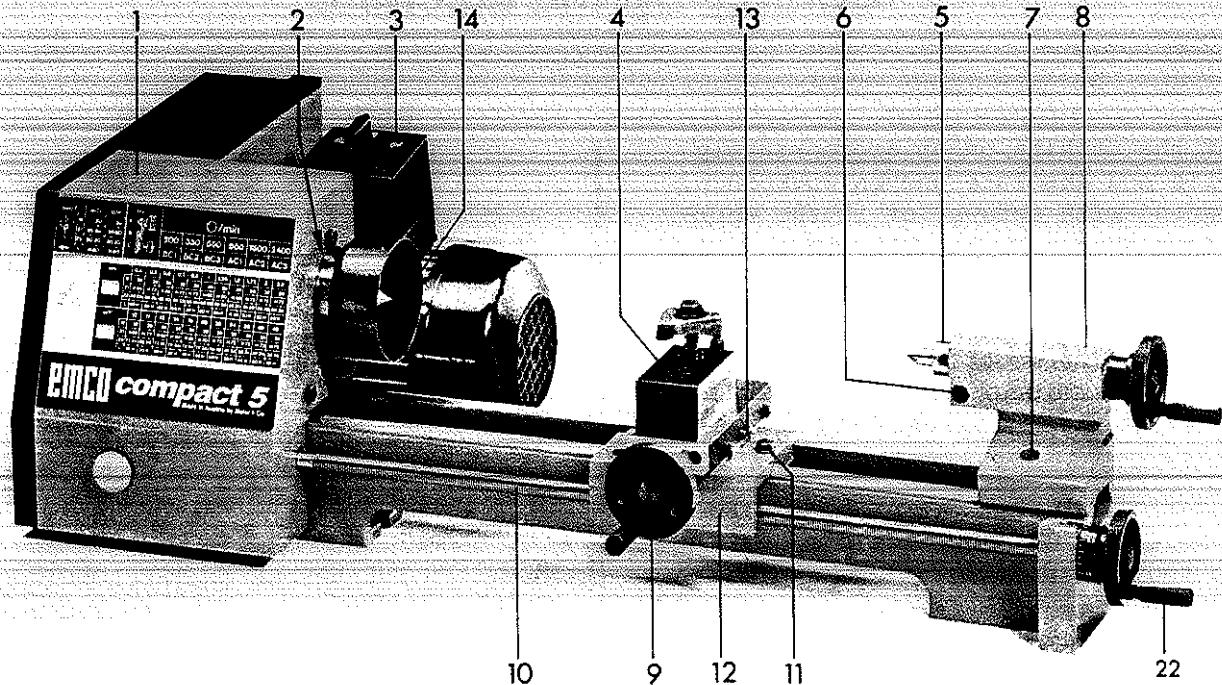


Electrical Connection

Mounting the Plug

Clamp the grounding wire (yellow-green) to the grounding contact (symbol \oplus). Clamp the other two wires to contact R and N.

A grounding receptacle must be available for connection of the machine!



- | | |
|---------------------------------------|---|
| 1 HEADSTOCK | 13 CLAMPING SCREW FOR CROSS SLIDE |
| 2 MAIN SPINDLE | 14 LATHE DOG GUARD |
| 3 MOTOR SWITCH | 15 CHANGE GEARS (Accessory) |
| 4 TOOLHOLDER WITH CLAMPING SHOE | 16 MOTOR PULLEY (A) |
| 5 TAILSTOCK SLEEVE | 17 IDLER PULLEY (B) |
| 6 CLAMPING SCREW FOR TAILSTOCK SLEEVE | 18 MAIN SPINDLE PULLEY (C) |
| 7 CLAMPING SCREW FOR TAILSTOCK | 19 SWITCH FOR AUTOMATIC FEED MECHANI
(Accessory) |
| 8 TAILSTOCK | 20 TOP SLIDE WITH CLAMPING SHOE
(Accessory) |
| 9 CROSS SLIDE HANDWHEEL | 21 SCALE ON TOP SLIDE |
| 10 LEADSREW | 22 LONG. SLIDE HANDWHEEL |
| 11 CLAMPING SCREW FOR LONG. SLIDE | |
| 12 LONGITUDINAL SLIDE | |

Design, Controls, Operating Elements

Lathe Bed

The lathe bed is made of high-quality cast-iron. The strong side walls and ribbing assure high rigidity and torsion resistance. Cast-iron absorbs vibrations exceptionally well.

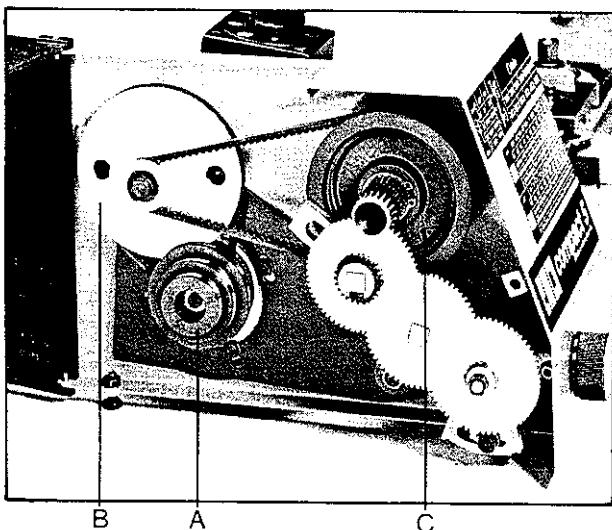
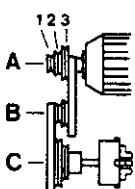
The high precision ground guideways guarantee lasting and exact slide and tailstock running guidance.

The Main Spindle Drive

The motor is reversible (this is necessary for thread-cutting). The main spindle is driven either directly from the

- + Motor pulley A to the main spindle pulley C (speeds 950/1500/2400 rpm) or from the
- + motor pulley A to the idler pulley B and from the idler pulley B to the main spindle pulley C (speeds 200/330/550 rpm).

The belt from the motor pulley to the idler pulley is never changed.



Spindle Speed Chart

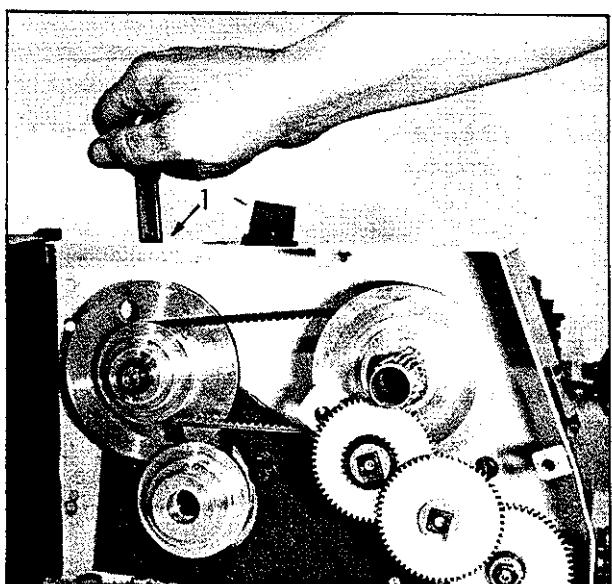
The spindle speeds and the corresponding belt positions are indicated on the front plate of the spindlestock.

	"/min						
A	123	200	330	550	950	1500	2400
B		BC1	BC2	BC3	AC1	AC2	AC3

Setting the required spindle speed:

Loosen the hexagon screw (1) and lift the motor upwards. Place the belt on the required pulley combination. Press the motor downwards - this tightens the belt - and tighten the hexagon screw.

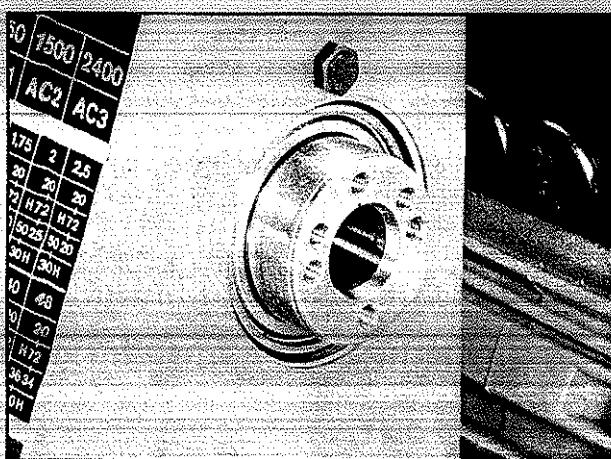
The illustration below shows belt position BC3 (550 rpm).



TIP

If the belt should slide when using low spindle speeds, the belt must be tightened or the cutting depth must be reduced.

Head Stock, Main Spindle



The main spindle is supported by 2 ball bearings in the sturdy headstock housing. The ball bearings are completely enclosed and lubricated for life (no lubrication). The bearings are pre-loaded by a special spring so the main spindle runs always playfree (no adjustment is to be done).

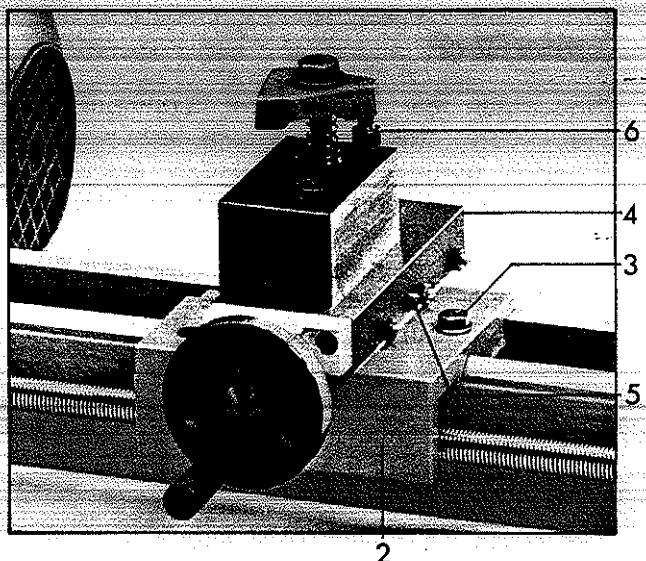
Lathe chuck, independent chuck, etc. are mounted onto the main spindle. The inside taper MT2 serves for mounting the MT2 center (turning between centers). Explanation about feed and thread-cutting charts, see page 17/18.

The Slides

Longitudinal Slide

The longitudinal slide (2) runs playfree in the guideways of the lathe bed and can be clamped with the hexagon screw (3).

Longitudinal adjustment (manual feed) is achieved via handwheel to the leadscrew. The scale divisions on the handwheel: 0,05 mm. When a complete turn of the handwheel is made, the longitudinal slide moves 1,5 mm.



Cross Slide

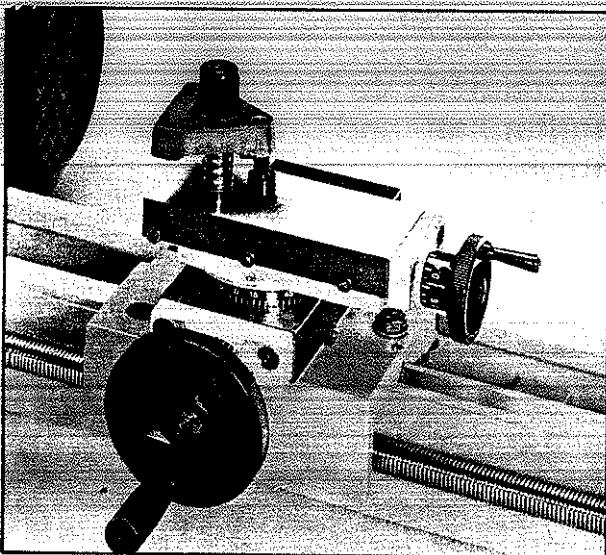
The cross slide (4) runs playfree in the adjustable dovetail guideway of the longitudinal slide. The cross slide can only be adjusted by hand (manually). The scale divisions relate to the diameter and are indicated by 0,05 mm. This means: when the cross slide is adjusted 1 mm according to the scale ring, 1 mm of the diameter of the workpiece will be turned off. The actual movement of the cross slide is, however, 0,5 mm.

The cross slide can be clamped with the set screw (5).

Tool Holder

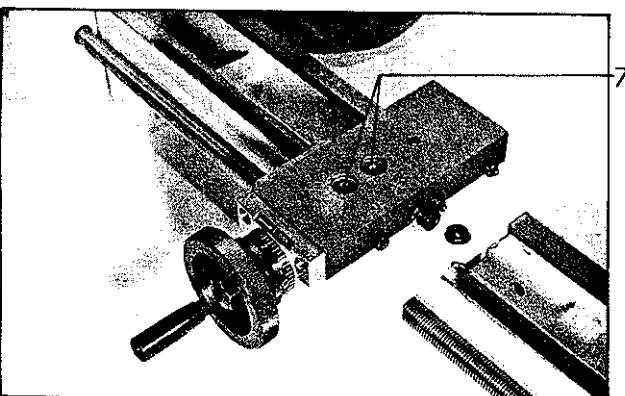
The toolholder is designed for tools with 6x6 mm cross-section. When clamping the turning tool, adjust the allen screw (6) so that the bracket is horizontal in clamped position.

Top Slide (Accessory)

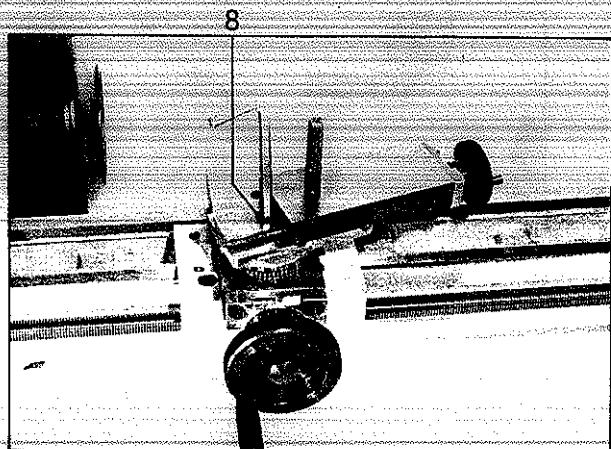


The top slide runs playfree in a dovetail guideway and can be clamped in any required angle relating to the turning axis. The graduated scale enables exact angle adjustment. With the clamping shoe, tools with a maximum size of 12x12 mm cross-section can be clamped. - Scale divisions on handwheel: 0,05 mm

Mounting the Top Slide:

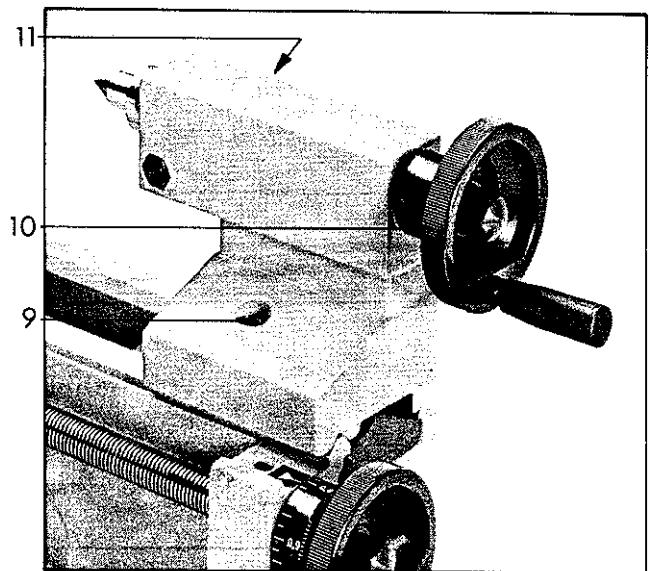


Depending on the required working position, set the top slide in the front or rear centering bore (7) and clamp in the required angle with the allen screw (8).



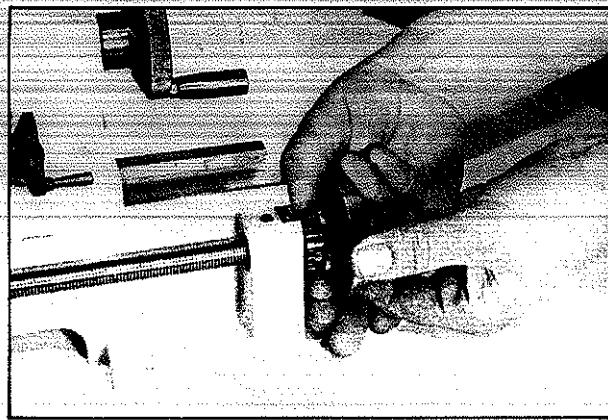
Tailstock

The tailstock serves for holding long workpieces. For this purpose, the fixed center or the revolving center is placed into the inside taper of the tailstock



sleeve. After loosening the clamping screw (9), the tailstock can be moved on the lathe bed. The tailstock sleeve can be adjusted by turning the handwheel (10) and is fixed before turning work with the clamping screw (11). If you turn back the sleeve all the way, the center is automatically ejected.

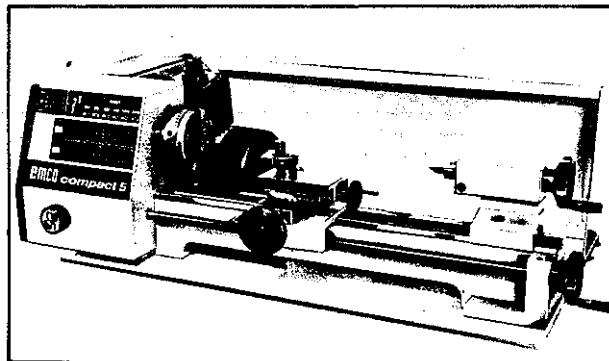
For drilling, the drill chuck is placed into the sleeve. The drill feed is effected with the handwheel. The drilling depth can be seen on the scale on the sleeve.



Adjustable Scale Rings on Longitudinal- and Cross Slide Handwheel

The scale rings on the handwheels can also be adjusted. You can set the scale ring to zero position without changing the position of the slide. This saves calculation work.

Splashguard with Chip Tray

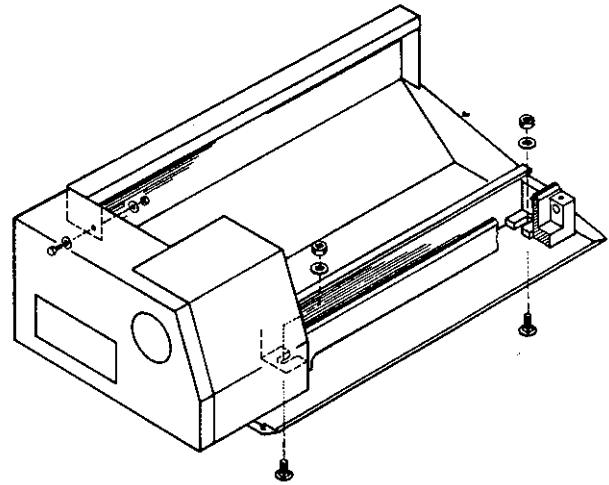


Splashguard with Chip Tray

The working area is kept clean by the chip tray and splashguard. With the splashguard it is not necessary to bolt the machine to a workbench. The 4 plastic washers on the bottom of the chip tray are shock absorbing. The unit can be placed on every stabile table.

Mounting

1. Assemble the chip tray and splashguard with screws (dimensions see spare parts list).
2. Set up machine, bolt splashguard with carrier plate of the machine with screws. Tighten machine bed onto chip tray.

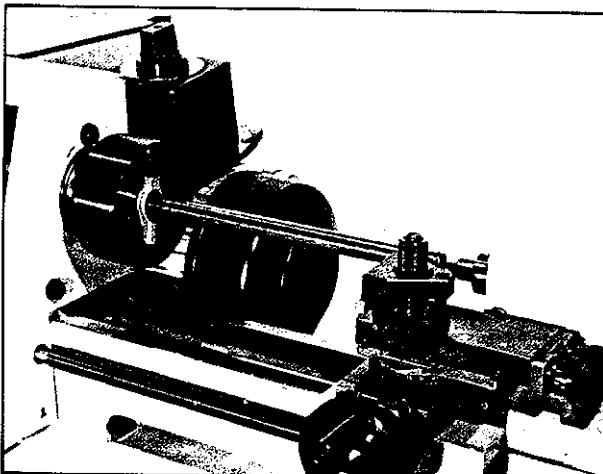
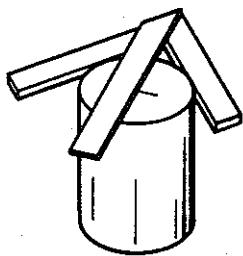


Turning between Centers

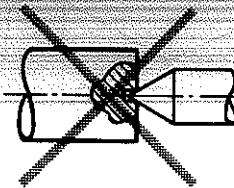
In order to clamp the workpiece, a center bore must be made at each face end.

Making a Center Bore

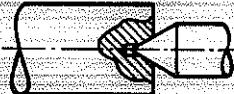
- If the workpiece is not too long, you can mount it in the lathe chuck and align it so that the free end runs concentrically. Insert drill chuck into tailstock sleeve taper and clamp centering drill. Start machine. Move center drill towards face end of workpiece by turning tailstock handwheel.
- It is best to make center bores on long workpieces with a hand drill. Mark center before drilling with a center ruler or a center punch.



Wrong: If center bore is not deep enough, the center would only touch the sharp corners.

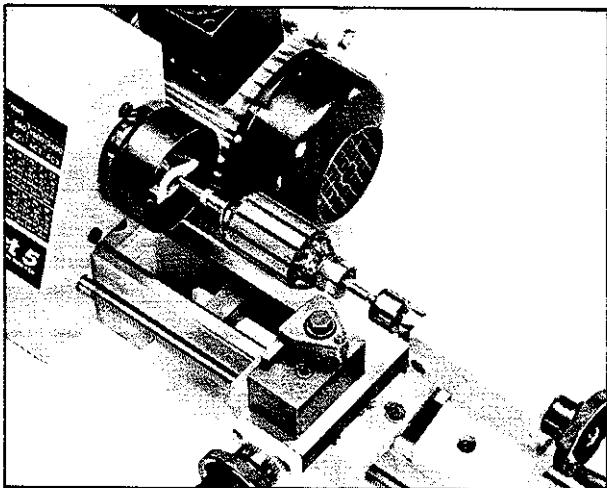


Correct: The center fits completely into the 60° center bore.



Working Example:

Turning a rotor
Spindle speed 950 rpm.

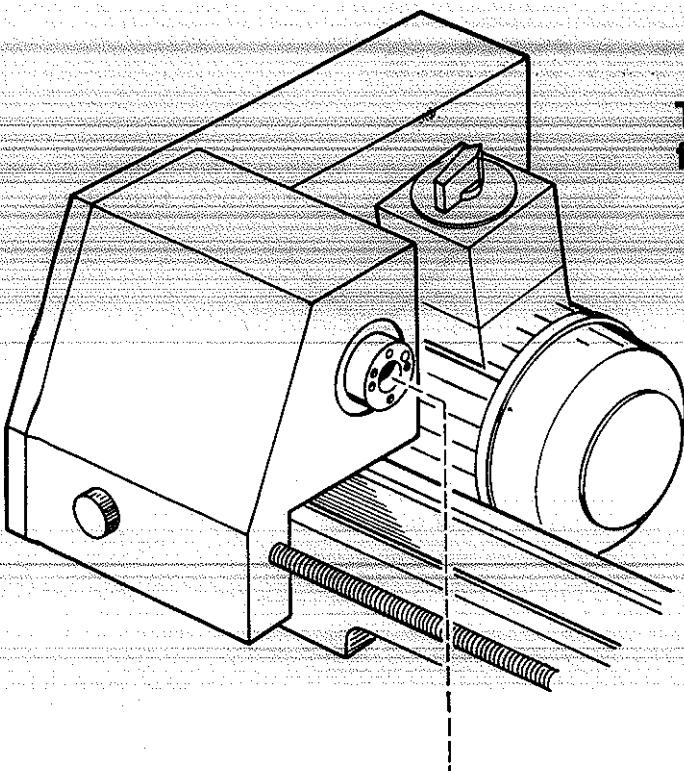


Mounting the Workpiece

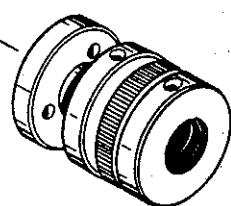
Mount lathe dog guard onto the spindle nose with the 3 allen screws M5 x 10. Clamp lathe dog on workpiece. Mount workpiece between centers.

Working Tip:

Continually lubricate contact points of workpiece - tailstock center or use revolving center.



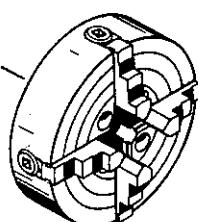
Turning: Clamping Devices for Workpieces (Summary)



Collet chuck attachment

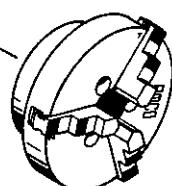
Clamping capacity 1,5 – 14 mm in connection with collets type ESX 25.

Round workpieces can be clamped with highest round-run accuracy using the collets. Collets leave no clamping marks on the workpiece.



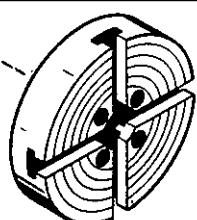
4-jaw independent chuck 90 mm diameter

With the 4-jaw independent chuck, workpieces can be clamped centrically and excentrically. Each jaw can be individually adjusted and reversed.



3-jaw chuck, 80 mm diameter

The 3-jaw chuck serves for centrically clamping round, hexagon or twelve-sided workpieces.



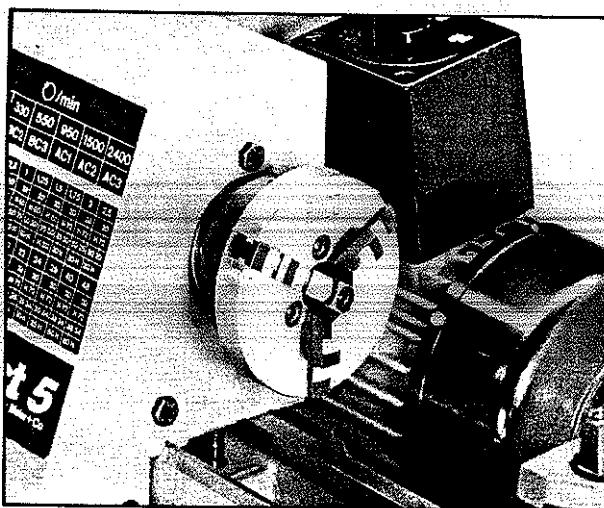
Clamping plate, 90 mm diameter

For clamping large-dimensioned workpieces that cannot be clamped with the 3-jaw or 4-jaw independent chuck. The workpiece is clamped by using the clamping shoes.

Clamping Devices – Working Examples

3-Jaw-Chuck, Ø 80 mm

For centrically clamping of round, hexagon and 12-sided workpieces. Square workpieces cannot be clamped centrically with the 3-jaw chuck.



Clamping Capacities:

If the maximum clamping capacities are passed, there is the danger of breaking the jaw teeth. Safe clamping is no longer guaranteed.

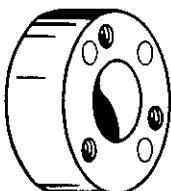
d_5 min.	d_5 max.	d_7 min.	d_7 max.	d_9 max.	d_{10} min.	d_{11} min.	d_{12} max.	d_{13} max.
1	36	21	80	104	5	29	84	104

Mounting

Spindle nose and chuck bore must be dust-free. Mount the 3-jaw chuck onto the spindle nose with the 3 allen screws (M5 x 30, DIN 912).

Do not use longer screws - this would prevent the correct contact with the spindle nose.

Do not use shorter screws - the screws could break or tear out.



Threaded holes for
3-jaw chuck and
lathe dog guard

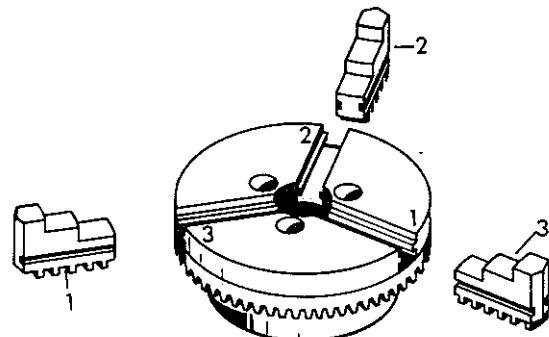
Reversing the Jaws

The jaws can be reversed: jaws mounted stepped outside or jaws mounted stepped inside. Note the correct mounting order for the jaws. Clean the jaws before re-inserting.

A) Jaws stepped inside (external):

Turn the toothed tension ring until the beginning of the spiral thread comes to groove 1.

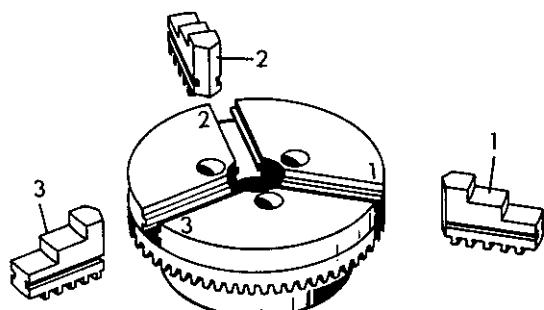
1. Insert jaw no. 3 into groove 1 and turn the tension ring until spiral comes to groove 2.
2. Insert jaw no. 2 into groove 2, turn tension ring.
3. Insert jaw no. 1 into groove 3.



B) Mounting the jaws, stepped outside:

Inserting order:

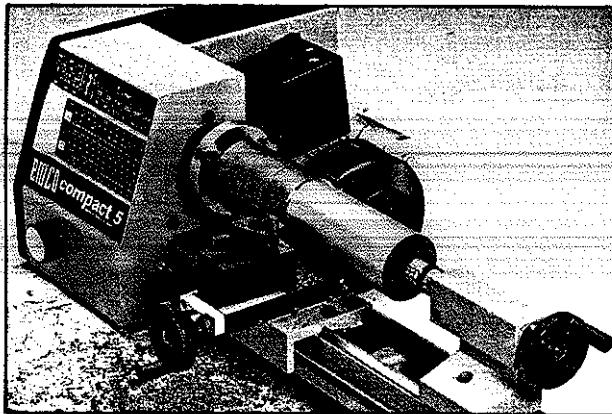
1. Jaw no. 1 in groove 1
2. Jaw no. 2 in groove 2
3. Jaw no. 3 in groove 3



Working with 3-Jaw-Chuck, Working Tips

The workpiece is of steel, 65 mm diameter, spindle speed 200 rpm, feed is 0,14 mm/rev, turning tool: side tool, right, chip removal 0,8 mm (see chart, page B).

The center bore was made with a hand drill.

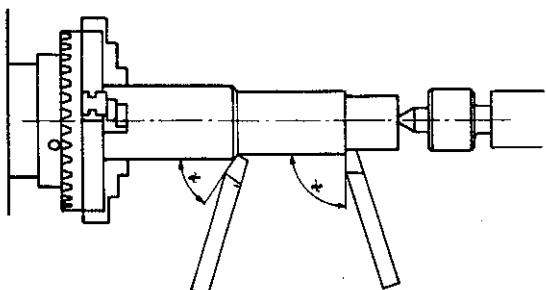


An even surface is achieved with the automatic feed mechanism.

The chip form and the surface of the workpiece alters with the clamping angle "x" of the turning tool. Try clamping the turning tool at different angles "x".

The most advantageous angle depends on the workpiece material. In no case should the angle be smaller than 45°.

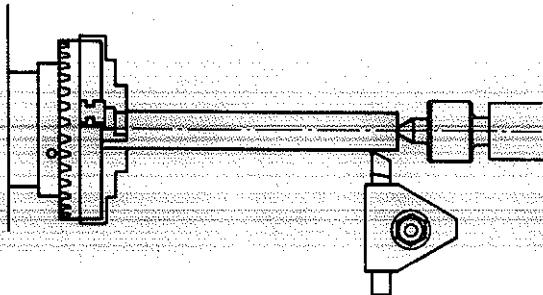
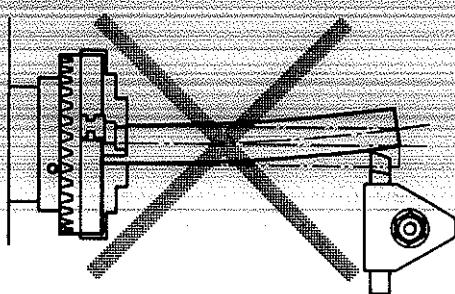
When working on thin workpieces, which have the tendency to bend, use a tool angle "x" of 90°.



SAFETY TIP

Never exceed the maximum clamping capacity of the chuck. (see page 19) This could cause the chuck teeth to break - the jaws and the workpiece would be thrown out and could cause severe injuries.

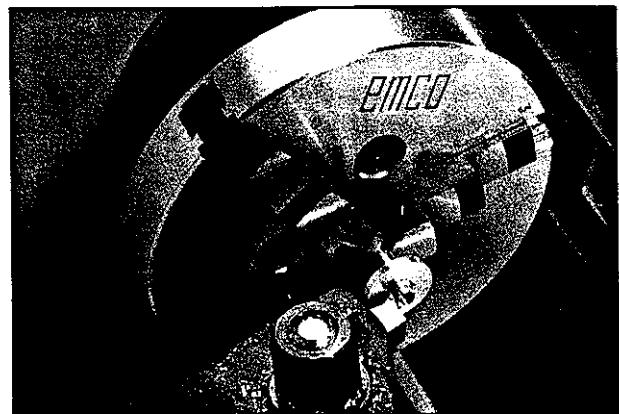
SUPPORTING LONG WORKPIECES



Long workpieces bend through the pressure of the tool and must be supported by the tailstock center.

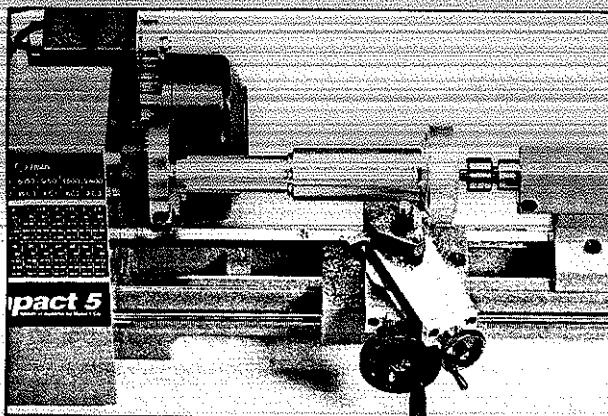
WORKING WITH THE REVOLVING CENTER

With spindle speeds over 550 rpm, it is recommendable to use the revolving center.



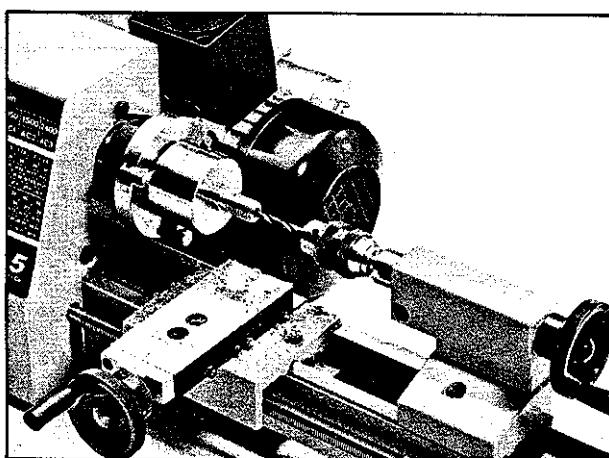
When turning off small diameters, the exact center height of the turning tool is especially important.

TURNING A STEPPED SHAFT



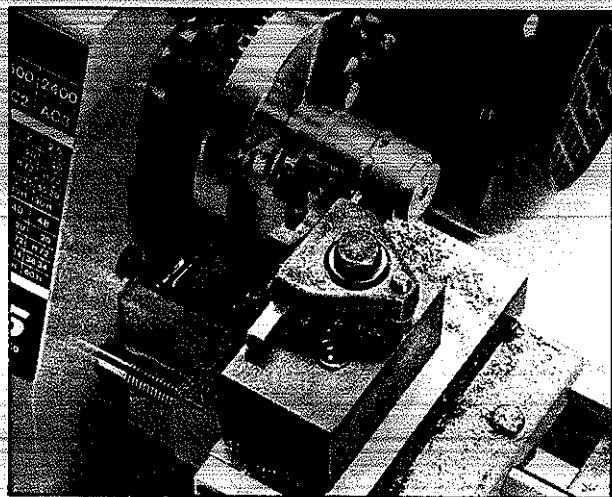
The speed must always match with the diameter of the workpiece. A spindle speed, which is too high, causes damage of the tool. Too slow cutting speeds may cause rough workpiece surfaces (for instance with aluminium alloys).

DRILLING



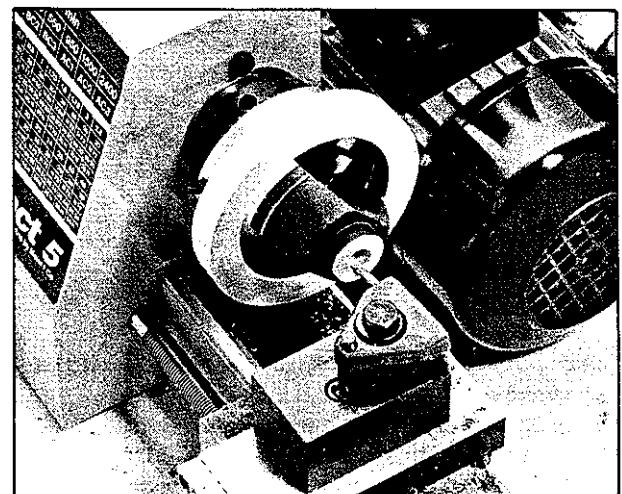
- + Turn back the drill so that the chips are removed from the bore.
- + Use oil for lubrication and coolant
- + The spindle speed for drilling depends on the bore diameter. See chart on side B. Simply exchange the workpiece diameter with the drill diameter.

WORKING TIPS - PARTING-OFF



- Clamp workpiece with as minimum overhang as possible, so that it is not bent by the pressure of the tool.
- The parting-off tool must be clamped at exact center height and at a right angle to the turning axis.
- Use low spindle speed
- Oiling enables easier parting-off
- Clamp longitudinal slide

BORING

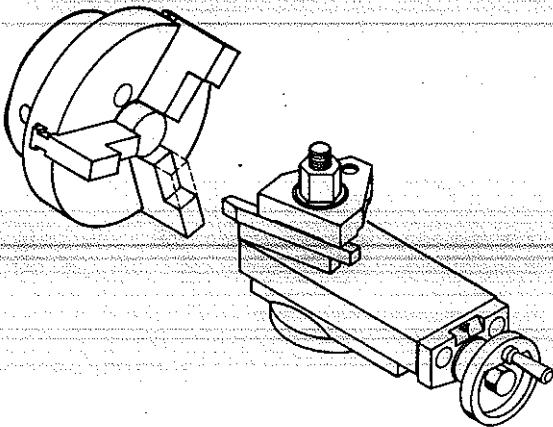


The workpiece is clamped internally. After a bore has been made with the 8 mm drill, you can start with the boring tool.

Soft jaws for the chuck

The steps of the soft jaws must be turned by the user.

When turning these steps, clamp a round workpiece to fix the jaws.



Procedure:

Clamp a round workpiece and turn the step.

Safety tip:

The overhang of the jaws may never be more than 12 mm, otherwise the teeth might break. If the teeth break, the jaw could be thrown out and cause severe injuries.

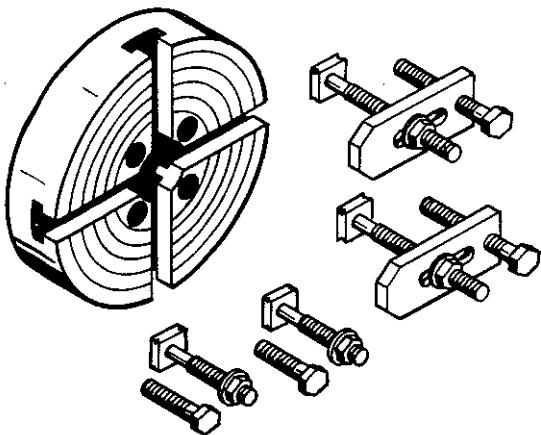
SAFETY TIP:

The steps must be turned so deep that the workpiece is clamped securely.

The Clamping Plate 90 mm diameter

Clamping capacity using the small T-nut screws: up to 13 mm

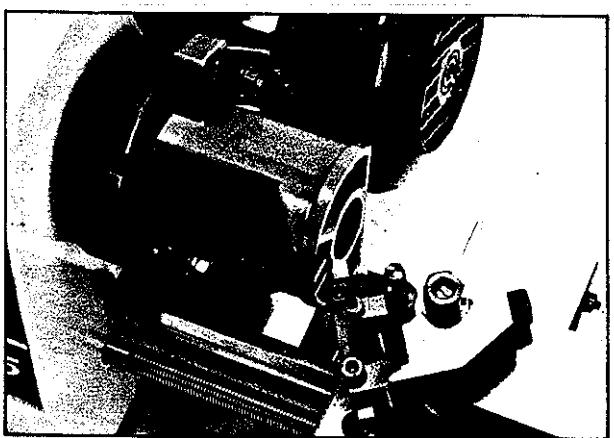
Clamping capacity using the big T-nut screws: up to 33 mm



Often uneven or irregular shaped workpieces cannot be clamped with the 3-jaw chuck or the 4-jaw independent chuck. Using the T-nut screws and the clamping shoes, uneven or large-dimensioned workpieces can be clamped. The rings turned into the clamping plate serve as an aid for centrical clamping.

Mounting

Mount the clamping plate onto the spindle nose with the 4 socket head screws M5 x 20.



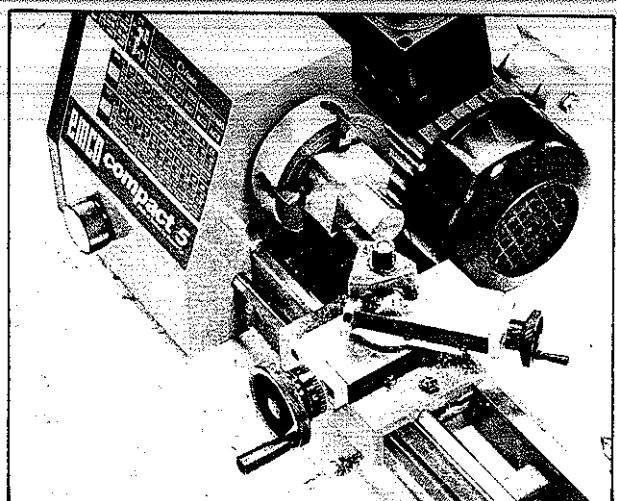
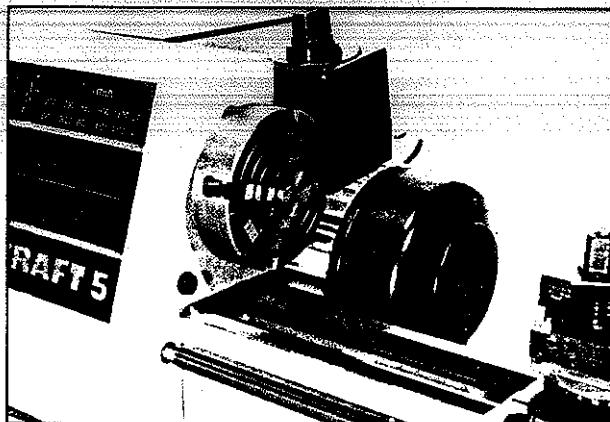
Safety Tip:

Uneven workpieces often cause unbalanced round-run. Therefore always work with low spindle speeds. Be careful of extending parts.

The Independent Chuck, Ø 90 mm

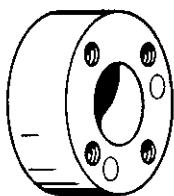
For clamping round, square, rectangular and uneven shaped workpieces.
Each jaw can be adjusted individually.
Workpieces can be clamped centrically and eccentrically.

The rings turned into the independent chuck provide a means of orientation for centric or eccentric clamping of workpieces.



Mounting

Mount the independent chuck to the spindle nose with the 4 allen screws (M5 x 25, DIN 912).



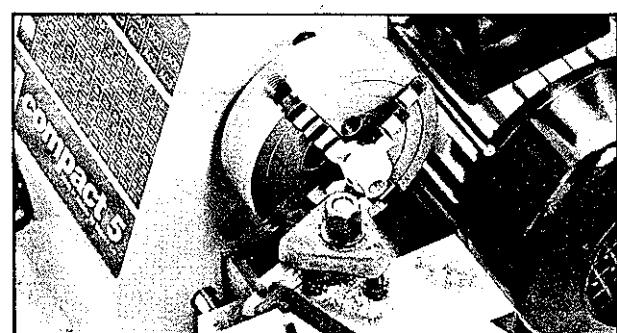
Threaded bores for independent chuck.

Clamping Capacities

d_5 min.	d_6 max.	d_7 min.	d_8 max.	d_9 max.	d_{10} min.	d_{11} min.	d_{12} max.	d_{13} max.
1	42	21	86	110	9	29	90	110

Example:

Square material (workpiece) cannot be clamped centrically in 3-jaw chuck.



Turning a crank

The Collet Chuck Attachment for the Lathe

Clamping capacity 1,5 - 14 mm using the collets type ESX 25.

Round workpieces can be clamped with highest round-run accuracy using the collets. Collets leave no clamping marks on the workpiece.

Mounting

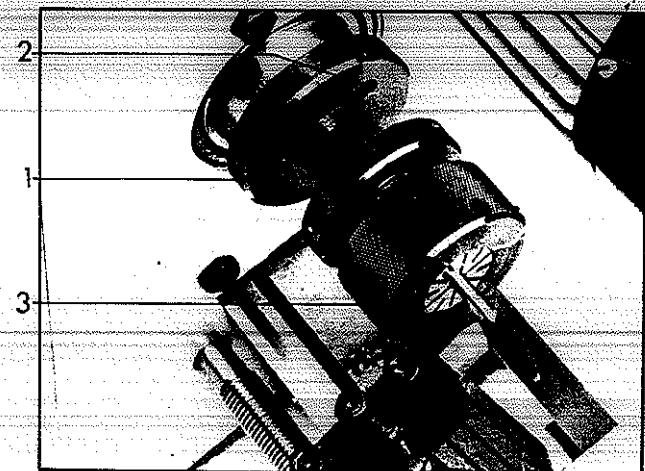
Mount collet holder (1) onto the spindle nose with the 3 hexagon screws (2).

Clamping the workpiece

Insert collet, loosen clamping nut (3), insert workpiece and re-tighten clamping nut with the socket head key. Tightening is done clockwise!

Changing the collets

When the clamping nut is removed, the collet is automatically ejected from the cone of the collet holder.

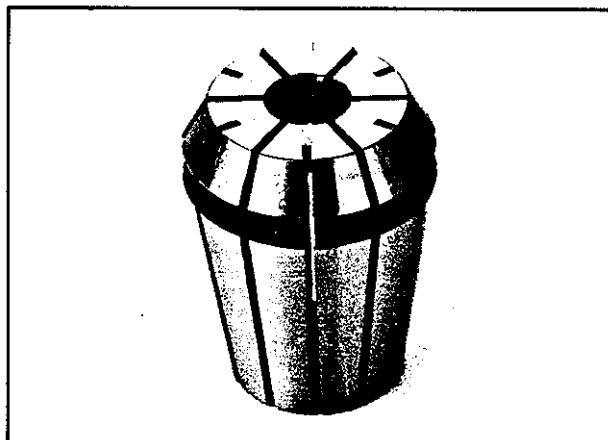


Care/Service

Clean and oil collet holder before and after use - chips and dirt could damage the clamping taper and cone and influence the precision.

The ESX 25 Collets

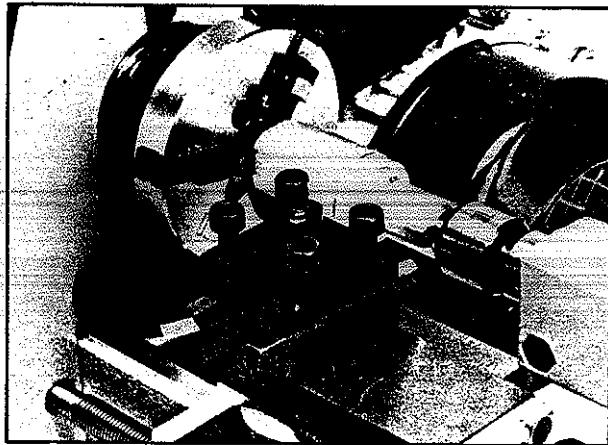
The metric and inch clamping capacity is engraved in the collets. Larger or smaller diameters cannot be clamped.



The Two-Way Toolholder

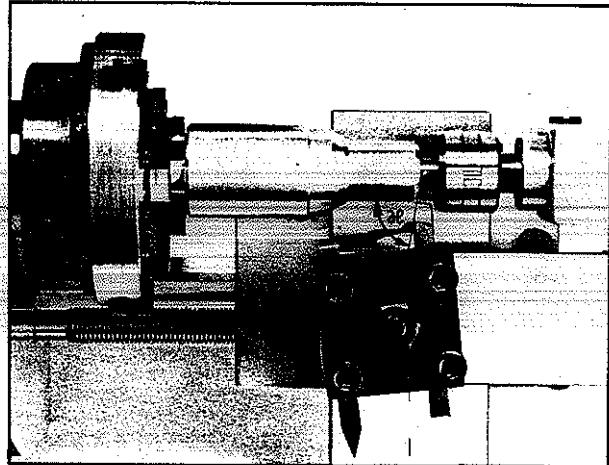
Max. tool section: 6 x 6 mm

The 2-way toolholder can only be mounted onto the top slide. In order to reach the exact center height, spacers must be used.



Working tips:

The 2-way toolholder can be turned. This enables easy adjusting of the clearance angle "X". The clearance angle "X" influences the type of chips and the surface quality. Try it and see!



The Quick-Change Toolholder

Max. tool section: 8 x 8 mm

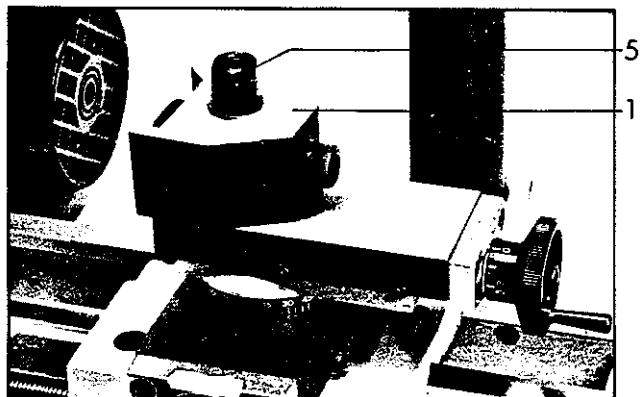
Can only be mounted on top slide.

Should several tools be necessary for turning a certain workpiece, continual changing of tools would be very time-consuming.

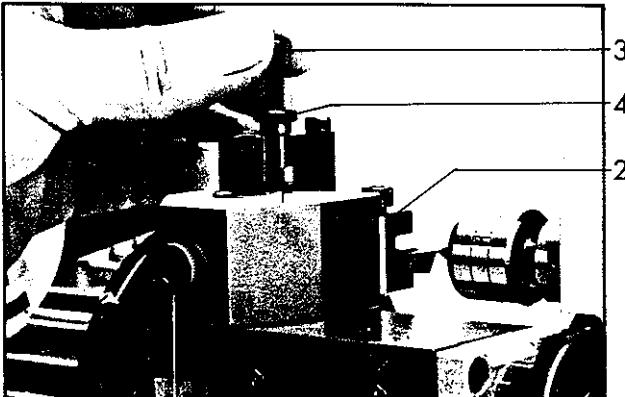
With the quick-change toolholder, the tool can be clamped beforehand and adjusted to exact center height.

Mounting

- + Set basic element (1) onto the top slide.



- + Clamp the tool in the toolholder (2) and mount onto the basic element from the top.
- + Adjust center height with the knurled screw (3), tighten knurled nut (4). The knurled screw is thereby fixed in the adjusted height.
- + Tighten socket head screw (5); the toolholder is clamped.
- + Clamp the basic element in the required angle with the hexagon screw.

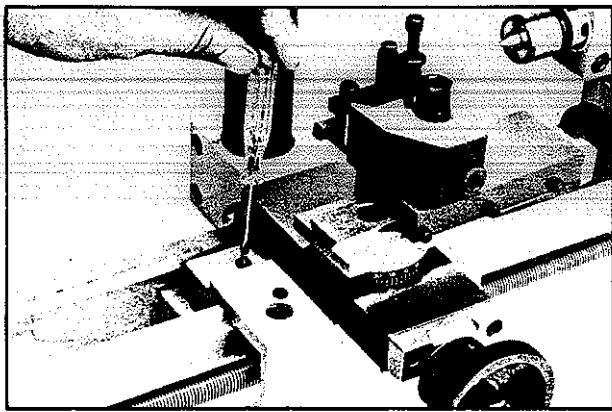


The Travelling Steady

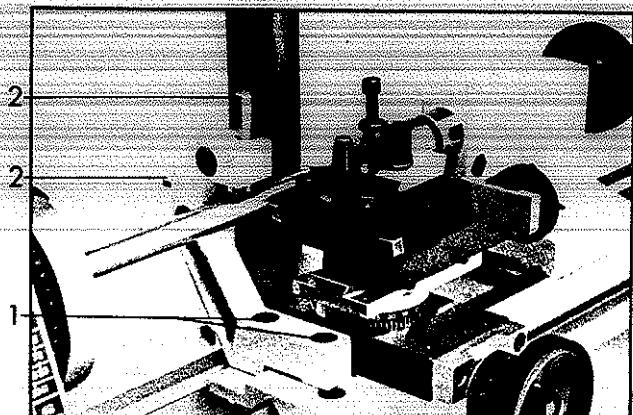
For long round workpieces with diameters from 4 - 25 mm.

Narrow workpieces bend under the pressure of the turning tool. The workpiece would not be cylindrically. The supporting pins of the travelling steady support the workpiece near the tool and prevent bending.

Mounting



Remove the 2 set screws on the longitudinal slide.



Tighten the travelling steady with the socket head screws (1).

Re insert the set screws in the longitudinal slide after dismounting the travelling steady, in order to prevent dirt from damaging the threads.

Working tip:

When adjusting the pins (2), do not bend the workpiece.

Continually oil the contact points pin-workpiece.

The Steady Rest

Capacities:

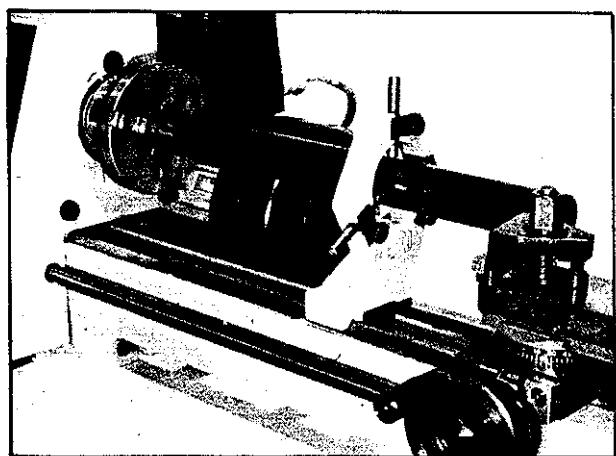
Smallest workpiece diameter: 2 mm
Largest workpiece diameter: 40 mm

With some work, such as boring, drilling, turning pipes, taper turning, etc., the steady rest is necessary for supporting the workpiece, since the center cannot be used.

Also when turning very narrow (thin) workpieces, which are supported with the center, the steady rest prevents the workpiece from bending.

Mounting:

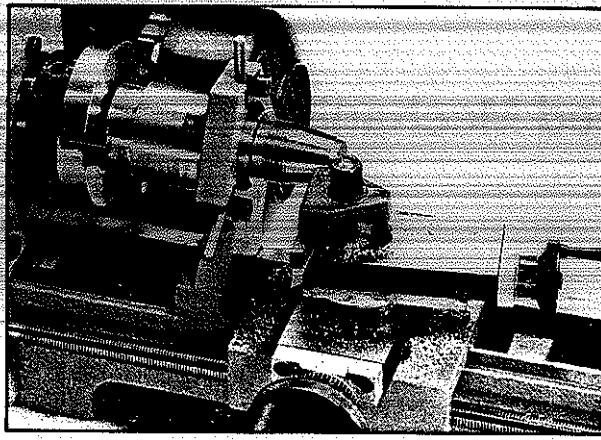
Mount the steady rest on the lathe bed with the clamping plate. Clamp the slide pins so that the workpiece is centrally supported, but not clamped.



A smooth pipe is turned internally and on the face side, supporting with the center is not possible.

Working tip:

Oil contact points to decrease friction and heating up.



At the end of the shaft, a taper is turned; the steady rest prevents a possible movement (pressing out of position) of the workpiece.

Follow all Accident Prevention Rules!

**Always wear Safety Goggles.
Foresight is better
than no Sight!**

Never surpass the Clamping Capacity of the Lathe Chuck and the Independent Chuck!

Always check the Workpiece before Working – is it securely clamped?

The Automatic Feed Mechanism

Delivered Units

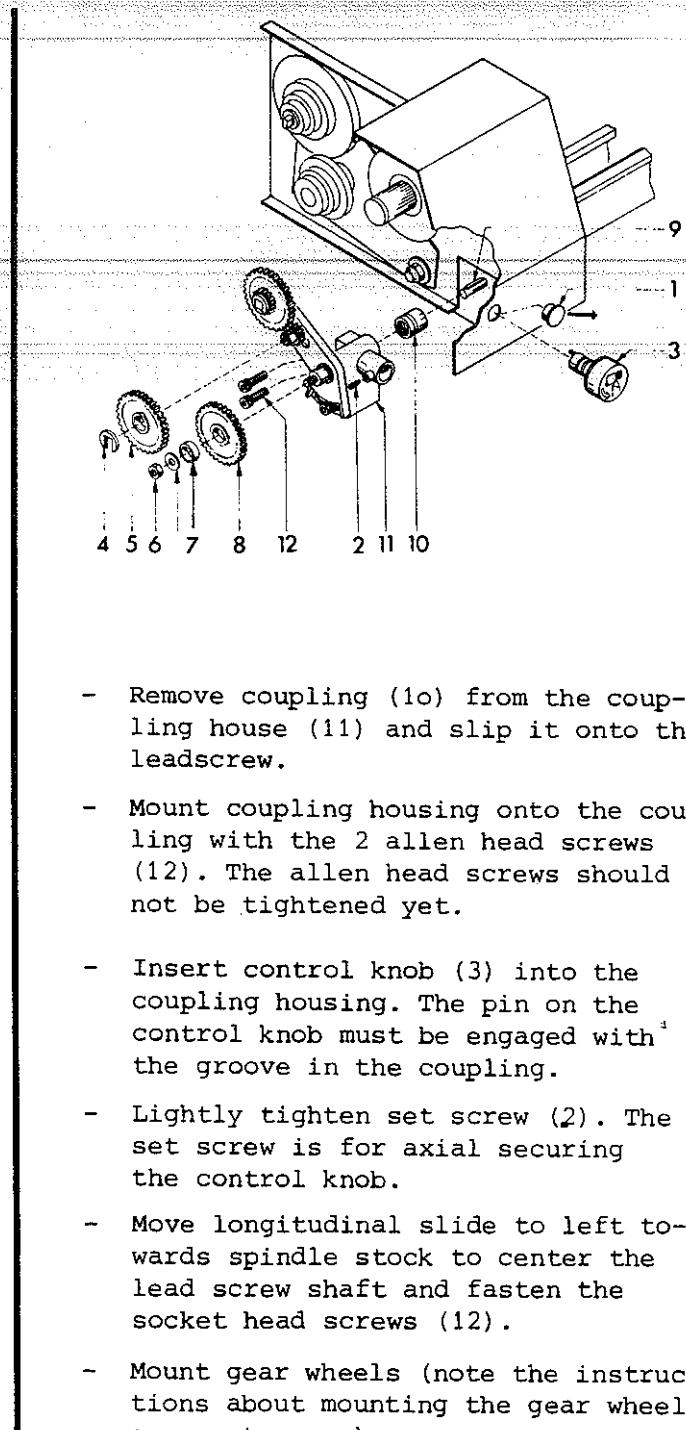
- + Coupling with control knob
- + Quadrant with 6 gear wheels
- + 3 shear pins
- + 2 spacers

Function

- a) Turning with automatic longitudinal feed:
 - You save turning the longitudinal slide handwheel
 - The surface of the workpiece is even.
- b) Thread-cutting:
 - With the exception of the two feeds (0,07 and 0,14 mm per main spindle revolution) you can cut 5 metric threads: 0,4/0,6/1,0/1,25/1,5 mm.
 - With the change gear set you can cut additionally 10 metric threads and 14 inch threads (see technical data).

Mounting

- Remove plastic plug (1)
- Loosen set screw (2) and pull out control knob (3)
- Remove washer (4) and gear wheel 60 (5)
- Unscrew hexagon nut (6), remove washer, spacer (7) and gear wheel 60 (8).
The gear wheels must be dismounted, so that the coupling housing can be mounted with the allen screws (12).
- Remove the tape on the leadscrew - its purpose was to hold the parallel key (9).



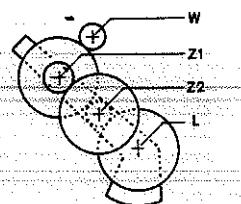
Mounting the Gears

On the front panel the gear combinations for the two feeds (0,07 and 0,14 mm/rev) and for the thread pitches are indicated.

Example of mounting:

Required feed size: 0,07 mm/rev. On the top left side of the front panel, you will find the gear wheel combination.

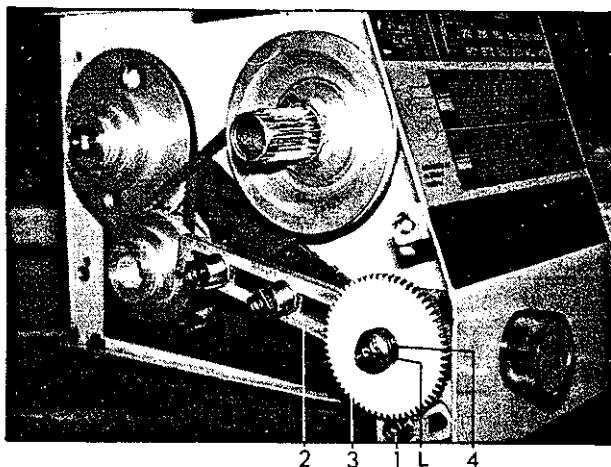
mm/rev	0.07	0.14
W	20	20
Z1	25 60	50 60
Z2	60 20	60 20
L	H 60	H 60



Steps for Mounting the Gears

W	
Z1	
Z2	
L	H 60

- ① Loosen the allen head screw (1) and swivel the quadrant (2) downwards. Mount gear wheel 60 (3) and spacer H (4) onto the leadscrew (L). Fix gear wheel and spacer with the ring washer and the hexagon nut.



W	
Z1	
Z2	20
L	H 60

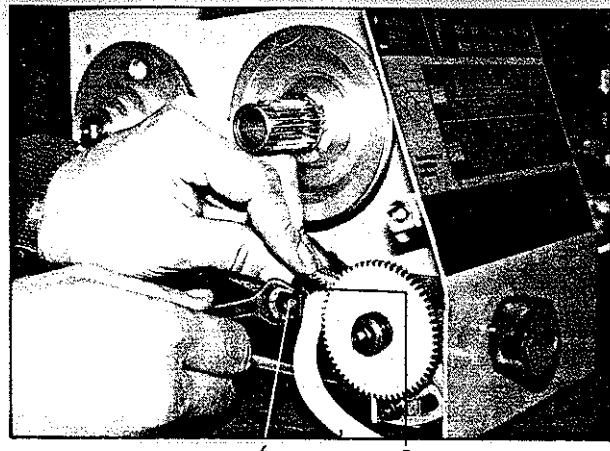
- ② Mount gear wheel 20 (5) onto the axis Z2 (6). Clamp axis Z2, so that gear wheel 60 and gear wheel 20 are engaged.

Correct Play of the engaged Gear Wheels

A small amount of play must be present, otherwise the gears would wear out quickly. This play in no way influences the accuracy of the thread pitch.

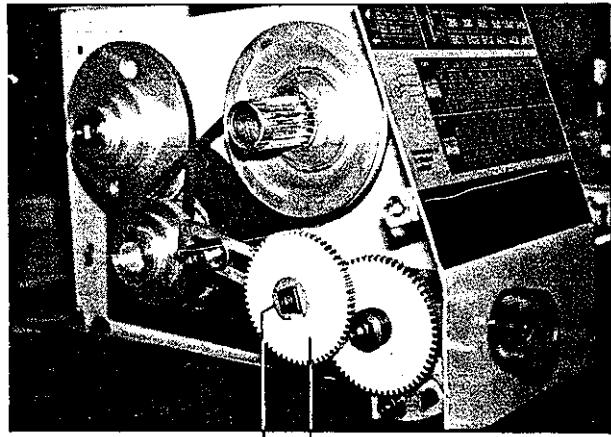
Recommended method:

Place a piece of paper between the gears; press the engaging gears together and clamp axis Z2. Remove paper.



W	
Z1	
Z2	60 20
L	H 60

- ③ Mount gear 60 (7) onto axis Z2. Place ring (8) onto Z2 in order to fix gears axially.

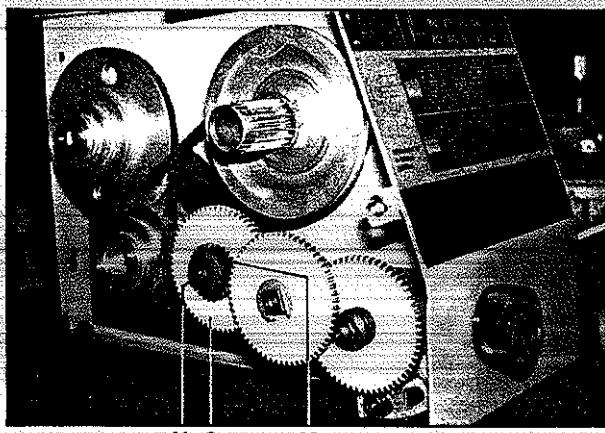


W	
Z1	25 60
Z2	60 20
L	H 60

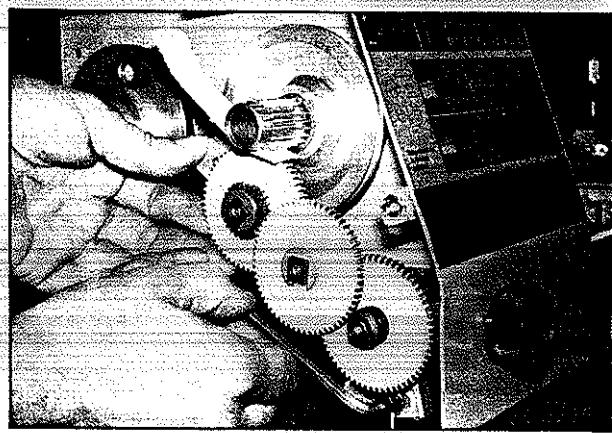
- ④ Mount gears 60 (9) and 25 (10) onto axis Z1 (11). Clamp axis Z1 so that tooth surface play is present. Mount ring for axial fixing.

W	20
Z1	25 60
Z2	60 20
L	H 60

- ⑤ Swivel quadrant upwards and clamp with socket head screw (1). Note tooth surface play.



11 9 10



1

Thread Pitches – Gear Combinations

mm	0,4	0,5	0,6	0,7	0,8	1	1,25	1,5	1,75	2	2,5
	W 20	20	20	20	20	20	20	20	20	20	20
Z1	H 60	H 72	H 60	H 72	H 72	H 60	H 60	H 60	H 72	H 72	H 72
Z2	20 25	25 30	60 50	35 25	20 25	50 25	50 20	25 50	35 20	50 25	50 20
L	60 H	50 H	60 H	60 H	30 H	60 H	60 H	H 20	30 H	30 H	30 H

n/1"	10	11	12	14	16	20	22	24	28	40	48
	W 20	20	20	20	20	20	20	20	20	20	20
Z1	H 60	H 72	H 60	H 60	H 60	H 60	H 72				
Z2	72 34	60 26	72 34	72 34	72 34	72 34	60 26	36 34	36 34	36 34	36 34
L	25 H	30 H	30 H	35 H	40 H	50 H	60 H	30 H	35 H	50 H	60 H

ADDITIONAL THREAD PITCHES, WHICH ARE
NOT SHOWN ON THE FRONT PANEL

Metric Threads

mm/°	0,25	0,3	0,35	0,75
W	20	20	20	20
Z1	H 60	H 72	H 72	H 72
Z2	30 60	30 50	35 50	25 50
L	60 H	60 H	60 H	H 40

Inch Threads

n/1"	18	32	36
W	20	20	20
Z1	H 72	H 72	H 72
Z2	40 25	36 34	40 50
L	34 H	40 H	34 H

Working Tips – Thread-Cutting

Metric and Inch Threads, the Chart on the Spindle Stock

All threads and their geometrical sizes and shapes are standardized. The thread charts (see page 18) show the gear combination for the respective thread pitch.

Metric threads:

The pitch size "p" is given in mm with metric threads.

Inch threads:

The inch threads are defined by the number of threads per inch (abbreviation: tpi, symbol: n/1").

For example: 10 tpi or n/1" means 10 threads per inch. The actual pitch size is:

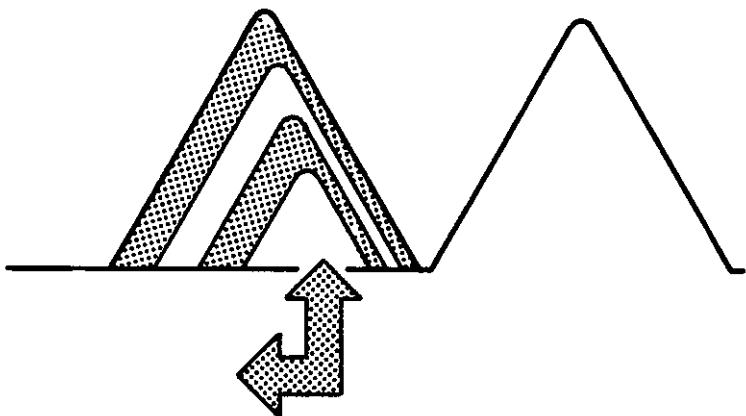
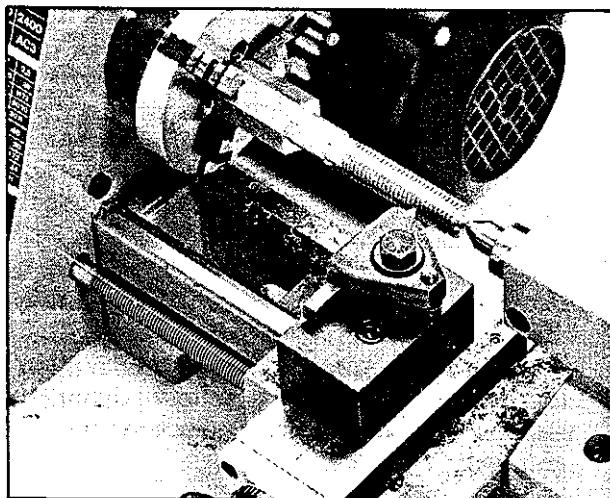
$$\frac{1 \text{ inch}}{10} = \frac{1''}{10} \text{ or } 0,1''$$

Procedure

- + Tool must be clamped at an exact right angle to the turning axis.
- + Mount gears for required pitch (see pages 17/18)
- + Choose spindle speed so, that you have enough time to turn back the cross slide and switch off the machine.
- + It is recommendable to use oil as lubricant.

Each thread has to be cut in several steps. The cutting depth must not be large. Turn back the cross slide at the end of one cut, reverse the motor to bring the tool to the start position. - Adjust the tool to a new cutting depth using the dial on the cross slide hand-wheel.

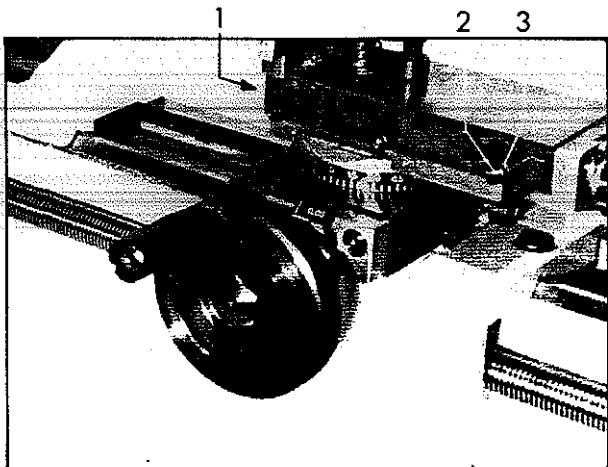
The top slide is recommendable for thread-cutting to adjust the tool sideways, as shown in the illustration.



Adjustments

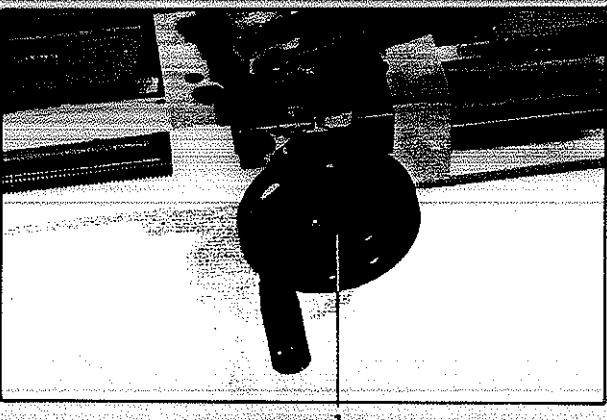
Playfree Re-Adjustment of Cross Slide and Top Slide Guidance

The dovetail guideways are fitted with gibbs (1). With the set screws (2), which press on the gibbs, the play-free slide guidance is adjusted. The hexagon nuts (3) serve for securing the set screws in adjusted position.



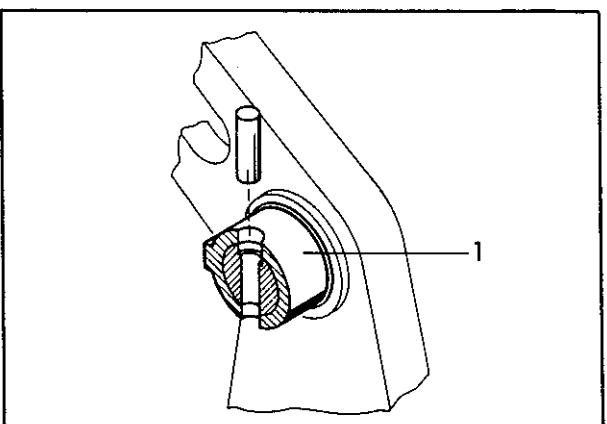
Adjustment:

Loosen hexagon nuts, adjust set screws until the slides run without play. Hold set screws in the adjusted position with a screwdriver and tighten the hexagon nuts.



Changing the Shear Pin

If the shear pin should break, due to overload or incorrect handling of the machine (if the automatic feed is switched on while longitudinal slide is clamped), a new original shear pin must be inserted.



Procedure:

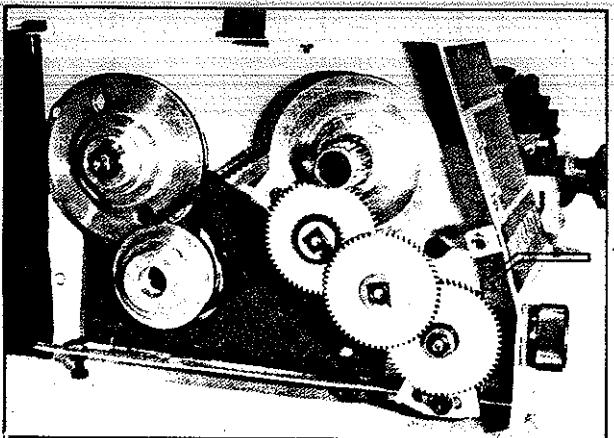
- Hold handwheel and loosen cap nut (1).
- Turn handwheel inwards, hold in the adjusted position and re-tighten cap nut.
- Dismount gears from the leadscrew, remove bush (1), remove broken shear pin with a punch (maximum diameter of punch: 2,5 mm).
- Remount bush and turn it, so that the bores match - press shear pin through the larger bore of the bush. Note: Shear pin may not overhang the bush, otherwise the gears cannot be mounted.

USE ONLY ORIGINAL SHEAR PINS!

Lubrication

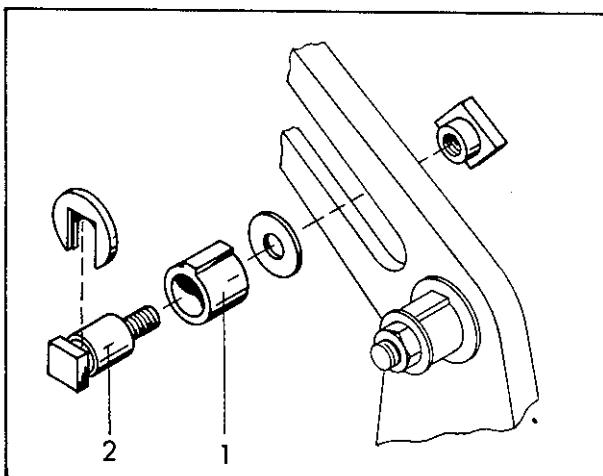
Interval approx. 20 Working Hours

Oil coupling bolt through the opening of the feed housing (1), with an oil can (light machine oil).



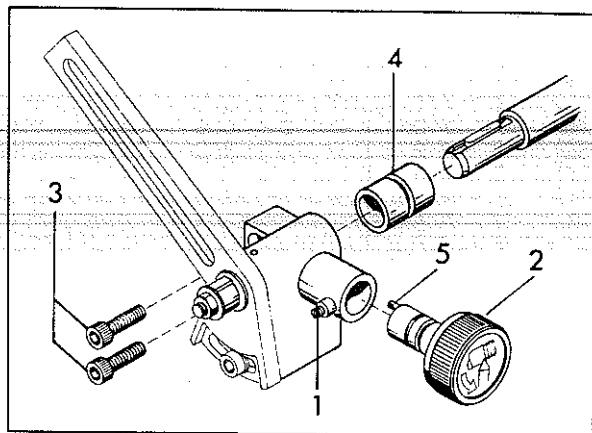
Interval approx. 50 Working Hours

Bushes and bolts (axis Z1,Z2) on the quadrant: remove gears, unscrew bolts. Oil bush (1) and bolt (2).



Interval approx. 200 Working Hours

Coupling in housing:



1. Dismount gears, unscrew set screw (1) until you can pull out the control knob (2).
2. Move longitudinal slide towards spindle stock (for centering lead-screw).
3. Unscrew the 2 allen head screws (3) and remove feed mechanism.
4. Remove coupling (4) from the feed gear housing and lubricate with grease.
5. Re-mounting:
 - Place coupling (4) onto leadscrew and mount feed mechanism housing with the two allen head screws.
 - Insert control knob, so that bolt (5) is in the groove of the coupling; turn set screw (1) until it touches bottom of groove, then turn 1/4 revolution back again.

Problems – Possible Causes – Remedy

Chattering	Spindle speed is too high or too low Machine not bolted down Too much tool overhang	Decrease or increase spindle speed. It could happen that the eigenfrequency is identical with the spindle speed. Bolt machine to even workbench Clamp tool with smallest overhang possible
	Long or narrow workpiece not supported either by tailstock center or by fixed steady. Workpiece bends through the power generated by the cutting operation.	Support workpiece with tailstock center or fixed steady. Sharpen tool. Increase adjusting angle to 90°.
	Cutting tool dull, or cutter angles not correct	Grind cutting tool
	Main cutting edge not on center height	Adjust cutter to center height
	Play in the slide guideways	Adjust slides playfree
	Increased cutting depth "a"	Reduce cutting depth
Rough surface	Dull tool Tool is too pointed Play in the slide guideways	Sharpen tool Grind a small radius to the tool point Adjust slides playfree
	Dull tool Spindle speed too high, or cutting depth too large	Grind tool Reduce spindle speed and cutting depth
	Tailstock center does not fit to center bore	Machine correct center bore, adjust tailstock center into center bore
	Long or narrow workpiece not supported by tailstock center or fixed steady	Support workpiece
	Drive overloaded, longitudinal slide clamped	Reduce feed and/or cutting depth. Loosen hexagon bolt on longitudinal slide.
	Shear pin breaks	

Drilling – Milling

With the vertical milling and drilling unit, the Compact 5 can be converted into a drilling machine and a universal milling machine.

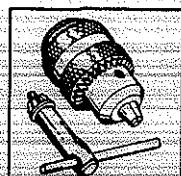
Note:

The name "vertical milling and drilling unit" has become well-known, but it is not descriptive. It is really a universal milling and drilling unit, since the milling spindle can be used for milling not only vertically, but in any required angle position.

Index Drilling – Milling

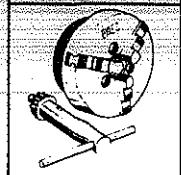
Accessories (summary)	36-37
Accident Prevention	37
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Milling - General tips	43-45
Clamping tools for drill and mill	46/48
Clamping tools for workpieces	47/49/50
Dividing Attachment	51-54

Accessories for milling and drilling attachment



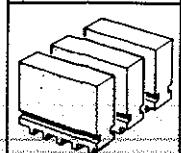
Three-jaw drill chuck
capacity 1 to 8 mm, with M 14x1 mounting thread

Order No. 152 500



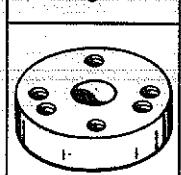
Three-jaw lathe chuck
80 mm dia., with scroll, reversible jaws, and tee-handle pinion key

Order No. 200 410



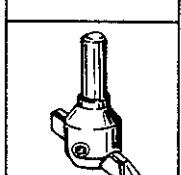
Set of 3 soft jaws
Technical tip: For three-jaw lathe chuck
Order No. 200 410

Order No. 200 430



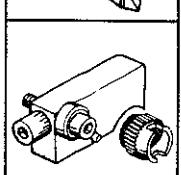
Support flange
Technical tip: For mounting three-jaw lathe chuck
Order No. 200 410, four-jaw independent chuck
Order No. 200 360,
collet attachment Order No. 200 040

Order No. 200 250



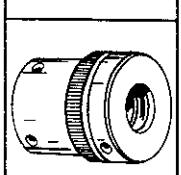
Facing and boring head (Fly cutter)
with 1 ground facing and boring tool, 2 unground tools, operating key

Order No. 150 100



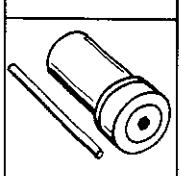
Vertical fine feed attachment
1 division = 0.1 mm

Order No. 151 110



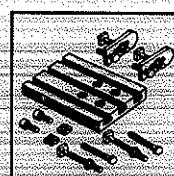
Collet attachment
for collets type ESX-25, gripping capacity
1.5–14 mm

Order No. 200 050



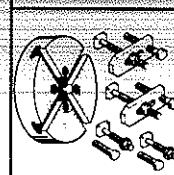
Cutter arbor
for tooth milling cutters and circular saw blade

Order No. 151 070



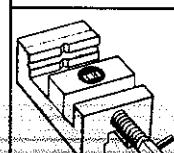
Milling table
with 2 clamps, can be mounted on cross slide for
fixing or clamping large-surface workpieces

Order No. 150 350



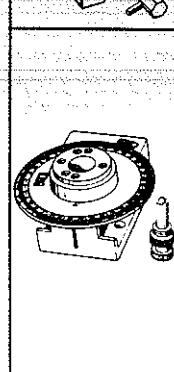
Clamping plate
90 mm dia., with 2 clamps
Technical tip: Fits on spindle of headstock and dividing
attachment Order No. 200 320

Order No. 200 360



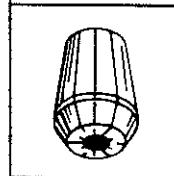
Machine vice
Clamping range 32 mm
Width of jaws 46 mm
Height of jaws 18 mm

Order No. 200 310



Dividing attachment
with integrated dividing plate for direct dividing.
22 possible divisions: 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 15,
16, 18, 20, 24, 28, 30, 36, 48, 56, 60
Technical tip: Chucking means that can be used –
Three-jaw lathe chuck Order No. 200 410
Clamping plate Order No. 200 360
Four-jaw independent chuck Order No. 200 420
Collet attachment Order No. 200 040

Order No. 200 320



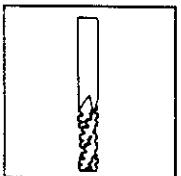
Set of 14 collets ESX-25
in wooden case, gripping capacity from 1.5–14 mm

Order No. 225 000

Individual collets ESX-25

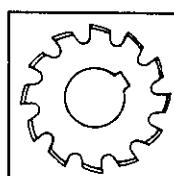
Nominal dia. in mm	Chuck capacity in mm	Shaft dia. in inches	Order No.
2,0	1,5–2,0	1/16–5/64	225 020
2,5	2,0–2,5	3/32	225 025
3,0	2,5–3,0	7/64	225 030
4,0	3,0–4,0	1/8–9/64–5/32	225 040
5,0	4,0–5,0	1 1/16–3/8	225 050
6,0	5,0–6,0	13/64–7/32–15/64	225 060
7,0	6,0–7,0	1/4–17/64	225 070
8,0	7,0–8,0	9/32–19/64–5/16	225 080
9,0	8,0–9,0	21/64–11/32	225 090
10,0	9,0–10,0	23/64–3/8–25/64	225 100
11,0	10,0–11,0	13/32–27/64	225 110
12,0	11,0–12,0	7/16–29/64–15/32	225 120
13,0	12,0–13,0	31/64–1/2	225 130
14,0	13,0–14,0	33/64–17/32–35/64	225 140

Tools for vertical milling and drilling attachment



Heavy-duty end mill
high speed steel with roughing toothing, shaft dia.
8 mm

Order No. 764 200



Set of 6 gear mills
dia. 40 mm, Module 0.5 (No. 1–6)

Order No. 152 110



Circular saw blade
for metal, 60 mm dia.

Order No. 123 100

Tool assortment, large

- 15 twist drills, 1-8 mm dia. in steps of 0.5 mm
- 2 center drills 1.5 mm dia.
- 4 grooving cutters dia. 3, 4, 5, 6 mm
- 1 roughing mill dia. 8 mm
- 8 turning tools, ground, assorted
- 1 turning tool, unground
- 1 circular saw blade for metal dia. 60 mm
- 1 countersink 90°
- 1 T-slot cutter Ø 16x4 mm

Order No. 152 100

Individual gear mills

- Ø 40 mm, module 0.5, No. 1, for 12-13 teeth
- Ø 40 mm, module 0.5, No. 2, for 14-16 teeth
- Ø 40 mm, module 0.5, No. 3, for 17-20 teeth
- Ø 40 mm, module 0.5, No. 4, for 21-25 teeth
- Ø 40 mm, module 0.5, No. 5, for 26-34 teeth
- Ø 40 mm, module 0.5, No. 6, for 35-54 teeth

- Order No. 764 601**
- Order No. 764 602**
- Order No. 764 603**
- Order No. 764 604**
- Order No. 764 605**
- Order No. 764 606**

Tool assortment, small

- 1 twist drill each 2, 3, 4, 5 mm dia., 1 center drill 1.5 mm dia.,
- 1 countersink 90°, 1 grooving cutter 4 mm dia.,
- 1 T-slot cutter 16x4 mm dia.

Order No. 119 000

Service parts set

- 2 V-belts, 10 shear pins, 2 washers, 2 grooved pins

Order No. 200 990

Accident Prevention: Milling – Drilling

- + Always follow the rules for accident prevention on page 3!

Additional tips:

+ Clamping the workpiece

When drilling or milling, the workpiece must be clamped securely, in order to prevent the workpiece from being loosened by the cutting force of the tool.

Clamping tools: machine vice, milling table with clamping shoes, 3-jaw chuck, 4-jaw independent chuck ...

+ Work only with perfectly ground and sharpened tools!

+ Close belt cover before switching on machine.

+ Remove milling and drilling chips only with brush and only when machine is not switched on.

+ Loose clothing and hairs can be especially dangerous! Hair or clothing can easily get caught in the spiral grooves of the millers and drills.

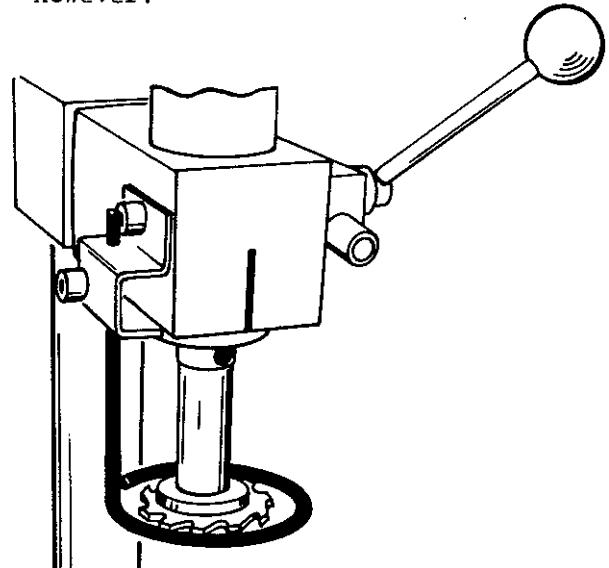
+ Never wear rings when working!

+ Never clean machine while it is running.

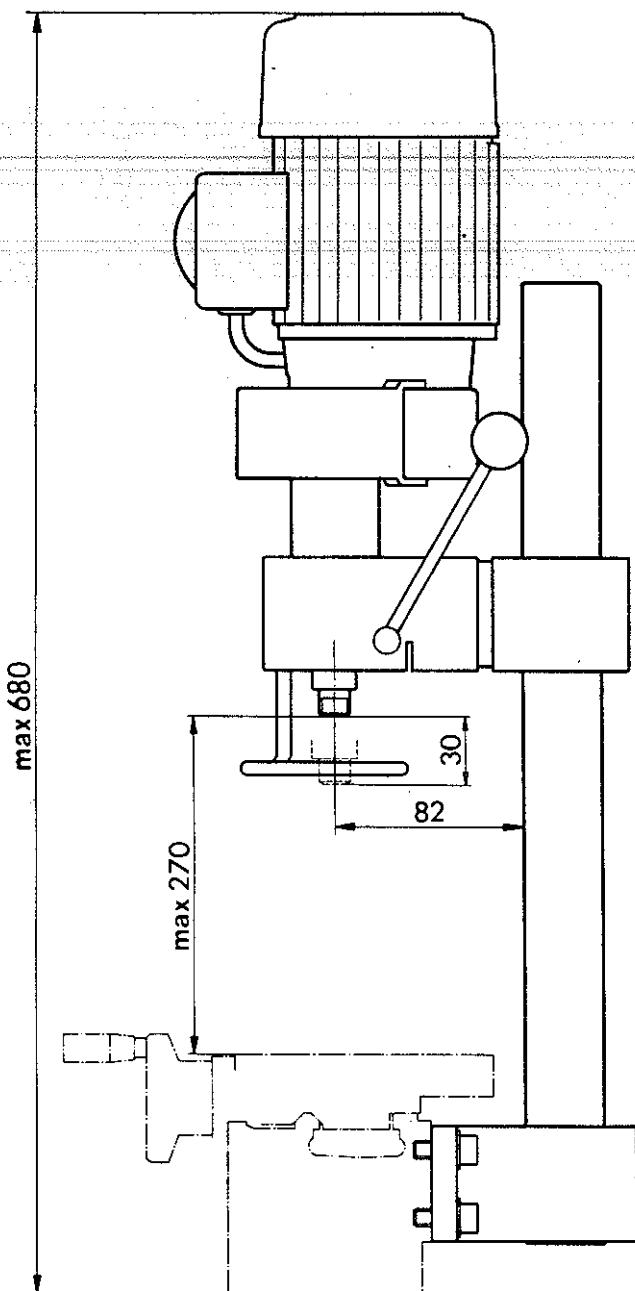
+ The milling guard: the ring must be clamped so, that the tool (miller, circular saw blade) is covered when in the uppermost position.

Note:

To enable better illustration, the milling guard is not shown in some drawings. The guard must be mounted, however.



Technical Data



Motor:

IEC-standard single-phase motor, dust and splashproof according to IP 44

Input power (P1) 200 W, S3-60 % ID

Output power (P2) 100 W, S3-60 % ID

For voltage and frequency - see label on motor.

Spindle speeds: 380/700/1600 rpm

Spindle nose (main spindle):

according to factory standard, with M14 x 1 thread.

Weight: 6,5 kg

For dimensions - refer to sketch

Electrical Connection

The vertical milling and drilling unit may only be plugged into outlets with grounding contacts (a grounding receptacle must be available for connection of the machine).

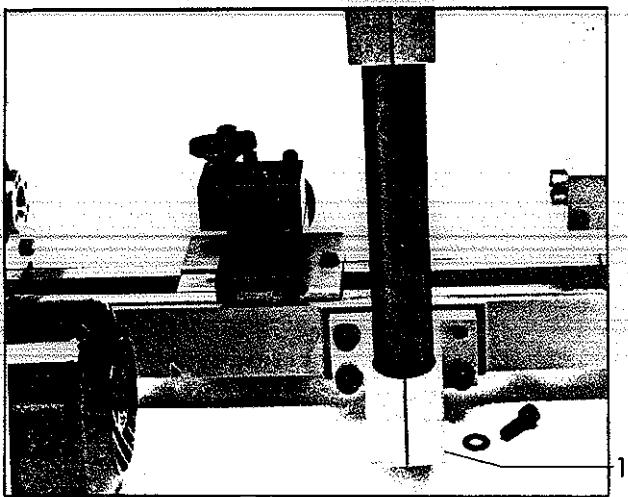
Mounting the plug:

Due to the different requirements in different countries, the machines are not delivered with plugs everywhere. Mounting of plugs must be carried out professionally!

Clamp the grounding wire (yellow-green) to the grounding contact (symbol \oplus). Clamp the other two wires to contact R and N.

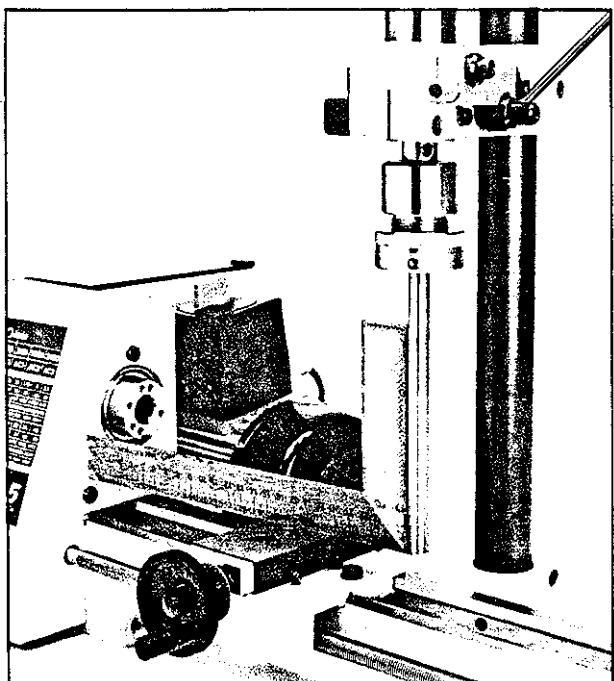
Mounting the Vertical Unit – Operating Elements

Attach the base to the lathe bed with the 4 socket head screws and washers. Clean contact surfaces thoroughly before mounting.



Fixing the vertical column

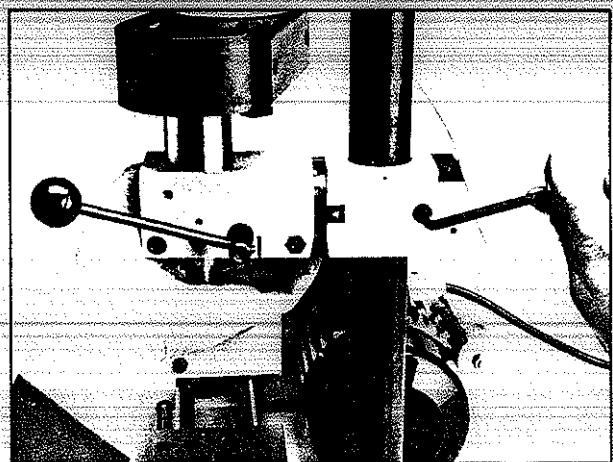
Tighten the two socket head screws (1).



Vertical adjustment

The base must be clamped so, that the vertical column is at a right angle to the cross slide.

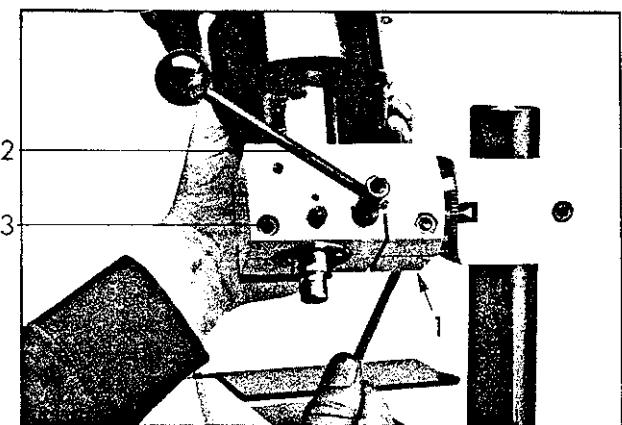
Height adjustment and turning the vertical unit



Loosen the socket head screw on the clamping head and bring the vertical unit into the required position and height.

- ❖ The cross slide throat is limited to 50 mm. By clamping the vertical unit in different angles, you can match the working requirements to the cross slide travel.

Swivelling the quill holder



Loosen socket head screw (1) and swivel the quill holder to the required angle. The graduated scale enables accurate positioning.

- ❖ Through these turning and swivelling movements, the quill can be set at any required angle.

Moving the quill

Insert toggle into the bore. By swiveling the toggle, the quill is lowered. A built-in spring returns the quill into the original position.

Clamping screw for the quill (3)

The quill is fixed with the socket head screw.

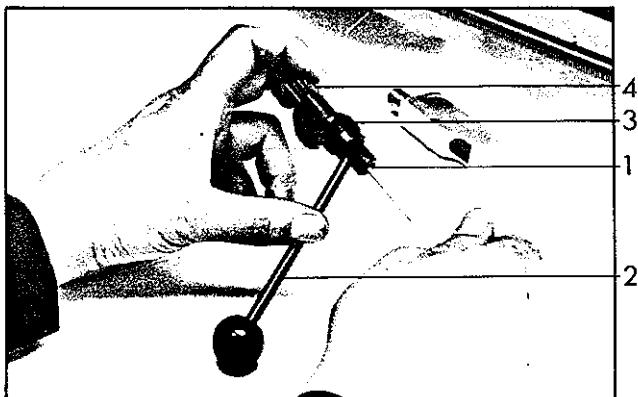
Always clamp quill when milling, never force the toggle.

The Vertical Fine Feed Attachment

The vertical fine feed serves for accurate depth adjustment for milling and drilling operations.

Mounting

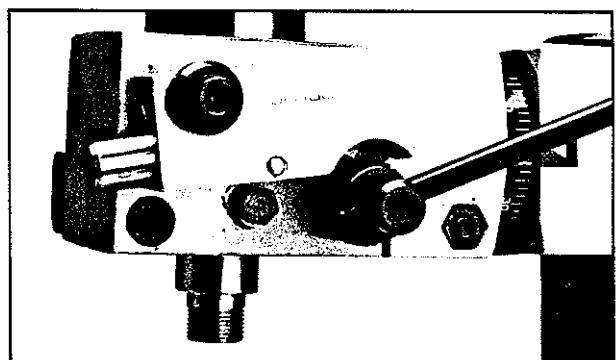
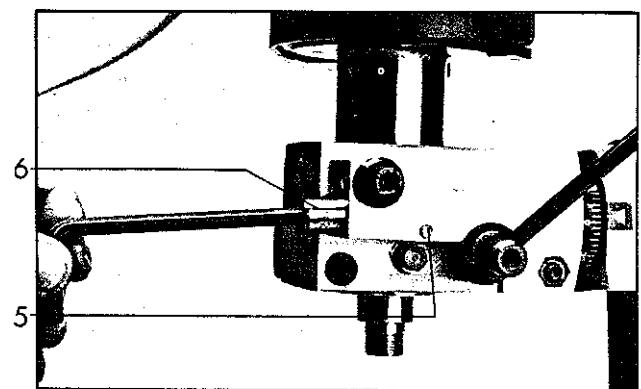
1. Loosen set screw (1), pull out toggle (2) and mount worm wheel (3) onto the pinion (4), re-tighten toggle.



2. Insert pinion into the quill holder.
3. Place centering bolt (5) of the feed unit into the bore and clamp with the socket head screw, so that the worm wheel is engaged with the worm.

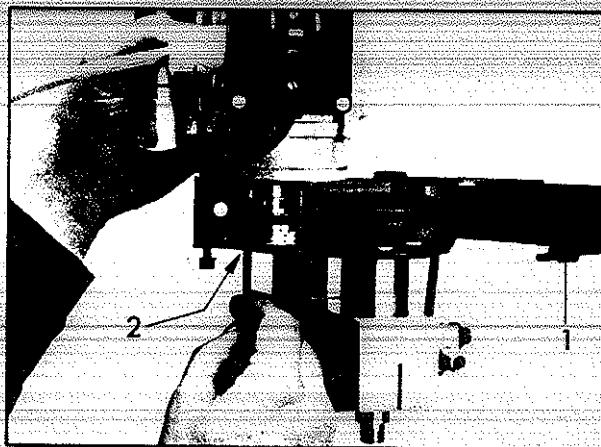
Adjusting

If the worm (6) is turned by one division, the quill moves 0,1 mm.



If the fine feed is not required, loosen socket head screw and swivel. Worm and worm wheel are not engaged. The pinion can be moved with the toggle.

Adjusting the Spindle Speed



Open cover (1), loosen socket head screw (2) and swivel motor toward the front. The belt is loosened and can be shifted onto the required pulley combination. Tighten belt and fix socket head screw again.

Note:

Never work with belt cover opened!

Spindle Speed Chart

The spindle speed during milling and drilling depends on the diameter of the tool (miller, drill) and the type of workpiece material. The values shown below are valid only for sharpened tools.

Diameter of miller or drill (mm)	SPINDLE SPEED Steel	Cast Iron	Aluminium/Brass
to 5	1600	1600	1600
5-10	700	700	1600
10-15	700	380	700
15-20	380	380	700
20-40	380	380	380

Drilling in General

Clamping the drill

Drills are clamped in the drill chuck or in the collet chuck.

Clamping the workpiece

The workpiece is fixed on the top slide or on the dividing attachment, using the appropriate clamping device.

Spindle speed:

The spindle speed of the drill depends on the diameter of the drill, resp. miller and the material of the workpiece.

Drill feed:

Drill feed is achieved via the quill.

Working Tips – Drilling

The smaller the drill, the easier it is that it will break. Drill feed must be carried out with feeling (very carefully).

Coordinate drilling

With aid of the scale rings on the longitudinal and cross slide handwheels, drilling in accurate coordinates can be carried out.

Please note:

The scale on the cross slide refers to the diameter of the workpiece during turning. The scale on the cross slide handwheel indicates 2,5 mm after one complete revolution. The slide, however, moves only 1,25 mm.

Place a wooden or plastic board under the workpiece so that the milling table, machine vice, etc. are not damaged by the drill.

Use the vertical fine feed for accurate depth adjustments.

When drilling deep holes, pull the drill out of the bore regularly, so that drilling chips are removed.

A few drops of oil will decrease the friction of the drill and increase the tool's life.

Wear of the drill can first be seen edges of the main cutting surface. Re-sharpen drill in time.

Milling in General

Types of Movements

Main or working movement

The miller does the main or working movement. The cutting edges of the miller penetrate the workpiece and remove material.

Adjustments

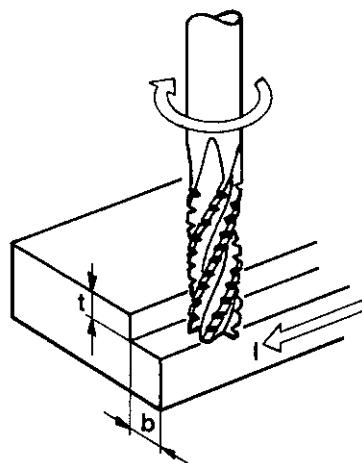
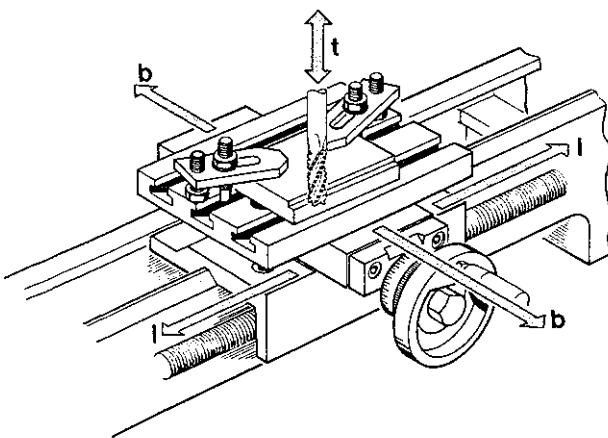
Adjustment of milling depth or width.

Feed movement

Accomplished by the workpiece.

Example:

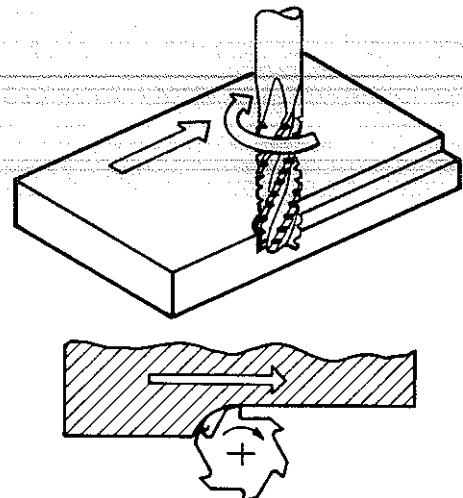
- Main movement is made by miller.
- Adjustment by the cross slide (b)
- Adjustment by the quill (t)
- The feed movement by the longitudinal slide (l)



Climb Milling (downcut milling) – Conventional Milling (up-milling process)

Climb milling

Cutting direction of the miller and feed direction of the workpiece are the same.

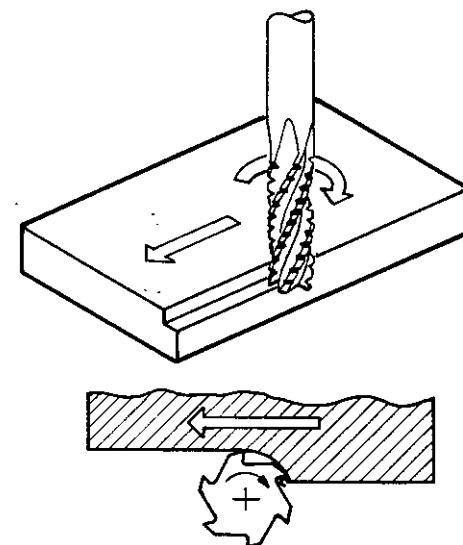


Conventional milling

Cutting direction of the miller and feed direction of the workpiece are opposite.

Working tip:

- Use conventional milling method on the Compact 5, otherwise there is danger of breaking the miller.



Working Tips – Milling

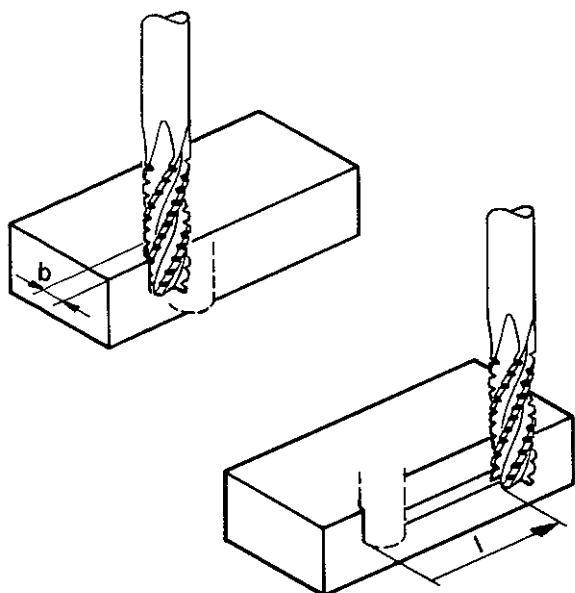
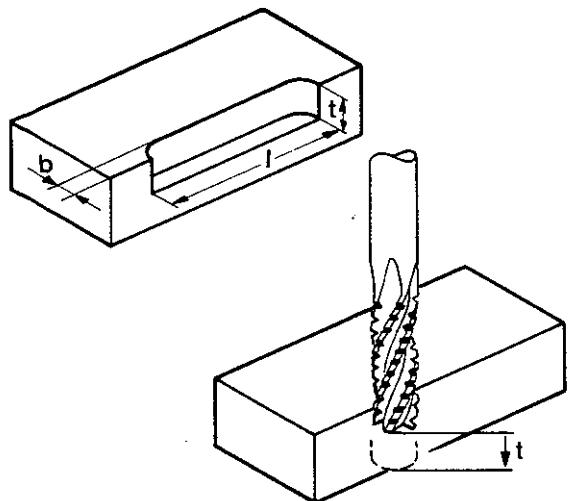
Clamping points

Tighten all clamping facilities, except that of the feed movement.

Example 1

Milling a notch with the heavy duty mill.

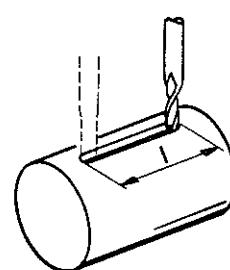
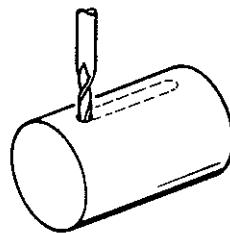
- Set milling depth "t" with the quill, clamp quill.
- Clamp longitudinal slide with cross slide feed to width "b". Clamp cross slide.
- Loosen longitudinal slide clamping, mill the length "l" of the notch.



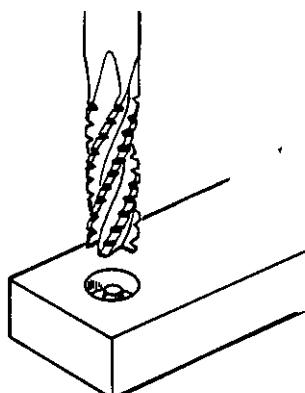
Example 2

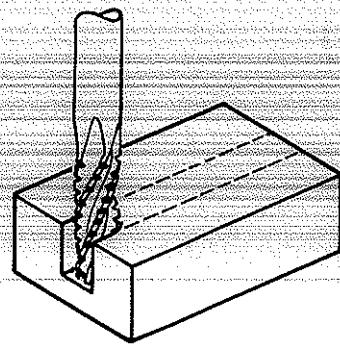
Milling a groove with the grooving cutter.

- Adjust center of axis using the cross slide, clamp cross slide.
- Using quill, mill depth of groove, clamp quill.
- Using longitudinal slide feed mill the length "l" of the groove.



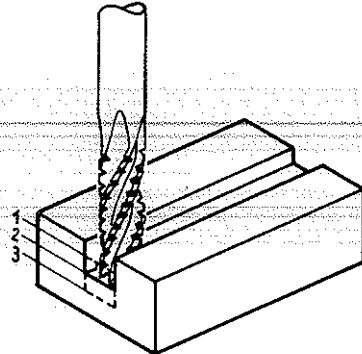
The heavy duty mill has a bore on the face surface. For this reason this miller cannot be inserted in bore and then move in longitudinal or cross direction, since a plug remains in the center and prevents any feed.





Milling depth – milling feed

If the milling depth and the milling feed are too large/fast, the miller will bend – this means danger of breaking and overloading the machine. When hard materials are used, the load is larger than with softer materials.



For this reason:

Complete deep grooves in several working steps. Feed must be carried out with feeling.

Selecting the Spindle Speeds

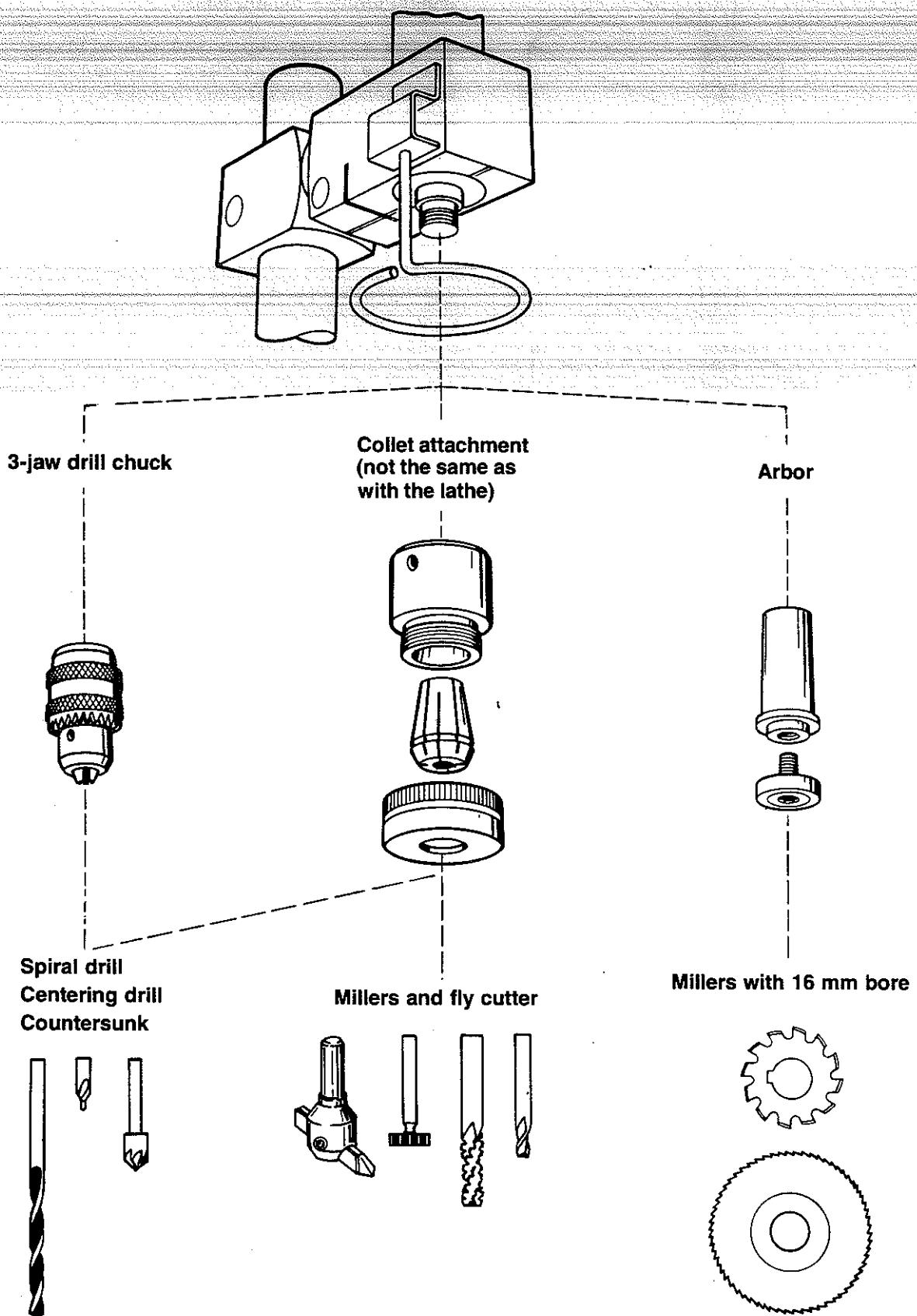
The selection of the spindle speeds depends on the diameter of the miller resp. drill and not on the size of the workpiece.

In General:

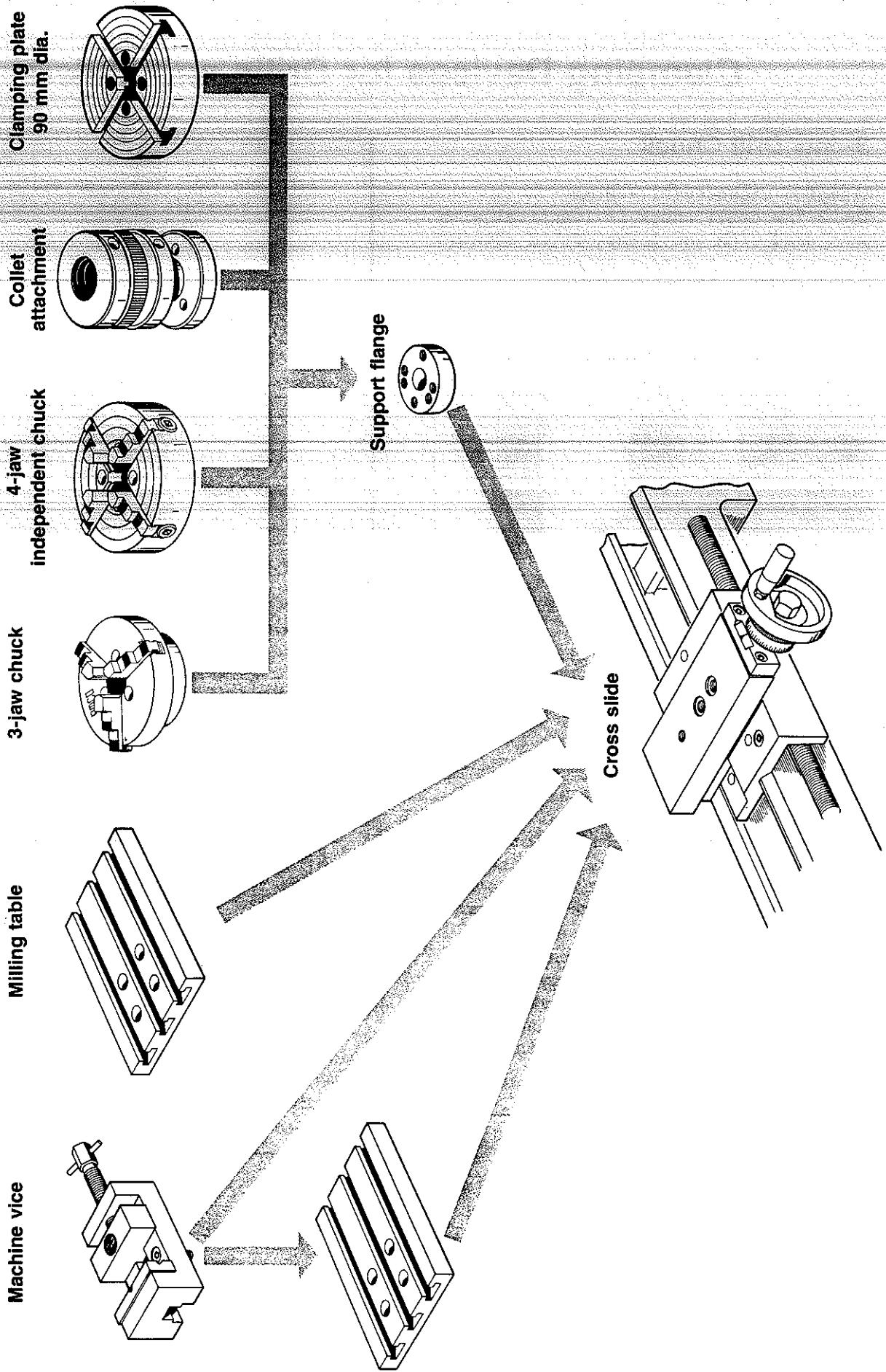
- The larger the diameter of the miller, the slower the spindle speed.
- The harder the material of the workpiece, the slower the spindle speed.

Diameter of miller or drill (mm)	SPINDLE SPEED Steel	Cast Iron	Aluminium/Brass
to 5	1600	1600	1600
5-10	700	700	1600
10-15	700	380	700
15-20	380	380	700
20-40	380	380	380

Clamping Devices for Drills and Millers (Summary)



Clamping Devices for Workpieces (Summary)

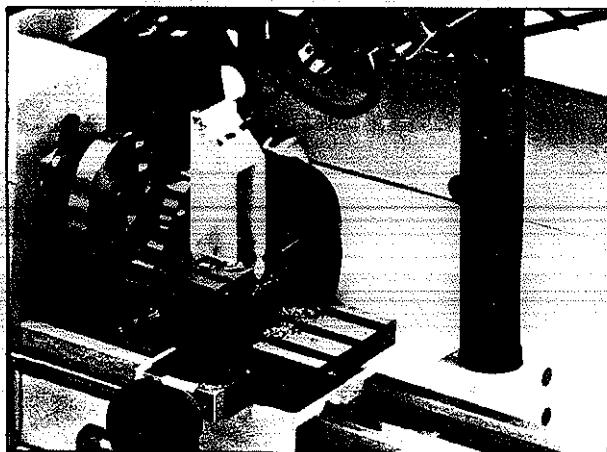


Clamping Devices for Drills and Millers

3-Jaw Drill Chuck

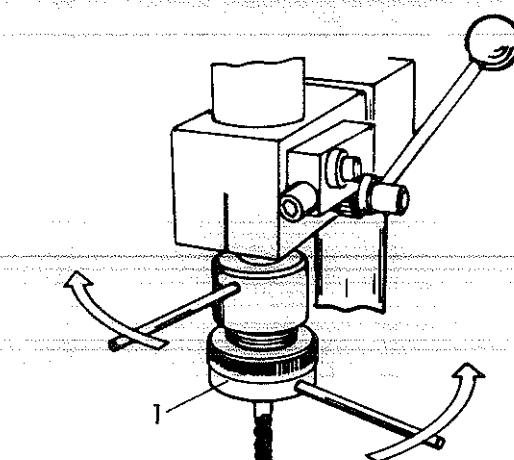
Clamping capacity: 1 - 8 mm

The 3-jaw drill chuck is identical with that used with the lathe. It is mounted directly onto the main spindle.

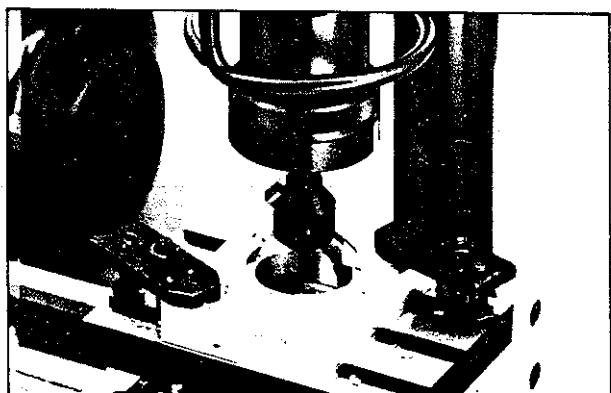


Tighten clamping nut (1) clockwise!

Note: if you look at the clamping nut from the top, the tightening direction, however, looks counterclockwise.



When working with the fly cutter (dia. of shaft 8 mm) secure clamping of the shaft is absolutely necessary.

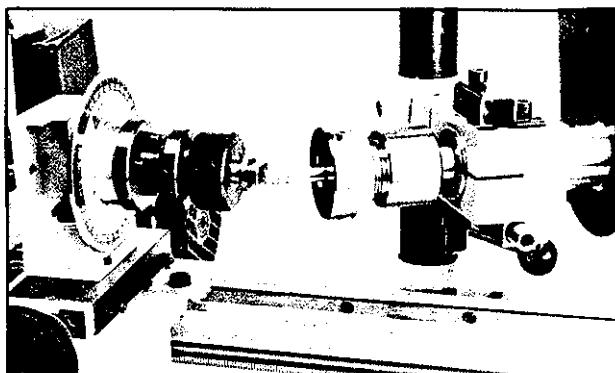


Collet Attachment

Clamping capacity using the collets ESX 25: 1,5 - 14 mm

The collet attachment for the vertical unit has an M14 x 1 mounting thread and is therefore not identical with that for the lathe. The collets for the vertical unit and the lathe are the same.

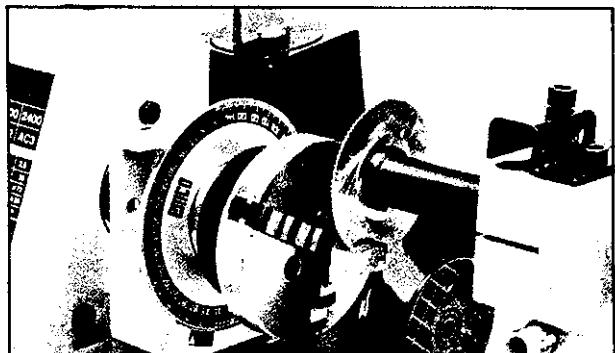
Millers must be clamped securely and with highest round-run accuracy. For this reason, the collet attachment is necessary. Clamping is accomplished by means of the pins which are included.



Two collet attachments being used.

Arbor

The arbor serves for clamping the gear mills, the circular saw blade and other millers with a center bore of 16 mm.



Clamping Devices for Workpieces

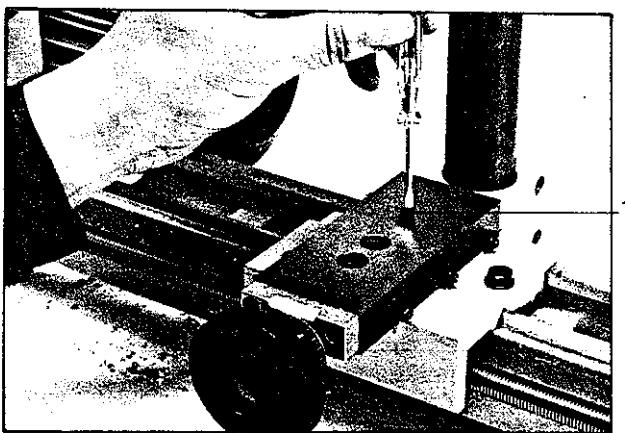
The Machine Vice

Technical data

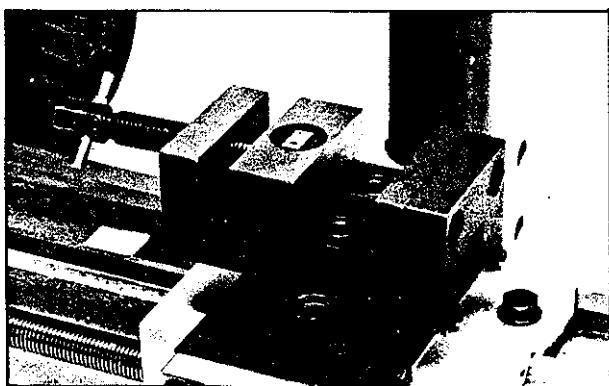
Width of clamping jaws: 46 mm
Height of clamping jaws: 18 mm
Opening of jaws: up to 32 mm

Mounting on cross slide

1. Remove set screw (1)

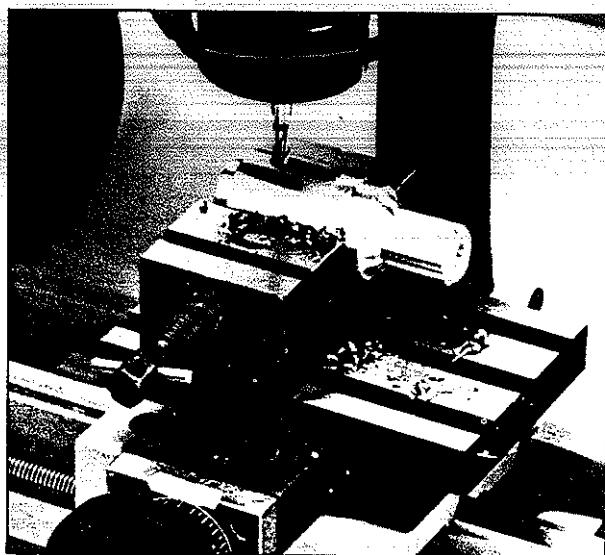


2. Mount machine vice on cross slide and tighten with the two shorter socket head screws M6 x 20.

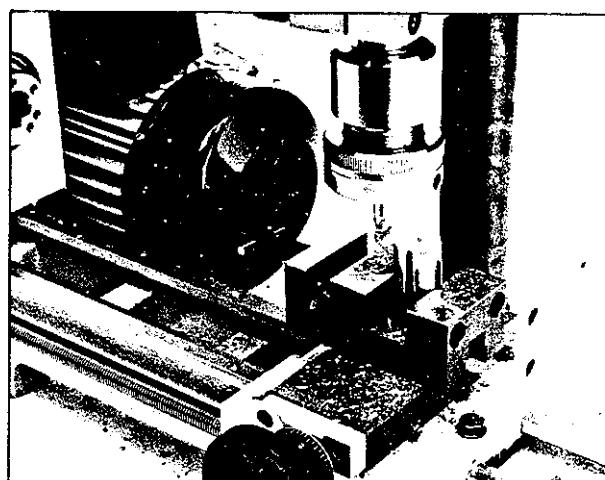


Mounting on milling table

Mount the machine vice on the milling table with the two longer socket head screws M6 x 16 and the T-nuts. The machine vice can be mounted on the milling table longitudinally or crosswise.



Working tip



The V-recess in the machine vice serves for vertically clamping round workpieces.

The Milling Table

Dimensions:

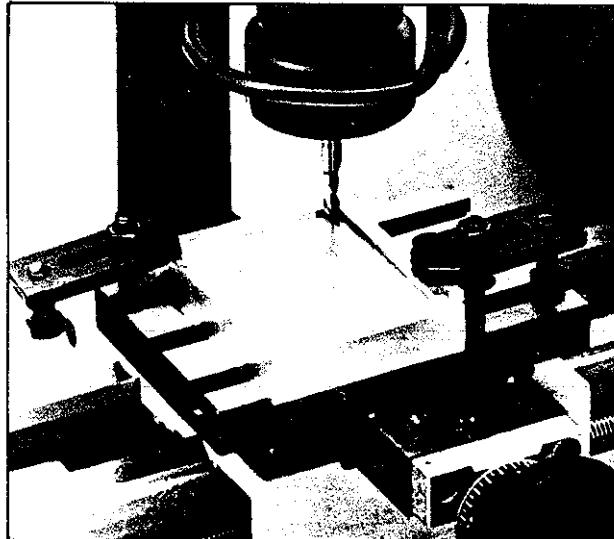
Length x width: 120 x 80 mm

Max. clamping height with short screws:
up to 15 mm

Max. clamping height with long screws:
up to 35 mm

Mounting on the cross slide:

The milling table can be mounted in longitudinal or cross direction on the cross slide with the socket head screws M6 x 12.

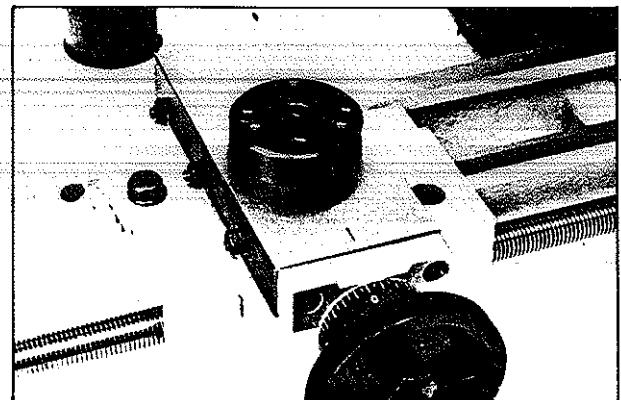


If you want to adjust the clamping of the milling table exactly parallel to the lathe bed, feed a round pin in the collet and align the table.

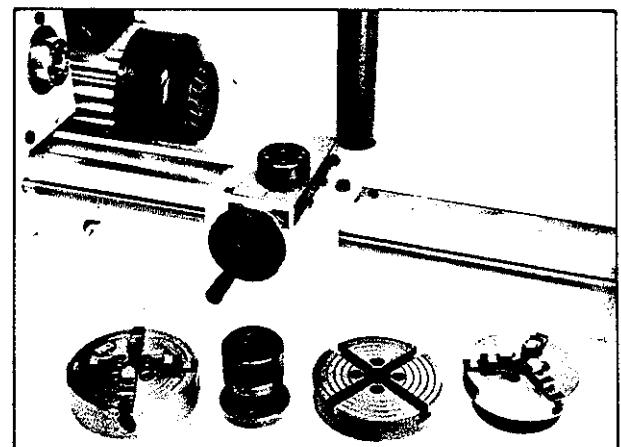
Adjust the hexagon screw so that the clamping shoe is vertical.

The Support Flange

The support flange has the same dimensions as the spindle nose of the lathe spindle. Mount the support flange on the cross slide with the socket head screw M6 x 12.



Following devices can be mounted on the support flange: 3-jaw chuck, collet attachment for lathe, clamping plate, 4-jaw independent chuck.

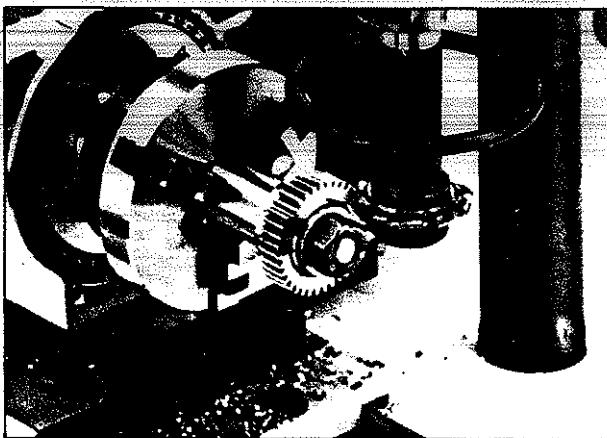


Note that all contact surfaces are clean - cross slide-support flange, support flange-3-jaw chuck.

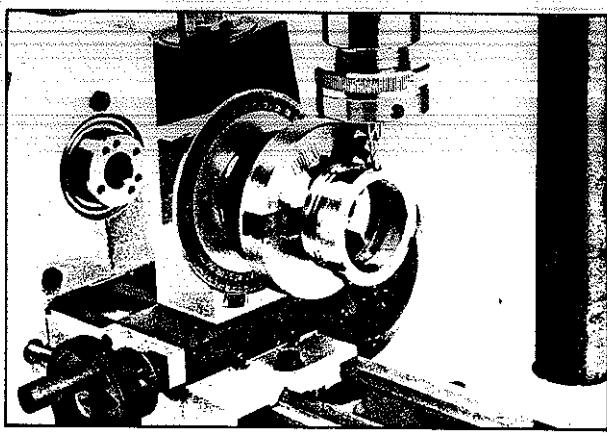
The Dividing Attachment

For drilling flange bores, for milling an exact hexagon, for milling gear wheels, etc., everywhere where exact divisions must be adjusted, a dividing attachment is required.

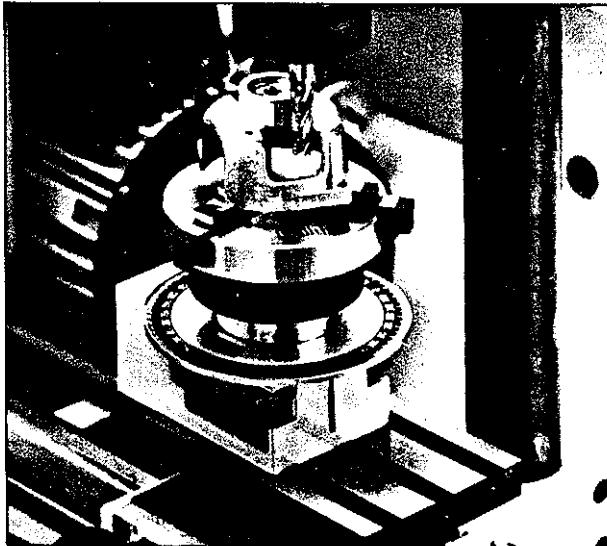
Examples:



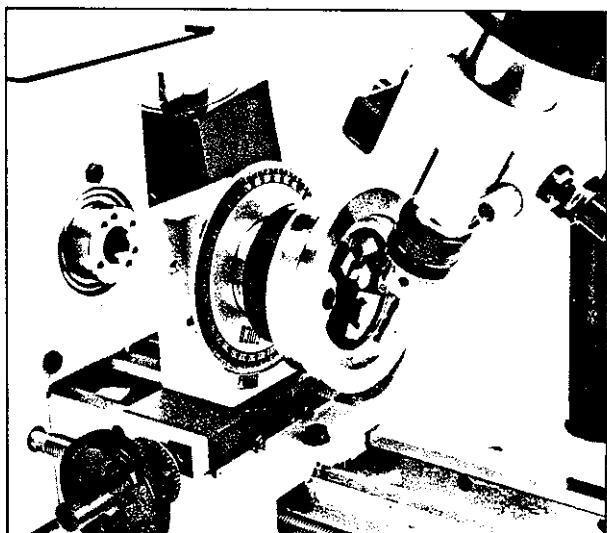
Gear milling: the pre-turned disc is clamped onto an arbor. The possible number of teeth of the gear wheel is engraved into the gear miller. When clamping gear millers, note revolution direction.



Grooves for a hooked key are milled. - The feed is carried out via the longitudinal slide; all other clamping screws (cross slide, quill, base screws, dividing attachment) are tightened.



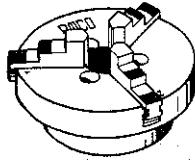
Workpiece is mounted on dividing attachment which is mounted horizontally. Feed is carried out with the longitudinal slide, adjustments with the cross slide.



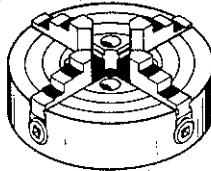
Note: when the vertical unit is turned and swivelled, solid angles are the result.

**Clamping Devices for the Dividing Attachment (Summary)
(identical with Clamping Devices for Turning)**

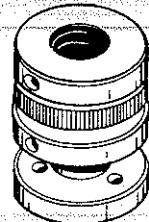
3-jaw chuck



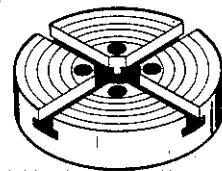
4-jaw independent chuck



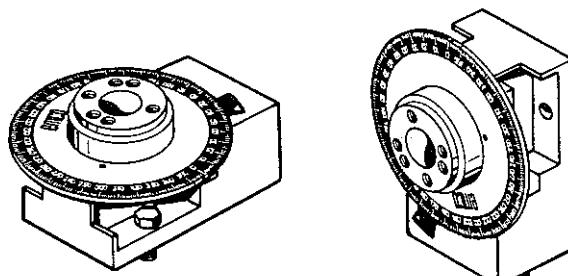
Collet attachment



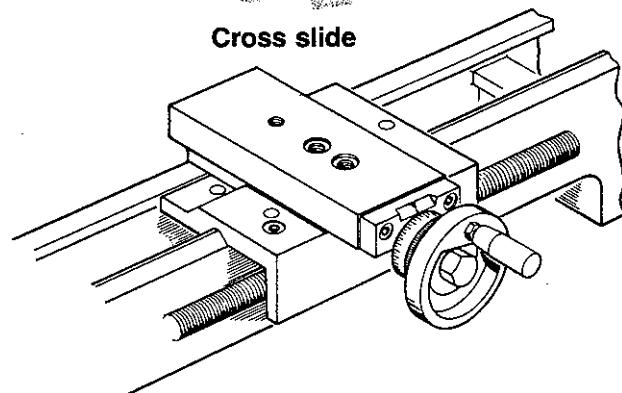
Clamping plate 90 mm dia.



Dividing attachment



Cross slide

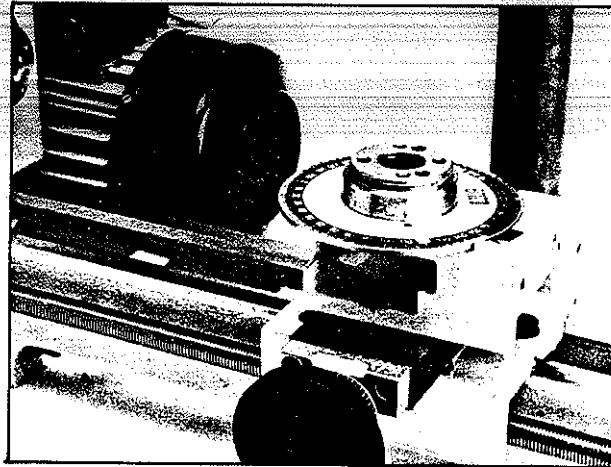


Mounting the dividing attachment

During milling operations, feed should be achieved via the longitudinal or cross slide. For this reason, the dividing attachment can be mounted either horizontally or vertically.

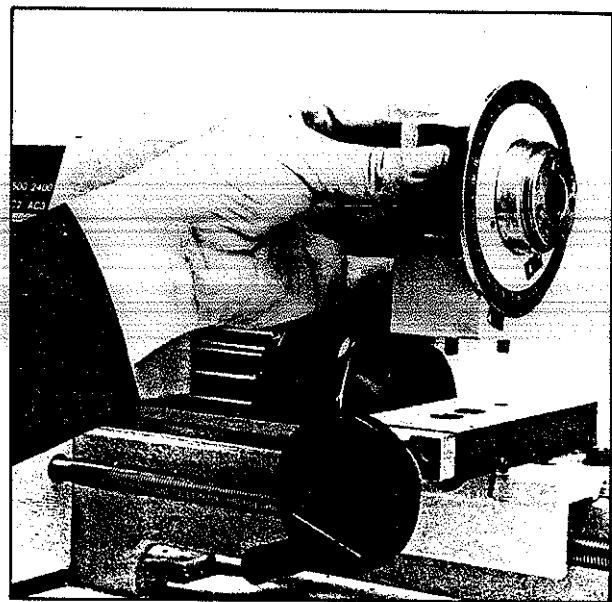
Horizontal mounting:

Mount the dividing attachment on the cross slide with the two hexagon screws M6 x 16.



Vertical mounting:

Mount dividing attachment on the cross slide with the two socket head screws M6 x 40.



The dividing chart

The dividing chart indicates the dividing possibilities for the respective circle of holes.

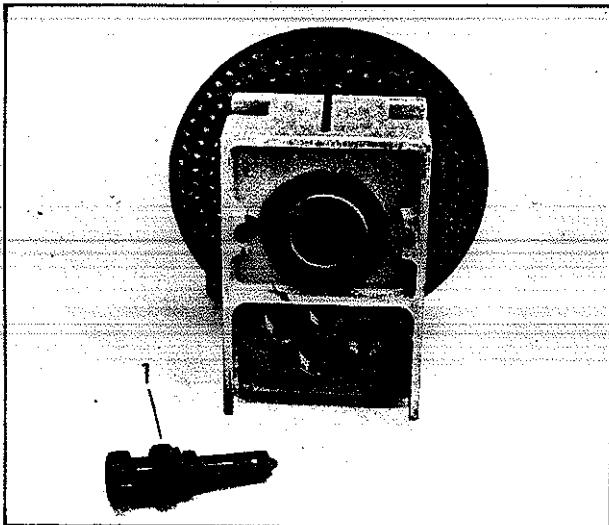
Example:

15 divisions are required. These are reached with the circle of holes 60.
 $60:15 = 4$.
I.e., division in every fourth hole.

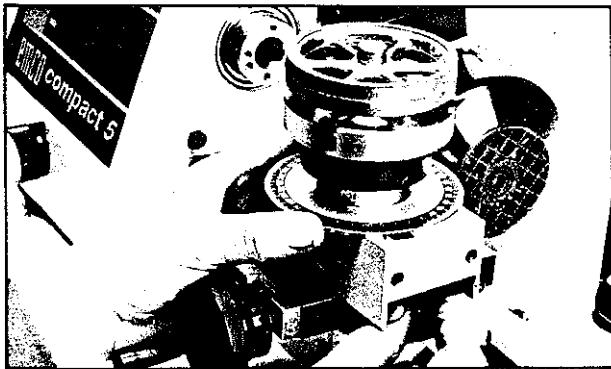
Circle of holes	Dividing possibilities															
60	2	3	4	5	6				10	12		15		20	30	60
56	2		4			7	8				14				28	56
48	2	3	4		6		8			12			16		24	48
36	2	3	4		6			9		12				18		36

Dividing procedure

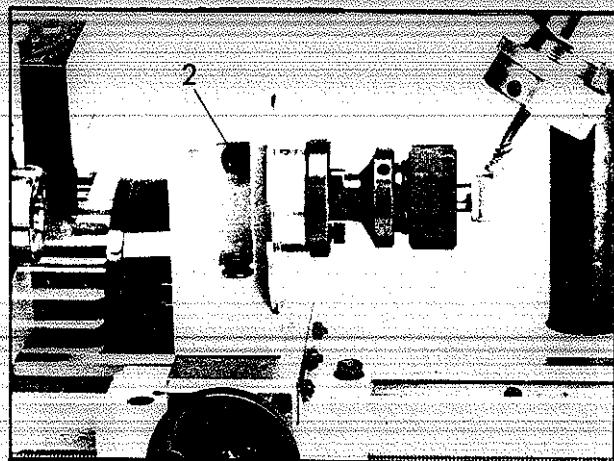
1. Insert index bolt (1) into bore for required division. The outermost circle of divisions has 60 holes, the second has 56, etc.



2. Pull the index bolt and turn dividing plate as many divisions as required.



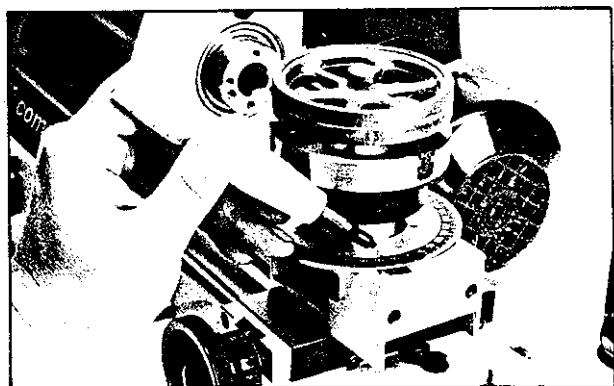
3. Tighten clamping screw (2) before each milling or drilling operation!



Working tip:

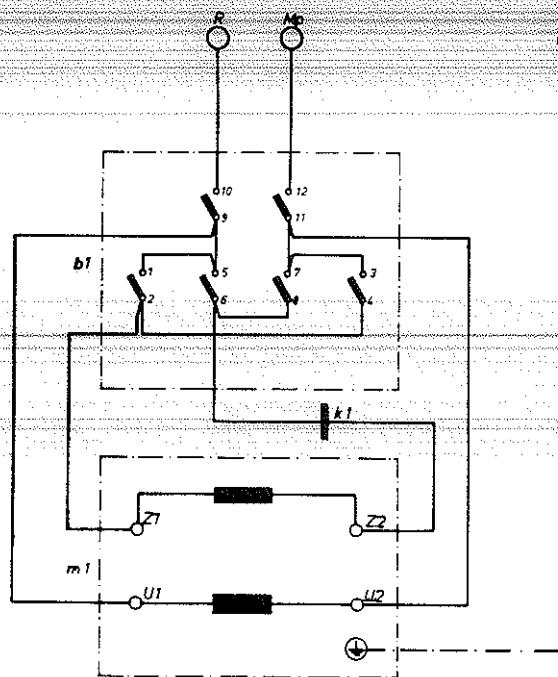
Mark the graduation with a felt marker for better orientation.

Example: 15 divisions are required.
 $360^\circ : 15 = 24^\circ$. Mark 24° , 48° , etc.

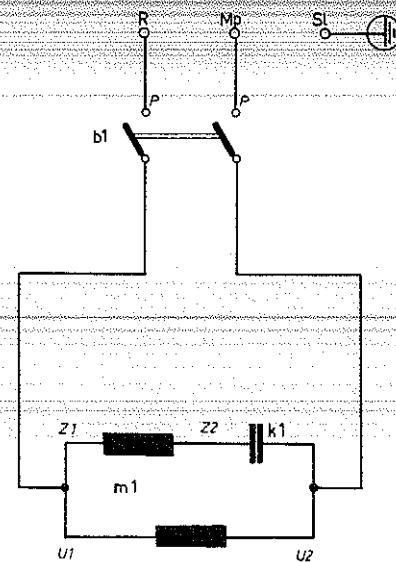


STROOMPLAN VOOR DE DRAATBANK

A 12.819



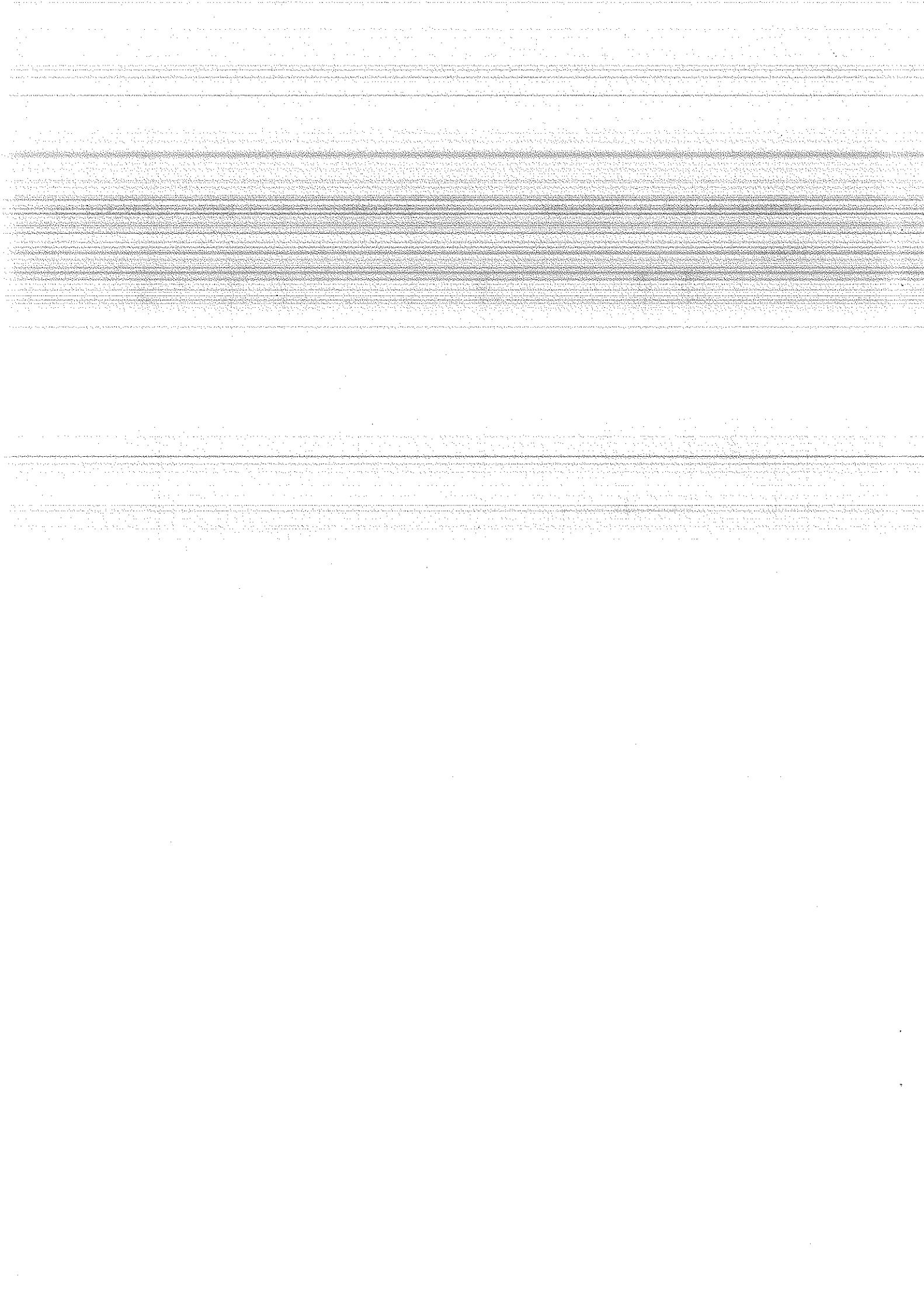
STROOMPLAN VOOR DE BOOR- EN FREESKOLOM



b1 Motorschakelaar
 k1 Kondensator
 m1 Motor

Schakelschema motorschakelaar

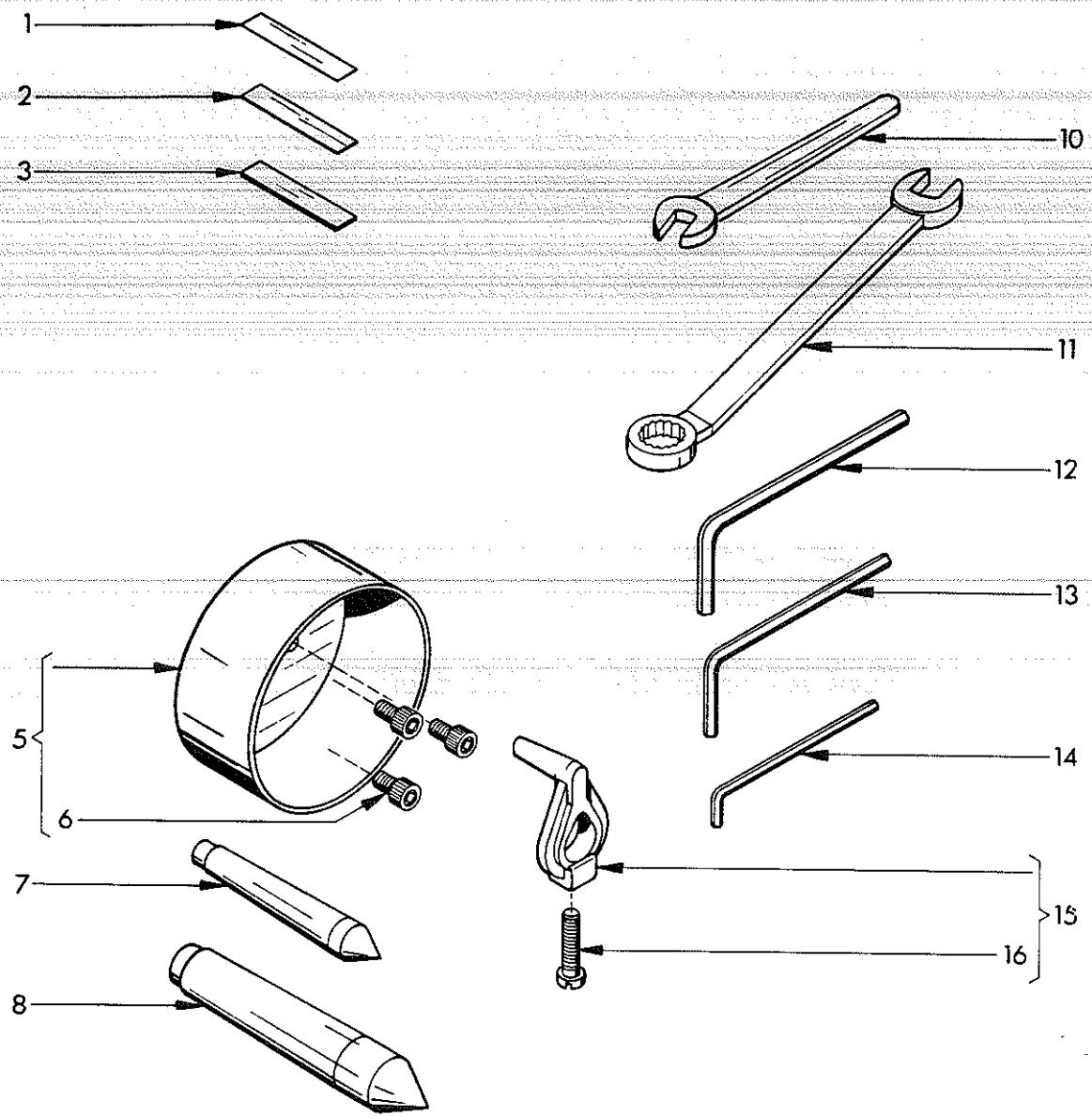
b1	1 2	3 4	5 6	7 8	9 10	11 12
voorw.	-	x	x	-	x	x
-	-	-	-	-	-	-
0	-	-	-	-	-	-
-	-	-	-	-	-	-
terugw.	x	-	-	x	x	x



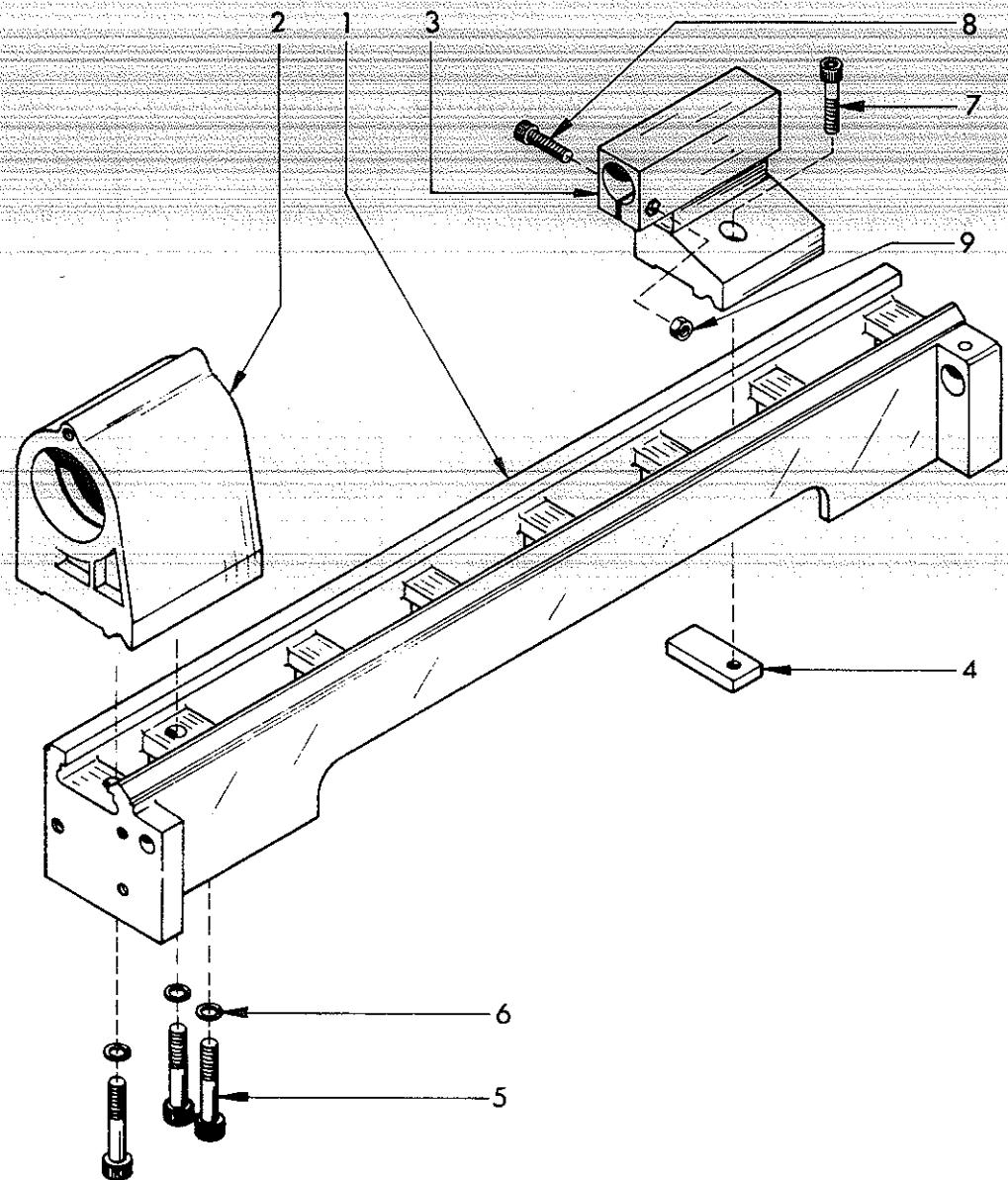
SERVICETEILE

SERVICE PARTS

PIECES DE SERVICE

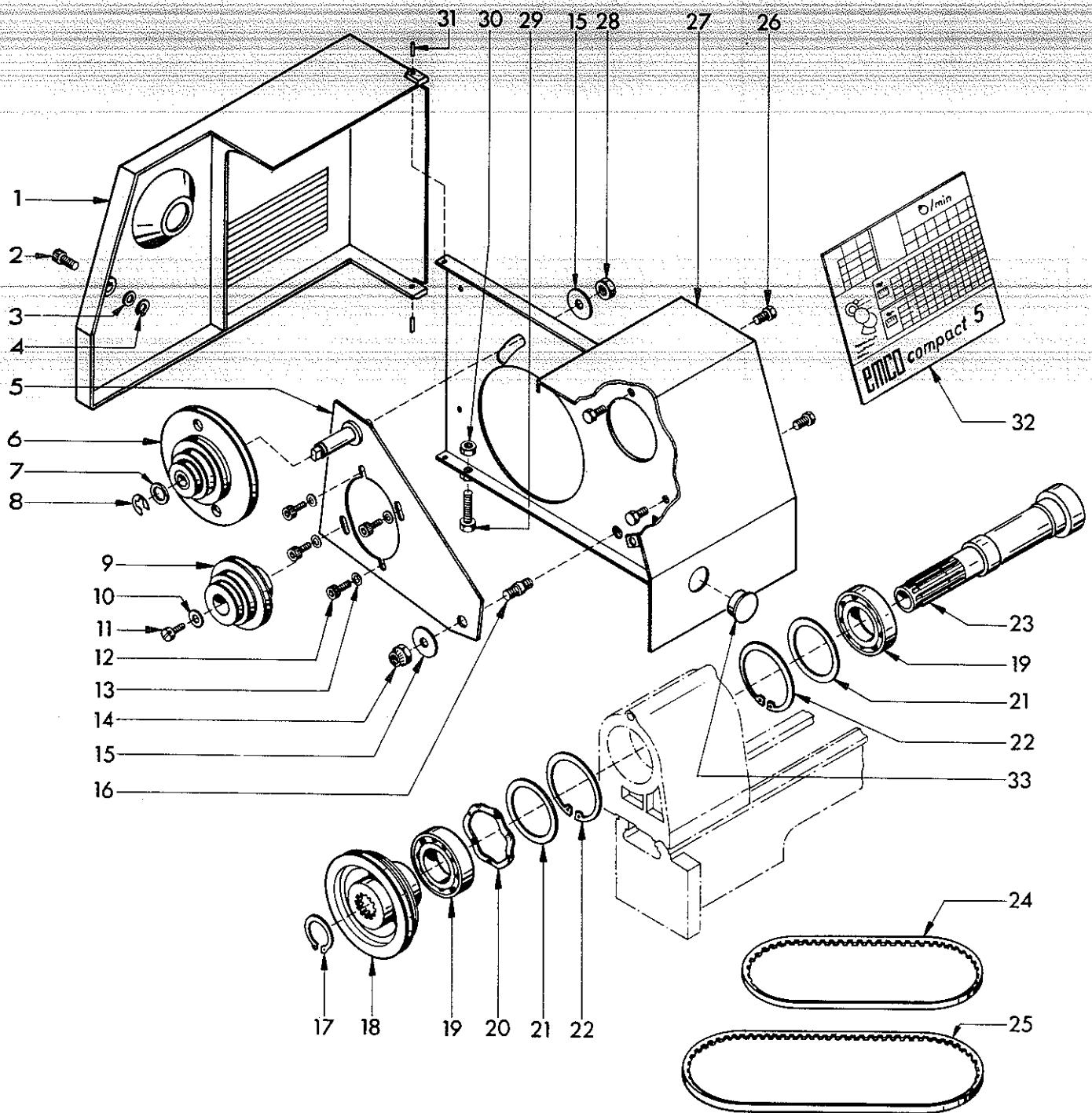


Pos.	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
				Grundausrüstung	Basic equipment	Equipement de base
1	A5A 000 310			Drehstahlunterlage 0,2	Tool base 0,2	Base pour outil 0,2
2	A5A 000 320			Drehstahlunterlage 0,5	Tool base 0,5	Base pour outil 0,5
3	A5A 000 330			Drehstahlunterlage 1,0	Tool base 1,0	Base pour outil 1,0
5	A5A 070 000			Drehherzschutz	Guard for lathe dog	Protecteur pour toc de tour
6	ZSR 12 0508	M5x8 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
7	A5A 000 260			Körnerspitze MK1	Lathe center MT1	Contre-pointe CM1
8	B2A 000 420			Körnerspitze MK2	Lathe center MT2	Contre-pointe CM2
10	ZWZ 94 0800	SW8 DIN 894		Seinmaulschlüssel	Single-ended spanner	Clé deservice
11	B2A 000 470			Ring-Maulschlüssel	Key	Cle à oeil
12	ZWZ 11 0500	SW5 DIN 911		Schraubendreher	Hexagonal key	Clé à six pans
13	ZWZ 11 0400	SW4 DIN 911		Schraubendreher	Hexagonal key	Clé à six pans
14	A5A 000 350	SW3		Stiftschlüssel	Hexagonal key	Clé à six pans
15	A2A 080 000			Drehherz	Lathe dog	Toc de tour
16	ZSR 84 0525	M5x25 DIN 84		Zylinderschraube	Flat head screw	Vis à tête cylindrique

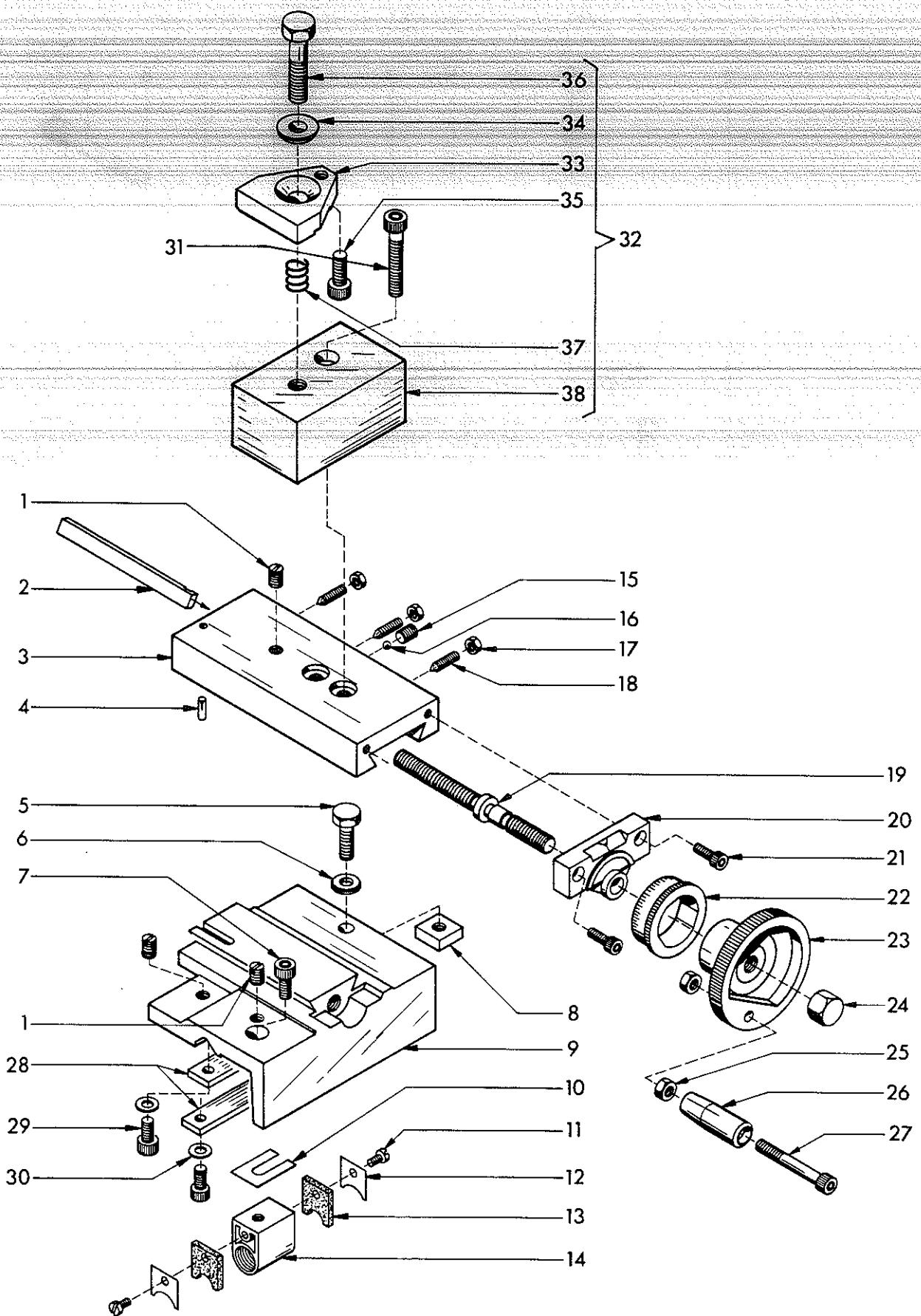


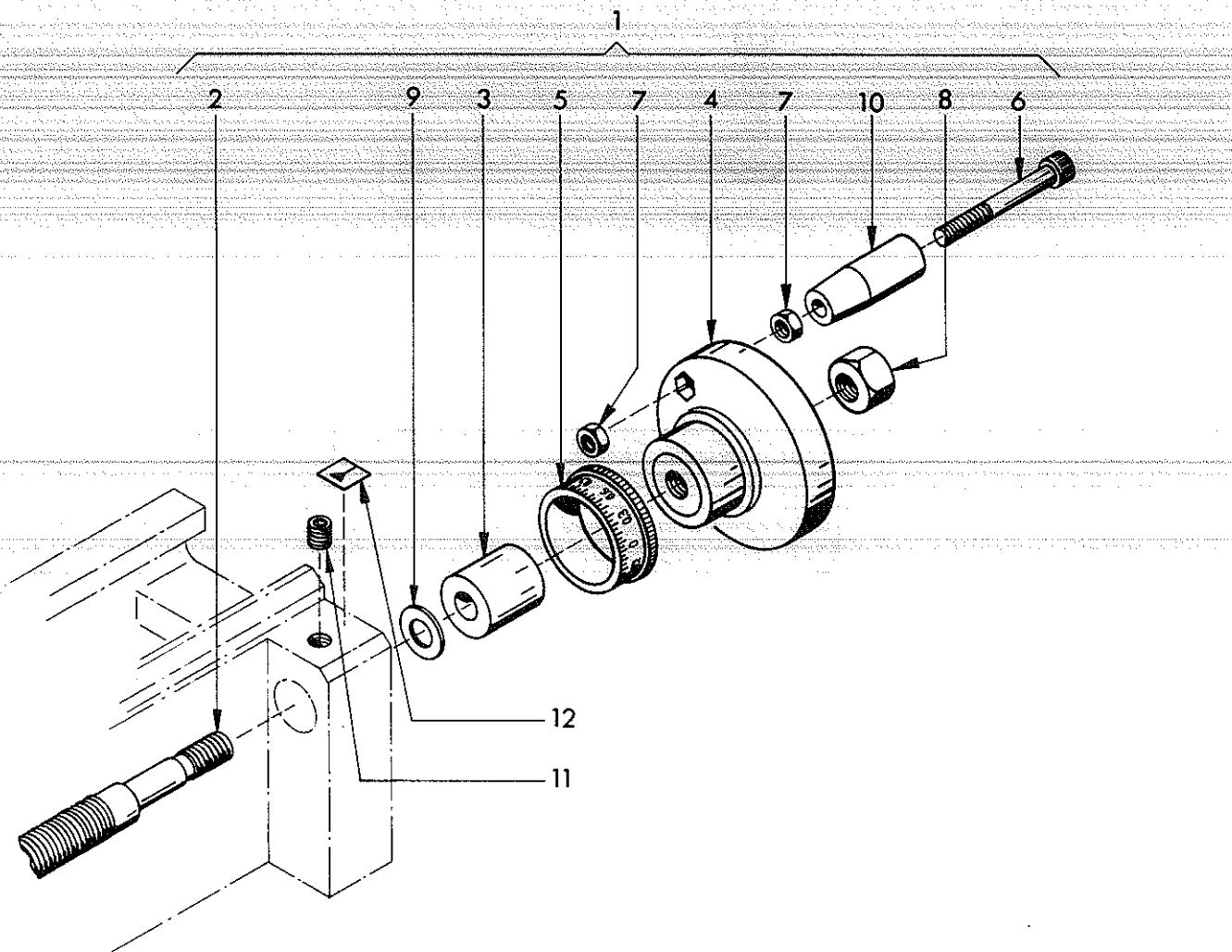
Pos.	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
				Bett	Bed	Banc
1	A5A 010 010			Bett	Bed	Banc
2	A5A 010 020			Spindelstock	Headstock	Poupée fixe
3	A5A 010 030			Reitstock	Tailstock housing	Corps de la poupée
4	A3A 000 040			Klemmplatte	Clamping plate	Plaque de blocage
5	ZSR 12 0845	M8x45DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
6	ZRG 28 0080	B8 DIN 127		Federring	Spring washer	Rondelle - ressort
7	ZSR 12 0630	M6x30DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
8	ZSR 12 0625	M6x25DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
9	ZMU 34 0600	M6 DIN 934-6		Sechskantmutter	Hexagonal nut	Ecrou 6 pans

Pos	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
1	A5A 000 060			Räderdeckel	Cover	Couvercle
2	ZSR 12 0616	M6x16 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
3	ZSB 25 0640	B6,4 DIN 125		Scheibe	Washer	Rondelle
4	ZRG 71 0607	6x0,7 DIN 471		Sicherungsring	Retaining ring	Anneau de retenue
5	A5A 130 000			Trägerplatte	Carrier plate	Plaque support seule
6	A5A 060 000			Vorgelegeriemenscheibe	Countershaft pulley	Poulie
7	ZSB 10 2181	SS/12x18x1,2		Stützscheibe	Supporting ring	Rondelle
8	ZSB 99 0900	(DIN 6799		Sicherungsscheibe	Retaining washer	Poulie de retenue
9	A5A 000 030			Motorriemenscheibe	Motor pulley	Poulie de moteur
10	ZSB 22 0530	B5,3 DIN 9021		Scheibe	Washer	Rondelle
11	ZSR 84 0512	M5x12 DIN84-4.8		Zylinderschraube	Flat head screw	Vis à tête cylindrique
12	ZSR 11 0512	M5x12 DIN6912-6.9		Zylinderschraube	Flat head screw	Vis à tête cylindrique
13	ZSB 22 0530	B5,3 DIN 9021		Scheibe	Washer	Rondelle
14	ZMU 80 0800	NM8 DIN 980-8		Sicherungsmutter	Securing nut	Ecrou de sûreté
15	ZSB 21 0840	A8,4 DIN 9021		Scheibe	Washer	Rondelle
16	A5A 000 100			Lagerbolzen	Bearing shaft	Axe palier
17	ZRG 71 2412	24x1,2 DIN 471		Sicherungsring	Retaining ring	Anneau de retenue
18	A5A 000 020			Riemenscheibe	Pulley	Poulie
19	ZLG 60 0602	6006 - 2Z		Rillenkugellager	Ball bearing	Roulement à billes
20	ZSB 02 6006	6006/K2		Ausgleichsscheibe	Compensating washer	Rondelle de compensation
21	ZSB 10 5553	SS 45x55x3		Stützscheibe	Supporting ring	Rondelle
22	ZRG 72 5520	B55x2 DIN 472		Sicherungsring	Retaining ring	Anneau de retenue
23	A5A 000 010			Hauptspindel	Main spindle	Broche principale
24	ZRM 40 6335	6x335		Keilriemen	V-Belt	Courroie trapézoidale
25	ZRM 40 6450	6x450		Keilriemen	V-Belt	Courroie trapézoidale
26	ZSR 33 0612	M6x12 DIN933-5,6		Sechskantschraube	Hexagon head screw	Vis hexagonale
27	A5A 030 000			Spindelstockabdeckung	Headstock covermount	Tôle de couverture
28	ZMU 34 0800	M8 DIN 934-6		Sechskantmutter	Hexagon nut	Ecrou 6 pans
29	ZSR 33 0625	M6x25 DIN933-5,6		Sechskantschraube	Hexagon head screw	Vis hexagonale
30	ZMU 34 0600	M6 DIN 934-6		Sechskantmutter	Hexagon nut	Ecrou 6 pans
31	ZST 72 0312	3x12 DIN 1472-6.8		Paßkerbstift	Grooved adjusting pin	Goupille de position
32	A5A 000 360			Frontschild 50Hz metr.	Front plate 50Hz. metr.	Plaque frontale 50 Hz. metr.
	A5B 000 360			Frontschild 60Hz zöllig	Front plate 60Hz. inch	Plaque frontale 60 Hz. en pouces
	A5D 000 360			Frontschild 50Hz zöllig	Front plate 50Hz. inch	Plaque frontale 50Hz. en pouces
	A5C 000 360			Frontschild 60Hz metr.	Front plate 60Hz. metr.	Plaque frontale 60Hz. metr.
33	ZDK 60 0019			Verschlußstopfen	Plug	Bouchon fileté

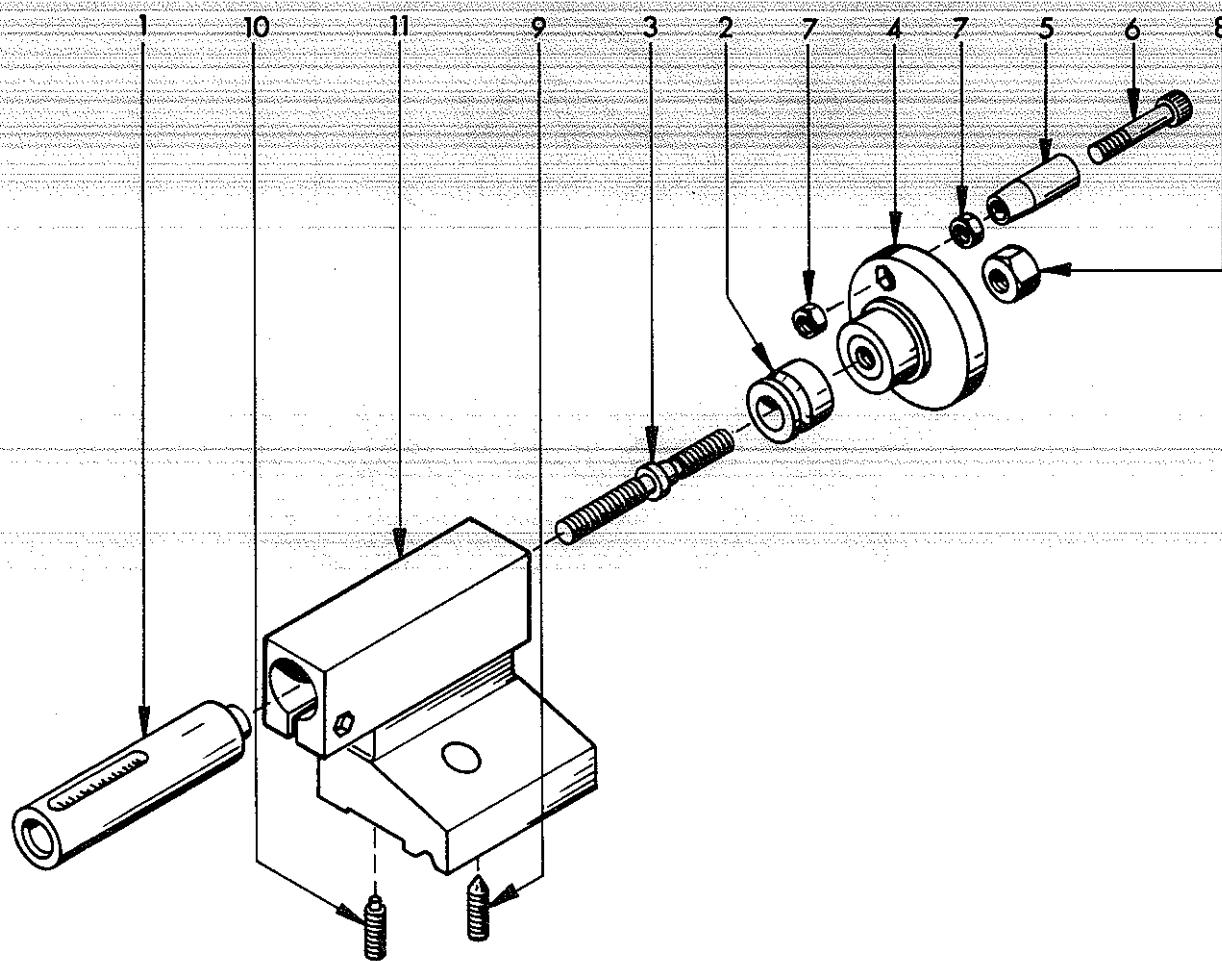


Pos	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
1	ZST 51 0608	M6x8 DIN551-5.8		Gewindestift	Set screw	Vis pointeau
2	A5A 020 040			Einstelleiste	Gib	Lardon
3	A5A 020 020			Querschlitten	Cross slide table	Support transversal
4	ZST 74 0310	3x10 DIN1474-6.8		Kerbstift	Grooved adjusting pin	Goupille de position
5	ZSR 33 0620	M6x20 DIN933-5.6		Sechskantschraube	Hexagon head screw	Vis hexagonale
6	ZSB 25 0640	B6,4 DIN 125		Scheibe	Washer	Rondelle
7	ZSR 12 0512	M5x12 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
8	A3A 000 030			Klemmbacke	Clamping jaw	Mors de blocage
9	A5A 020 010			Schlitten metr.	Slide metr.	Support metr.
	A5B 020 010			Schlitten zöllig	Slide inch	Support en pouces
10	A5A 000 210			Abstimmsscheibe	Intermediate plate	Pièce intermédiaire
11	ZSR 84 0306	M 3x6 DIN 84		Gewindeschneidschraube	Self tapping screw	Vis taraud
12	A5A 000 290			Abstreifblech	Wiper plate	Plaquette de racleur postérieur
13	A5A 000 280			Abstreiffilz	Felt wiper	Racleur en feutre postérieur
14	A5A 000 090			Leitspindelmutter metr.	Lead screw nut metr.	Ecrou de vis mère metr.
	A5B 000 090			Leitspindelmutter zöllig	Lead screw nut inch	Ecrou de vis mère en pouces
15	ZST 13 0608	M6x8 DIN913-45H		Gewindestift	Set screw	Vis pointeau
16	ZKG 00 1030	GK3 DIN 5401		Stahlkugel	Steel ball	Bille en acier
17	ZMU 34 0400	M4 DIN 934-5		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
18	ZST 53 0416	M4x16 DIN553-5.8		Gewindestift	Set screw	Vis pointeau
19	A5A 021 020			Querspindel metr.	Cross slide screw metr.	Broche transversale nue metr.
	A5B 021 020			Querspindel zöllig	Cross slide screw inch	Broche transversale nue en pouces
20	A5A 021 010			Querspindelträger	Lead screw mount	Palier de la broche
21	ZSR 12 0412	M4x12 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
22	A5A 021 040			Skalenring metr.	Graduated ring metr.	Bague graduée metr.
	A5B 021 040			Skalenring zöllig	Graduated ring inch	Bague graduée en pouces
23	A5A 022 000			Handrad	Handwheel	Volant
24	ZMU 17 0800	M8 DIN917-5.8		Hutmutter	Cap nut	Ecrou borgne
25	ZMU 34 0500	M5 DIN 934		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
26	A5A 021 050			Kegelgriff	Handle	Bouton cylindrique
27	ZSR 12 0540	M5x40 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
28	A5A 000 130			Bettleiste	Keep plate	Lardon longitudinal
29	ZSR 12 0510	M5x10 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
30	ZSB 25 0530	B5,3 DIN 125		Scheibe	Washer	Rondelle
31	ZSR 12 0635	M6x35 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
32	A5A 080 000			Gruppe Stahlaufage	Toolholder compl.	Ens. Porte outil
33	A5A 050 070			Spannklaue	Tool clamp	Bride de serrage de l'outil
34	B4A 050 120			Ballenscheibe	Washer	Rondelle sphérique
35	ZSR 12 0616	M6x16 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
36	ZSR 31 0835	M8x35 DIN931-5.6		Sechskantschraube	Hexagon head screw	Vis hexagonale
37	ZFD 20 4152			Druckfeder	Compression spring	Ressort de compression
38	A5A 080 010			Stahlaufage	Toolholder	Porte outil

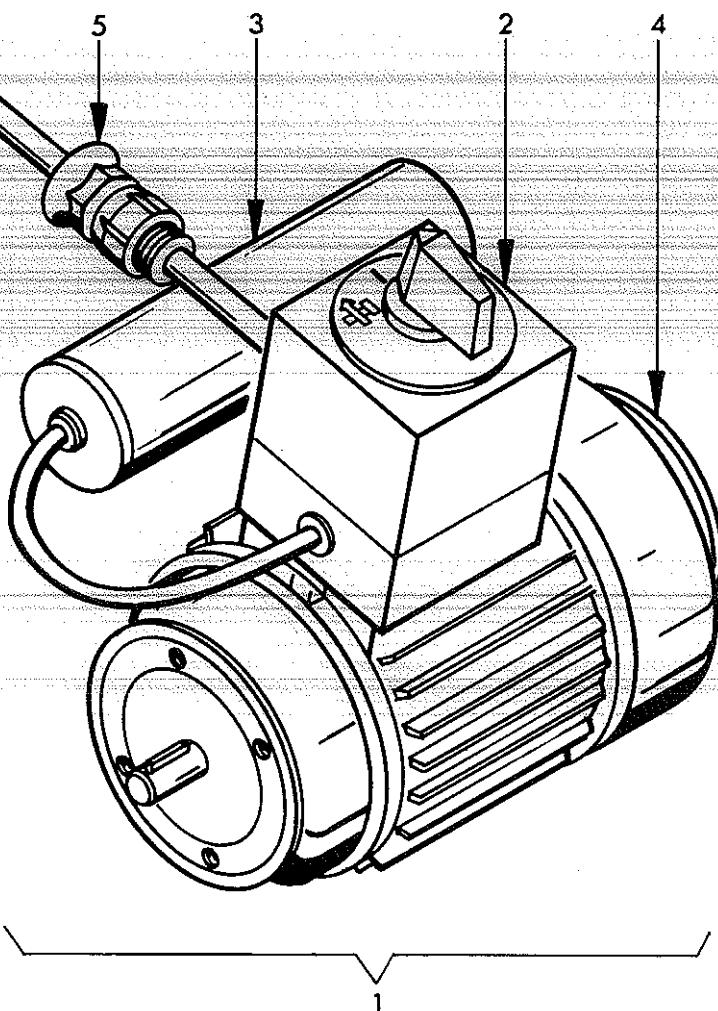




Pos.	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
1	A5A 160 000			Gruppe Leitspindel metr.	Lead screw metr. compl.	Ens. Vis mère metr.
	A5B 160 000			Gruppe Leitspindel zöll.	Lead screw inch compl.	Ens. Vis mère en pouces
2	A5A 160 010			Leitspindel metr.	Lead screw mwtr.	Vis mère metr.
	A5B 160 010			Leitspindel zöllig	Lead screw inch	Vis mère en pouces
3	A5A 160 050			Büchse	Bush	Douille
4	A5A 022 000			Handrad	Handwheel	Volant
5	A5A 160 030			Skalenring metr.	Graduated ring metr.	Bague graduée metr.
	A5B 160 030			Skalenring zöllig	Graduated ring inch	Bague graduée en pouces
6	ZSR 12 0540	M5x40 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
7	ZMU 34 0500	M5 DIN 934-5		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
8	ZMU 17 0800	M8 DIN 917-5.8		Hutmutter	Cap nut	Ecrou borgne
9	ZSB 10 8141	SS 8x14x1,2		Stützscheibe	Supporting ring	Rondelle
10	A5A 021 050			Kegelgriff	Handle	Bouton cylindrique
11	ZST 16 0608	M6x8 DIN916/45H		Gewindestift	Set screw	Vis pointeau
12	H8A 000 120			Zeiger	Pointer	Aiguille

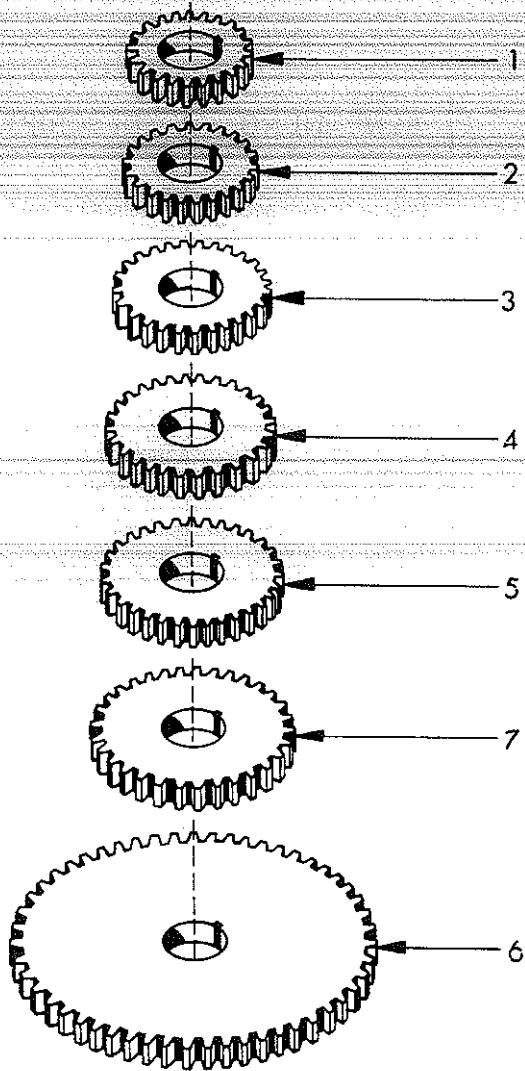


Pos.	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
1	A5A 121 000 A5B 121 000			Reitstockpinole	Tailstock barrel	Canon de la poupée
2	A5A 120 020			Pinole metr. Pinole zöllig	Barret metr. Barret inch	Canon metr. Canon en pouces
3	A5A 120 030			Lagerbüchse	Bearing bush	Coussinet
4	A5A 022 000			Triebsschraube	Lead screw	Broche
5	A5A 021 050			Handrad	Hand wheel	Volant
6	ZSR 12 0540	M5x40DIN912-6.9		Kegelgriff	Handle	Bouton cylindrique
7	ZMU 34 0500	M5 DIN934-5		Zylinderschraube	Socket head screw	Vis 6 pans creux
8	ZMU 17 0800	M8DIN917-5.8		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
9	ZST 14 0620	M6x20DIN914-45H		Hutmutter	Cap nut	Ecrou borgne
10	ZST 15 0620	M6x20DIN915-45H		Gewindestift	Set screw	Vis pointeau
11	A5A 010 030			Gewindestift	Set screw	Vis pointeau
				Reitstock	Tailstock housing	Corps de la poupée



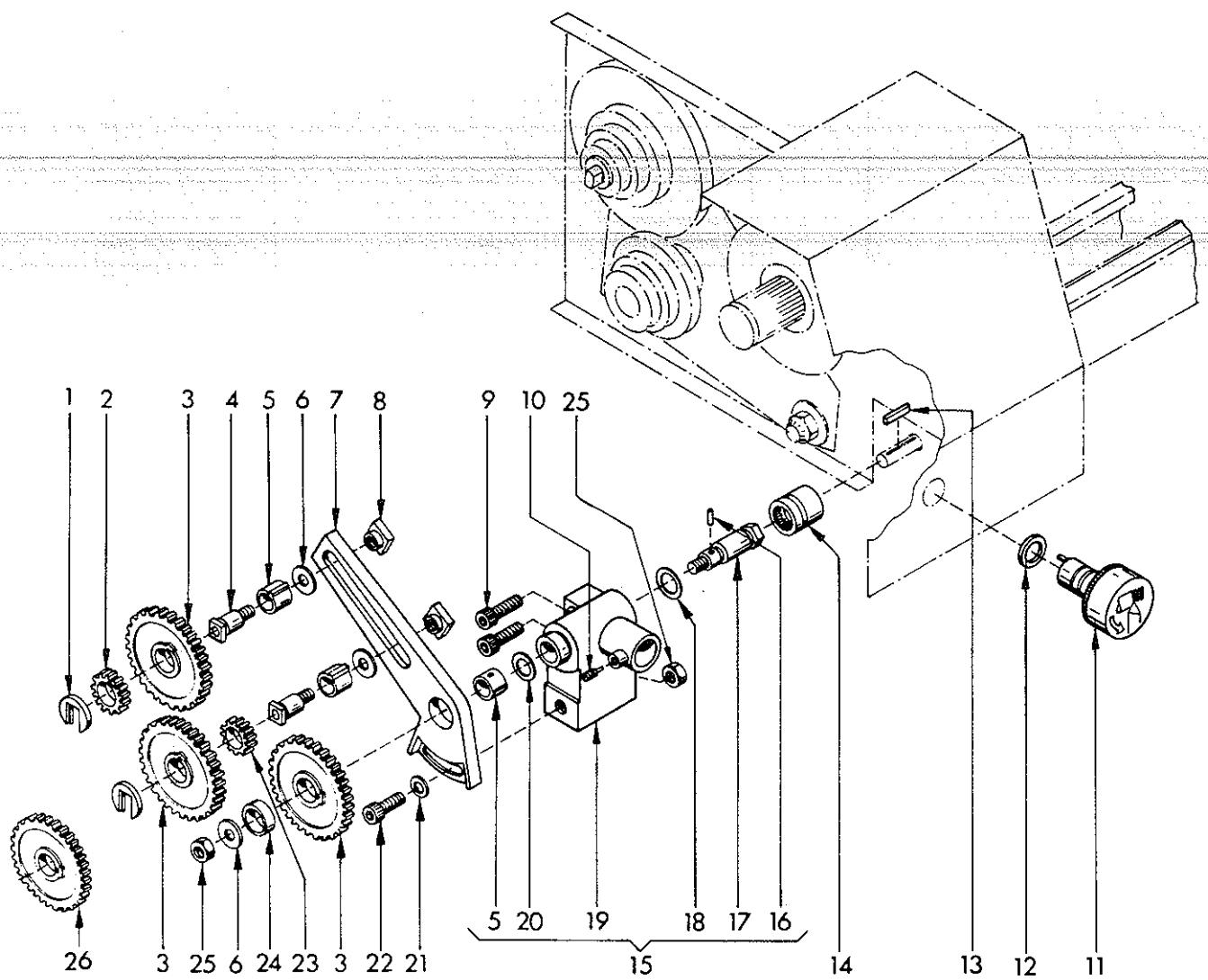
Pos.	Ref. No.	DIN	BENENNUNG	DESCRIPTION	DESIGNATION
1	A5. *		Gruppe E- Ausrüstung	Electrical equipment compl.	Ens. Electrique équipement
2	ZME *		Schalter	Switch	Interrupteur
3	ZME *		Kondensator	Condenser	Condensateur
4	ZME 20 0043		Lüfterhaube	Fan cover	Carter de ventilateur
5	ZPG 10 0007	MZB 11	Kabelverschraubung	Screw-type conduit fitting	Raccordement à vis

Spannung Voltage (V) Tension	Frequenz Frequency Frequence	Ref. Nr. für Gr. E-Ausrüstung Ref. Nr. for electrical equipment compl. Ref. Nr. pour ens. électrique équipement	Ref. Nr. für Kondensator Ref. Nr. for condenser Ref. Nr. pour condensateur	Ref. Nr. für Schalter Ref. Nr. for switch Ref. Nr. pour interrupteur
115	60	A5B 100 000	ZME 20 0069	ZME 20 0065
115	60 CSA	A5C 100 000	ZME 20 0069	ZME 20 0066
100	50	A5D 100 000	ZME 20 0070	ZME 20 0065
100	60	A5E 100 000	ZME 20 0070	ZME 20 0065
110	50	A5F 100 000	ZME 20 0069	ZME 20 0065
220	60	A5G 100 000	ZME 20 0068	ZME 20 0065
230	50	A5H 100 000	ZME 20 0068	ZME 20 0065
240	50	A5L 100 000	ZME 20 0067	ZME 20 0065
250	50	A5M 100 000	ZME 20 0067	ZME 20 0065
220	50 VDE	A5V 100 000	ZME 20 0068	ZME 20 0065
220	50	A5U 100 000	ZME 20 0068	ZME 20 0065

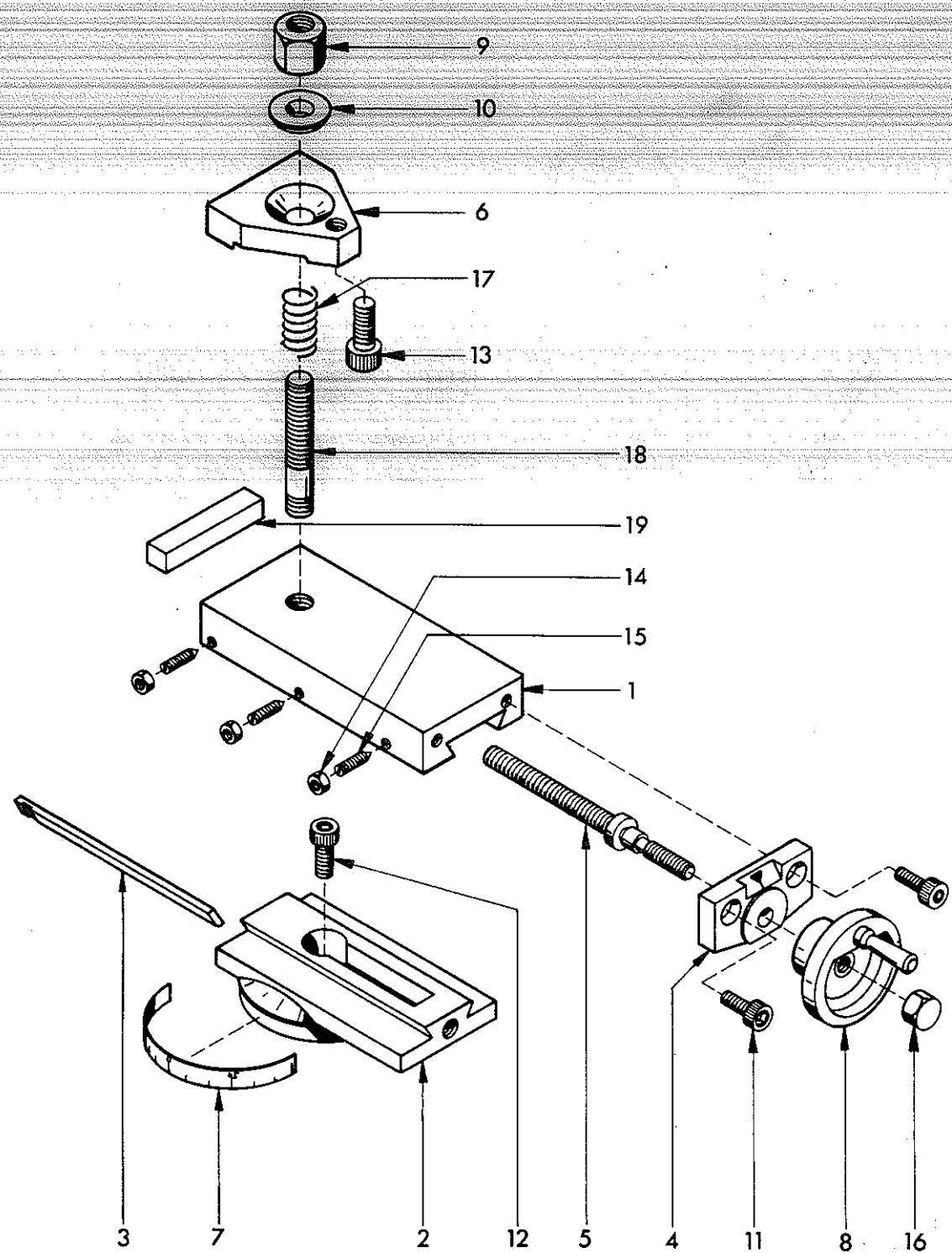


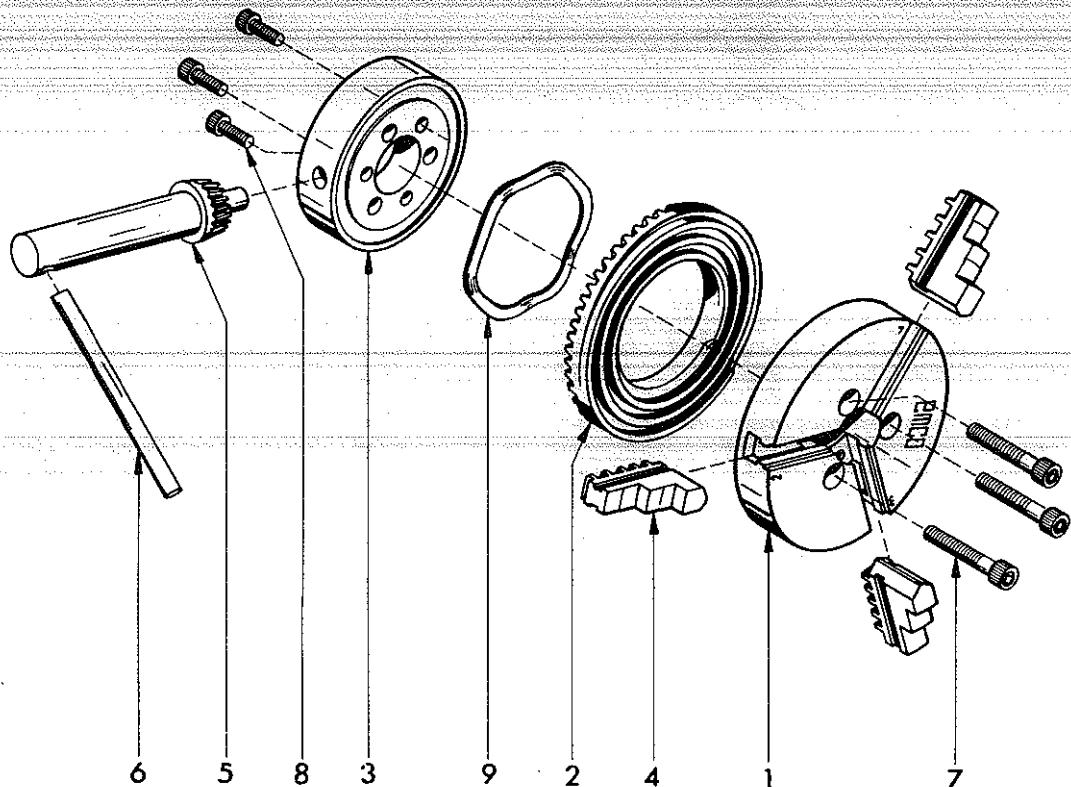
Pos.	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
	200 200			Gruppe Rädersatz	Set of change gears	Jeu d'engrenages
1	A5Z 200 010			Wechselrad 26	Change gear 26	Engrenage 26
2	A5Z 200 020			Wechselrad 30	Change gear 30	Engrenage 30
3	A5Z 200 030			Wechselrad 34	Change gear 34	Engrenage 34
4	A5Z 200 040			Wechselrad 35	Change gear 35	Engrenage 35
5	A5Z 200 050			Wechselrad 36	Change gear 36	Engrenage 36
6	A5Z 200 060			Wechselrad 72	Change gear 72	Engrenage 72
7	A5Z 200 070			Wechselrad 40	Change gear 40	Engrenage 40

Pos	Ref. No.	DIN	BENENNUNG	DESCRIPTION	DESIGNATION
	200 300		Gruppe Vorschubgetriebe	Feed mechanism	Mecanisme d'avance
1	B1A 000 040		Scheibe	Washer	Rondelle
2	A5A 000 180		Wechselrad 25	Change gear 25	Engrenage 25
3	A5A 000 170		Wechselrad 60	Change gear 60	Engrenage 60
4	A5A 000 150		Scherbolzen	Shaft	Boulon-axe
5	A5A 000 240		Keilhülse	Bush	Douille-clavette
6	B2A 071 020		Scheibe 16	Washer 16	Rondelle 16
7	A5A 000 080		Räderschere	Quadrant	Lyre
8	B2A 071 040		Nutenstein	T-nut	Boulon tête carrée
9	ZSR 12 0622	M6x22 DIN912-6.9	Zylinderschraube	Socket head screw	Vis 6 pans creux
10	ZST 17 0410	M4x10 DIN417-5.8	Gewindestift	Set screw	Vis pointeau
11	A5A 150 000		Schaltknopf mit O-Ring	Control knob with O-ring	Bouton de commande avec bague-O
12	ZOR 01 1324		O-Ring	O-ring	Bague-O
13	ZFD 85 3320	A3x3x20 DIN6885	Paßfeder	Parallel key	Clavette parallèle
14	A5A 000 140		Kupplung	Coupling	Embrayage
15	A5A 140 000		Gruppe Kupplungsgehäuse	Coupling compl.	Ens. Embrayage
16	A5A 140 040		Scherstift	Shear pin	Goupille de cisaillage
17	A5A 140 020		Kupplungsbolzen	Coupling bolt	Boulon d'embrayage
18	ZSB 12 1203	PS 12x18x0,3	Paßscheibe	Shim ring	Rondelle
19	A5A 140 010		Kupplungsgehäuse	Clutch housing	Cage d'embrayage
20	ZSB 12 1003	PS 10x16x0,3	Paßscheibe	Shim ring	Rondelle
21	ZSB 25 0640	B6,4 DIN 125	Scheibe	Washer	Rondelle
22	ZSR 12 0616	M6x16 DIN912-6.9	Zylinderschraube	Socket head screw	Vis 6 pans creux
23	A5A 000 190		Wechselrad 20	Change gear 20	Engrenage 20
24	A5A 000 160		Zwischenhülse	Spacer	Douille d'écartement
25	ZMU 34 0600	M6 DIN 934-6	Sechskantmutter	Hexagonal nut	Ecrou 6 pans
26	A5A 000 300		Wechselrad 50	Change gear 50	Engrenage 50

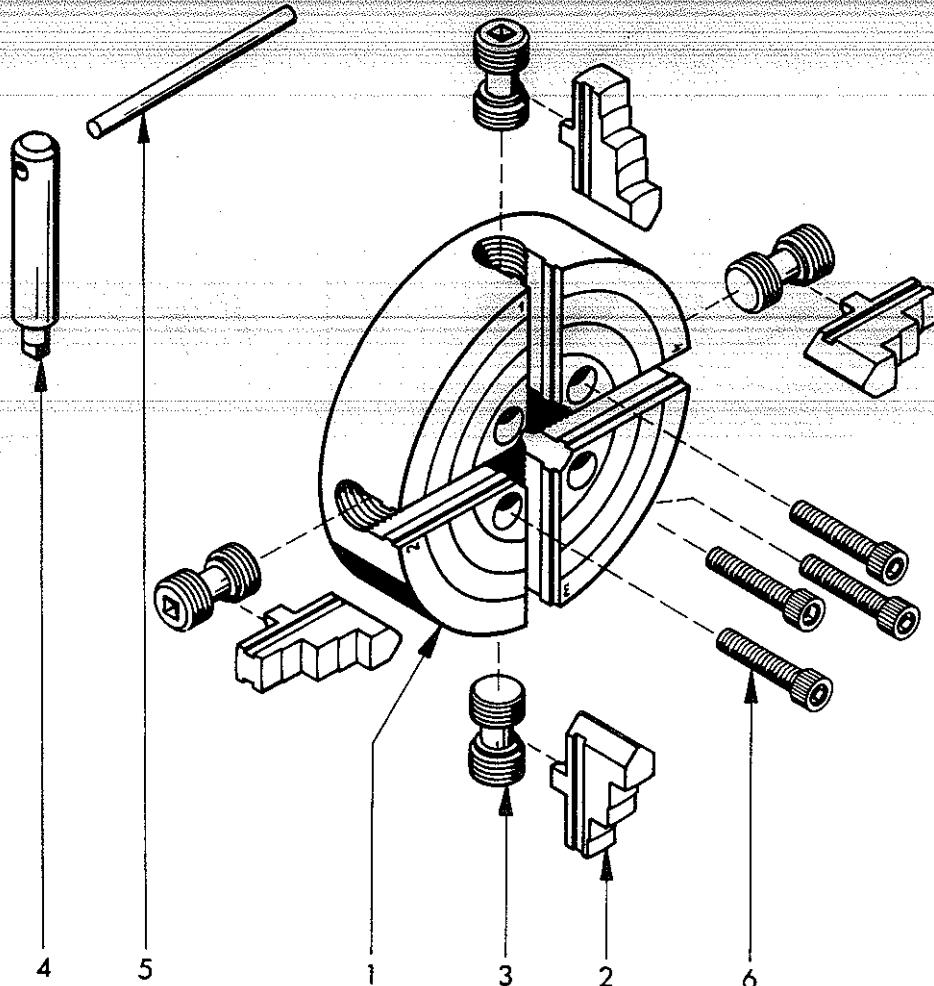


Pos.	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
1-19	200 500 200 550			Gruppe Obersupport metr. Gruppe Obersupport zöll.	Compound slide metr. Compound slide inch	Ens. Chariot supérieur metr. Ens. Chariot supérieur en pouces
1	A5A 050 010			Obersupport	Top slide	Support supérieur
2	A5A 050 020			Oberplatte	Bottom slide	Base du chariot
3	A5A 050 050			Einstelleiste	Gib	Lardon de réglage
4	A5A 050 030			Oberspindelträger	Lead screw mount	Palier de broche
5	A5A 050 040			Oberspindel	Lead screw	Broche
6	A5A 050 070			Spannklaue	Tool clamp	Bride de serrage de l'outil
7	A5A 050 080			Gradskala	Graduated scale	Echelle
8	A2A 020 050	M8		Handrad metr.	Handwheel metr.	Volant metr.
	A5B 050 090	M8		Handrad zöllig	Handwheel inch	Volant en pouces
9	B2A 040 100	M8		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
10	B4A 050 120			Ballenscheibe	Washer	Rondelle sphérique
11	ZSR 12 0412	M4x12DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
12	ZSR 12 0612	M6x12DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
13	ZSR 12 0616	M6x16 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
14	ZMU 34 0300	M3 DIN 934-5		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
15	ZST 53 0312	M3x12DIN553-5.8		Gewindestift	Set screw	Vis pointeau
16	ZMU 17 0500	M5 DIN917-5.8		Hutmutter	Cap nut	Ecrou borgne
17	ZFD 20 4152	DIN 152		Druckfeder	Compression spring	Ressort de compression
18	ZSR 38 0840	M8x40DIN938-5.6		Stiftschraube	Stud	Goujon
19	A5A 000 340			Drehstahlunterlage	Tool base	Base pour outil

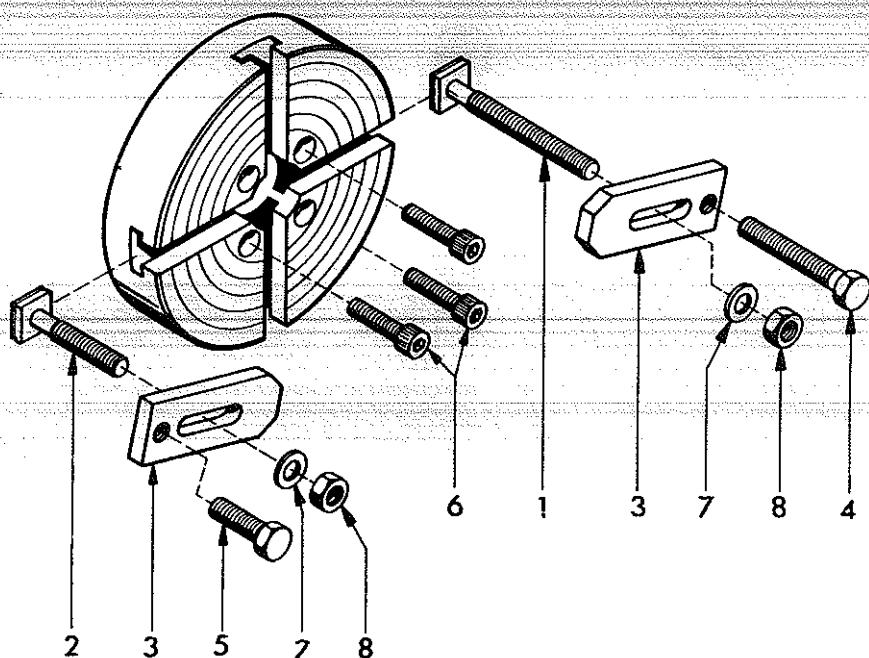




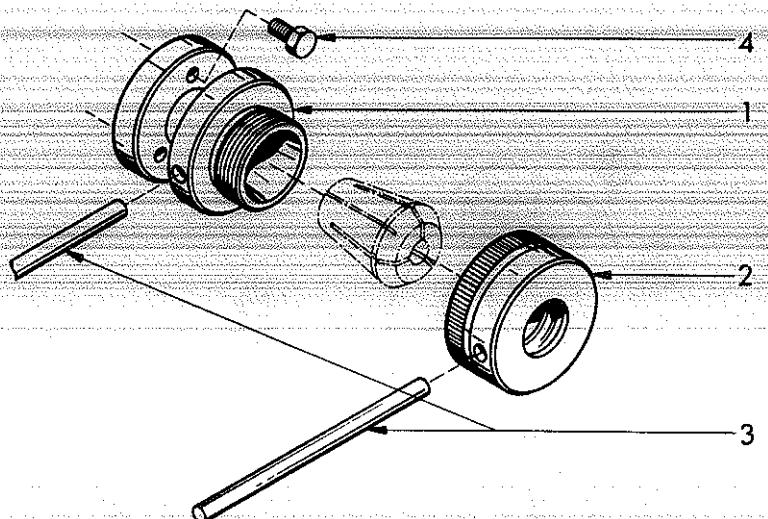
Pos.	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
	200 410			3-Backen Drehfutter	3-Jaw-chuck	Mandrin à 3 mors
1	A5Z 410 010			Gehäuse	Housing	Corps
2	A5Z 410 020			Zahnkranz	Scroll	Couronne
3	A5Z 410 030			Flansch	Flange	Flasque
4	A5Z 410 040			Satz von 3 Umkehrbacken	Set of 3 reversible jaws	Jeu de 3 mors reversibles
5	A5Z 410 050			Schlüssel	Key	Cle
6	A5Z 410 060			Knebel	Toggle	Garrot
7	ZSR 12 0530	M5x30 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
8	ZSR 12 0412	M4x12 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
9	ZSB 02 6006			Ausgleichscheibe	Compensating washer	Rondelle de compensation



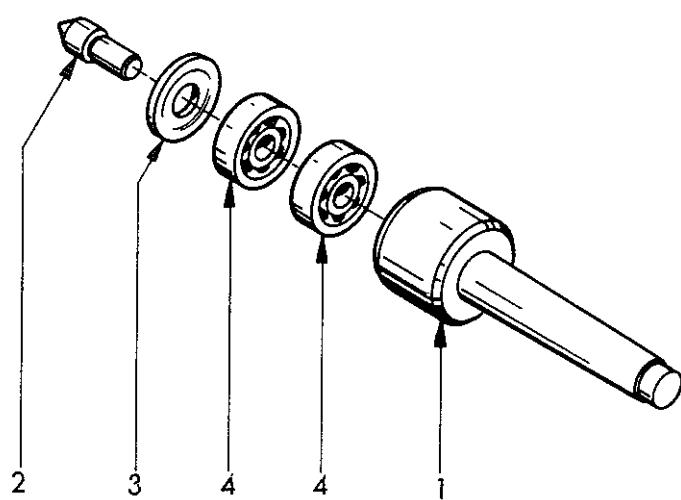
Pos.	Ref. No.	DIN	BENENNUNG	DESCRIPTION	DESIGNATION
	200 420		Planscheibe	Independent chuck	Plateau americain
1	A5Z 420 010		Gehäuse	Housing	Corps
2	A5Z 420 020		Satz von 4 Umkehrbacken	Set of 4 reversible jaws	Jeu de 4 mors reversibles
3	A2Z 420 020		Spannschraube	Spindle	Broche
4	A2Z 420 040		Schlüssel	Key	Cle
5	ZST 75 0460	4x60DIN1475-6.8	Knebel	Toggle	Garrot
6	ZSR 12 0525	M5x25DIN912-6.9	Zylinderschraube	Socket head screw	Vis 6 pans creux



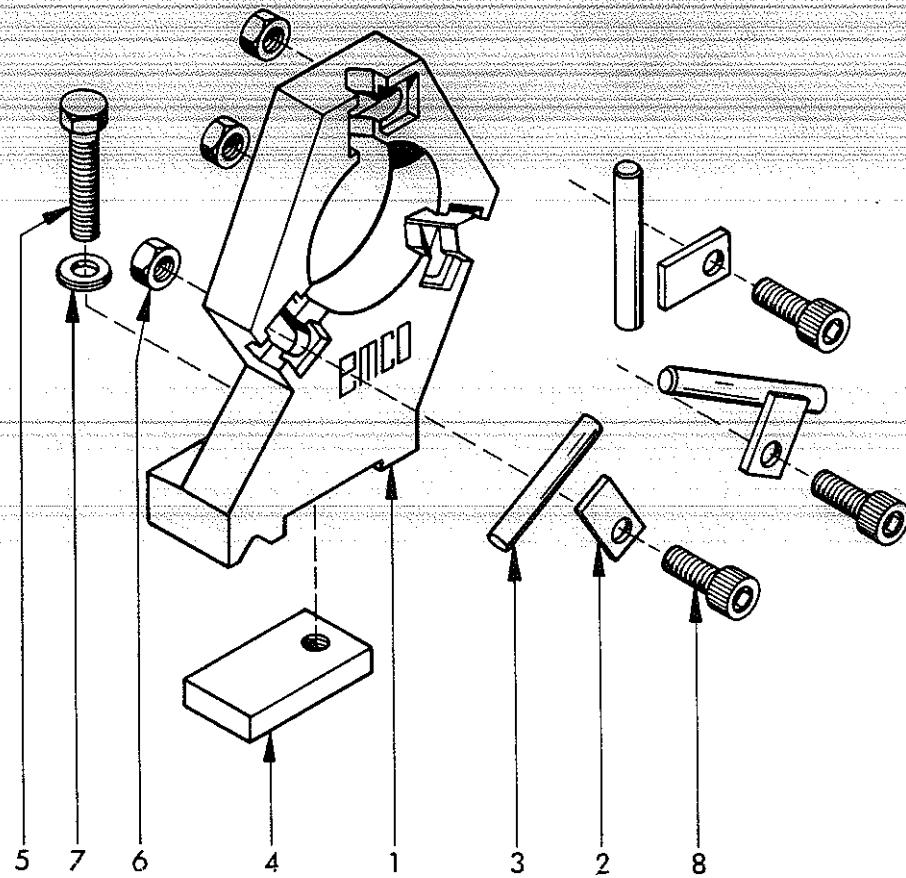
Pos.	Ref. No.	DIN		Benennung	Description	Designation
	Zoo 360			Aufspannscheibe	Clamping plate	Plateau de serrage
1	A3Z 350 020			Spannschraube 55	Clamping screw 55	Vis de serrage 55
2	A3Z 350 030			Spannschraube 35	Clamping screw 35	Vis de serrage 35
3	A2Z 351 010			Spanneisen	Clamping jaw	Bride de serrage
4	ZSR 33 0640	M6x40 DIN 933-5.6		Sechskantschraube	Hexagon head screw	Vis hexagonale
5	ZSR 33 0620	M6x20 DIN 933-5.6		Sechskantschraube	Hexagon head screw	Vis hexagonale
6	ZSR 12 0520	M5x20 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis à pans creux
7	ZSB 25 0640	B6,4 DIN 125		Scheibe	Washer	Rondelle
8	ZMU 34 0600	M6 DIN 934-6		Sechskantmutter	Hexagon nut	Ecrou 6 pans



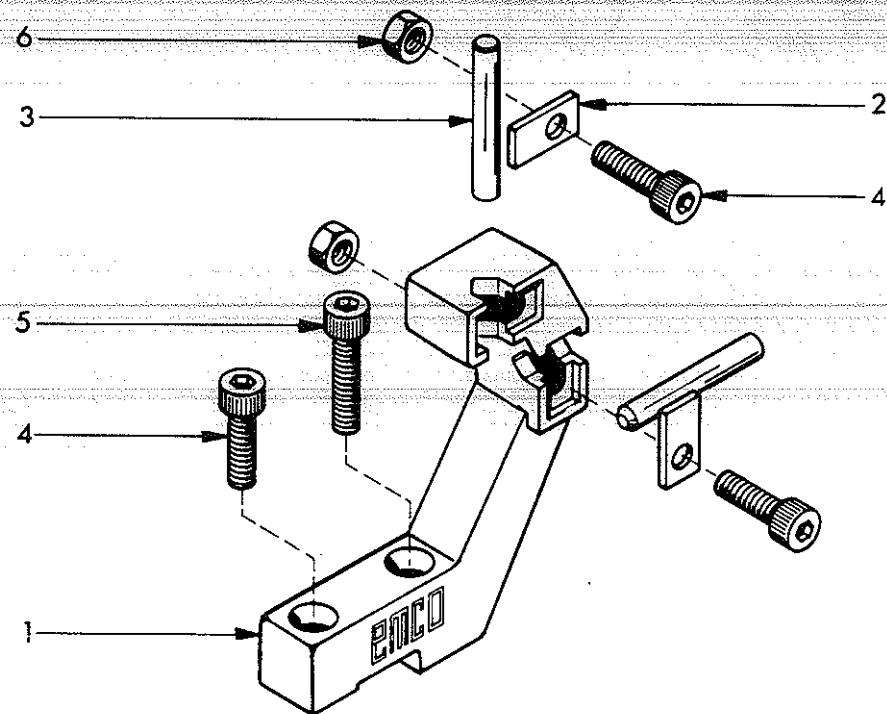
Pos.	Ref. No.	DIN		Benennung	Description	Designation
	200 040			Spannzangenvorrichtung	Collet holder	Porte-pinces
1	A5Z 040 010			Zangenhalter	Collet holder	Porte-pinces
2	A5Z 040 020			Spannmutter	Locking ring	Ecrou de serrage
3	ZST 11 0710	6x100 DIN 7		Zylinderstift	Dowel pin	Tige de serrage
4	ZSR 33 0510	M5x10 DIN 933-5.6		Sechskantschraube	Hexagon head screw	Vis hexagonale



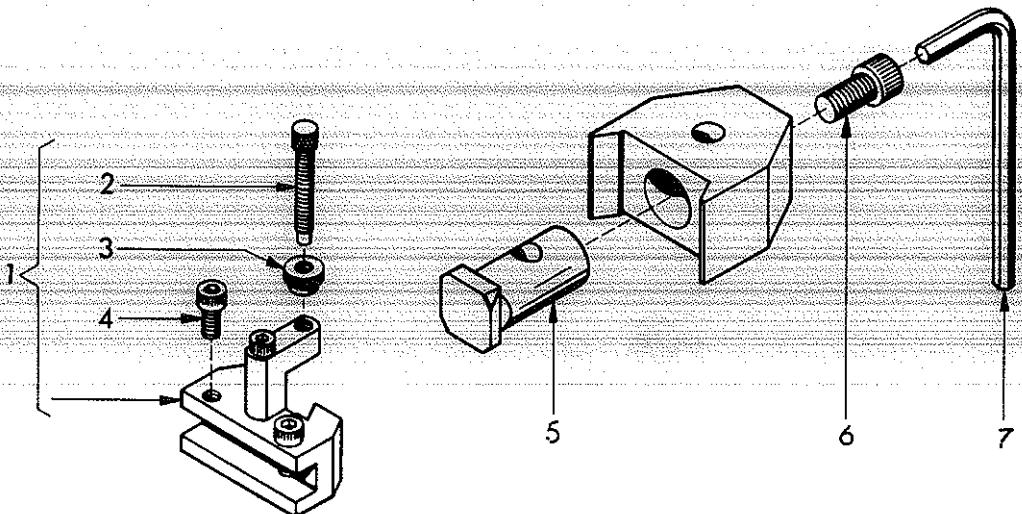
Pos.	Ref. No.	DIN		Benennung	Description	Designation
	200 270			Rollkörper	Revolving center	Pointe tournante
1	A5Z 270 010			Körper	Housing	Corps
2	A2Z 270 020			Spitze	Center	Pointe
3	A2Z 260 030			Deckel	Cover	Couvercle
4	ZLG 06 2600			Rillenkugellager	Ball bearing	Roulement à billes



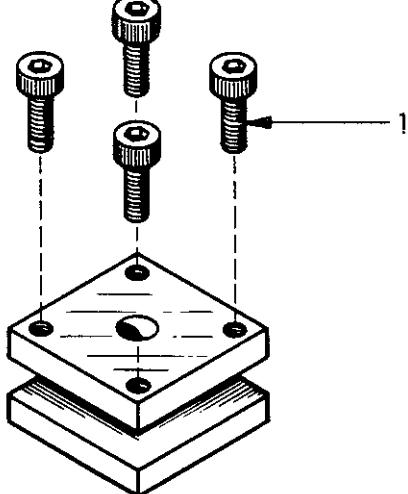
Pos.	Ref. No.	DIN		BENENNUNG	DESCRIPTION	DESIGNATION
	200 240			Stehlünnette	Fixed steady	Lunette fixe
1	A5Z 240 010			Stehlünnette	Body	Corps
2	A3Z 240 020			Klemmplatte	Clamping plate	Plaque de blocage
3	A3Z 240 030			Gleitstift	Slide- pin	Coulisseau
4	A3A 000 040			Klemmplatte	Clamping plate	Plaque de blocage
5	ZSR 33 0630	M6x30 DIN933-5.6		Sechskantschraube	Hexagon head screw	Vis hexagonale
6	ZMU 34 0600	M6 DIN 934-6		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
7	ZSB 25 0640	B6,4 DIN 125		Scheibe	Washer	Rondelle
8	ZSR 12 0616	M6x16 DIN912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux



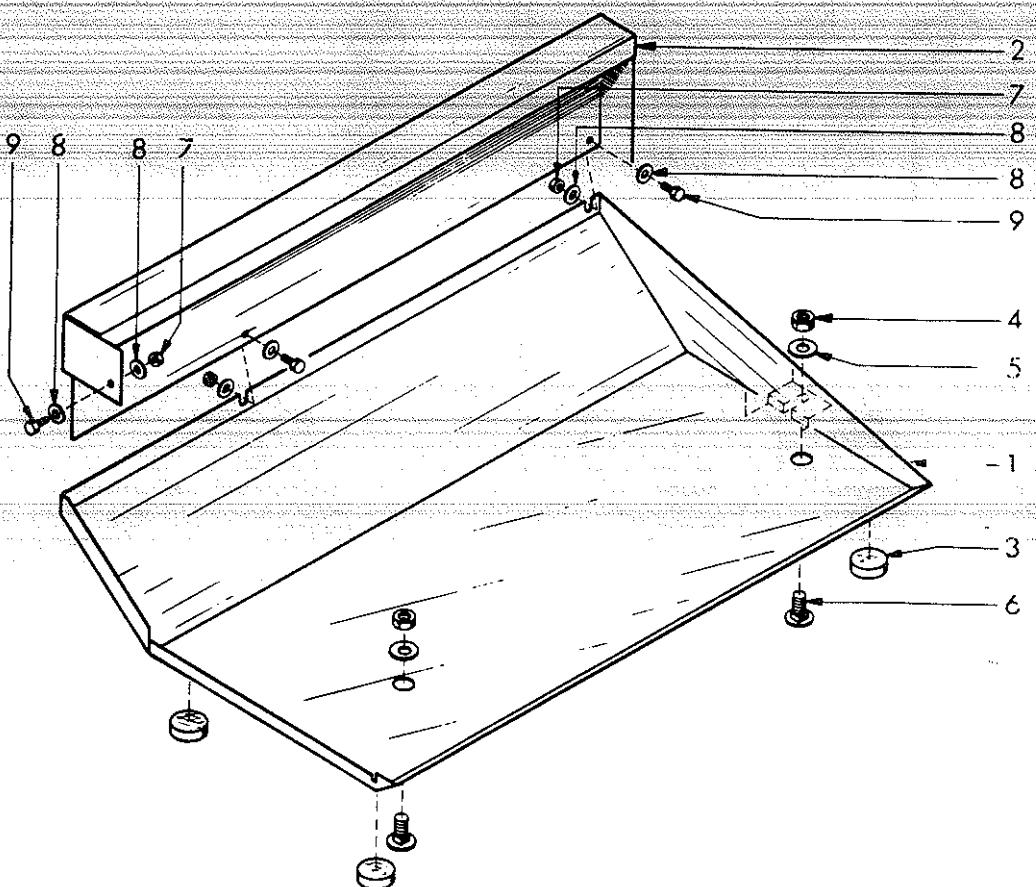
Pos.	Ref. No.	DIN		Benennung	Description	Designation
	200 230			<u>Mitlauflünnette</u>	<u>Travelling steady</u>	<u>Lunette à suivre</u>
1	A5Z 230 010			Körper	Body	Corps de la lunette
2	A3Z 240 020			Klemmplatte	Clamping plate	Contre-plaque de blocage
3	A3Z 240 030			Gleitstift	Slide pin	Goupille reglable
4	ZSR 12 0620	M6x20 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
5	ZSR 12 0625	M6x25 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
6	ZMU 34 0600	M6 DIN 934-6		Sechskantmutter	Hexagon nut	Excrou 6 pans



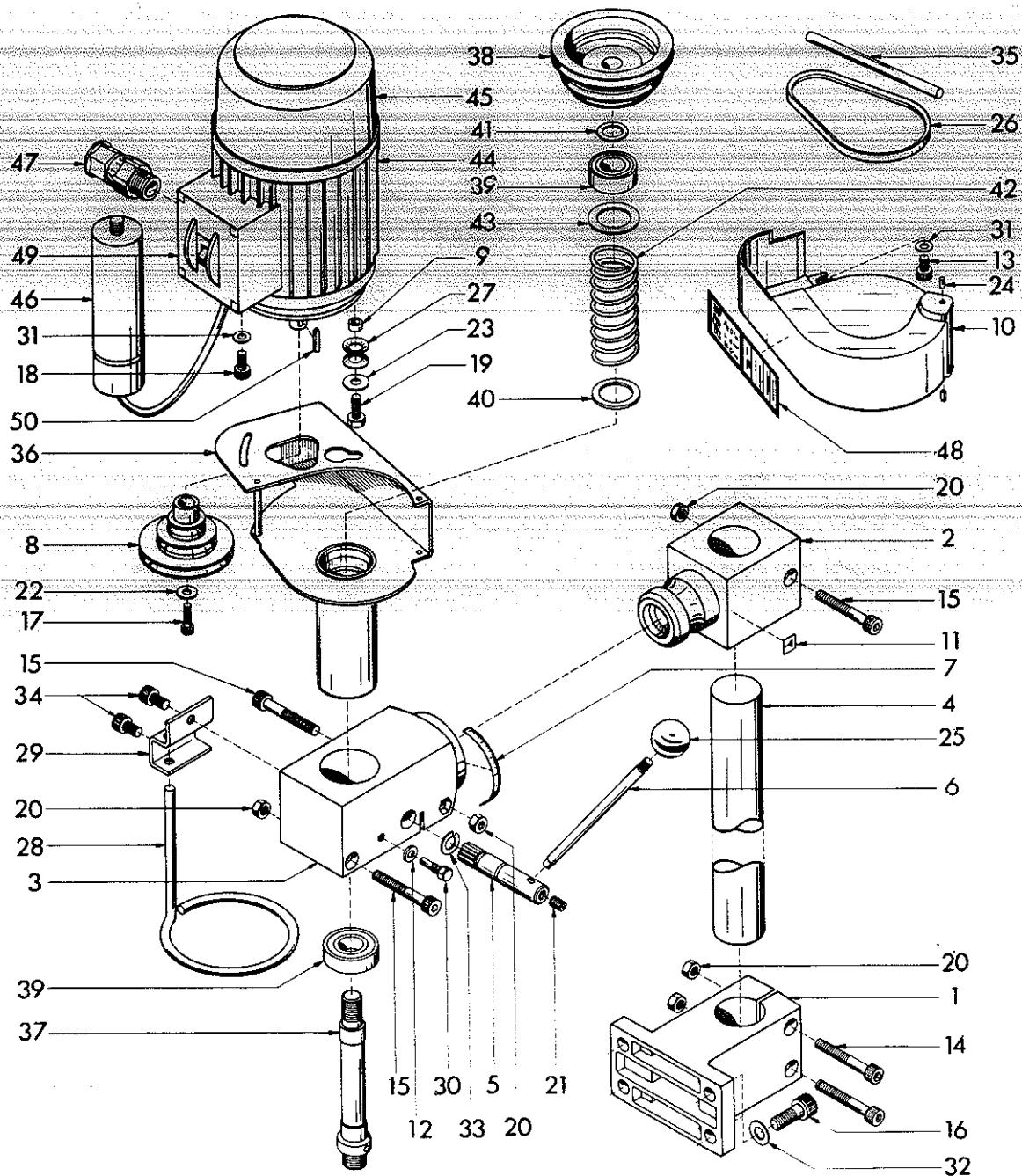
Pos.	Ref. No.	DIN	Benennung	Description	Designation
	202 000		Schnellwechselstahlhalter	Quick-change toolpost	Tourelle porte-outil à changement rapide
1	ZME 09 0070		Stahlhalter	Toolpost	Porte-outil
2	ZME 09 0071		Rändelschraube	Knurled screw	Vis
3	ZME 09 0072		Rändelmutter	Knurled nut	Ecrou
4	ZSR 12 0510	M5 x 10	Zylinderschraube	Socket head screw	Vis 6 pans creux
5	ZME 09 0073		Klemmstück	Clamp pad	Pièce de serrage
6	ZSR 12 0816	M8 x 16	Zylinderschraube	Socket head screw	Vis 6 pans creux
7	ZWZ 11 0600	SW 6	Schraubendreher	Hexagonal key	Cle à 6 pans



Pos.	Ref. No.	DIN	Benennung	Description	Designation
1	200 010	M6x16 DIN 912-6.9	Zweifachstahlhalter	2-way toolpost	Tourelle



Pos.	Ref. No.	DIN		Benennung	Description	Designation
	200 150			Gruppe Spritzwand	Splash guard	Pare gouttes
1	A5Z 150 010			Spänetasse	Chip tray	Bac à copeaux
2	A5Z 150 020			Spritzwand	Backplate	Panneau
3	ZGU 05 0001	28/8		Filzgleiter	Felt disc	Rondelle de feutre
4	ZMU 34 0800	M8 DIN 934-6		Sechskantmutter	Hexagon nut	Ecrou 6 pans
5	ZSB 21 0840	A84 DIN 9021		Scheibe	Washer	Rondelle
6	ZSR 03 0820	M8x20 DIN 603-4.6		Flachrundschraube	Square neck bolt	Collet carre
7	ZMU 34 0500	M5 DIN 934-5		Sechskantmutter	Hexagon nut	Ecrou 6 pans
8	ZSB 21 0530	A5,3 DIN 9021		Scheibe	Washer	Rondelle
9	ZSR 84 0512	M5x12 DIN 84-4.8		Zylinderschraube	Flat head screw	Vis à tête cylindrique



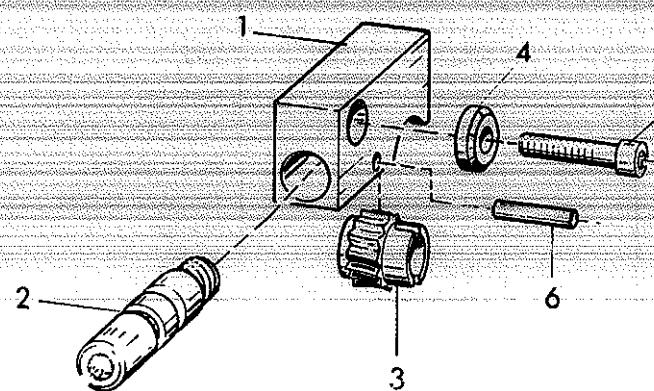
Spannung Voltage (V) Tension	Frequenz Frequency Fréquence	Ref.Nr. für Gr. E-Ausrüstung Ref.No. for electr. equipment compl. Ref.Nr. pour ens. électrique équipement	Ref.Nr. für Kondensator Ref.No. for condenser Ref.Nr. pour condensateur
115	60	ZMO 76 1115	ZME 20 0071
115	60 CSA	ZMO 77 1115	ZME 20 0071
100	50	ZMO 75 1100	ZME 20 0072
100	60	ZMO 76 1100	ZME 20 0072
110	50	ZMO 75 1110	ZME 20 0071
220	60	ZMO 76 1220	ZME 20 0073
230	50	ZMO 75 1230	ZME 20 0073
240	50	ZMO 75 1240	ZME 20 0073
250	50	ZMO 75 1250	ZME 20 0074
220	50 VDE	ZMO 75 1221	ZME 20 0073
220	50 SEV	ZMO 75 1222	ZME 20 0073

Pos.	Ref. No.	DIN	Benennung	Description	Designation
			<u>Vertikale Frä- und Bohrvorrichtung</u>	<u>Vertical attachment compl.</u>	<u>Ens. dispositif vertical</u>
1	A5Z 100 010		Sockel	Pedestal	Socle support
2	A5Z 100 020		Klemmkopf	Headstock adapter	Support vertical de poupee
3	A5Z 100 030		Pinolenhalter	Quill holder	Porte fourreau
4	A5Z 100 040		Vertikalsäule	Vertical column	Colonne verticale
5	A5Z 100 050		Ritzel	Pinion	Pignon
6	A5Z 100 060		Knebel	Toggle	Genouilliere
7	A5Z 100 070		Gradskala	Graduated scale	Echelle
8	A5Z 100 090		Motorriemenscheibe	Motor pulley	Poulie de moteur
9	A5Z 100 120		Distanzhülse	Spacer	Douille d'ecartement
10	A5Z 100 130		Räderdeckel	Cover	Couvercle
11	H8A 000 120		Zeiger	Pointer	Aiguille
12	A5Z 100 150		Distanzscheibe	Distance washer	Rondelle
13	ZSR 12 0508	M5x8 DIN 912-6.9	Zylinderschraube	Socket head screw	Vis 6 pans creux
14	ZSR 12 0635	M6x35 DIN 912-6.9	Zylinderschraube	Socket head screw	Vis 6 pans creux
15	ZSR 12 0640	M6x40 DIN 912-6.9	Zylinderschraube	Socket head screw	Vis 6 pans creux
16	ZSR 12 0820	M8x20 DIN 912-8.8	Zylinderschraube	Socket head screw	Vis 6 pans creux
17	ZSR 12 0416	M4x16 DIN 912-6.9	Zylinderschraube	Socket head screw	Vis 6 pans creux
18	ZSR 12 0512	M5x12 DIN 912-6.9	Zylinderschraube	Socket head screw	Vis 6 pans creux
19	ZSR 33 0516	M5x16 DIN 933-5.6	Sechskantschraube	Hexagon head screw	Vis hexagonale
20	ZMU 34 0600	M6 DIN 934-6	Sechskantmutter	Hexagonal nut	Ecrou 6 pans
21	ZST 13 0608	M6x8 DIN 913-45H	Gewindestift	Set screw	Vis pointeau
22	ZSB 21 0430	A4, 3 DIN 9021	Scheibe	Washer	Rondelle
23	ZSB 22 0530	B 5,3 DIN 9021	Scheibe	Washer	Rondelle
24	ZST 72 0306	3x6 DIN 1472-6.8	Paßkerbstift	Grooved adjusting pin	Chevelle de position
25	ZGF 19 2506	C25xM6 DIN 319	Kugelknopf	Ball knob	Sphère
26	ZRM 40 5260	TX 5x260	Keilriemen	V-belt	Courroie-V
27	ZFD 93 1501	15x8,2x0,7,DIN2093	Tellerfeder	Disc spring	Ressort beleville
28	A3Y 100 110		Schutzring	Protection ring	Anneau de protection
29	A3Y 100 120		Führungslasche	Guide sheet	Tôle de guidage
30	A5Z 100 140		Schraube	Screw	Vis
31	ZSB 25 0530	B5,3 DIN 125	Scheibe	Washer	Rondelle
32	ZSB 25 0840	B8,4 DIN 125	Scheibe	Washer	Rondelle
33	ZRG 21 0120	WR12	Sprengring	Retaining ring	Bague élastique
34	ZSR 12 0610	M6x10 DIN 912-6.9	Zylinderschraube	Socket head screw	Vis 6 pans creux
35	ZST 11 0710	6x100 DIN 7	Zylinderstift	Dowel pin	Tige de serrage
36-43	A5Z 101 000		<u>Gruppe Pinole</u>	<u>Quill compl.</u>	<u>Ens. Canon</u>
36	ZME 400 100		Trägerplatte	Carrier plate	Support
37	A5Z 101 020		Vertikalspindel	Vertical spindle	Broche verticale
38	A5Z 101 030		Riemenscheibe	Pulley	Poulie
39	ZLG 60 0202	6002-2Z	Rillenkugellager	Ball bearing	Roulement à billes
40	ZSB 10 0282	SS20x28x2	Stützscheibe	Supporting ring	Rondelle
41	ZSB 10 2181	SS12x18x1,2	Stützscheibe	Supporting ring	Rondelle
42	A5Z 100 080		Druckfeder	Compression spring	Ressort de compression
43	ZSB 12 2210	PS22x32x1	Paßscheibe	Ring	Rondelle
44-49	ZMO*		<u>E-Ausrüstung</u>	<u>Drive unit</u>	<u>Ens. Entrainement</u>
44			Motor	Motor	Moteur
45	ZME 20 0036		Lüfterhaube	Fan cover	Carter de ventilateur
46	ZME*		Kondensator	Condenser	Condensateur
47	ZPG 10 0008	MZB 13	Kabelverschraubung	Screw type cond.fittg	Raccordement à vis
48	A5A 200 150		Drehzahlschild 50 Hz	Speed plate 50 Hz	Plaque de vitesses 50Hz
	A5B 200 150		Drehzahlschild 60 Hz	Speed plate 60 Hz	Plaque de vitesses 50Hz
49	ZME 20 0030		Schalter mit Gehäuse	Switch	Interrupteur

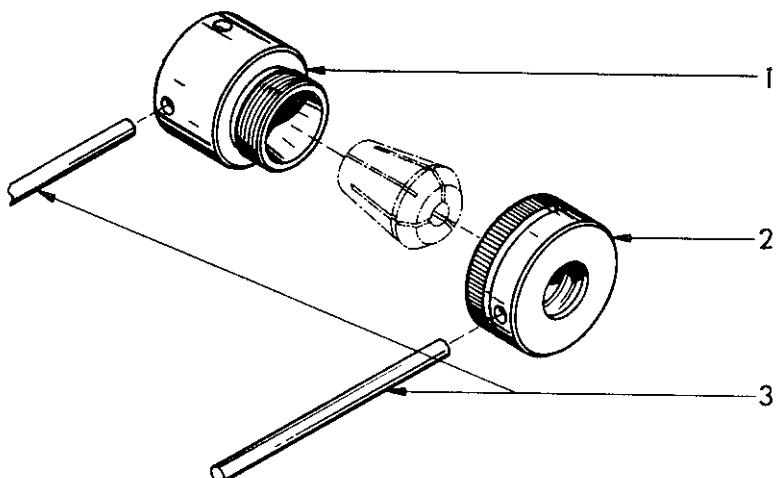
* Ref. Nr. siehe Tabelle

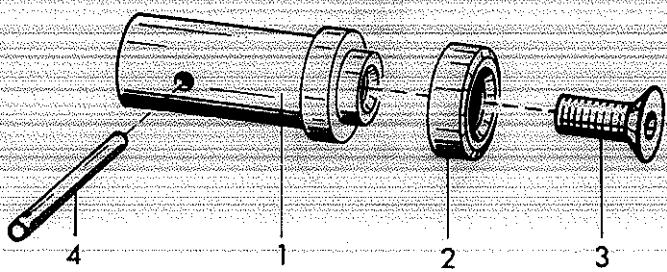
* Ref. Nr. see table

* Ref. Nr. voir tableau

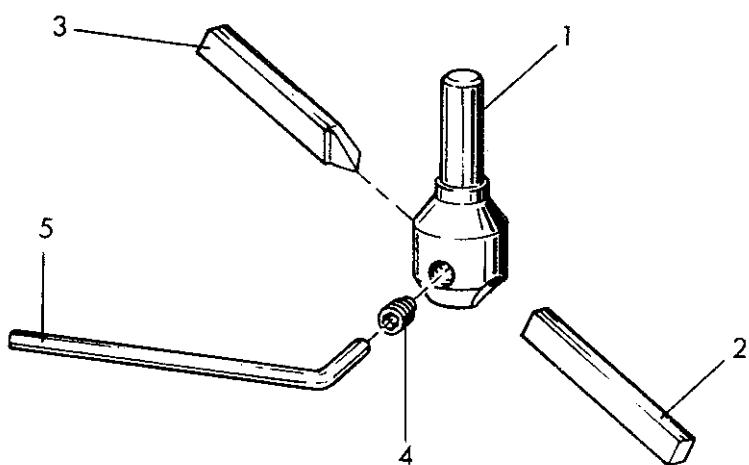


Pos.	Ref. No.	DIN	Benennung	Description	Désignation
	151 110		Gr. Vertikalfineinstellung	Fine feed attachment	Ens. réglage vertical fin.
1	A3Y 110 011		Lagerstock	Bearing block	Support de parlier
2	A3Y 110 020		Zustellschnecke	Worm	Commande de réglage
3	A3Y 110 030		Zustellritzel	Splined shaft	Pignon de réglage
4	A3Y 110 040		Scheibe	Washer	Rondelle
5	ZSR 12 0630	M6x30 DIN 912-6.9	Zylinderschraube	Allen head screw	Vis à pans creux
6	ZST 06 0420	4m6x20 DIN 7	Zylinderstift	Dowel pin	Vis tête cylindrique

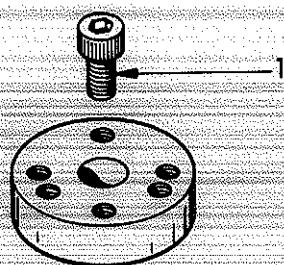




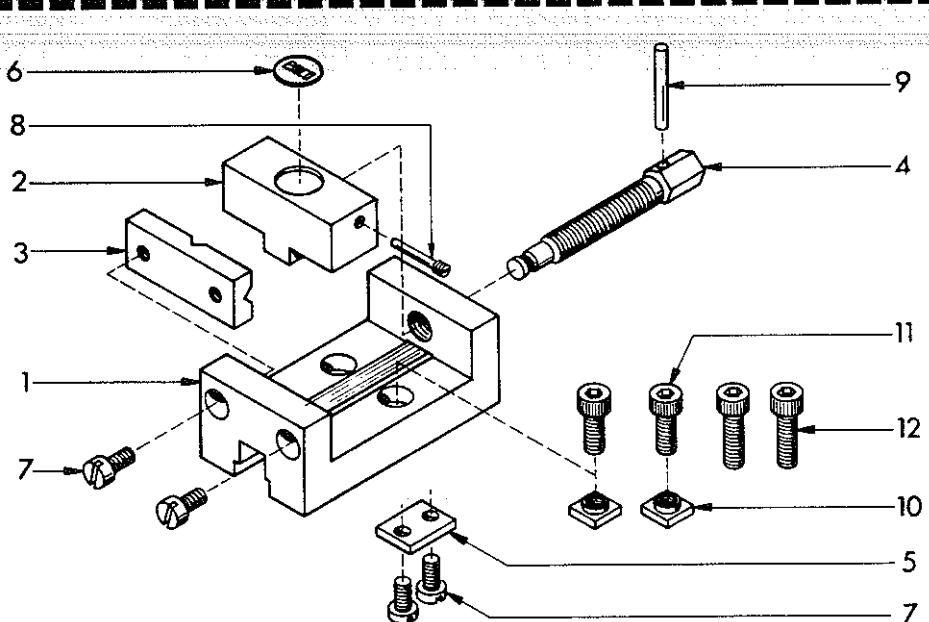
Pos.	Ref. No.	DIN	Benennung	Description	Designation
	151 070		Gr. Fräse- und Säge-dorn	Sawing and milling arbor compl.	Ens. arbre p. fraise et p.-scie
1	A3Y 070 010		Fräse- und Säge-dorn	Sawing and milling arbor	Arbre p-fraise et p-scie
2	A3Y 070 020		Gegenscheibe	Retaining ring	Contre-rondelle
3	ZSR 79 0820	M8x20 DIN 7991-8.8	Senkschraube	Countersunk screw	Vis tête fraisée
4	A2Z 410 050		Zylinderstift	Dowel pin	Tige de serrage



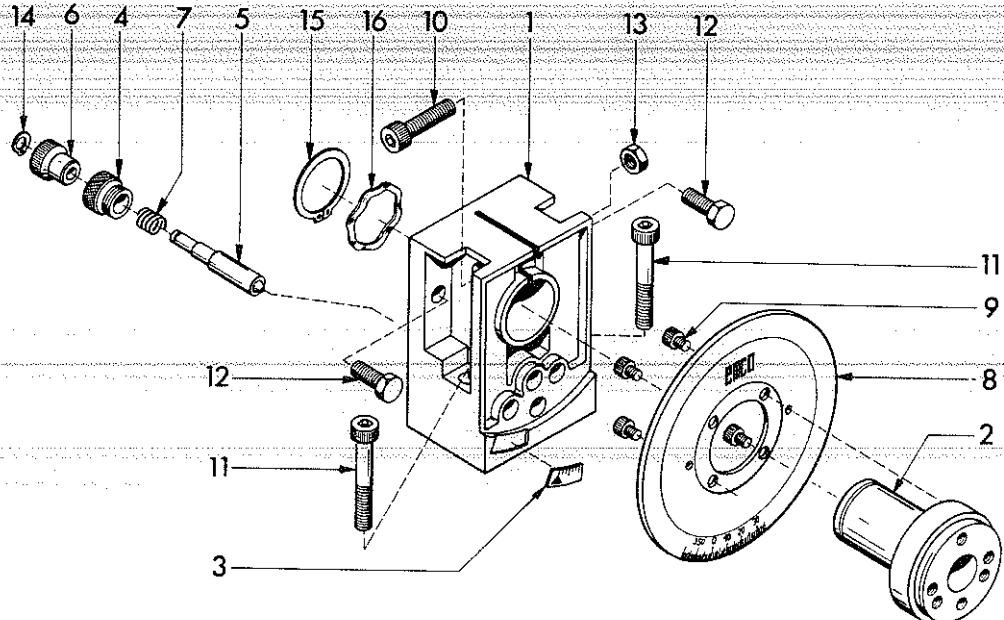
Pos.	Ref. No.	DIN	Benennung	Description	Designation
	150 100		Gruppe Ausdrehkopf	Fly cutter compl.	Ens. tête d'alesage
1	A3Z 100 010		Ausdrehkopf	Body	Corps
2	A3Z 100 020		Drehstahl roh	Tool not ground	Barreau
3	A3Z 100 030		Plandrehstahl	Planing tool	Outil à dresser
4	ZST 13 0608	M6x8 DIN 913-45H	Gewindestift	Set screw	Vis pointeau
5	ZWZ 11 0300	SW3 DIN 911	6kt. Schraubendreher	Hexagonal key	Cle à 6 pans



Pos.	Ref. No.	DIN		Benennung	Description	Designation
1.	ZSR 12 o612	M6x12 DIN 912-6.9		Supportflansch Zylinderschraube	Cross slide adaptor Socket head screw	Flaque de montage Vis 6 pans creux



Pos.	Ref. No.	DIN		Benennung	Description	Designation
	200 310			Maschinenschraubstock	Machine vice	Etau-machine
1	A5Z 310 o10			Körper	Body	Corps
2	A5Z 310 o20			Backe	Moving jaw	Mors mobile
3	A5Z 310 o30			Backe	Fixed jaw	Mors fixe
4	A5Z 310 o40			Spindel	Operating screw	Broche
5	A5Z 310 o50			Untergriffleiste	Plate	Plaquette
6	A2Z 430 o40			Firmenschild	Name plate	Ecusson
7	ZSR 84 o510	M5x10 DIN 84-4.8		Zylinderschraube	Flat head screw	Vis à tête cylindrique
8	VOA ooo o60	3x12 DIN 1481		Sicherungsschraube	Lock screw	Vis de blocage
9	ZST 75 o430	4x30 DIN 1475-6.8		Knebelkerbstift	Pin	Goupille
10	A3A o70 o20			Nutenstein	T-nut	Ecrou en T
11	ZSR 12 o616	M6x16 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
12	ZSR 12 o620	M6x20 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux



Pos.	Ref. No.	DIN		Benennung	Description	Designation
	200 320			Teilapparat	Dividing attachment	Appareil diviseur
1	A5Z 320 010			Gehäuse	Housing	Corps
2	A5Z 320 020			Aufnahmeflansch	Flange	Faux plateau
3	A5Z 320 030			Nonius	Vernier	Vernier
4	A5Z 320 040			Rändelmutter	Knurled nut	Ecrou moletée
5	A5Z 320 050			Indexbolzen	Indexing pin	Boulon index
6	A3Z 320 060			Rändelhülse	Knurled sleeve	Boulon moletée
7	A3Z 320 070			Druckfeder	Compression spring	Ressort de compression
8	A5Z 321 000			Teilscheibe	Index plate	Disque diviseur
9	ZSR 12 0406	M4x6 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
10	ZSR 12 0625	M6x25 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
11	ZSR 12 0640	M6x40 DIN 912-6.9		Zylinderschraube	Socket head screw	Vis 6 pans creux
12	ZSR 33 0616	M6x16 DIN 933-5.6		Sechskantschraube	Hexagon head screw	Vis hexagonale
13	ZMU 34 0600	M6 DIN 934-6		Sechskantmutter	Hexagonal nut	Ecrou 6 pans
14	ZRG 71 0506	5xo,6 DIN 471		Sicherungsring	Retaining ring	Anneau de retenue
15	ZRG 71 2412	24x1,2 DIN 471		Sicherungsring	Retaining ring	Anneau de retenue
16	ZSB 04 6003	16002/K3		Ausgleichscheibe	Compensating washer	Rondelle de compensation

Warranty conditions for new EMCO machines

- 1. The warranty period for new EMCO machines is, without limitation of operating hours, 12 months after initial shipment of the machine from EMCO or its authorized representative. Should the installation be completed by EMCO or its authorized representative, the warranty period begins with the completed installation of the machine.**

If a delay of installation occurs which is not caused by EMCO or its representative, the warranty period becomes invalid 12 months after scheduled installation date.
- 2. The warranty extends to the elimination of all defects in material or workmanship which affect the regular function of the machine.**
- 3. Occuring defects must be immediately reported to the EMCO representative or the next EMCO service department with detailed description of the defect in written or oral form, followed by a written verification.**
- 4. Defects which are correctly reported and under warranty will be corrected by either repair or replacement delivery to the original buyer free-of-charge; defective parts are to be returned to EMCO or the EMCO authorized representative, freight prepaid, if requested.**
- 5. Warranty for spare parts: Emco guarantees to the original buyer that, only those parts sold directly by Emco or through an authorized representative will be free from defects, which render part commercially unacceptable in material and workmanship, for a period according to applicable national law, at least three (3) months, but not to exceed six (6) months from the date of initial shipment or installation by Emco or its representative.
In the case of repeated claims for the same part: Warranty replacement does not extend the period of the original warranty.**
- 6. There is no claim of warranty for defects which occurred by:
Negligence of operating instruction manuals, safety and handling regulations or other instructions regarding delivery, installation, set-up or usage of the machine, incorrect set-up resp. installation, as well as, unauthorized, not expressed regulated or allowed alterations or modifications of the machine by the original buyer or third parties, natural wear, improper or negligent handling, chemical, electro-chemical or electrical influences, inadequate energy supply or force majeure.**
- 7. Any service performed by EMCO or its authorized representative beyond warranty will be charged at EMCO's or its authorized representative's regular rates.**

