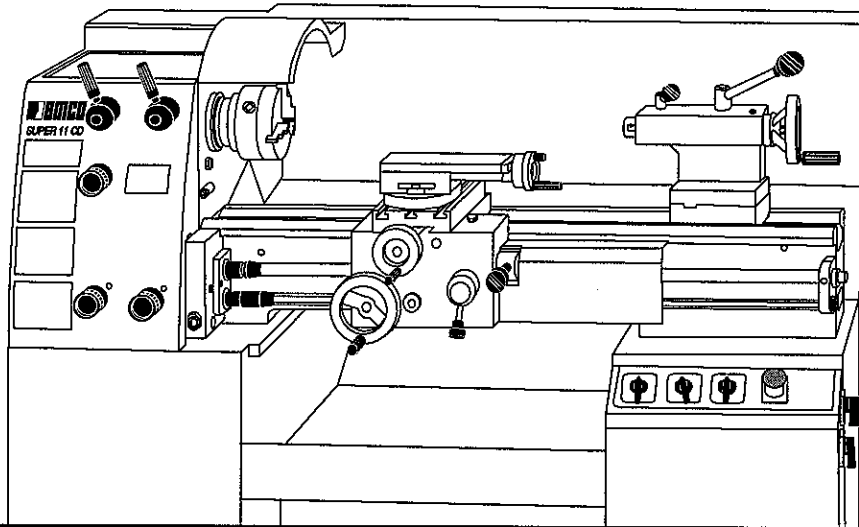


Lathe Maximat Super 11 CD



Instruction Book Maximat Super 11 CD

Ref.-No. EN 5813 Edition D2003-12

EMCO Maier Ges.m.b.H.

P.O. Box 131

A-5400 Hallein-Taxach/Austria

Phone ++43-(0)62 45-891-0

Fax ++43-(0)62 45-869 65

Internet: www.emco.at

E-Mail: service@emco.co.at

emco
innovative machine tools

Introduction

For more than five decades EMCO has been developing and building wood and metal working machines and has been successfully on the market since 1980 with computer controlled machine tools.

This high degree of experience is also an advantage for the lathe EMCO MAXIMAT SUPER 11 CD.

The large accessory range allows you to solve practically all occurring lathe and milling problem.

Due to the worldwide use of our machines we have of a service network which covers all world areas.

Immediately available service engineers, telephone service as well as a 100 % spare part supply exceeding the 10-year obligatory provision is something natural for us.

One of our more than 100 general representatives worldwide will inform you on particular new developments (e.g. clamping options for workpieces or tools etc.) and their retrofitting possibilities.

In the present operating instructions you will find a complete description of safety hints, transport, set-up, operation and maintenance of the machine. Therefore, read these instructions completely before machine start-up.

Safety covers are not mounted in all illustrations in this manual due to clear presentation.

Or any inquiries or proposals for improvement with a view to the present operating instructions please get directly in touch with

**EMCO MAIER Gesellschaft m. b. H.
Abteilung Technische Dokumentation
A-5400 Hallein, Austria**



EC conformity

The CE sign certifies together with the EC declaration of conformity that the machine and the manual corresponds to the guidelines applicable for these products.

List of contents

Adequate use	4
Warranty conditions	4
Safety recommendations	5
Safe clamping	7
Working hints	8
Recurrent symbols	8
Technical data	9

A Start-up

Machine acceptance	10
Scope of supply	10
Transport	11
Criteria for installation	12
Dimensions of the machine	13
Installation possibilities	14
Transport protection devices	16
Mounting the lubricant device	16
Electrical connection	17
Initial start-up	19

B Working with the machine

Notes for operators	20
Main and operating elements	27
Speed setting	28
Feed setting	29
Cutting speeds	31
Approximate values for cutting speed	32
Thread cutting	33
Thread cutting (inch type machine)	36
Mounting change gears	38
Tailstock	40
Mounting clamping device onto DIN-spindle ..	42
Mounting clamping device onto Camlock-spindle	43

C Maintenance

Readjustment works

Lubrication scheme	44
Lubricant table	45
Lubricant and coolant recommendations	45
Hints for cooling lubricant selection	46
Adjustment of the main spindle	47
Compensating play of the cross slide spindle in the cross slide nut	47
Compensating play of the top slide spindle in the top slide nut	48
Adjustment of the dovetail guideways of cross and top slides	48
Compensating of too much play between half-nuts and leadscrew	49
Adjustment of half-nut guidance	49
Adjusting axial play of the leadscrew	49
Replacing the shearing pin on the leadscrew ..	50

D Accessories

Toolpost grinder	51
Foot brake	54
Thread dial indicator	56
Taper turning attachment	57
Machine lamp	58

Declaration of conformity

Spare parts list

Adequate use

The machine EMCO MAXIMAT SUPER 11 CD is designed for turning machinable metals. Machining of other materials is not admitted and may be carried out in particular cases only after consultation with the 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 preventions of accidents and safety instructions for work with woodworking machines 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. 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 alternations 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.

All rights reserved, reproduction only by authorization of Messrs. Fa. EMCO MAIER

© EMCO MAIER Gesellschaft m.b.H, Hallein 1995

Safety recommendations

Read documentations

Read this documentation completely before you start up the machine.

Electrical connection

The electrical connection and interferences with the control cabinet must only be carried out by electricians experts. The machine may only be connected to sockets with earthing conductors.

Authorized operation

The machine may only be operated by trained and authorized persons. It must be protected against unauthorized start-up (main switch can be locked).

Obligation of supervision

Never leave running machine unattended. After end of work switch off main switch and protect against unauthorized start-up using a padlock.

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 are prohibited. Non-compliance represents a hazard to the operator and the function of the machine. Furthermore, any guarantee claim will expire.

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.

Wear body protection

Wear hair protection, eye protection and tight clothings.

Work during standstill of machine

Carry out measuring, clamping work, tool and workpiece change and adjusting work only during standstill of machine and EMERGENCY-OFF key actuated.

Removing of objects

Prior to the operation all free-lying objects, such as e.g. redundant clamping jaws, wrenches, measuring instruments, tools etc. have to be removed from the clamping area.

Tools

Only work with perfectly ground tools. Mind rotary direction of the tools.

Dangerous materials

Machining magnesium and its alloys is not admissible because of fire hazard.

Clamping keys

Chuck keys etc. must not be attached to the machine by chains, cords or similar means and have always to be taken off prior to machining start.

Do not reach into running machine!

In case of hazards - EMERGENCY-OFF

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

Observe maximum speed

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

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.

Cleanness

Always keep working place and machine clean. Never remove chips with running machine. Use chip hook, brush or whisk for this purpose. An untidy working place and a dirty machine increase the hazard of accidents.

Maintenance and readjustment work

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

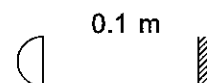
Working place

Set up machine in such a way that there is enough space for operation and maintenance of the machine. Do not deposit or store anything or lay electric lines in these areas.

Machine lamp

The distance between machine lamp and lighted surface must be at least 0.1 m, otherwise the lamp might be destroyed because of heat flow.

According to ÖVE:



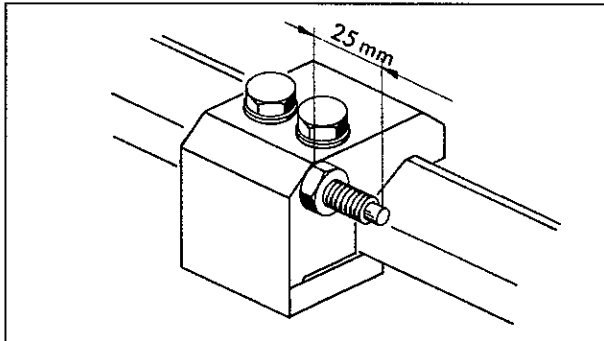
Safe clamping

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

Cover extending parts

When working on tubes or pipes which extend to the side of the headstock, these must be covered over the whole length.

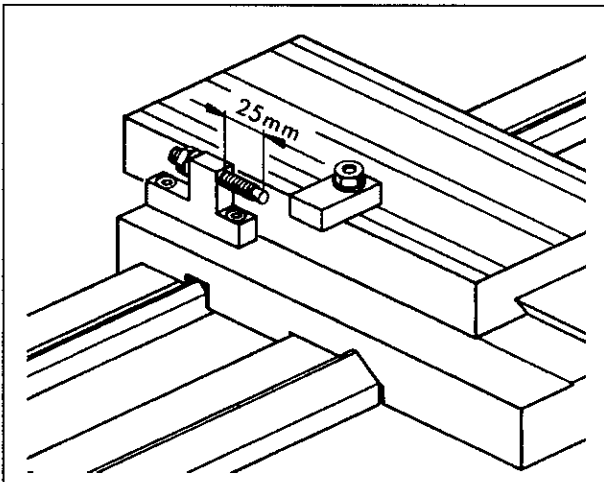
Always use chuck guard



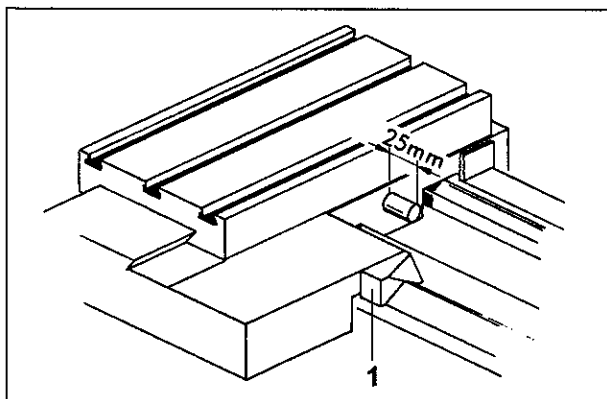
Longitudinal stop

Adjust stop pin

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



Lateral stop



Keep-off wedge and tailstock stop

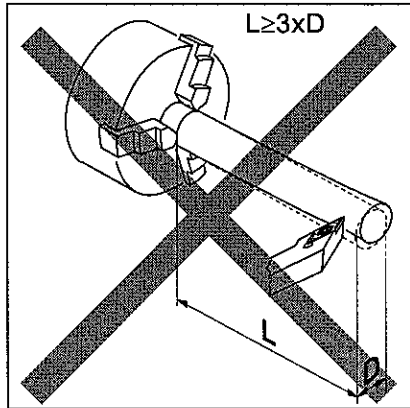
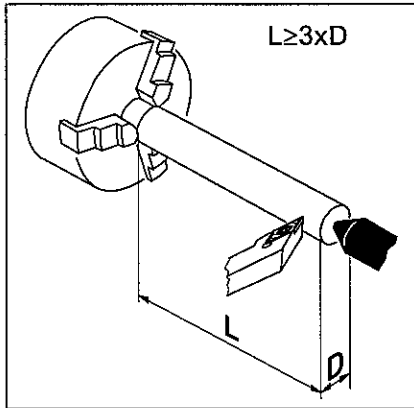
Don't remove keep-off wedge and tailstock stop

A keep-off wedge (1) and a tailstock stop pin are mounted on the longitudinal slide to prevent contusion of your fingers between slide and tailstock. These safety devices must not be removed.

A bolt (length 25 mm) mounted on the longitudinal slide prevents contusion of your fingers between slide and tailstock plate. This bolt must not be removed.

Safe clamping

Always clamp workpieces only on pre-turned and premachined surfaces!

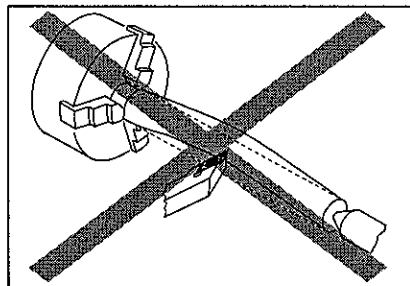
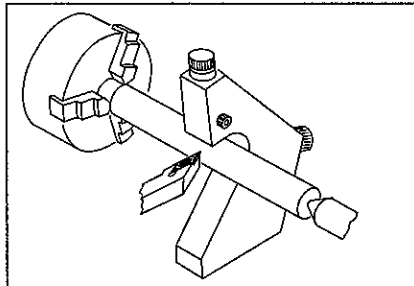


Clamp only short workpieces in cantilevered mode

If the outstanding workpiece length 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.

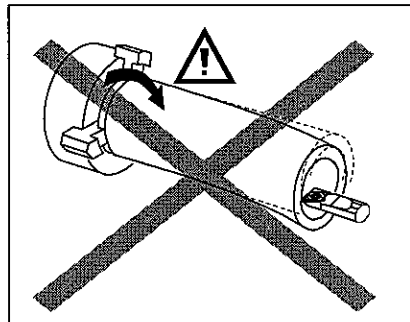
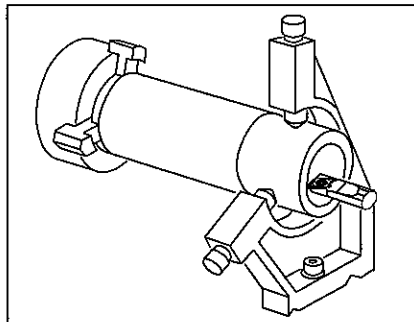
Result:
Bad turning result, breaking of the tool, **bending or catapulting out of the workpiece.**



Travelling steady

Slender workpieces will be bended by the cutting pressure.

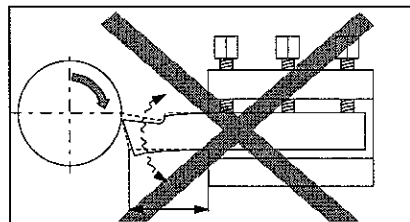
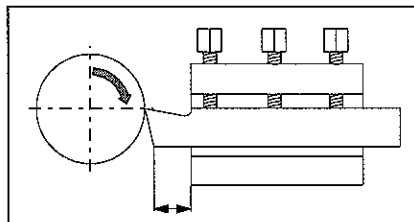
Use the **travelling steady** as support. The travelling steady will be mounted on the longitudinal slide.



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.

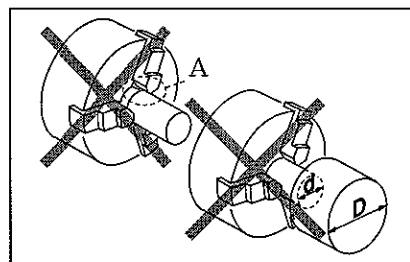
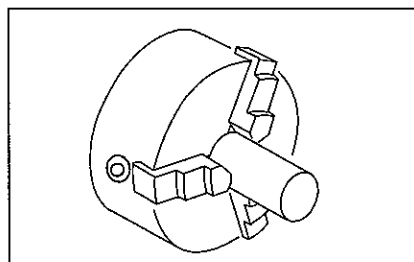
Dangers without fixed steady:
Bad turning result, breaking of the tool, **bending or catapulting out of the workpiece.**



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 center height.



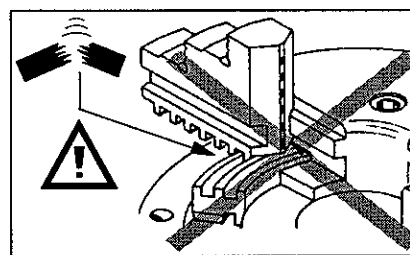
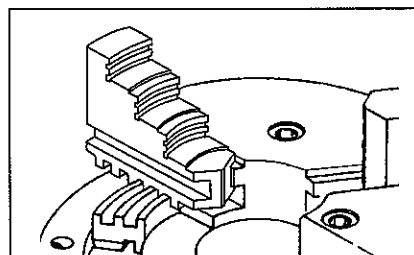
Never clamp the workpiece too short (A)

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**.

Always tighten all chuck pinions.



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.

Working hints

Switch during standstill

Switch lever for speed setting only during standstill of the machine.

Switch all operating levers always in lock-in position never in intermediate position.

all switchings at the headstock have to be carried out only during standstill of the machine.

Sheraing pin

For safety reasons the shearing pin of the lead screw is made of an aluminium alloy. If this pin breaks due to overstress it has to be replaced by an original shearing pin (by no means a pin of a harder material).

Locking

Thread and feed control are interlocked to each other.

Clean machine

after working with collant clean and oil machine. Never clean machine with compressed air otherwise chips might enter the guideways.



By correct handling of the chips you can avoid that lubricants and emulsions get into the ground water.

Chips are not worthless waste but rather represent valuable raw materials. By collecting the chips according to kinds the quality of this raw material can be essentially improved (e.g. separation of aluminium and steel chips).

The better the chips are cleaned from residual oils, (mind that a sufficiently long drop-off period is provided as well as adequate temperature) the less is the environmental burden during intermediate storage and transport as well as the usability of the chips in the re-cycling process.

Working spindle

Never knock the working spindle (precision bearing).

Lubrication

Maintain machine according to lubrication scheme, check oil levels in regular intervals.

Grinding device

Cover all guides when using a toolpost grinder.

Centre height

Align tools always to the height of the rotation axis. If necessary, use support platelets.

Noise burden of single-phase machines during lowerspeeds

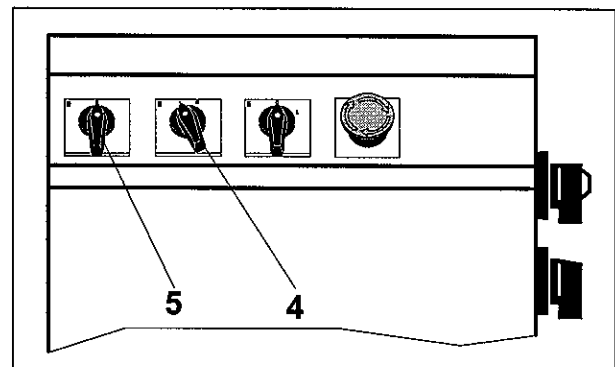
For starting and/or reversing a starting capacitor package is connected for approx. 2.5 seconds for technical reasons.

Thus, an increased noise burden is caused with lower speed steps.

Work with maximum speed step (2200 rpm) with 115 volt version

For the starting period of the maximum speed step first you have to switch on the switch (5) and within anther 2.5 seconds (starting capacitor package is connected during this period) the switch (4) must be advanced from position 1 to position 2.

If you switch directly to position 2 the main spindle does not achieve its nominal speed.



Main spindle switch

Recurrent symbols



The "Attention" symbol indicates hazards of injury.

You will find it in the Instruction Book wherever specific hazards are indicated.



After the info hand you will find advice to avoid damage at the machine and to provide correct operation respectively.



The environment symbol informs you on how you can avoid or reduce environmental burdens.

Technical data

Working area

Distance between centers	650 mm
Center height	140 mm
Swing over bed	280 mm
Swing over cross slide	170 mm
Bed width	155 mm
Travel of longitudinal slide	590 mm
Travel of cross slide	135 mm
Travel of top slide	100 mm
Distance centre-top slide	23 mm
Swivel area top slide	+/- 180°
Tool cross section	12x12 mm

Main spindle

Spindle nose according to DIN 55021	size 3
Caml. ASA 5.9 D1	size 4
Inner taper DIN	MT 4
Inner taper CAMLOCK	MT 5
Spindle bore DIN/CAMLOCK	ø26/ø35 mm
Spindle diameter in front bearing	45 mm
Spindle speeds	8
Speeds	55, 110, 200, 300, 410, 600, 1100, 2200 rpm

Pole changing drive motor (IEC)

Power (three-phase) S6-60%	1.1/1.4 kW
Power (single-phase) S6-60%	0.75/1.0 kW

Feeds

Metric machine:

14 longitudinal (0.00118-0.0118 inch/rev.)	0.03-0.3 mm/rev.
14 transversal (0.00059-0.0059 inch/rev.)	0.015-0.15 mm/rev.

Inch type machine:

15 longitudinal	0.00118-0.0128 inch/rev.
15 transversal	0.0009-0.064 inch/rev.

Thread cutting

Thread pitches metric machine:

14 metric threads (0.01-0.1")	0.25-2.5 mm (M1-M22)
9 inch threads	9-96 t.p.i.
with change gear set additionally: 13 metric threads (0.005-0.19")	0.125-5 mm
29 inch threads	29-76 t.p.i.
12 module threads	0.25-2.5
25 diam. pitch	96-11

Thread pitches inch type machine:

6 metric threads (0.0059-0.078")	0.15-2 mm
15 inch threads	64-9 t.p.i.
with change gear set additionally: 21 inch threads	126-4 t.p.i.
13 metric threads (0.010.24")	0.25-6 mm
29 diam. pitch	128-9
7 module threads	0.5-2.0

Tailstock

Center sleeve diameter	30 mm
Inside taper	MT 2
Stroke of center sleeve	80 mm
Set-over	+10/-8 mm

Graduated collar division of handwheels

Longitudinal slide	0.02 mm
Cross slide	0.05 mm
Top slide	0.025 mm
Tailstock	0.05 mm

Admissible workpiece weights

Flying	45 kg
With tailstock	80 kg

Electrical connection

Power supply	230 V~/1/N/PE/50/60Hz
Power supply	230 V~/3/PE/60Hz
Power supply	400 V~/3/PE/50/60Hz
Max. voltage fluctuations	+6/-10%
Connection lead	3 kVA
Preliminary fuse for machine	16 A slow

Machine dimensions

Total length	1385 mm
Total width	714 mm
Total height	1166 mm
Turning spindle above the floor	1050 mm
Weight of the machine	243 kg

Sound pressure level

Max. sound pressure level .	77 dB(A)
With the following conditions:	
- Measuring method: enveloping surface method according to DIN 45635	
- Measuring point 1 m distance and 1.6 m above ground	
- Operating mode: max. speed during idle running	

Subject to technical modifications!

A Start-up

Machine acceptance

Mind the following hints for machine acceptance:

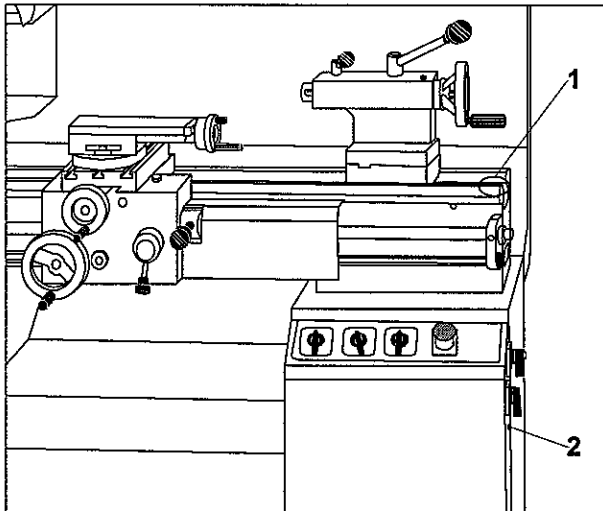
- Check machine for possible transport damage and completeness of scope of supply. In case of defects get immediately in touch with supplier, transport company and/or insurance company indicating exactly machine name, machine number and electrics number.
- In case of transport damage protect machine and accessories against further damage (e.g. influence of weather).

Machine number and electrics number

The machine number (1) is punched into the machine bed at the position shown.

The adhesive plate (2) with the electrics number is to be found laterally at the switch cabinet.

The electrics number consist of a 9-digit number (e.g. Y5A 300 000). The version number is indicated in table form (e.g. V1). V1 means electric version 1. The circuit diagram belonging to this electric equipment is to be found in the electrical documentation order no. ZVP674373 V1 for single-phase version and for 3-phase machine version in the electrical documentation order no. ZVP674374 V1 (to be found in the switch cabinet).



Machine number and electrics number

Scope of supply (Basic equipment)

Bed with Vee-guides, machine base, spindle headstock-wheel gear, tailstock, longitudinal, cross and top slides, spindle tool post (clamping claw), electr. chuck guard, feed gear mechanism, feed shaft with sliding clutch, lead screw with claw clutch, gear quadrant with change gears (Z30, Z90, Z120, Z127), 1 solid lathe center MT 4 or MT 5, 1 solid lathe center MT 2, 3 pcs. shearing pi lathe dog, holding pin, grease gun, operating instructions and electrical documentation.

Handling tools consisting of:

- 1 pc. double-ended ring spanner 17x13 DIN837
- 1 pc. slip-on wrench B13x17-A DIN896
- 1 pc. hexagonal key wrench size 5 DIN911
- 1 pc. hexagonal key wrench size 6 DIN911
- 1 pc. double-ended spanner 8x10 DIN895
- 1 pc. single-ended spanner wrench size 13 DIN894

Transport



Danger

Mind the maximum permissible lifting capacity of the hoist and the gravity center position when lifting the machine.

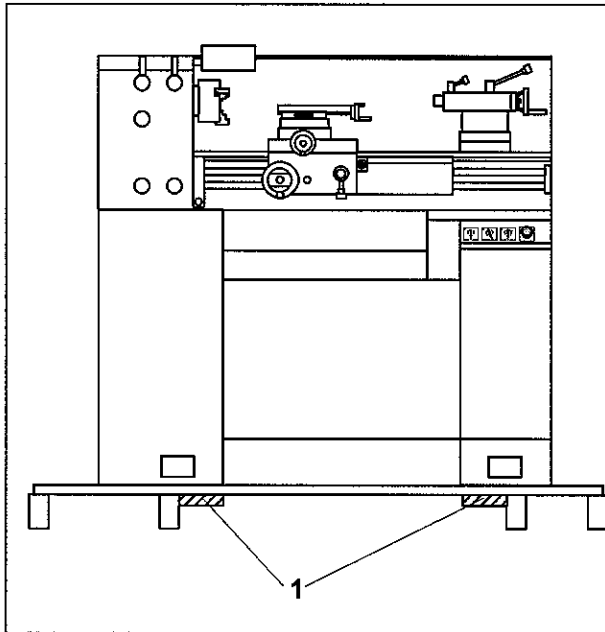
Fork length min. 1000 mm
Lifting capacity (incl. packaging) min. 350 kg

Transport with pallet

The packaging of the machine varies according to the country of supply. The pallet, however, is carried out equally for all packaging variants.

Position the lift fork (1) in the pallet in such a way that the gravity center lies in the center of the lift fork.

The lift fork must be inserted at least 900 mm into the pallet.



Lift fork in pallet

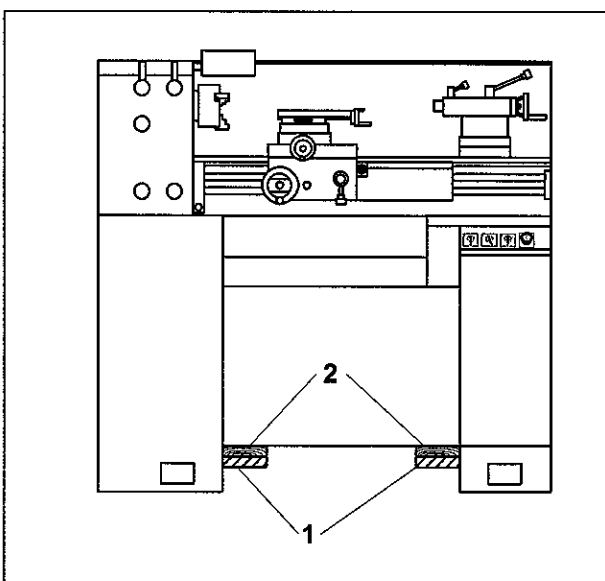
Transport without pallet

- Remove the screw connections of the machine with the pallet.
- Position the lift fork (1) in the machine as shown (observe gravity center).



Attention:

Prior to inserting the lift fork (1) put wooden boards (2) onto the lift fork to avoid damaging the machine.



Lift fork in machine

Criteria for installation

Ground

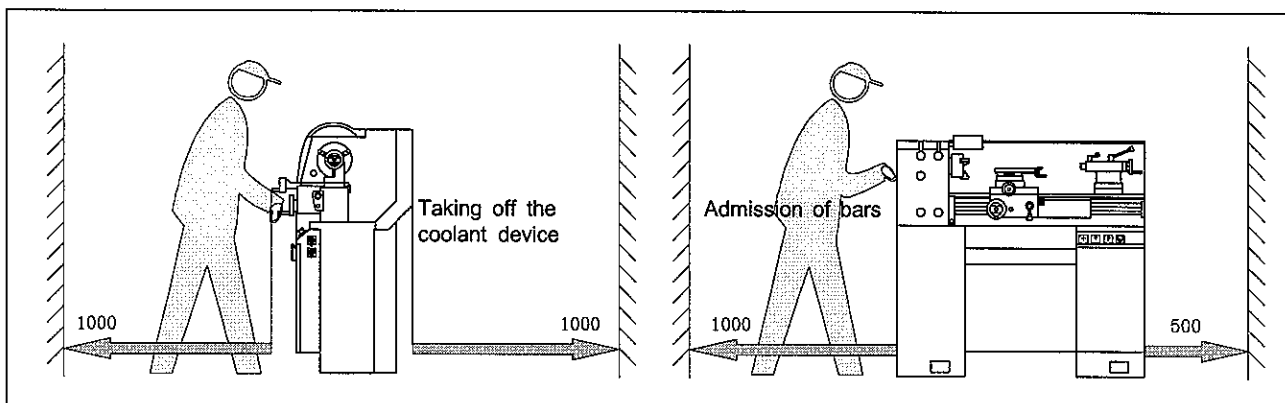
The machine is to be set up on a ground as horizontal as possible with appropriate load-bearing capacity to assure a steady position and avoid vibrations which could have a negative influence on the finishing accuracy.

Ergonomic design

Due to its ergonomic design the machine provides optimum operation.

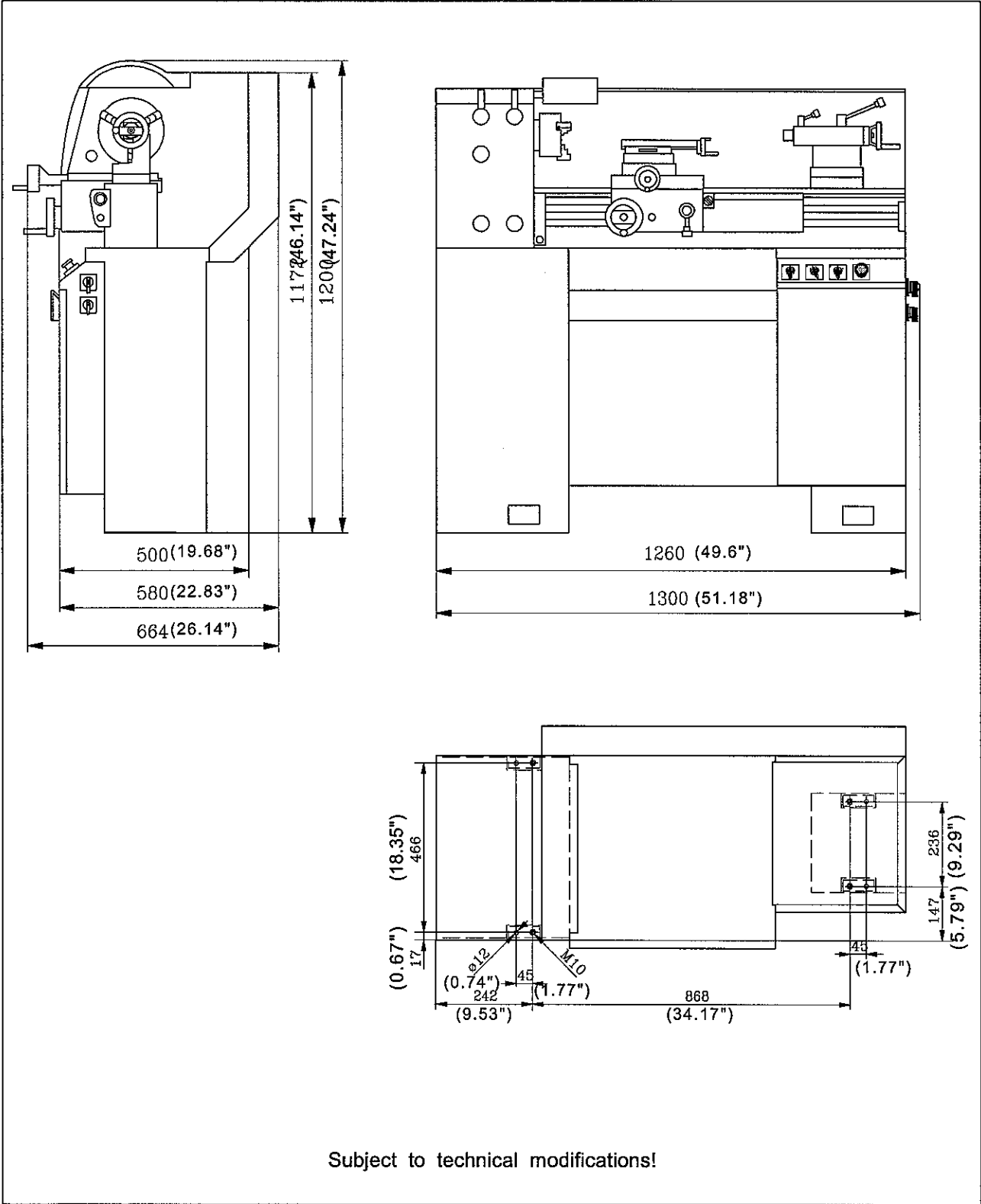
However, when choosing the installation site pay attention to sufficient lighting.

Space required for operation and maintenance



Space required for operation and maintenance

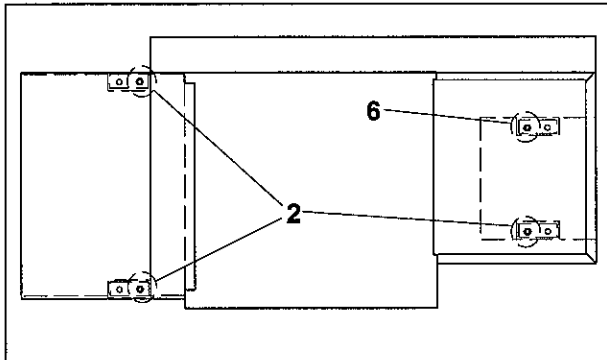
Dimensions of the machine



Subject to technical modifications!

Installation possibilities

The machine bed is mounted exactly at the machine stand.



Setting screw



Attention:

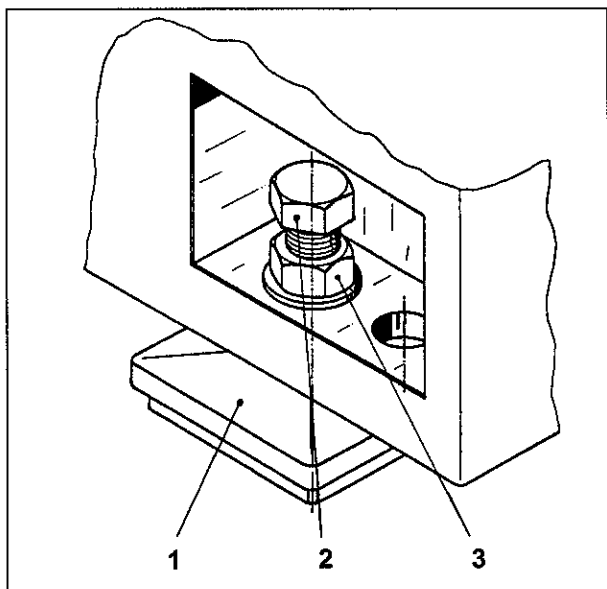
To avoid an influence on the accuracy of the machine mount the machine vertically only with the three setting screws (2) and counter. After aligning the machine just adjust the setting screw (6) to the respective support and counter it, too.

Installation with levelling shoes

Required:

4 levelling shoes order no. 585 110

- * Screw the setting screws (2) M10x45 (enclosed pack) into the support threads in the recesses on the machine support. Prior to it loosen counter nuts (3).
- * Place the machine in such a way on the levelling shoes (1) that the setting screws (2) are exactly in the grooves of the levelling shoes.
- * Align machine with setting screws (2).
- * Counter setting screws (2) with nuts (3).
- * Adjust setting screw (6) only slightly and counter them, too.



Installation with levelling shoes

Instead of levelling shoes also flat-bar steel 80x80x10 can be used.

Screwing down the machine

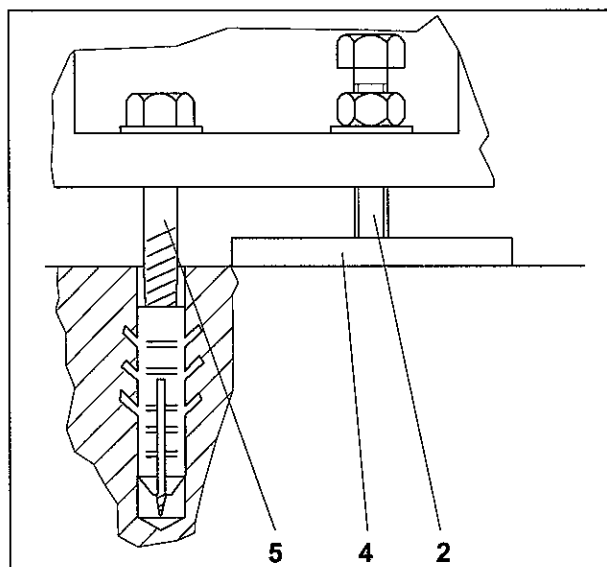
If the machine is to be screwed down three bores for wood screws (5) with washers and pins S10 have to be provided on the ground (dimensions for bores see "Dimensions of the machine").

We recommend wood screws 8x70 DIN 571.

The machine is aligned with three setting screws (2) M10x45 and respective counter nuts, the machine is fixed by tightening the wood screws (5).

Adjust setting screw (6) only slightly and counter it, too.

Use flat-bar steel 80x80x10 (4) as support so that the setting screws do not incorporate in the ground.



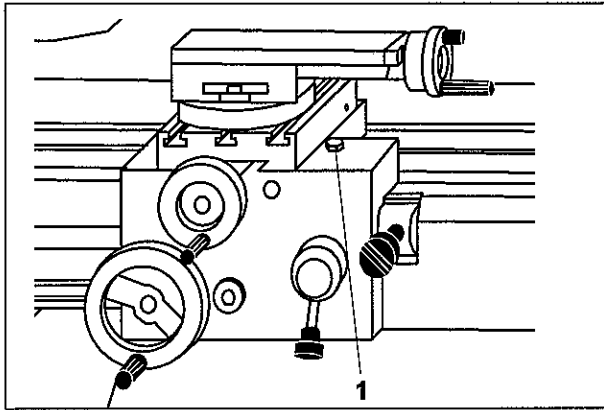
Niederschrauben mit Holzschrauben



Additional criteria for installation

In addition to the required capacity and vibration stability further requirements are to be met by the installation surface and the installation site:

- * The installation site of the machine has to be entirely sealed against ground water and soil to avoid that any leakage of coolant grease, lubricating or hydraulic oil become environmental hazards. An ideal situation would be provided if the installation site at the same time fulfills the function of a collecting tray.
- * Vibration-proof features as favourable as possible to avoid a transmission of vibrations (particularly when working in the upper speed range, with bar work, when machining heavily unbalanced workpieces, with interrupted cut, when using driven tools etc.) to nearby objects.
- * The specific noise load of a machine operator is to be noted. It has to be taken into account that in accordance with the operating situation a highly qualified operator works on the lathes who has to carry out exacting programming and supervising activities. Thus, the medium noise level should not exceed 70 to 75 dB(A). Sometimes the situations can be improved by sound insulation walls. From studies we know that the double distance to a nearby source of noise decreases the sound level by 3 to 5 dB(A). When doubling the number of similar sources of noise the level is increased by 3 dB(A).
- * Good and sufficient lighting of the working space facilitates operation of the machine and increases the quality of work.
- * Unfavourable light and sun radiation may lead to reflections on the control screen and, thus, impair the visibility of information items.
- * Heat sources with inconstant temperature near the machine as well as air drafts will influence the quality of the place of work as well as the operating position of the machine. If necessary, adequate measures for protection are to be taken.



Clamping screw of longitudinal slide

Transport protection

The longitudinal slide is clamped with a hexagon screw (1).

Loosen the screw prior to start of operation.

For exact facing it is recommended to clamp the longitudinal slide.

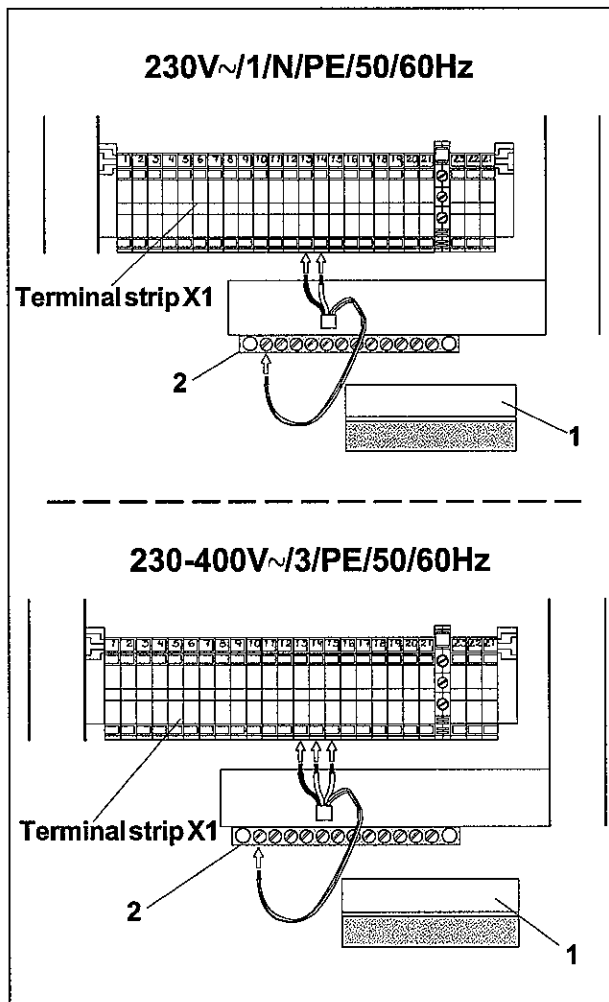
Mounting the coolant device

(accessory)



Danger

Mounting the coolant device may only be carried out by an electrician expert with machine switched off and EMERGENCY-OFF key actuated.



Connection of the coolant device

Technical data of the coolant device

Power of the pump motor 110W
 Tank capacity 27l
 Max. pump capacity 40l/min

- Mount coolant pump onto coolant tank.
- Attach return flow hose of chip tray to coolant tank.
- Thread coolant pump cable through clamping angle (1) into electrical cabinet and connect it as follows:

With single-phase machine version clamp both cores onto the terminals 13 and 14 of the terminal strip X1.

Clamp the yellow-green core to the earthing (⊥) bus bar (2).

With three-phase machine version clamp the black core on terminal 13, the brown core on terminal 14 and the blue core on terminal 15 of the terminal strip X1.

Clamp the yellow-green core to the earthing (⊥) bus bar (2).

- Push coolant tank on the rear side of the machine into the machine.
- Fill coolant into the coolant tank.



The correct choice of the cooling lubricant - particularly the compatibility of the cooling lubricant with the slideway oil - bears decisive influence on the life of the emulsion in addition to the correct care of the cooling lubricant. By observing the notes for the selection of cooling lubricant the service life can be increased and the quantity to be disposed of can be reduced considerably.

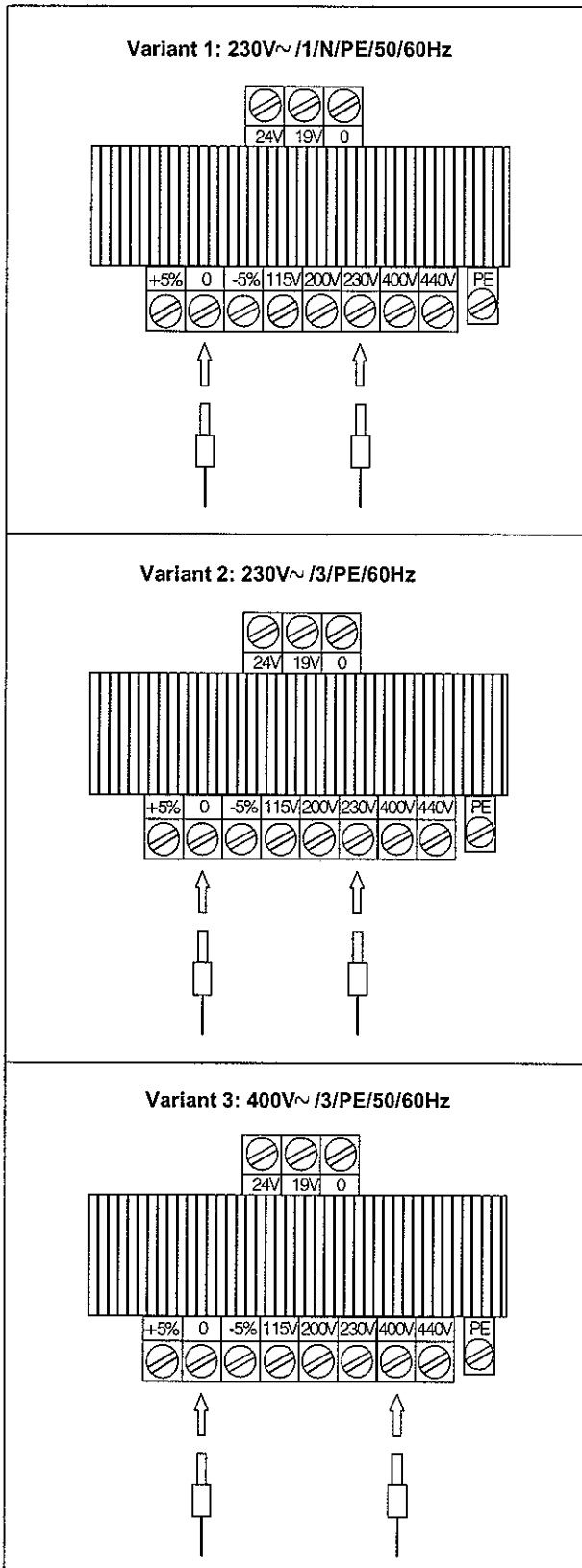


Attention:

A switch is to be found at the coolant motor. Take care that this switch is always switched on. Otherwise the coolant pump cannot be switched on via the operating panel.

For quality and service life of the coolant please see chapter "Maintenance".

Electrical connection



Connection of transformer

Connected loads

Variant 1 230V~ 1/N/PE/50/60Hz
 Variant 2 230V~ 3/PE/60Hz
 Variant 3 400V~ 3/PE/50/60Hz
 Max. voltage fluctuation +6/-10%
 Preliminary fuse for machine..... 16 A slow
 Connected load..... 3 kVA
 Cross-section of cable:
 Single-phase min. 3x2.5 mm²
 Three-phase min. 4x2.5 mm²

Check of transformer connection

This transformer in the electric-box produces the internal control voltage (24V~). Both black wires must be connected according to the drawings depending on voltage supply. To obtain the control voltage of 24V the right-hand wire may be connected either to 200V or to 230V (resp. either to 400V or to 440V in version 3) and/or the left-hand wire may be connected either to +5% or -5%

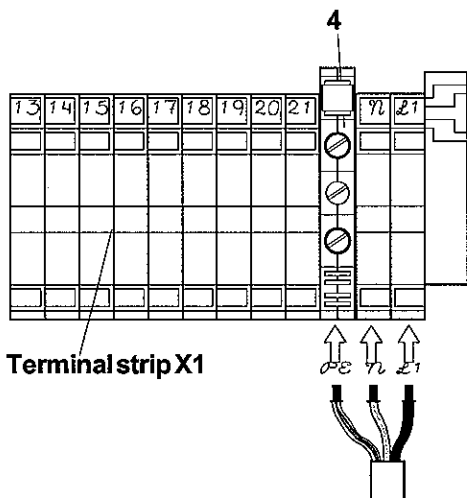


Safety regulation:

- Prior to reclamping the phases switch off voltage.
- The electrical connection of the machine must be established by an electrician expert only.
- Important:
The Transformer must be reconnected only between 200V and 230V (Variant 1+2) or between 400V and 440V (Variant 3) (=Voltage adaption)

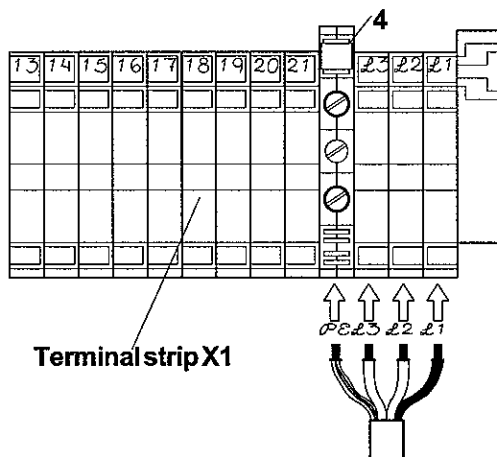
Reconnection from the 400/440V-area to the 200/230V-area or backward will destroy the machine.

230V~1/N/PE/50/60Hz



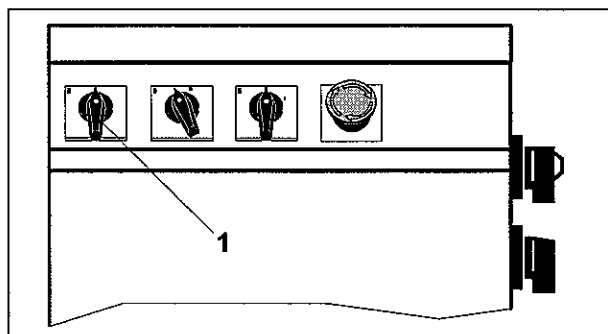
Terminal strip X1

230-400V~3/PE/50/60Hz



Terminal strip X1

Terminal strip for electrical connection



Main spindle switch

Connection of the power supply cable




Danger

The electrical connection to the operational mains may only be carried out by an electrician expert.



Note

Prior to connecting the power supply cable check the transformer connection in any case. Otherwise the power supply might be disconnected again for this operation.

- * Open the electrical cabinet.
- * Thread power supply cable at the rear side through clamping angle into the electrical cabinet.
- * With three-phase version connect phases L1, L2, L3 to the terminal strip X1 as shown.
- * With single-phase version connect phase L1 and the zero conductor to terminal strip X1 as shown.
- Clamp yellow-green core PE to terminal (4) 
- * Fasten clamping angle with screws.

Checking the correct mains connection

Check if the rotating direction of the main spindle is correct after switch-on. If the spindle movement does not correspond to the switch symbols at the main spindle switch (1), with three-phase version of the machine two phases, e.g. L1 with L2, have to be interchanged when clamping them on terminal strip X1.



Danger

Prior to interchanging the phases separate power supply cable from the mains.

Fuses

See electrical documentation, which can be found in the electrical cabinet.

**Caution:**

Connecting this machine to a mains protected by leakage current circuit breaker is admissible only with using an **all-current-sensitive leakage current breaker**.

Reason:

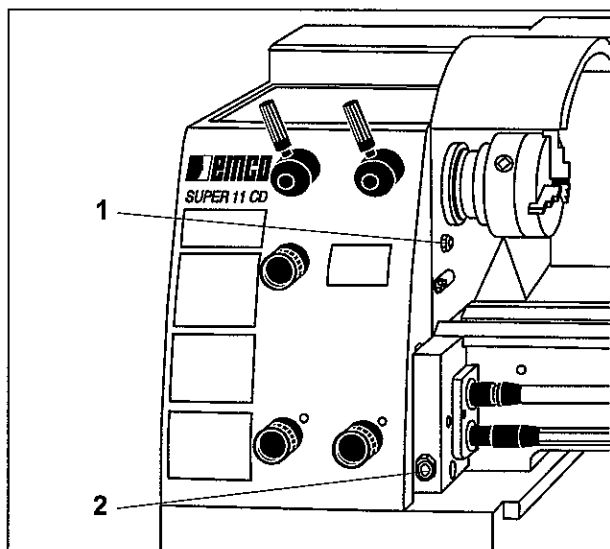
The drives used for this machine can cause DC leakage currents which will impair the protective function of the leakage current breaker (no release).

Types of the all-current-sensitive leakage current breaker tested by EMCO:

SIEMENS 5 SZ6 468 - OKG00

EMCO-Ref.No.: ZME 280 720

Other possible Type: ABB F804-63/0,3



Inspection glasses for headstock gear and feed gear

Initial start-up

- All blank parts are to be cleaned from rust preventing agent with a clean cloth and subsequently to be oiled slightly.
- Lubricate the guideways during initial start-up and after major standstill of the machine.
- Check the oil level for headstock gear and feed gear at the inspection glasses (1) and (2). Oil has already been filled in in delivery state.
- In case of existing coolant device (accessory) fill in coolant.
- Switch on machine using the main switch.

B Working with the machine

Notes for operators



In addition to the constantly increasing requirements of productivity and flexibility of working processes the demand for environmental compatibility has become of utmost importance. Avoiding environmental damage in the past years has become a central issue of society. We can no longer shift the blame on others according to the principle "don't hit me but hit the others". Rather, everybody has to contribute in his sphere of responsibility.

Machining production, too, contains many areas that may represent a burden to environment.

The main burdens are:

- * chips contaminated with cooling lubricant
- * auxiliary materials and utilities (cooling lubricants, cutting oils, lubricating oils etc.)
- * special waste (oily cleaning rags, used emulsions etc.)
- * formation of oil mist
- * annoyance caused by noise; vibrations
- * waste heat
- * etc.

Based on the necessity of the protection of our environment, laws and stipulations were created the observation of which aims at the improvement of the present situation. Additionally, the control of the compliance with these regulations has become stricter recently. Increasingly, also small companies are subjected to this trend and have to guarantee an environmental compatibility as high as possible of their production. Thus, reacting in time a to a changed situation turns out to be of utmost importance for the business.

It is EMCO'S aim to contribute to an improvement of the present environmental and waste disposal situation in machining production.

The following important hints are to be intended as a contribution. By observing these hints you will render a direct service for the protection of our environment in general and also for the quality improvement of your own working area. The hints are described in such a way that their observation will not cause additional costs and in most cases even a reduction of costs is possible in the short-term perspective. For a better comprehension of the solutions offered a short outline on the environmental problems occurring in machining production is provided prior to the hints proper.

1. Environmental burdens in machining production

1.1 Lubricants

The use of lubricants in machining production is indispensable. Frequently the lubricants are not used with optimum efficiency out of ignorance. Particularly when storing the lubricants the materials are handled in a careless way which is why the lubricants reach the soil and add to burdening the ground water. Leakages, damaged barrels, carelessness when handling oils, lacking or poorly serviced oil separators, empty barrels being "washed out" by the rain in the open air are just a few examples for the situation to be found too often in the companies. Nor does the existence of oil barrels in the most out-of-place corner of production represent a desirable solution. Oil-contaminated bay floors and dirty machines - as a result of incorrect handling of lubricating oils - represent an essential impairment of the quality of the place of work and, thus, indirectly also of the quality of the results achieved.

1.2 Cooling lubricants

Just like greases, cooling lubricants, too, are an indispensable factor in machining production. Cooling lubricants are highly developed chemical products that require careful handling. Wrong handling may lead to serious damage of health. Finely sprayed emulsions (open working space) reach the "lung" and are not eliminated any more. Similarly, the wrong handling of emulsions may lead to skin diseases (oil acne, oil excema etc.) and via injuries of the skin also to infections. By adequate hygienic measures of the company these dangers can be avoided. Emulsions are highly dangerous to ground water and must in no case be spilled away carelessly. Biodegradable cooling lubricants do not represent a solution in this respect since these emulsions are innocuous for the environment when being supplied but during operation, due to the contaminations occurring (leakage oils from lost oil lubrication, frictions etc.) lose their biological innocuousness and thus cannot be disposed of any more via sewage system. A particular source of danger are the residual emulsions that adhere to the chips. When storing the chips in the open air or under roofs permeable to water the residual emulsion may be washed out by the rain and



thus reaches the sewage system or the ground water.

The durability of cooling lubricants is limited. Since cooling lubricants contain organic substances they are prone to infestation by microorganisms. If their number increases too much the emulsion "tilts" over and has to be renewed. If the growth of these microorganisms is avoided the service life can be prolonged.

By service measures and careful handling of emulsions the durability can be prolonged considerably.

Essentially, these microorganisms reach the emulsion:

- * via the air
- * via dirty water
- * via leakage oils
- * via waste getting in touch directly or indirectly with the emulsion (cigarette ends, empty tins of drinks etc.)
- * via the workpiece machined
- * via operating staff
- * via lacking hygienic conditions in the company

Observing the following hints of care you can contribute considerably to an improvement of the situation and to cost savings.

1.3 Solvents and cleaning agents

Cleaning agents are amply used in machining production for washing of machined workpieces as well as in repairs and for cleaning utilities. But the chlorinated hydrocarbons (e.g. trichloroethylene, trichloroethane, perchloroethylene etc.) are amply used. For the user these substances represent a source of danger that is not evident. Particularly due to the seemingly non-problematic use of these substances (inflammable, very good liposolubility, little odour etc.) these substances obscure the fact that they are serious poisons of the liver and the nerves. Therefore, it is necessary to handle these substances adequately. Additionally, these substances are able, due to their little density, to penetrate without problems through concrete floors (even very thick ones) and thus contaminate the ground water. Due to their low boiling point these substances evaporate from open plants (e.g. open cleaning tray). A very unfavourable feature is the fact that these substances are not decomposed biologically and thus represent a serious environmental hazard. In the past this has

led to environmental burdens which today lead to a contamination of the ground water reservoir.

1 kg of chlorinated hydrocarbons may render forever unusable 40 millions litres of drinking water!

1.4 Special problems with chips containing residual oil

With the chips considerable quantities of lubricants and emulsions are "discharged" by the machine. By drop-off of the chips a part of these substances can be recovered (as valuable auxiliary materials). The remaining quantities are "lost" during transport and storage until further use and thus also contribute to ground water contamination.

Chips are not waste but represent valuable raw materials!

Therefore, it is necessary:

- * that the chip containers are not used as waste baskets (cigarette ends, plastic cups etc. are not to be thrown into the chip container)
- * that the chips are collected in accordance with grades
- * that the chips reach their further use without oil, if possible, since otherwise they burn more when charged into the steel furnace.

1.5 Problems with oil mists and oil vapours, dust etc.

Oil mists are caused by evaporation and mixing of lubricants or emulsions by draughts in the working space. An essential factor in the formation of oil mist is also represented by the user of compressed air when cleaning workpieces, machines and devices. The same holds also true for dust development during dry machining.

In addition to representing a burden to the working environment (machines and devices become oily), oil mists and vapours contribute to health hazards of the operating staff.

1.6 Further burdens

In addition to the burdens illustrated particularly annoyance by excessive noise, problems with accumulating waste heat and the use of other



problem substances connected indirectly with machining production (e.g. cold cleaning agents, pour-in resins, packaging materials etc.) represent further burdens for the machine operating staff and the environment.

2. Measures of environmentally compatible design in machining production

2.1 General hints

The best way to remove waste is to not cause it at all!

Thus, avoid as much as possible any special waste! Handle substances noxious to the environment with great efficiency!

Mind correct operation when handling dangerous substances!

"Carefree" handling of problematic substances is not a simple offence, it damages your health and increases the burden on environment and on costs!

Use the right dosages!

Observe the instructions of the manufacturer!

Avoid any unnecessary waste!

2.2 Hints for correct handling of utilities

2.2.1 Lubricant oils

Storage of lubricant oils:

Avoid any kind of loss of lubricant; during storage, use (leaking lines, sealings), during refilling and transport etc. Accordingly, this also applies to used oil.

Pay attention that the storage is on solid ground and that the oil containers cannot tilt.

Drop trays must be able to collect the residual oil.

Lock empty oil barrels stored in the open air against wash-out by rain.

Used lubricant oils are special waste and have to be disposed of as such.

Identify clearly those containers which are available for the collection of different disposal substances (e.g. used oil, barrel for used oil filters, oily cleaning rags etc.).

Use of lubricant oils:

Only use adequate lubricants (wrong lubricants are consumed faster, lead to formation of fumes and to unnecessary disposal quantities).

When using lubricant oils mind the compatibility with other auxiliary materials (e.g. emulsions); instructions are provided by the manufacturer of the products.

In case of doubt try to get information since the wrong use of the product may lead to considerable costs.

Take care of the lubricants! Regular cleaning or change of filters will increase service life.

Close carefully the filling outlets.

2.2.2 Cooling lubricants

Only use cooling lubricants that are compatible with the lubricants used. (Incompatibility among each other will result in shorter life time of the cooling lubricant used.)

If possible, use cooling lubricant without halogens (these are considerably cheaper for disposal).

Observe the storage conditions for the concentrate containers (no frost, no excessive heat etc.).

Multi-use containers help to reduce disposal quantities and are therefore to be preferred.

Take particular care of your cooling lubricants! Due to thorough care the service life is at least doubled. Mind the following hints for care:

- * Avoid any contamination of the emulsion.
- * The cooling lubricant container is not a waste basket. Avoid mixing of residual oils in the emulsion (used oils are lighter than the emulsion and remain on top. They cover the emulsion and prevent oxygen supply. Thus, there is an ideal source for anaerobic microorganisms).
- * Regularly eliminate the used oils on top (daily prior to operation start), or simply by skimming off.
- * Avoid contamination of the emulsion by leaking oils (e.g. untight pneumatic system etc.).



- * Check regularly the concentration of the emulsion (too fat emulsions lead to a major health hazard and also attack machine parts).
- * Check daily the filling level of the emulsion; too little emulsion quantities are warmed up excessively and thus promote bacterial growth.
- * Avoid unnecessary splashing of emulsions (e.g. by skinning geometries).
- * With major standstill times of the machines repump the emulsion quantity at least once daily (oxygen activation!).
- * Remove the chips after operation from the machine (short after-running of the chip conveyor will be sufficient in most cases).
- * Mind during change of emulsion:
 - The used emulsions are to be pumped into containers designated clearly for that purpose (independently of persons; to be understood by everybody as a prevention against emergencies) to avoid confusion!
 - Do not mix carelessly the emulsions to be disposed of with other substances since the disposal costs might increase considerably.
 - Clean the entire coolant circuits v e r y carefully (contaminations particulaly in corners of difficult access are a source for bacteria which will attack again immediately the freshly prepared emulsion).
Mind: When using system cleaning agents the costs of the disposal of the emulsion may be increased!
 - Mind the correct mixing ratio during fresh preparation!
 - Emulsions should not be mixed for storage and then stocked.

2.2.3 Hints for correct handling of chips

Chips represent a valuable raw material! They are not to be treated as waste.

When handled incorrectly, chips may contaminate the ground water and the soil (if adhered with emulsions and lubricants).

Chips are to be stored in the state as they leave the machine tool in an oil-proof container which makes it possible to drop off the residual emulsion (used oils). On the bottom of the

container a collecting tray has to be placed where the dropped-off emulsion may collect without mixing with the chips. An outlet valve should facilitate emptying of the dropped-off lubricant.

A sufficiently long drop-off period is to be provided as well as an adequately high temperature (in winter not in unheated environments) so that the residual materials show a viscosity which favours a complete drop-off.

The collection of emulsions (oils) has to be according to grades so that during refilling into the cooling lubricant circuit necessary contamination items will not reach the circuit.

The chips should also be collected and stored according to the grades since a mix-up will lead to an impairment of the quality of the raw material.

The chip container must not represent the waste basket in production; waste must not be mixed with valuable raw materials.

After drop-off the chips - also classified according to grades - are to be stored intermediately until being carried away by the scrap dealer.

The collection of the residual oil dropping down has to be guaranteed so that in this phase there is no hazard to soil and ground water. In any case the storage in the open air or under inadequately fixed roofs is to be avoided since here the residual oils may be washed out by rain.

2.2.4 Hints for the correct handling of dangerous substances

Try to resort to alternative substances; use dangerous substances only if it is indispensable to use them!

The cost argument can frequently not be supported with a view to increasing disposal costs and often also because of the incorporation of the disposal costs in the overhead costs.

Avoid the use of dangerous substances whenever it is possible by:

Quantitative avoidance:

by renouncing problem substances and/or change to products that can be recycled or decompose

Qualitative avoidance:

by saving measures and optimization in use



If dangerous substances cannot be avoided only such substances should be used that can be recycled by:

- * material reutilization (recycling)
- * biochemical reutilization (composting)
- * energetic reutilization (burning)

Waste that cannot be avoided nor recycled has to be disposed of as innocuously as possible (disposal after adequate pretreatment).

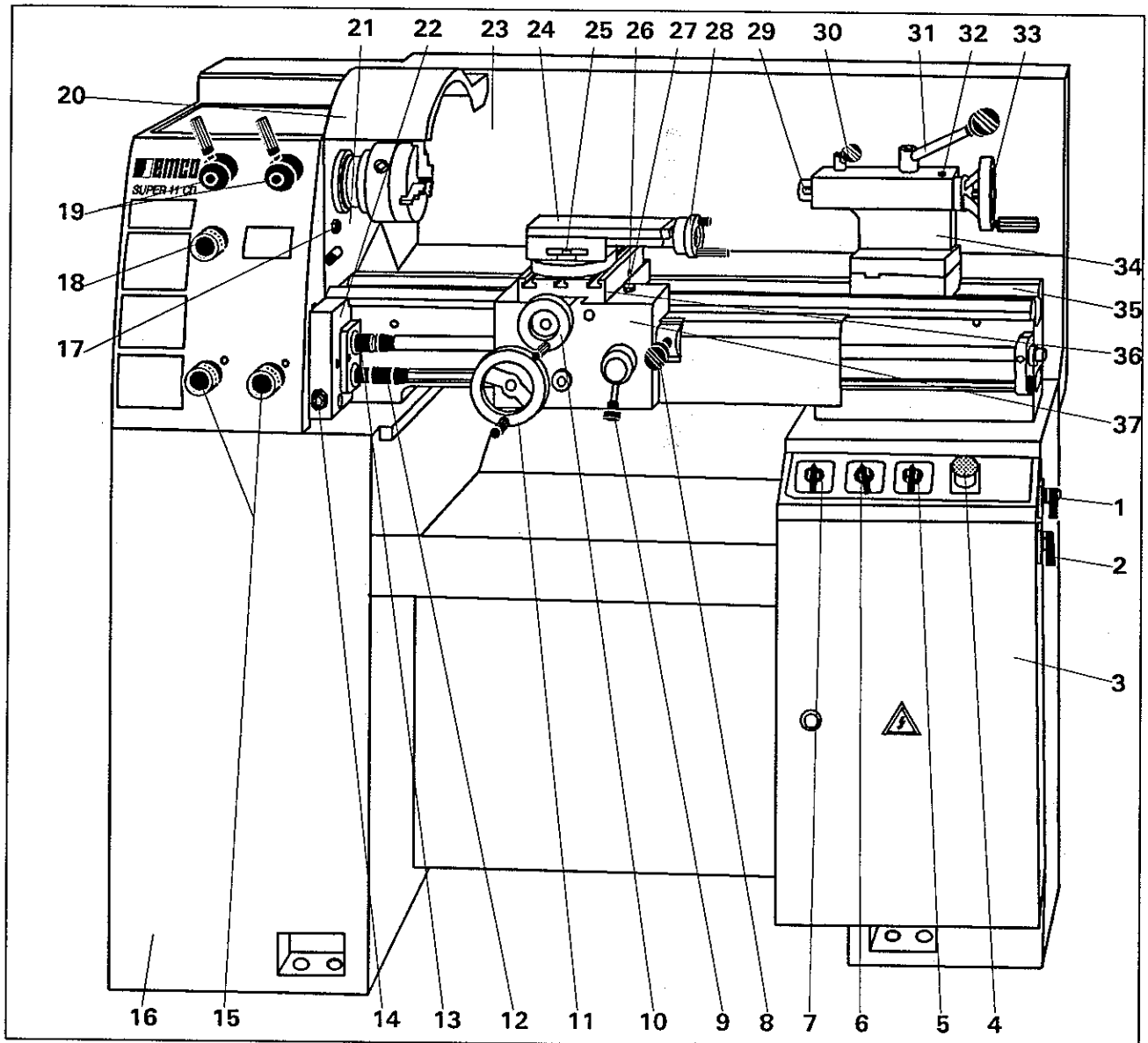
So-called special waste requires particularly careful handling. A list of these special wastes is to be found on the following pages. This outline forms an extract of ÖNORM S 2101 in which special wastes are indicated that need supervision. For all these substances the following applies:

- * information and notification required
- * records required
- * innocuous disposal required
- * declaration required (accompanying certificate)

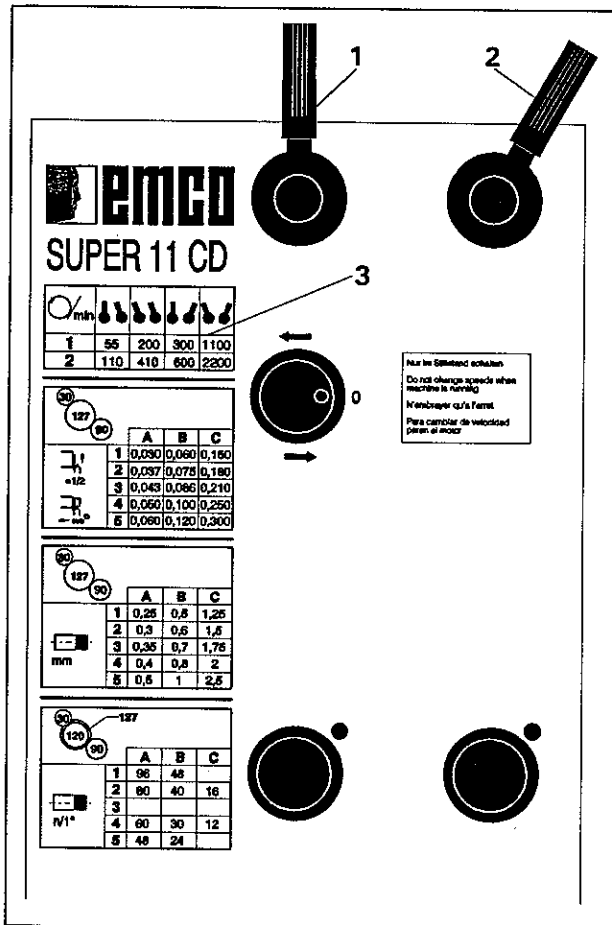
Designation	Key number	Properties	State	1) Note 2) Origin (examples)
oil-contaminated soil (excavated material)	31423	hazard o water	solid (also pasty)	1) during collection, transport and storage is protect against heat
used filter and absorption masses if charged with other special waste that needs supervision	31434	hazard to water see (1)	solid	2) oil accidente, mineral oil extraction, old charges 1) classification with a view to properties is to be carried out according to the filtered material 2) water preperation, production of foods and luxury foods, chemical industry, laundries, adsorptive gas and liquid cleaning processes
metal wastes	35			
dust containing nonferrous metals	35321	toxic, hazard to water, explosive	solid	1) may contain lead, cadmium, arsenic, beryllium. Particular measures avoid dust explosions required. production of processing of prongs. 2) Production of aluminium. Foundries, production of lead. Production of magnesium, ignition stones and pyrotechnical products, electrical engineerinf.
mercury batteries	35324	toxic, hazard to water	solid	2) production of batteries, trade, application
dry batteries, containing mercury and silver	35325	toxic hazard to water	solid	2) production of batteries, trade, application
waste produced by mineral oil products	54			
oils acid ')	54101	hazard to water, caustic with pH <3, may form explosive gases with air	liquid	2) textile industry
used oils ')	54102	hazard to water, residues from used oil treatment may be toxic, may form explosive gases with air	liquid to solid	1) also hydraulic oils and brake liquids trade and industriy, filling stations, 2) car repair workshops
drilling cutting and grinding ouls ')	54109	hazard to water, may form explosive gases with air	liquid	2) metal machining
synthetic coolants and lubricants ')	54401	hazard to water	liquid	2) metal machining
drilling and grinding oil emulsions and emulsions mixes ')	54402	hazard to water	liquid	2) metal machining
oil water mixes ')	54408	hazard to water	liquid	

Designation	Key number	Properties	State	1) Note 2) Origin (examples)
contents of oil separators and of petrol separators ')	54702	hazard to water	liquid to solid	
sludge from oil separating plants ')	54703	hazard to water	liquid to solid	
sludge from container cleaning and barrel cleaning ')	54704	hazard to water	liquid to solid	
paraffine oil sludge ')	54706	hazard to water	liquid to solid	2) petrol chemistry, commercial trade
grinding sludges, oil-containing ')	54710	hazard to water	liquid to solid	2) metal, glass and rock machining
used oil binding materials ')	54926	hazard to water		
used oil and air filters (containing mineral oil) ')	54928	hazard to water		
perchloroethylene (per)	55209	hazard to water	liquid	2) chemical industry, textile industry, laundries, degreasing, production of coating agents
trichlorethane	55212	hazard to water toxic only 1.1.2 trichlorethane detrimental to health	flüssig	2) chemical industry, textile industry, laundries, degreasing, production of coating agents
trichlorethylene (tri)	55213	hazard to water, detrimental to health	liquid	2) chemical industry, textile industry, laundries, degreasing, production of coating agents
cold cleaning agents, halogen-containing solvent mixes, halogen-containing	55214	hazard to water	liquid	2) industry and trade
	55220	hazard to water, may be toxic	liquid	2) industry and trade
diluent for cellulose lacquers	55359	hazard to water, may form explosive gases with air	liquid	2) cleaning and degreasing of metallic surfaces, production of coating agents, textile industry, plastics processing, chemical industry
paraffine oil	55360	hazard to water, may form explosive gases with air	liquid	2) cleaning and degreasing of metallic surfaces
solvent mixes, halogen-free	55370	hazard to water, may form explosive gases with air	liquid	2) trade and industry
solvent-containing sludges, halogen coating	55401	may be toxic, hazard to water	liquid to pasty	2) industry and trade, concentration plants
solvent-coating sludges, halogen free	55402	may be toxic, hazard to water	liquid to pasty	2) industry and trade, concentration plants

Main and operating elements



- | | |
|--|--|
| 1 Lockable main switch | 19 Control knobs speed |
| 2 Switch for coolant pump | 20 Chuck guard |
| 3 Electrical cabinet | 21 Headstock |
| 4 EMERGENCY-OFF key | 22 Feed gears |
| 5 Switch for vertical unit | 23 Splash protection wall |
| 6 Switch speed range slow/quick | 24 Top slide |
| 7 Switch on/off; (left/right) | 25 Nuts for fixation of the top slide |
| 8 Feed lever for longitudinal and cross feed | 26 Locking screw for cross slide |
| 9 Apron nut lever | 27 Locking screw for longitudinal slide |
| 10 Handwheel for cross slide | 28 Handwheel for top slide |
| 11 Handwheel for longitudinal slide | 29 Tailstock sleeve |
| 12 Sliding clutch | 30 Clamping lever for tailstock sleeve |
| 13 Engaging and disengaging claw clutch | 31 Lever for tailstock fixation |
| 14 Inspection glass oil level feed gear | 32 Lubricating nipple for tailstock sleeve |
| 15 Control knobs for feeds and pitches | 33 Handwheel for tailstock |
| 16 Machine base | 34 Tailstock |
| 17 Inspection glass oil level headstock | 35 Machine bed |
| 18 Reverse control knob for feed | 36 Cross slide |
| | 37 Apron |



Speed-fee diagram

Speed setting

The machine is provided with 8 different speeds to be adjusted mechanically.

Setting is carried out by means of the control knob (1) and (2) in accordance with the diagram (3).

During switching turn the main spindle slightly by hand so that the control levers snap in distinctly and easily.

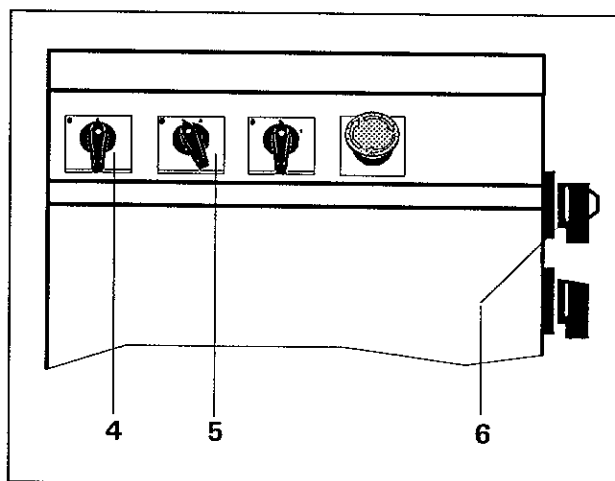


Attention

Speed setting may be carried out only during standstill of the machine.

Example

With a desired speed of 600 rpm the control levers (1, 2) have to be set as shown in the speed diagram.



Main spindle switch

The main spindle is switched on by means of the switch (4) after setting the speed and after switching on the main switch (6). Thus, when turning to the right the main spindle is switched on in clockwise run - and when turning to the left it is switched on in counter-clockwise run. By means of the switch (5) you can select between slow speed (positions 1 on the speed diagram) and rapid speed (positions 2).

Note

- * All toothed wheels are ground and hardened. Inexpert switching may damage the tooth profile leading to an increase of the running noise.
- * If a speed is to be set which is in the intersection range of two speeds, in general to lower speed is to be set. Thus, a larger torque is achieved.
- * With single-phase machines observe in any case the items indicated under chapter working hints "Noise burden of single-phase machines during lower speeds" and "Work with maximum speed step (2200 rpm) with 115 volt version".

Feed setting

The automatic feed can be used for movements in longitudinal (Z-) and cross axis (X-).

To the feed gear a reverse gear is connected in series. Thus, a reversal of direction of the feed with equal rotary direction of the main spindle is possible.

In the feed diagram the feed values are indicated in [mm/rev.] with metric version and in [inch/rev.] with inch version.

However, you have to take into consideration that the feed values for the cross feed are carried out only

- by half of the indicated value with metric machines;
- by 2/3 (67%) of the indicated value with inch type machines.

Furthermore, in the diagram also the location of the change gear wheels can be seen.

	A	B	C
1	0,030	0,060	0,150
2	0,037	0,075	0,180
3	0,043	0,086	0,210
4	0,050	0,100	0,250
5	0,060	0,120	0,300

Feed diagram metric

EMCO SUPER 11 CD

1	55	200	300	1100
2	110	410	600	2200

	A	B	C
1	0,030	0,060	0,150
2	0,037	0,075	0,180
3	0,043	0,086	0,210
4	0,050	0,100	0,250
5	0,060	0,120	0,300

	A	B	C
1	0,25	0,5	1,25
2	0,3	0,6	1,5
3	0,35	0,7	1,75
4	0,4	0,8	2
5	0,5	1	2,5

	A	B	C
1	60	48	12
2	80	40	16
3			
4	60	30	12
5	48	24	

*Nur im Stillstand schalten
Do not change speeds when machine is running
Niemalsper qu'is l'arrêt
Pans cambiar de velocidad sinen el estar*

Speed-feed diagram



Attention

- * The feed levers may be set only during machine standstill.
- * Eine Richtungsumkehr des Vorschubes mit dem Drehknopf (1) darf nur bei Stillstand der Maschine durchgeführt werden.



Note

If automatic feed is not used set turning knob (1) to "0" so as not to needlessly burden the feed drive.

The feed direction is selected with the control knob (1).

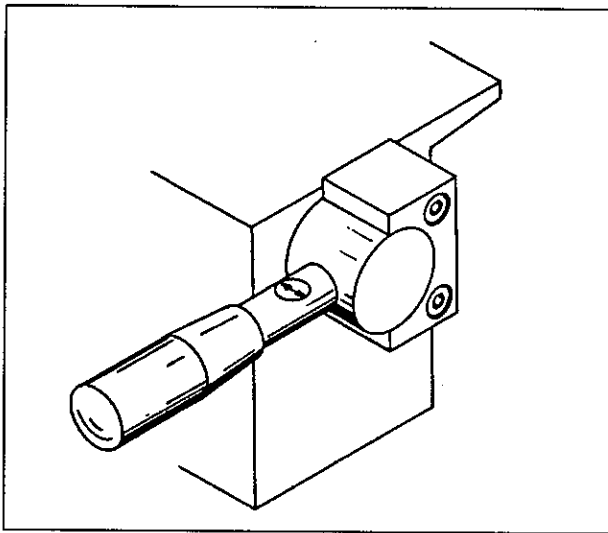
In position "0" the power flow between spindle and feed gear is interrupted.

Feed gear, change gear wheels, lead screw and feed shaft are in standstill also with the main spindle running.

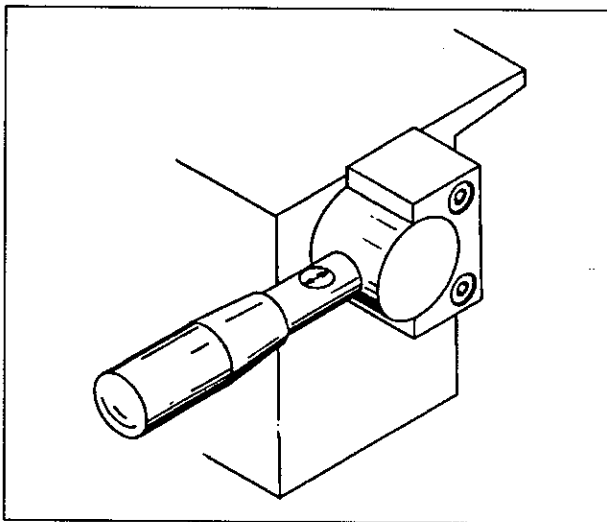
Select the desired feed value in accordance with the diagrams (4) and (5) by means of the control knobs (2) and (3).

During setting, turn the main spindle slightly by hand so that the turning knobs snap in distinctly and easily in the switching positions.

For easier turning of the main spindle set a high speed or insert chuck key.



Longitudinal feed active



Cross feed active

Switching the feeds and pitches



Danger

During work with automatic feed never put your hand between tailstock and slide, otherwise injuries (contused wound) might be caused during the slide travel.

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

Setting the longitudinal feed

- * Pull out feed lever and turn to longitudinal feed (see arrow).
- * Pull out feed lever and swing upwards.

Setting the cross feed

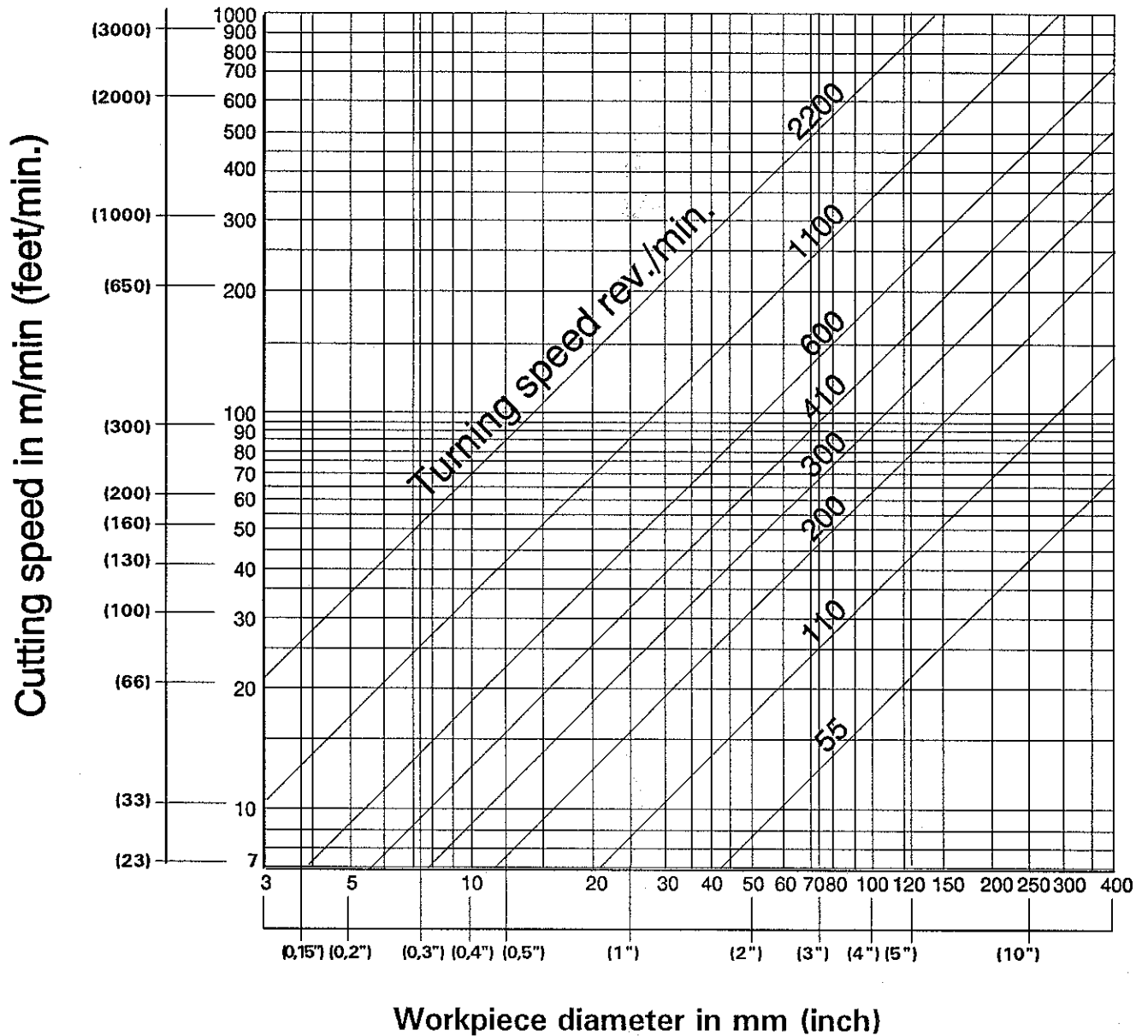
- * Pull out feed lever and turn to cross feed (see arrow).
- * Pull out feed lever and swing downwards.

Coupling the half-nut for thread-cutting

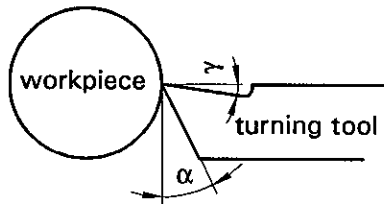
By swinging the half-nut lever clockwise, the half-nut engages with the leadscrew.

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

Cutting speeds



Approximate values for cutting speed



Values valid for dry cutting with:

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

$$\text{Cutting speed } v = \frac{d \cdot \pi \cdot n}{1000} \text{ in m/min}$$

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

Workpiece material	Tensile strength in kp/mm ²	Tool	Cutting angle		Feed in mm/rev.				Coolant and lubricant	
			Clearance α	Top γ	0.1	0.2	0.4	0.8	Roughing	Finishing
Steel St 34, St 37, St 42	up to 50	SS	8	14	280	60	45	34	E	E o. P
		S1	5	10						
St 50, St 60	50...70	SS	8	14	240	44	32	24	E	E o. P
		S1	5	10						
St 70	70...85	SS	8	14	200	32	24	18	E	E o. P
		S1	5	10						
Cast steel	50...70	SS	8	10	118	34	25	19	E	tr.
		S1	5	6						
Alloyed steel	85...100	SS	8	10	150	24	17	12	E	E o. P
		S1	5	6						
Mn-Steel, Cr-Ni-Steel, Cr-Mo-Steel	100...140	SS	8	6	95	16	11	8	E	E o. P
		S1	5	6						
other alloyed steels	140...180	SS	8	6	60	9,5	6	32	E	E o. P
		S1	5	6						
Tool steel	150...180	SS	8	6	50	40	32	27	E	Colza oil or P
		S1	5	6						
GG-20, GG-25	hardness Brinell 200...250	SS	8	0	106	32	18	13	tr. o. E	tr.
		H1	5	0						
Cooper alloys	hardness Brinell 80...120	SS	8	0	600	125	85	56	tr. o. E o. L	tr.
		G1	5	6						
Cast bronze		SS	8	0	355	63	53	43	E or L	tr.
		G1	5	6						
Light alloys aluminium		SS	12	30	400	300	200	118	E or P soap spirit	E or P soap spirit
		G1	12	30						
Aluminium-alloys (11...13% Si)		SS	12	18	100	67	45	30	E	Oil S II or P
		G1	12	18						
Magnesium-alloys*		SS	8	6	1000	900	800	750	tr. or with non combustible oil	tr. or with non combustible oil
		G1	5	6						
Plastics and hard rubber		SS	12	10	300	280	250	224	tr.	tr.
		G1	12	10						
Bakelite, Novotext, Pertinax hard plastic		SS	12	14	280	212	170	132	tr.	tr.
		G1	12	14						

SS = high speed steel S1 H1 G1 = tipped tools E = cutting emulsion P = paraffin tr. = dry L = air

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

Thread cutting

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

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

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

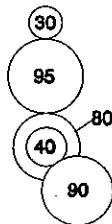
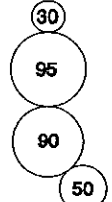
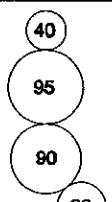
The number of thread pitches, the type of pitch (Module, Diametral, etc.) and the range of pitches can be increased as required with the set of change gears.

The following charts indicate all standard pitches which are required.

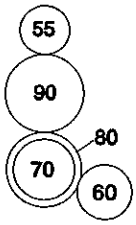
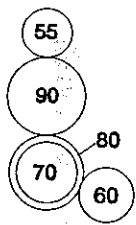
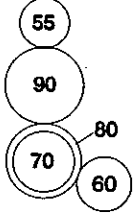
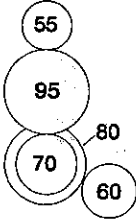
Calculating special pitches is not always easy, even for experienced machinists.

If such pitches are required, our technicians would be glad to be of assistance in the calculation upon request.

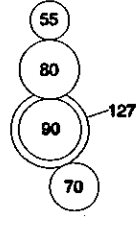
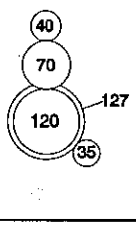
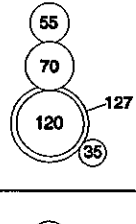
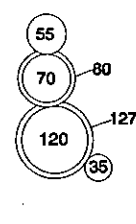
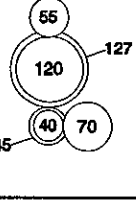
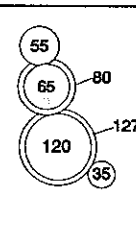
Metric threads

	Pitch	Lever position
	0.125	A1
	0.15	A2
	0.175	A3
	0.2	A4
	0.75	C2
	0.45	A1
	0.9	A5, B1
	2.25	C1
	4.5	B5
	3.0	C2
	3.5	C3
	4.0	C4
	5.0	C5

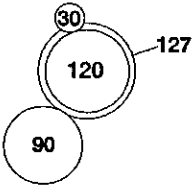
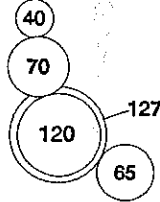
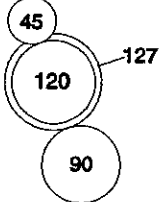
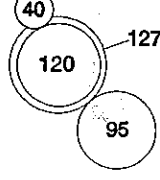
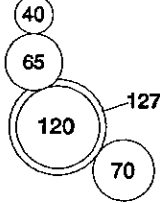
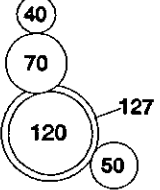
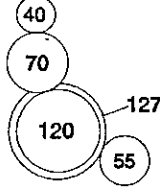
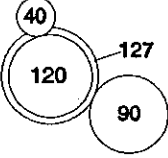
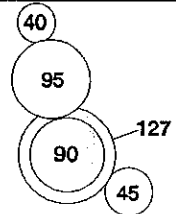
Module pitches

	Modul	Lever position		Modul	Lever position
	0.25	A1		1.75	C3
	0.3	A2		2.0	C4
	0.4	A4		2.5	C5
	0.5	A5, B1			
	0.7	B3			
	1.0	B5			
	1.25	C1		2.25	C4
	1.5	C2			

Diametral pitches

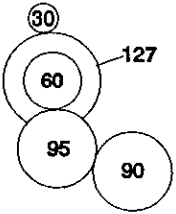
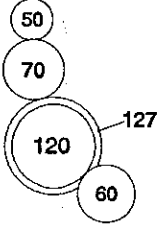
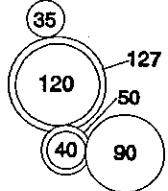
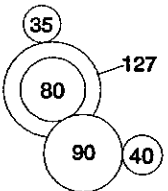
	t.p.i.	Lever position		t.p.i.	Lever position
	12	C4		11	C4
	16	C2		22	B5
	24	B5		44	B1, A5
	30	B4		88	A1
	40	B2			
	48	B1, A5			
	60	A4			
	80	A2			
96	A1				
	20	B4		14	B5
	32	B1		28	B1, A5
	64	A1		56	A1
	18	C4		13	B5
	36	B5		26	B1, A5
	72	B1, A5		52	A1

Inch threads

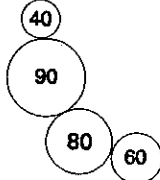
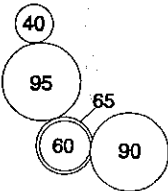
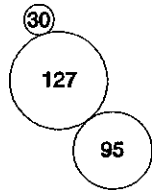
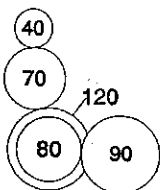
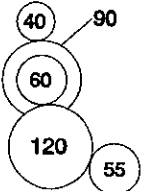
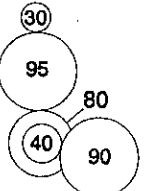
	t.p.i.	Lever position		t.p.i.	Lever position
	12	C4		6½	C4
	16	C2		13	B5
	24	B5		26	B1, A5
	30	B4		52	A1
	40	B2			
	48	B1, A5			
	60	A4			
	80	A2			
	96	A1			
	32 64	B1 A1		9½	B5
				19	B1, A5
				38	A1
				7	C4
				14	B5
				28	B1, A5
				56	A1
	4	C5		5½	C4
	5	C4		11	B5
	8	C1		22	B1, A5
	10	B5		44	A1
	20	B1, A5			
	9	C4		27	A1
	18	B5		4½	C1
	36	A5, B1			
	72	A1			

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

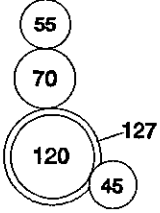
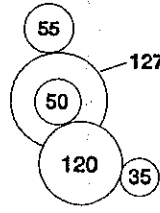
Additional metric threads on inch type machine

Gear combination	Pitch [mm]	Lever position	Gear combination	Pitch [mm]	Lever position
	0.25	A3		1.25	A3
	0.3	A4		2.5	B3
				3	B4
				5	C3
				6	C4
	0.35	A1		1.75	B3
	0.4	A2		3.5	C3
	0.7	B1			
	0.8	B2			

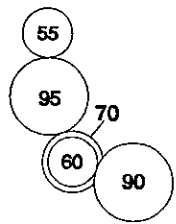
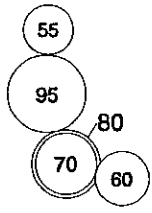
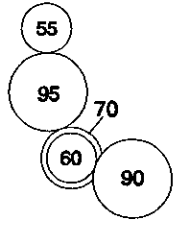
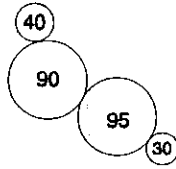
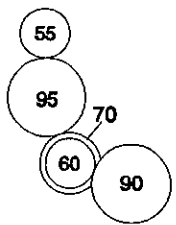
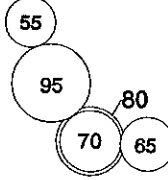
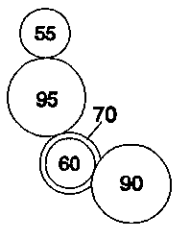
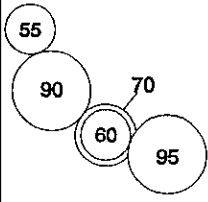
Additional inch threads on inch type machine

Gear combination	t.p.i.	Lever position	Gear combination	t.p.i.	Lever position
	4½	C5		13	C1
	5	C4		26	B1
	6	C3		52	A1
	7	C2			
	8	C1			
	9½	C5		27	B3
	19	B5		54	A3
	38	A5			
	11	C1		72	A5
	22	B1		80	A4
	44	A1		96	A3
				112	A2
				128	A1

Modul pitches on inch type machine

Gear combination	Module	Lever position	Gear combination	Module	Lever position
	0.5	A2		1.25 1.5	C3 C4
	0.7	A4			
	1	B2			
	1.75	C1			
	2	C2			

Diametral pitches on inch type machine

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

Mounting the change gears



Danger

- * Reinsertion of change gears may be carried out only during machine standstill and with the EMERGENCY-OFF key actuated.
- * Never start the machine when the change gear cover has been taken off.

General:

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

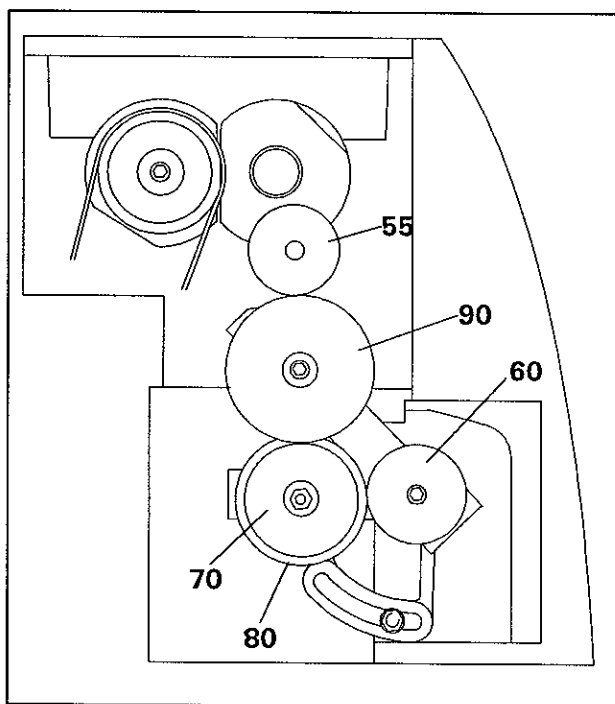
The number of teeth is engraved on each gear wheel.

Example of mounting

Required thread: module thread m 0.5
 (actual pitch = $m \times p = 0.5 \times 3.14 = 1.57 \text{ mm}$)
 (see Thread cutting/Module pitches)

From the chart you can see:

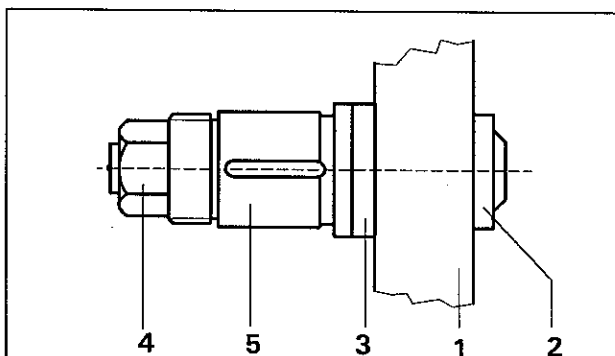
1. Gear 55 drives gear 90.
2. Gear 90 drives gear 70.
 Gear 70 and gear 80 are on the same bush and therefore have the same speed.
3. Gear 80 drives gear 60 which is mounted on the primary shaft of the feed gear.
4. Levers are switched to positions A5 or B1.



Change gear arrangement for module 0.5

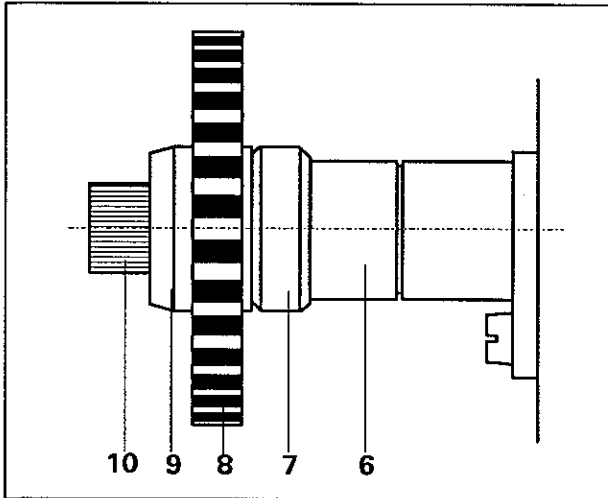
Mounting

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

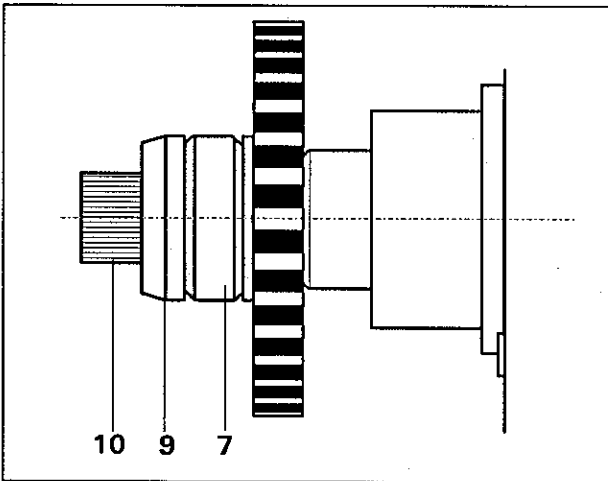


Mounting axis on gear quadrant

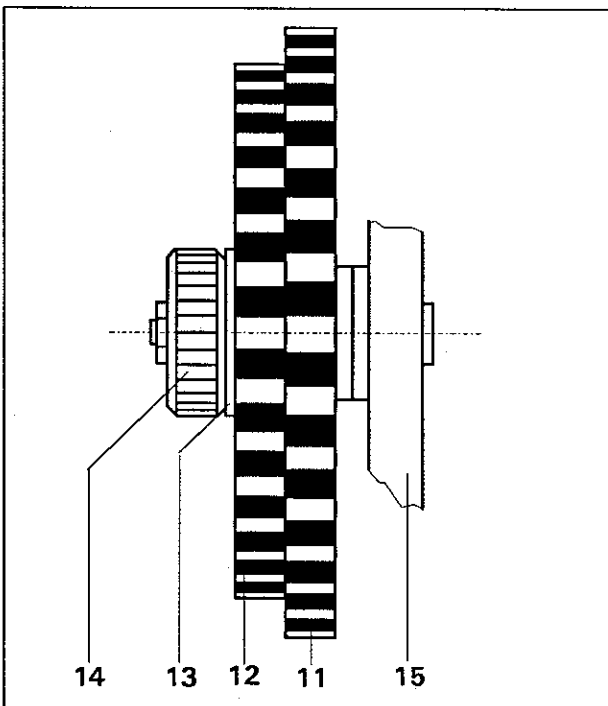
1. Quadrant
2. T-nut
3. Pressure washer
4. Axis
5. Bearing bush



Mounting the gear 55 onto spline shaft



Mounting the gear 60 onto primary shaft



Mounting the gears 70 and 80 onto quadrant

2. Gear 55 is mounted onto the spline shaft; gear 60 is mounted onto the primary shaft.

- 6. Spline shaft
- 7. Spacer
- 8. Gear 55
- 9. Tightening washer
- 10. Socket head screw
- 11. Gear 60

3. Gears 80 (11) and 70 (12) are mounted onto the bearing bush of the bottom arm of the quadrant and axially fixed with the compensating washer (13) and the knurled nut (14).

The axis is now tightened, so that gears 60 and 80 mesh.

A spacer is placed onto the second bearing bush and then gear 90 is mounted onto this bush and then axially tightened as described above with compensating washer (13) and knurled nut (14).

4. Gear 90 is brought to mesh with gear 55 by swivelling the quadrant. The quadrant is then fixed with the hexagon nut.

5. Remount gear cover.

The tailstock

The tailstock is set on the rear Vee of the lathe bed and is made of high-grade vibration-free cast-iron.

The tailstock sleeve is moved via the handwheel (travel of tailstock sleeve 90 mm (3.54")). A graduated scale is engraved into the tailstock sleeve. Accurate feed is guaranteed by a scale ring on the tailstock handwheel. Scale graduations on metric machines 0.025 mm, on inch type machines 0.001".

Note:

Tailstock sleeve should always be clamped, except during drilling work.

The inside taper of the tailstock sleeve (MT 2) serves for receiving centers and drill chuck. By turning back the sleeve, the center or drill chuck is automatically ejected.

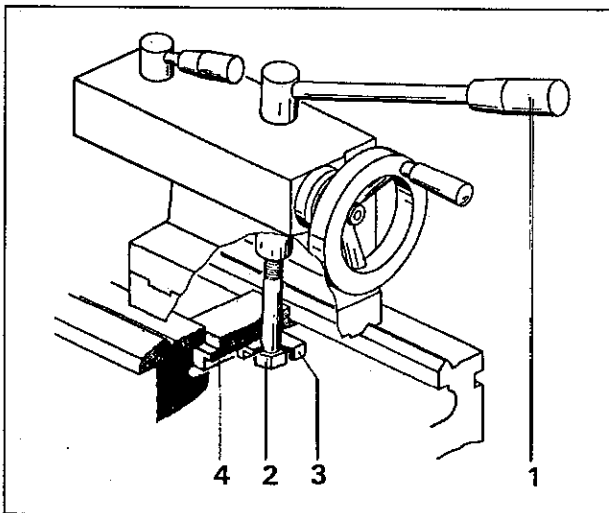
The tailstock itself is clamped to the lathe bed with the clamping lever.

Resetting the clamping lever

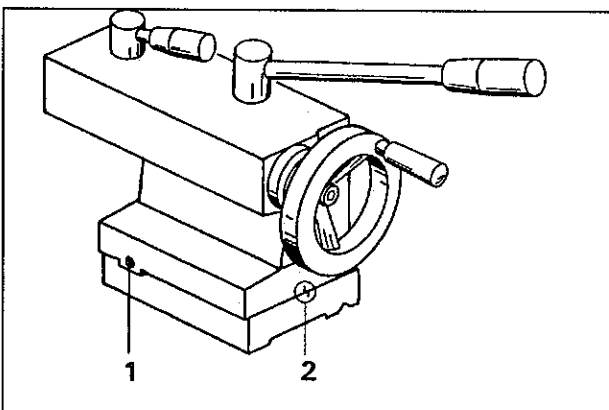
The clamping lever can be reset from 60° to 60°, in order to place the lever in the most convenient position for working.

Resetting

The clamping lever (1) is turned out so far, until the hexagon screw (2) can be turned in the slot of the wedge (3). The wedge is prestressed up against the clamping plate (4).



Clamping lever of tailstock



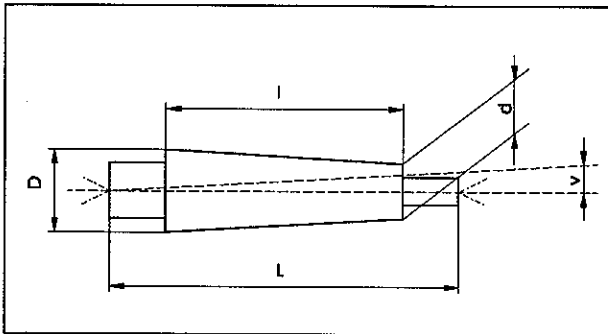
Setting-over the tailstock

Setting-over the tailstock

Example: Setting-over the tailstock to the front

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

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



Workpiece with slight taper

Taper turning using the tailstock set-over

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

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

Example: $D = 70 \text{ mm}; d = 65 \text{ mm};$
 $L = 400 \text{ mm}; l = 200 \text{ mm}$

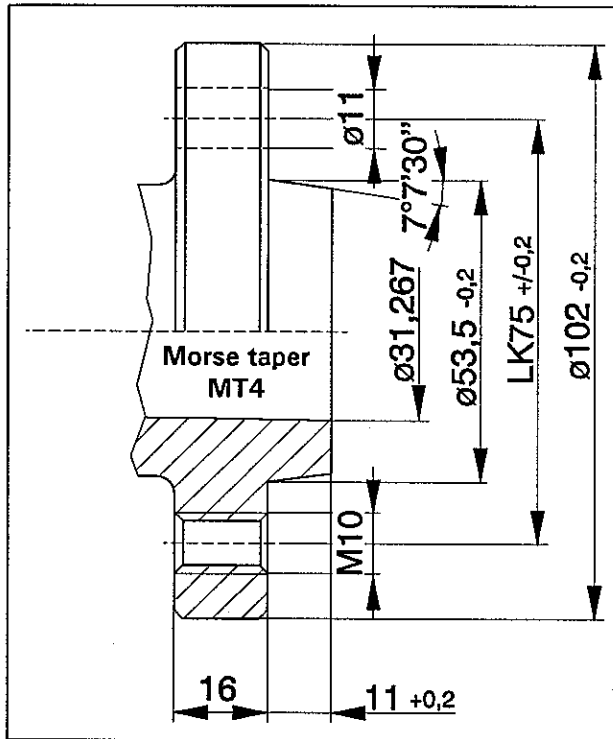
result:

$$v = \frac{70-65}{2} \times \frac{400}{200} = \frac{5}{2} \times 2 = 5 \text{ mm}$$

Mounting clamping device onto DIN spindle

The main spindle has a spindle bore of $\varnothing 26$ mm. The spindle nose is standardized according to DIN 55021.

The maximum chuck diameter is 140 mm. The maximum diameter of the face plate is 152 mm.



Spindle nose DIN

Mounting the clamping device on the main spindle

Note

Prior to mounting a clamping device on the spindle nose, the spindle nose and the chuck have to be cleaned from chips and other dirt.



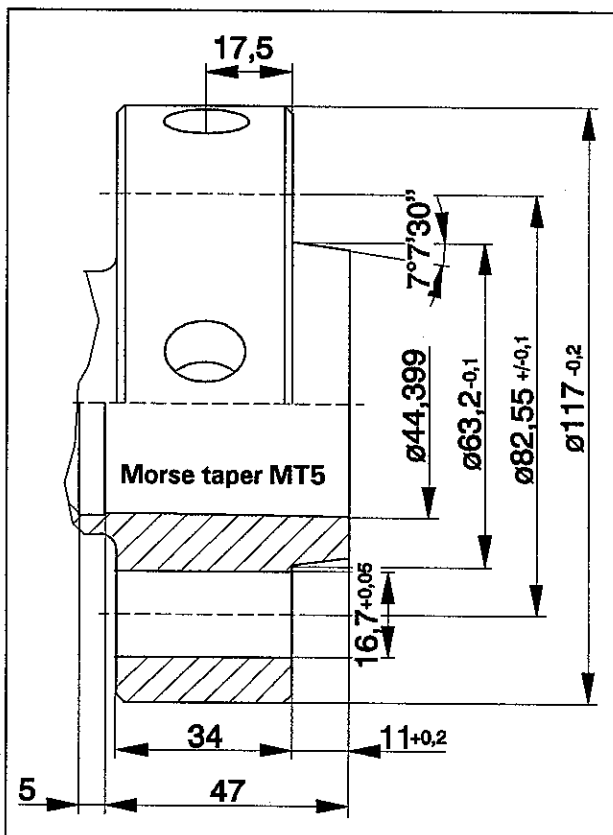
Danger



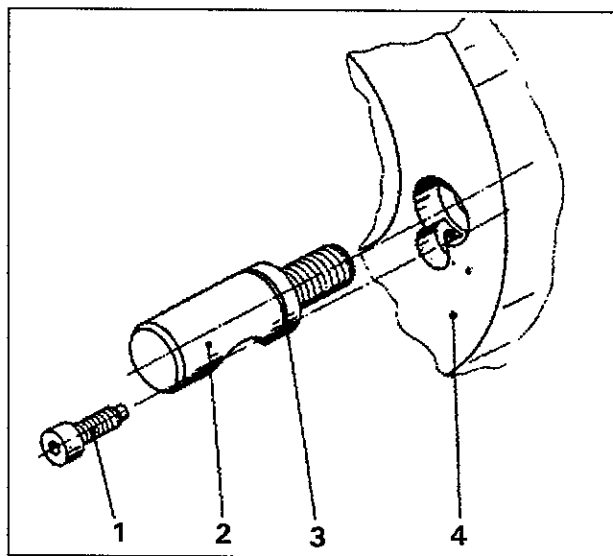
Mounting and dismounting the clamping device may only be carried out during standstill of the machine and high swivelled chuck protection.

Procedure

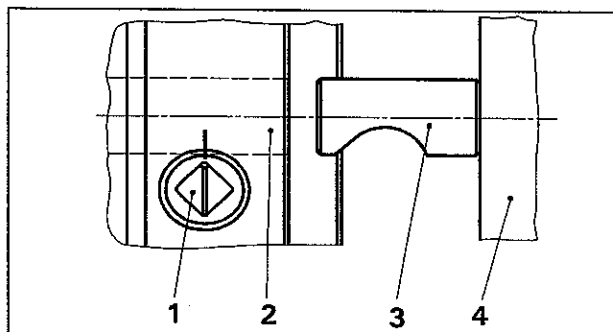
Place clamping device (with stud bolt) onto spindle nose and fasten with the three hexagon nuts M10.



Spindle nose Camlock



Mounting of Camlock-bolts



Turning of the clamping cams

Mounting clamping device onto Camlock-spindle

The main spindle has a spindle bore of $\varnothing 35$ mm. The spindle nose is in accordance with DIN 55029.

The maximum diameter of chuck is 140 mm. The maximum diameter of face plate is 152 mm.

Note

Prior to mounting a clamping device on the spindle nose, the spindle nose and the chuck have to be cleaned from chips and other dirt.



Danger

Mounting and dismantling the clamping device may only be carried out during standstill of the machine and high swivelled chuck protection.

Screwing in the Camlock bolts into the clamping device

All 6 Camlock bolts (2) are to be screwed into the support thread of the clamping device (4).

The Camlock bolts have to be turned in only until the recesses (3) at the bolts are at the same level of the plane surface of the clamping device (see figure on front page) and the locking screws (1) can be screwed in.

Screw in and tighten the 6 blocking screws (1).



Danger

If the recess at the Camlock bolt is above or below the plane surface of the clamping device, safe clamping cannot be guaranteed anymore.

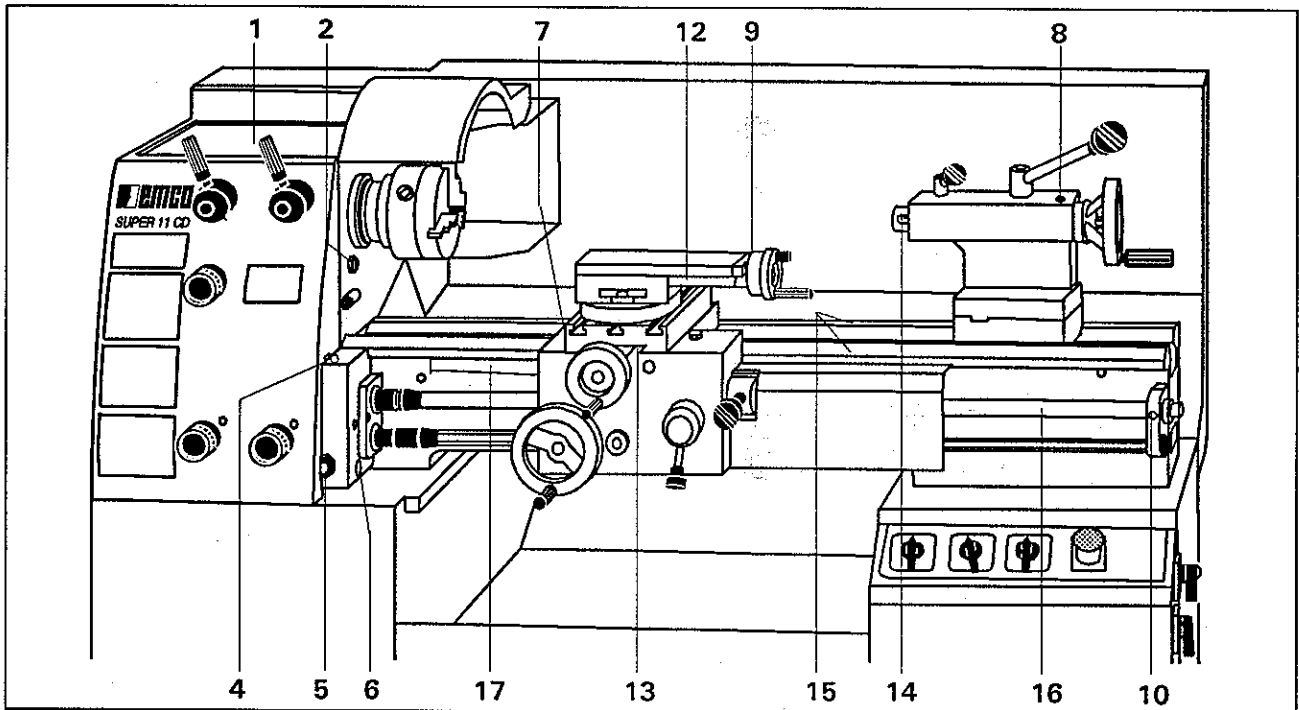
Mounting the clamping device

Stick clamping device (4) with the Camlock bolts (3) into the supports of the spindle nose (2).

Fix clamping device by turning the 3 clamping cams (1) with a square spanner in clockwise direction at the spindle nose.

The clamping cams (1) are open if the marks at the cams are in accordance with the marks at the spindle nose.

C Maintenance/Readjustment works



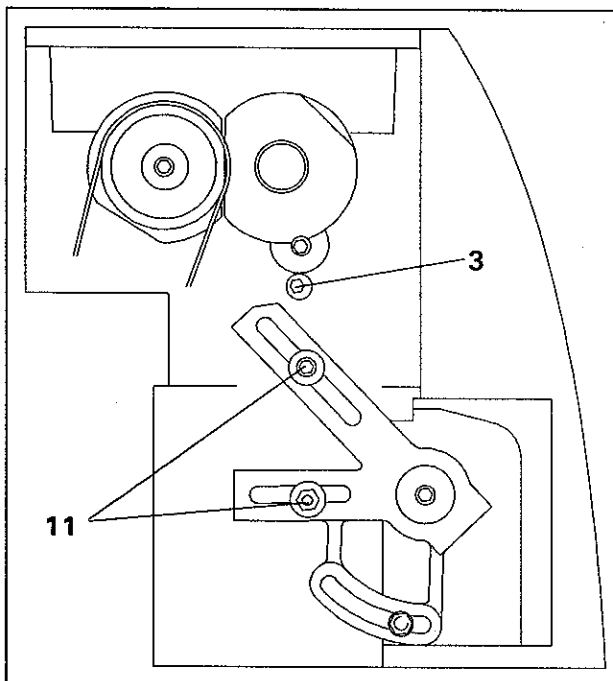
Maintenance points

Lubricant scheme



Danger

All maintenance work may only be carried out with the main switch switched off and the EMERGENCY-OFF key actuated.



Maintenance points

- 1 Headstock (remove cover for oil change)
- 2 Oil sight glass on headstock
- 3 Drain plug on headstock
- 4 Filling screw in gearbox
- 5 Oil sight glass on gearbox
- 6 Drain plug on gearbox
- 7 Grease nipple for carriage
- 8 Grease nipple for tailstock spindle
- 9 Grease nipple on cross slide
- 10 Grease nipple for leadscrew support
- 11 Grease nipple for change gears bolt
- 12 Top slide guideway
- 13 Cross slide guideway
- 14 Tailstock sleeve
- 15 Bed guideways
- 16 Leadscrew
- 17 Toothed rack

Note to Pos. 2 and 5

The oil level must not be above the middle of the oil sight glass, rather a little below.

Lubricant table

Machine part	Lubrication position	Control position	Material	Type of lubrication	Quantity	Frequency
Spindle stock	1	2	Oil	Oil bath	approx. 0.4 l	approx. 500 hours
Gear box	4	5	Oil		approx. 0.4 l	
Carriage	7	-	Grease	Grease gun		approx. 24 hours
Tailstock spindle	8	-				
Top slide spindle	9	-				
Leadscrew	10	-				
Change gear bolt	11	-				
Top slide	12	-	Oil	Oil can		Several times a day, especially leadscrew when thread-cutting
Cross slide	13	-				
Tailstock ram	14	-				
Bed guideways	15	-				
Leadscrew	16	-				
Toothed rack	17	-	Grease			approx. 24 hours
Vertical unit	18	19	Oil	Oil bath	approx. 0.5 l	approx. 300 hours
Pinion	20	-	Oil	Oil can		weekly
Spindle	21	-				
Column	22	-				

Lubricant and coolant recommendations

Use	Designation according to DIN	Example
Spindle gear Feed gear	Hydraulic oil HLP DIN 51524/2 ISO VG46	BP CASTROL EUROL ESSO KLÜBER MOBIL Energol HLP 46 Vario HDX Spezial K Nuto H 646 Croucolan 46 DTE 25
Slide guideways Tailstock sleeve	Guideway oil CGLP DIN 51502 ISO VG68	BP CASTROL ESSO KLÜBER MOBIL Maccurat 68 Magnaglide D68 Febis K 68 Lamora Super Pollad 68 Vactra 2
all grease lubricant points (lubricating nipple) change gears	Grease DIN 51804/T1 NLGI 2 DIN 51807 1	EMCO BP CASTROL KLÜBER MOBIL RÖHM Gleitpaste L2 Greace MS3 Altemp Q NB 50 Mobilgrease Special F80
Metal machining	Cooling lubricant	CASTROL CASTROL CASTROL BP BP BP Syntilo R Plus DC 282 Alusol B Fedaro Olex Bezora





Hints for cooling lubricant selection

* The costs for the procurement of cooling lubricants in machining are of rather subordinate importance (most frequently below 1 % of machining of production costs!). However, an incorrectly selected or used cooling lubricant may show decisive effects on the manufacturing process and thus, cause high costs indirectly.

* After the end of service life cooling lubricants represent special waste that need supervision and have to be disposed of adequately. The disposal costs accruing are of decisive influence on the economy of the cooling lubricant use.

* The main tasks of the cooling lubricant are:

COOLING LUBRICATING FLUSHING CHIPS

If machining is carried out with high power, the main task of a cooling lubricant consists in an effective cooling of tool and workpiece. In such a case the use of water-soluble cooling lubricants is to be preferred.

For complicated machining processes - e.g. threading, screw-tapping, reaming, turning-off - the main feature for the cooling lubricant is an efficient lubrication of the contact surface between tool and workpiece as well as of the chips. In these cases better results can be achieved with non-water soluble cooling lubricants.

High efficiency for flushing away the chips is influenced less by the type of cooling lubricant than by the kind and arrangement of the cooling lubricant nozzles as well as by the quantity and pressure of the cooling lubricant stream.

* In addition to these main criteria in cooling lubricant selection the following items are to be observed more or less according to application and operating framework conditions.

Disposal (cleavage property, decomposition property)

Content materials (chlorine, nitrite, phenols,...)

Corrosion protection

Viscosity (also in connection with chip de-oiling)

Resistance to aging, service life
Resistance against microorganisms
Emulsifying capacity
Foaming behaviour
Dirt elimination property
Wetting capacity
Filtering capacity
Transparency
Washability of remaining film
Compatibility with metals, plastics, lacquers
Residual behaviour
Inflammability
Odour
Compatibility with health (formation of mist, skin compatibility, toxicity, cancerogenity,...)

* Non-water soluble cooling lubricants are generally without problems in the use on machines as far as maintenance, handling, service life, corrosion protection and compatibility are concerned. Problems occur with the formation of mist and chip deoiling.

Cleaning of the cooling lubricant tank

* The used lubricants are to be filled in a clearly marked container to avoid confusion with other liquids!

* Residues in the cooling lubricant circuit (sludges) are special waste and must not be disposed of together with household waste.

* For cleaning of the cooling lubricant tank liposoluble fluorine chlorinated hydrocarbons are not to be used (e.g. trichloroethylene, trichloroethane, perchloroethylene etc.) since the use of these substances in open circuits is highly detrimental to health.

* During cleaning mind elimination without residues of deposits (particularly in edges and corners of difficult access). Remaining contaminations are points of growth for bacteria which attack the newly filled emulsion and drastically reduce its service life.

* Oil-contaminated rags are classified as special waste and must not be disposed of with the household waste.

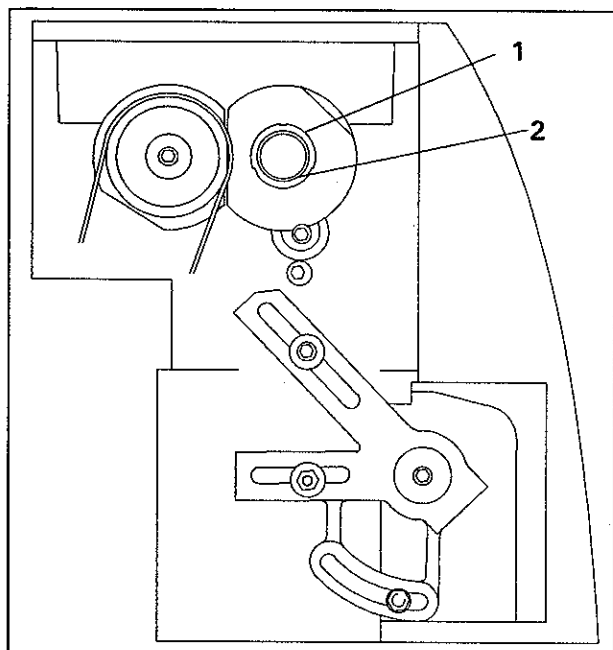
* Cleaning rags and solvents are to be used as efficiently as possible to keep the accumulating special waste quantity as small as possible.

Readjustment works



Danger

All readjustment works on the machine may be carried out only if the main switch is set to "0" and the EMERGENCY-OFF key is actuated.



Adjustment main spindle bearing

Adjustment of the main spindle bearings

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

Adjustment of the bearings

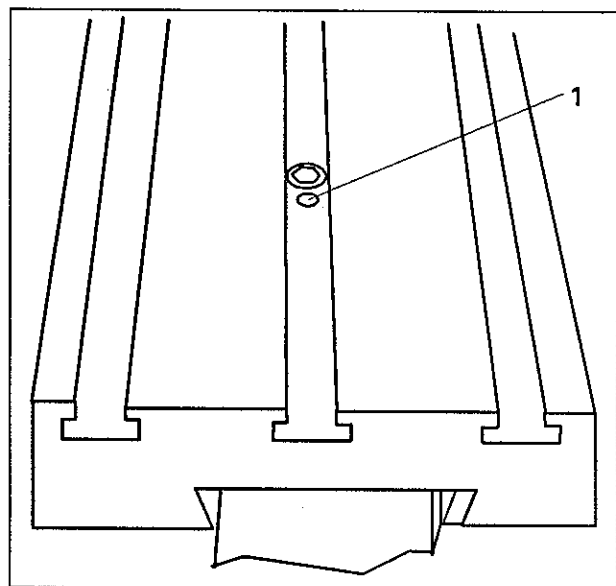
Loosen set screw (1), tighten slotted clamping nut (2) clockwise with a "C" spanner. Then re-tighten the set screw again to secure nut.

Checking the correct adjustment

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

Note

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



Set screw for movement of cross slide nut

Compensating play of the cross slide spindle in the cross slide nut

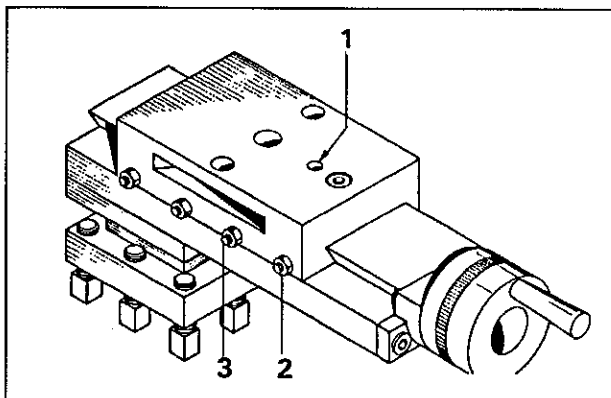
Necessary when cross slide does not move when the handwheel is turned a certain angle.

Adjustment

Dismount the top slide and adjust set screw (1) until backlash is compensated.

Checking

The cross slide should run smoothly. Excessive adjustment causes unnecessary wear of the cross slide nut.



Adjustment of the slide nut of top slide

Compensating play of the top slide spindle in the top slide nut

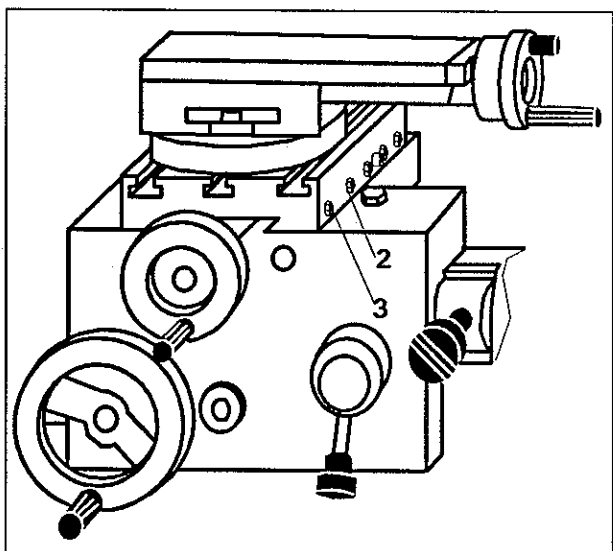
Cross and top slides are equipped with gibs. Adjustment of play-free guidance is done with the set-screws, which press onto the gib via the pressure pins.

Adjustment

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

Checking

The top slide should run smoothly. Excessive adjustment causes unnecessary wear of the top slide nut.



Adjustment of dovetail guideway of cross and top slide

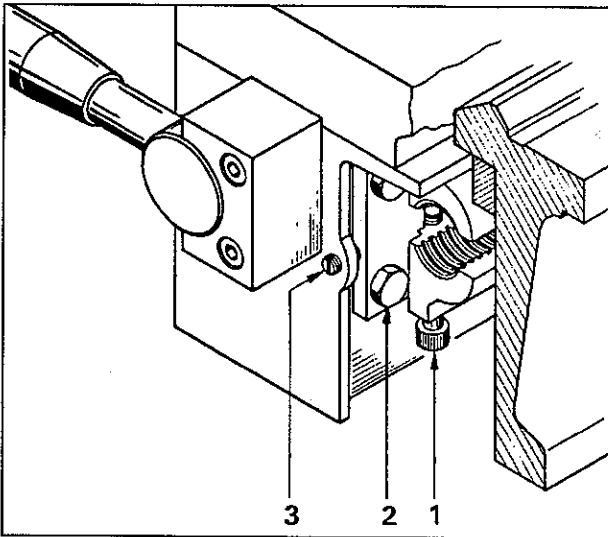
Adjustment of the dovetail guideways of cross and top slides

Cross and top slides are equipped with gibs. Adjustment of play-free guidance is done with the set screws (3), which press onto the gib via the pressure pins.

The hexagon nuts (2) are for securing the set screws (countering).

Adjustment

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



Adjustment of the play of half-nut

Compensating of too much play between half-nuts and leadscrew

Unscrew the socket head screw (1) 2 or 3 turns. Engage the half-nut completely with leadscrew by means of half-nut lever.

Now turn in the socket head screw until the other part of the half-nut is touched, but not moved.

Now make a further half turn of the socket head screw and the correct play will exist between half-nut and lead-screw.

Note

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

Adjustment of half-nut guidance

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

Adjustment

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

Checking

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

Adjusting axial play of the leadscrew

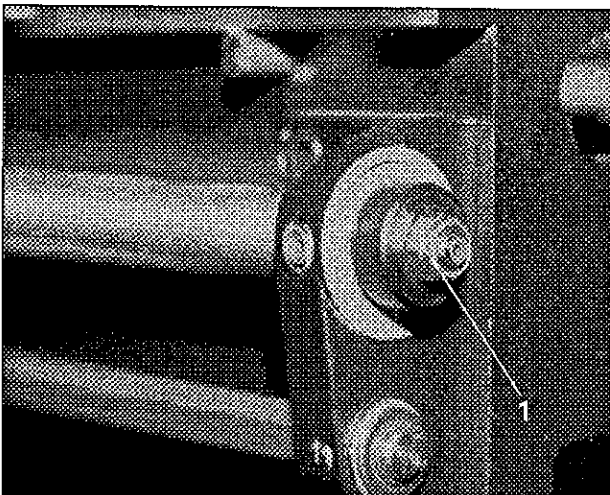
(Necessary when the leadscrew can be moved axially by hand)

Adjustment

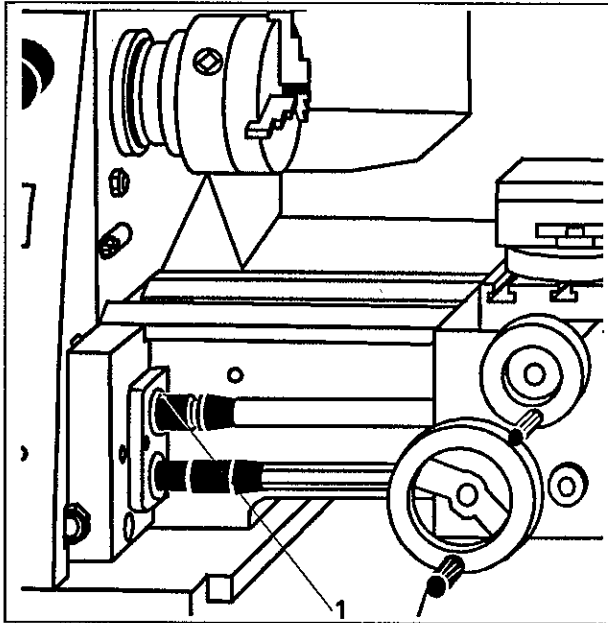
Adjust the securing nut (1) until the axial play is not more than 0.05 mm (0.002"). For holding the leadscrew when adjusting, engage the half-nut.

Checking

If you cannot turn the leadscrew by hand, the securing nut is too tight.



Adjustment of the axial play of leadscrew



Shearing pin for leadscrew

Replacing the shearing pin on the leadscrew

If the shearing pin (1) breaks through over loading or incorrect handling of the machine, replace it only with an original shearing pin.

Procedure

Remove the rest of the shearing pin with a punch.
Insert a new one.

D Accessories

The toolpost grinder



Danger

Mounting and dismounting the toolpost grinder may only be carried out with the machine switched off and the EMERGENCY-OFF key actuated.

Technical data

Spindle speeds: 13000 rpm
10000 rpm
7000 rpm

Distance between mounting base and grinding base: 23 mm (0.9")

Motor: IEC Standardized motor

Frequency: 50/60 Hz

Motor capacity: 185 W

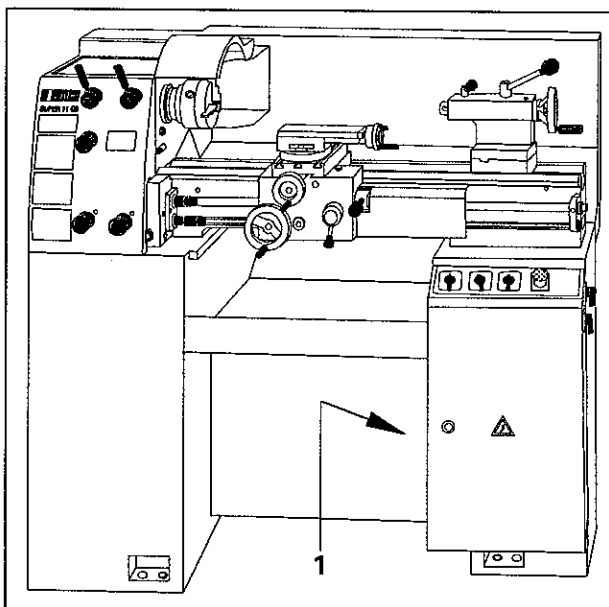
Dust- and splashproof according to: IP 54

Grinding wheels - Speeds

Straight grinding wheel for outside grinding:
ø 80 x 10 x 20 mm
Corresponding speed 7000 rpm

Straight grinding wheel for internal grinding:
ø 20 x 10 x 6 mm
Corresponding speed 13000 rpm

Cup grinding wheel for face grinding:
ø 45 x 30 x 20 mm
Corresponding speed 10000 rpm



Tip jack for toolpost grinder

Scope of supply

Toolpost complete with drive motor power supply cable, grinding arbors, service tools and a set of 3 grinding wheels, grit 80.

Electrical connection

The plug of the toolpost grinder is plugged into the tip jack at the electrical cabinet (1).

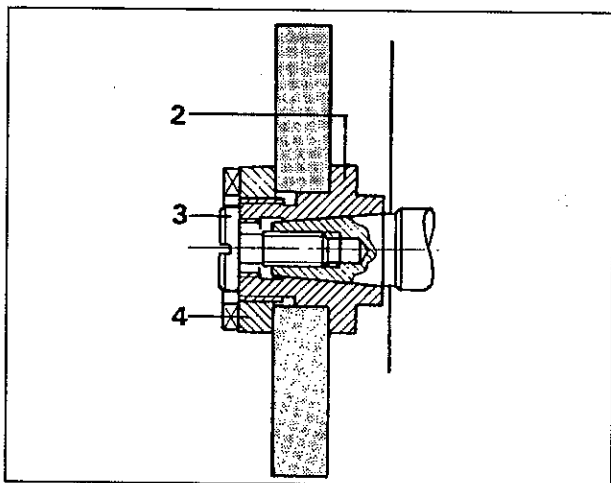
Mounting the toolpost grinder

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

Adjustment of spindle speeds

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

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

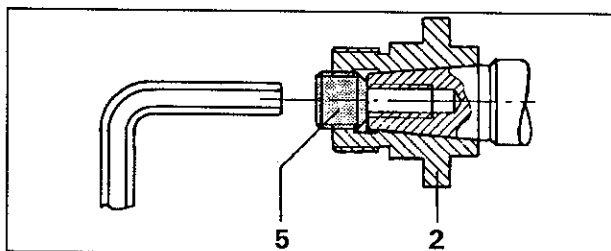


Mounting grinding wheel

Mounting the grinding wheels

Straight grinding wheel $\varnothing 80 \times 10 \times 20$ mm
Cup grinding wheel $\varnothing 45 \times 30 \times 20$ mm

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



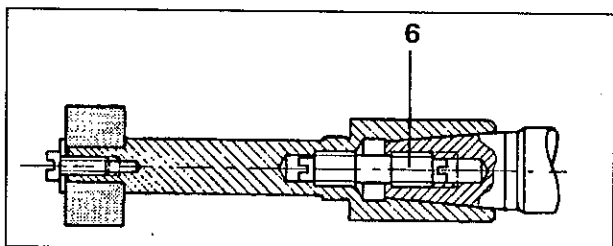
Dismounting grinding arbor from the spindle

Dismounting the arbor (2) from the grinding spindle

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

Mounting the internal grinding arbor $\varnothing 20 \times 10 \times 6$ mm

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



Mounting internal grinding arbor

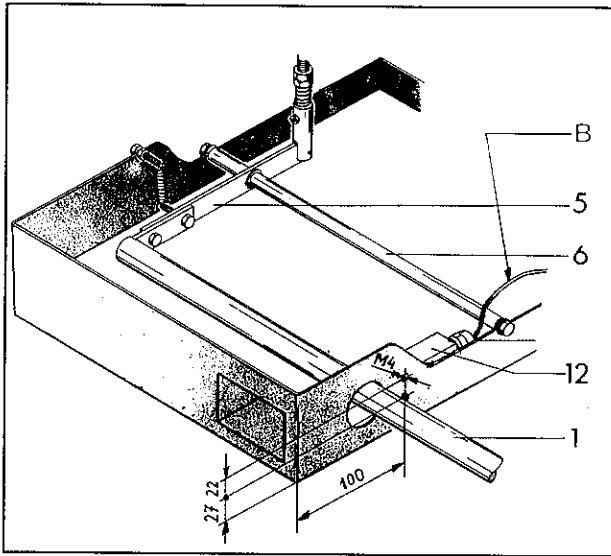
Mount grinding wheel as shown.

Important tips:

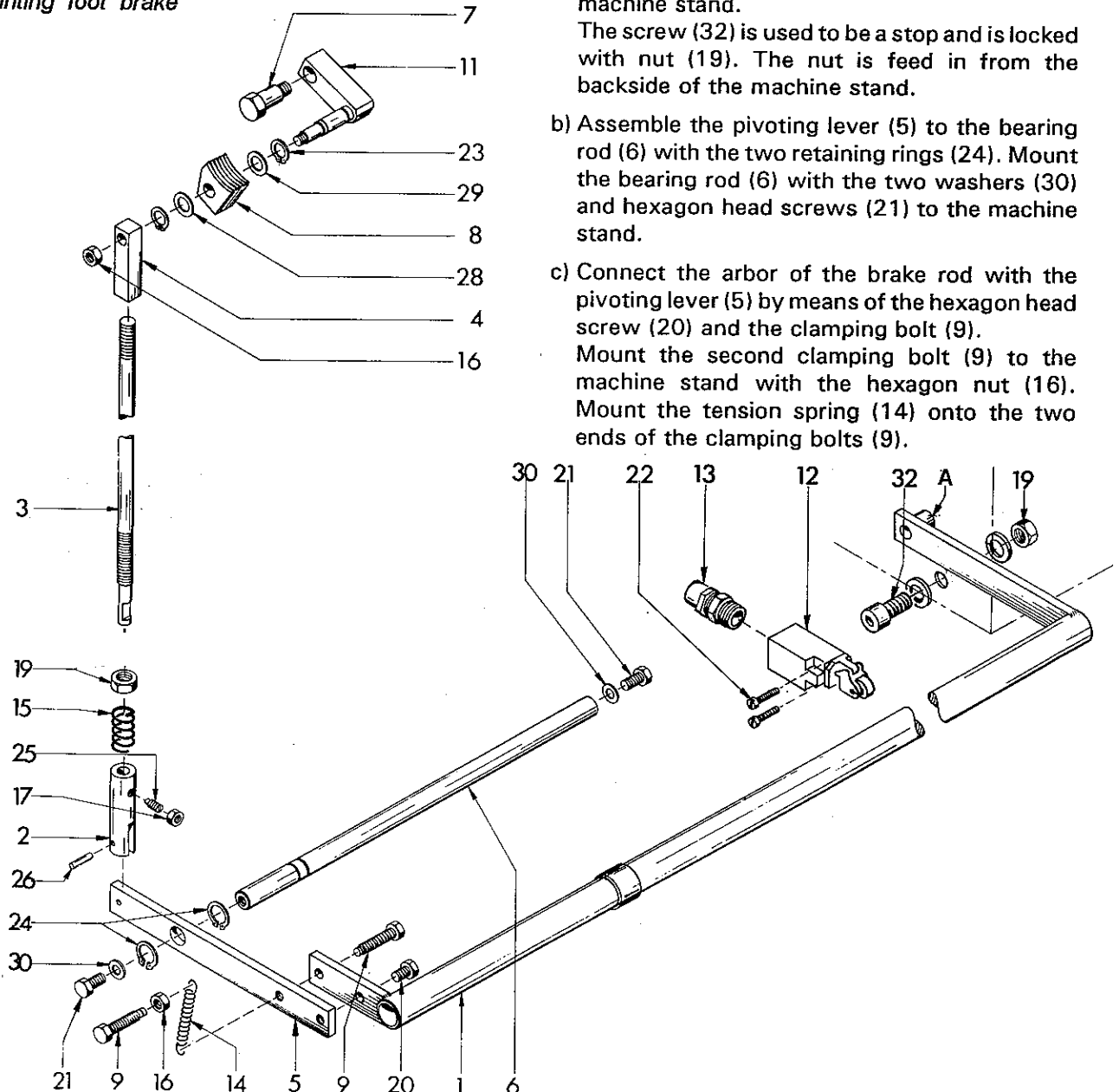
- Speed of the workpiece: max. 110 rpm.
- Feed of the toolpost grinder should be approx. 2 mm (0.1") per revolution of the workpiece clamped in the lathe.
- Dress grinding wheels.
- The guideways of the lathe must be carefully covered before grinding. The grinding dust would damage the precision guideways.

**Danger**

- Always wear eye protection during grinding.
- Never work without pulley and disc guards.
- Place grinding wheel guard always above grinding wheel.
- Read instructions carefully before mounting discs.
- Grinding discs must be stored so that they are protected from any possible impact.
- The bore of the grinding wheel may not be further enlarged, as this would cause breakage.
- A resonance test should be carried out before mounting the grinding wheel.
- Before using a new grinding disc, a test run should be carried out.
- Dress discs which run out of balance.
- Follow general rules for accident prevention.



Mounting foot brake



Foot brake



Danger

Mounting and dismounting the foot brake may only be carried out with the main switch switched off and EMERGENCY-OFF key actuated.

Function

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

Mounting the foot brake

Groups of the foot brake are reassembled. In the exploded drawing every part is shown single.

- a) Insert the rod brake (1) into the left machine stand and its pin (A) into the hole of the right machine stand.
The screw (32) is used to be a stop and is locked with nut (19). The nut is feed in from the backside of the machine stand.
- b) Assemble the pivoting lever (5) to the bearing rod (6) with the two retaining rings (24). Mount the bearing rod (6) with the two washers (30) and hexagon head screws (21) to the machine stand.
- c) Connect the arbor of the brake rod with the pivoting lever (5) by means of the hexagon head screw (20) and the clamping bolt (9). Mount the second clamping bolt (9) to the machine stand with the hexagon nut (16). Mount the tension spring (14) onto the two ends of the clamping bolts (9).

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

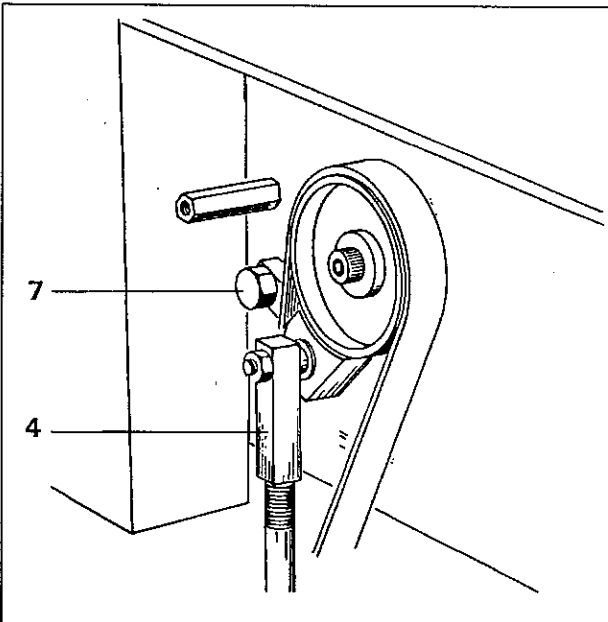
Note:

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

e) Preload the compression spring by screwing down the hexagon nut on the pressure rod (8 19) so that the distance pressure bolt - hexagon nut is approximately 20 mm.

f) Dismount the change gear cover. Mount brake mechanism with bolt (7). Remove the premounted adjusting nut (4) and thread it so far onto the pressure rod that space between brake block (8) and wheel is 1-2 mm in remounted condition. Use the right number and thickness of shim rings (29) for the profiles of brake block (8) and pulley fits to each other.

g) Mount the limit switch (12) with flat head screws (22) to the machine stand. If the necessary thread holes (M4) do not exist, they must be produced according to the dimensioned drawing above.



Mounting foot brake

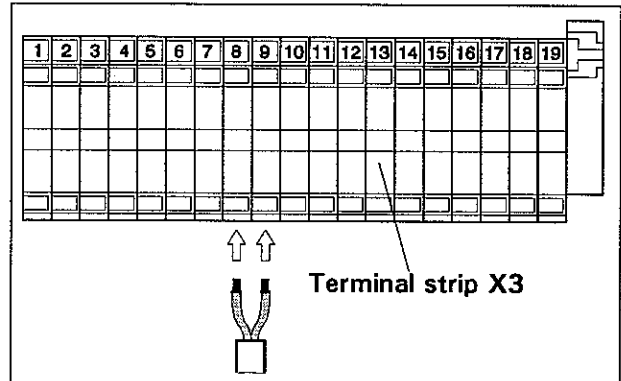
Electrical connection of the limit switch



Danger

The connection of the foot brake may only be carried out by an electrician expert with the machine switched off and EMERGENCY-OFF key actuated.

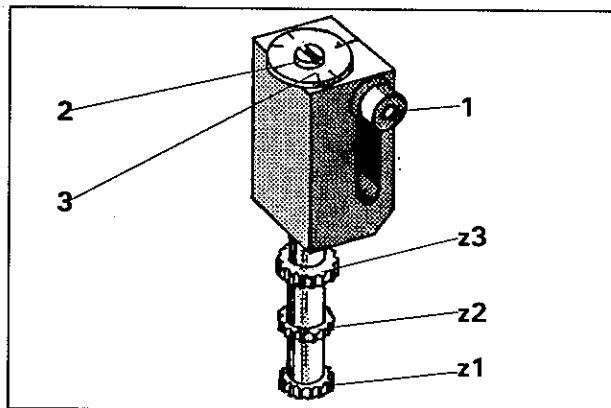
- * Open the electrical cabinet.
- * Remove the bridgings of terminals 8 and 9 on terminal strip X3.
- * Thread cable of the limit switch through clamping angle into electrical cabinet.
- * Connect both cores to terminals 8 and 9 of terminal strip X3.
- * Tighten clamping angle.



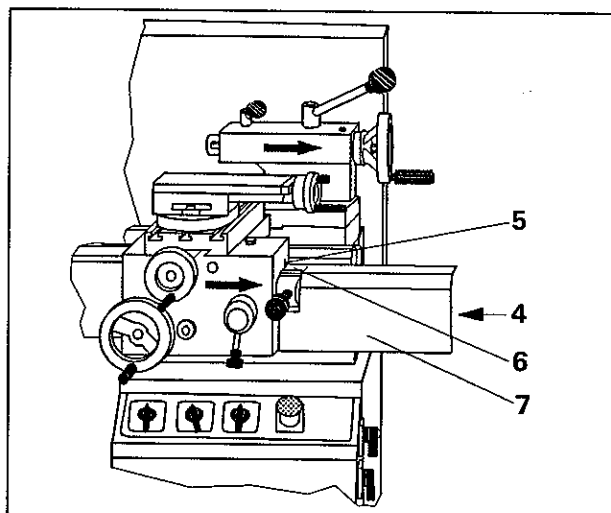
Electrical connection foot brake

Readjustment works:

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



Thread dial indicator



Mounting position thread dial indicator

Table for metric machine (Pitch of main spindle 3 mm)

Pitch mm/rev.	Markings of disc		
	z1 = 14	z2 = 15	z3 = 16
175	1, 2		
0.35	1, 2		
0.4			1, 2, 4
0.45		1	
0.7	1, 2		
0.8			1, 2
0.9		1	
1.25		1, 3	
1.75	1, 2		
2			1, 2, 4
2.25		1	
2.5		1, 3	
3.5	1, 2		
4			1, 2, 4
4.5		1	
5		1, 3	

Thread dial indicator

Mounting



Danger

Mounting and dismounting the thread dial indicator may only be carried out during machine standstill and with the EMERGENCY-OFF key actuated.

- Traverse the tailstock in utmost right position.
- Traverse also the tool slide extremely to the right.
- Unscrew both socket head screws (4) of the spindle cover and take off spindle cover.
- Unscrew set screw (5).
- Saw off the nearly completely cut off corner (6) of the spindle cover (7) and chamfer saw points.
- Engage prescribed gear with lead screw. Tighten socket head screw (1) only slightly.
- Swivel in apron nut and tighten socket head screw.
- Loosen slotted screw (2) and turn counter (3) so that the division mark and one of the possible numbers on the counter correspond. Tighten slotted screw.
- Remount spindle cover.

Thread cutting

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

Example

Pitch = 0.8 mm, gear 16 is engaged. The lead screw nut can be engaged. The lead screw nut can be engaged at mark 1, 2 or 4.

Table for inch type machine (Lead screw pitch 1/8")

Pitch n/"	Marking of disc Gear z3 = 16
6, 8, 22, 26, 38, 44, 52, 72, 80, 96, 112, 128	1, 2, 4
5, 7, 11, 13, 19, 27	1, 2
4 1/2, 9 1/2	1

Note

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

Taper turning attachment

Technical data

Maximum taper length: 210 mm
 Maximum taper diameter: 80 mm
 Taper $(\alpha/2) \pm 9^\circ$

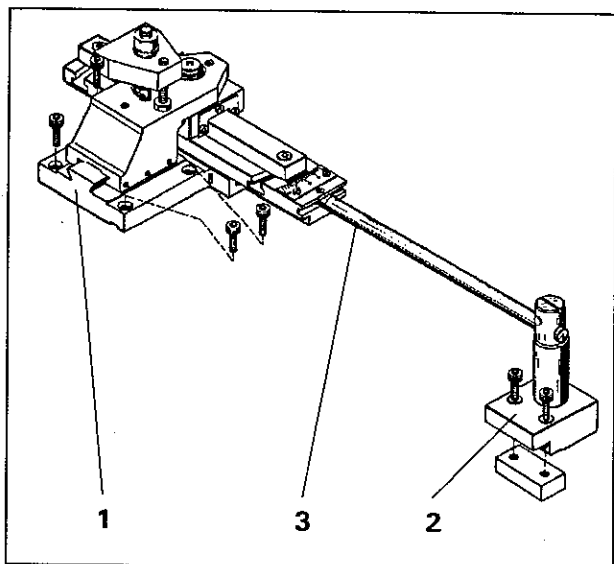
Mounting



Danger

Mounting and dismounting the taper turning attachment may only be carried out during standstill of the machine and with the EMERGENCY-OFF key actuated.

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



Taper turning attachment

Adjusting to the diameter

- Adjust the cross slide of the lathe.
- Adjust the compound slide position on the machine cross slide.

Adjusting the taper position in the longitudinal direction

Clamp the connection rod (3) accordingly.

Adjusting the taper angle

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

Readjusting the guides

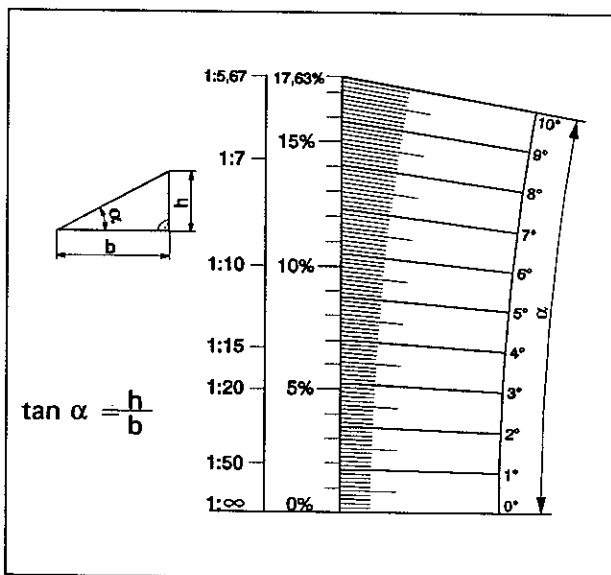
- The saddle and cross slides of the taper turning attachment are equipped with adjustable strips. Adjustments can be made as for the cross slide of the lathe.
- The cross slide of the taper turning attachment is guided along the straight edge by 3 support rolls.

Working note:

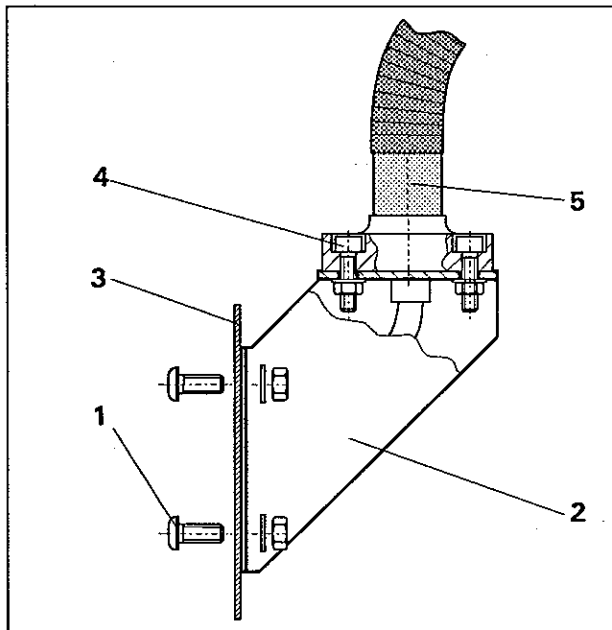
For heavier cuts, clamp the lathe cross slide.

Example for taper calculation

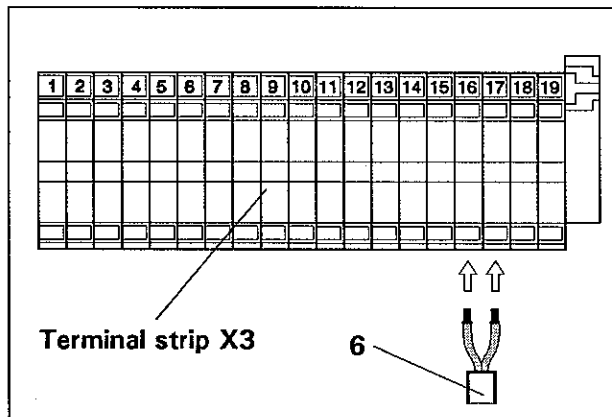
$i = 1:10, \alpha = ?$
 $\tan \alpha = i = \frac{h}{b}, \alpha = \arctan \frac{1}{10}, \alpha = \underline{\underline{5.71^\circ}}$



Nomogram for taper calculation



Mounting machine lamp



Electrical connection machine lamp

Machine lamp



Danger

Mounting and electrical connection of machine lamp may only be carried out by an electrician expert, during standstill of the machine and with the EMERGENCY-OFF key actuated.

- * Mount machine lighting fixture (5) to sheet metal holder (2) using the four socket head cap screws M4x16 (4) together with the matching washers and nuts.
- * Insert the four lens-head screws M5x12 (1) through the holes on the splashguard (3) of the machine; afterwards bolt sheet-metal holder (2) to splashguard using the washers and nuts M5.
- * Thread cable within the rear sheet coating of the headstock and via machine base into the switch cabinet (through clamping angle).
- * Connect the phases of the cable (6) to terminals 16 and 17 of the terminal strip X3.
- * Tighten clamping angle.

Note

The distance between machine lamp and lighted surface must be at least 0.1 m, otherwise the lamp might be destroyed because of heat flow.

According to ÖVE:  0.1m 

Declaration of conformity

Product: Lathe

Machine data:

<i>Model</i>	<i>Type</i>
EMCO	MAXIMAT SUPER 11 CD

Address of manufacturer: Emco Maier Ges.m.b.H
Salzachtal Bundesstraße Nord 58
A-5400 Hallein

Bases of standards: EN 292-1; EN 292-2; EN 294; EN 418; EN 60204-1; prEN 954-1;
prEN 1037; prEN 1050; prEN 1088

Regulations: MSV (BGBl. 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), July 22nd, 1993 (93/68/EEC), with the directive of the Council dated May 3rd, 1989 for the alignment of the legal stipulations for electromagnetic compatibility (89/336/EEC) and its modifications dated April 28th, 1992 (92/31/EEC) and July 22nd, 1993 (93/68/EEC), and with the directive of the Council dated February 19th, 1973 concerning low voltage equipment (73/23/EEC) and its modification dated 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, 26.01.98

Authorized person: Head of quality department Peter Binggl

