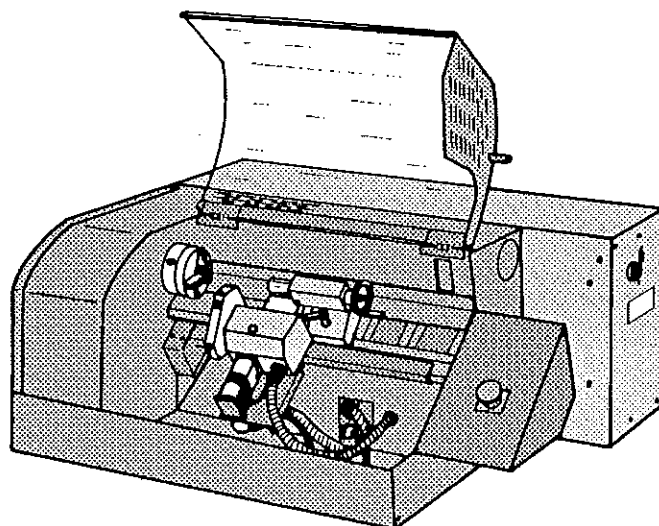


Machine description

EMCO PC TURN 50

Inclined-bed turning lathe



Edition 1994

Ref. No. EN 4305

Machine description
EMCO PC TURN 50
C94-07 EN 4305



Introduction

For more than four decades EMCO has been developing wood and metal working machines and has also been successfully on the market since 1980 with computer controlled machine tools (CNC machines), particularly on the training sector.

This high degree of experience is a profit for the turning and milling machines of the PC TURN and PC MILL model series.
The newly designed compact machines meet entirely today's requirements in construction and set up as well as safety.

The PC machines are operated via a conventional personal computer (PC). This kind of operation permits an efficient training of the most different CNC controls (SIEMENS, FANUC, etc.) with one and the same machine.
The CNC monitor of the installed CNC control is simulated on the PC screen, input of data is carried out alternatively via the PC keyboard or via a control keyboard available as accessory.

Due to the worldwide industrial use of our machines we dispose of a service network which covers all world areas.
Immediately available service engineers, telephone service as well as a 100% sparepart 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 work pieces or tools, new softwares, etc.) and their fitting 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 this instructions completely before machine start-up.

EC conformity



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

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

Contents

Adequate use	5	Summary	23
Warranty Conditions	5	The 3-/4-jaw chuck	24
Safety recommendations	6	Mounting the chuck	24
Technical data of the machine	7	Clamping ranges	24
PC Configuration	8	The collet chuck attachment	25
		Mounting the collet chuck attachment	25
		Mounting the collet chucks	25
		Dismounting the collet chucks	25
		Clamping of workpieces	26
		Clamping ranges	26
A Installation of the machine		The clamping plate	27
Machine acceptance	9	Mounting the chuck	27
Scope of supply	9	Clamping ranges	27
Dimensions of the machine	10	Maintenance of the machine	28
Installation requirement	10	Slideway oil	28
Electrical connection of the machine	11	Technological data	29
Adjustment of the required supply voltage	11	1. Cutting speed V	29
1. 110V and 230V mains	11	2. Speed S	29
2. 100V mains	11	3. Feed F	29
Connection of the power cable	12	Summary	29
Installation of the interface card	12	Finding the cutting values	30
PC connection to the machine	13	Finding the feed speed	31
Initial start-up	13	Speed-torque characteristic line	32
		Points at the machine - coordinate system	33
Description of the machine		Machine zero point M	33
Operating elements	14	Reference point R	33
Key switch	14	Workpiece zero point W	33
EMERGENCY-OFF key	15	Tool-holding fixture reference point N (T)	33
Safety package	15	Optical tool pre-setting device (accessory)	34
Tailstock	15	Scope of supply	34
The step motors	16	Mounting the optics	34
Limitation of travel paths	16	Adjustments at the optics	35
The toolholder	17	Adjust levelling element to tip height	35
Mounting the toolholder	17	Adjust tube	35
Tool clamping	17	Accessories for	36
Positions of the toolholder	18	quick-change device	36
Adjustment the tools to centre height	19	Accessories	36
1. Measuring the centre height	19	Tool holder accessories	36
2. Adjustment with reference tool	19	Tool turret accessories	36
The tool turret (option)	20	Turning tools	37
Clamping of tools and		HM-indexable inserts	37
adjustment to centre height	20	Drilling tools	38
External machining tools	20	Tailstock accessories	38
Internal machining tools	21		
Adjustment of speed	22	Declaration of conformity	
Changing the V-belt	22	Spare part list	
Clamping devices (accessories)	23		

Adequate use

The machine is designed for turning of machinable metals (Aluminium, brass, steel limited) and machinable synthetic materials.

Machining of other materials is not admitted and may be carried out in particular cases only after consultation with the machine manufacturer.

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

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

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

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

Warranty Conditions for new EMCO machines

1. The warranty period for new EMCO machines is, without limitation of operating hours, 12 months after initial shipment of the machine from EMCO or its authorized representative. Should the installation be completed by EMCO or its authorized representative, the warranty period begins with the completed installation of the machine.
If a delay of installation occurs which is not caused by EMCO or its representative, the warranty period becomes invalid 12 months after scheduled installation date.
2. The warranty extends to the elimination of all defects in material or workmanship which affect the regular function of the machine.
3. 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.

Safety recommendations

Read documentation

Read this documentation completely before you start up the machine.

Electrical connection

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

Authorized operation

The machine may only be operated by authorized persons.

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

Start-up

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

No modifications on machine

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

In case of hazards EMERGENCY-OFF

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

Safe tool-clamping

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

Remove chuck key

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

Observe speed limits

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

Clamp only short workpieces in cantilevered mode

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

Do not clamp too short

Avoid small clamping diameters with large turning diameters.

The workpiece should fit tightly.

Use chip hook

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

Do not reach into running machine!

Use protection for projecting parts

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

Tool change

Change machining tools only during standstill of machine.

Measurement work

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

Wear body protection

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

Protect your eyes with safety-glasses.

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

Machine supervision

Never leave running machine unattended.

Before leaving the working place switch off machine.

Maintenance and readjustment work

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

Claim

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

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

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

Technical data of the machine

Working area		
centre height	[mm]	65
distance between centres	[mm]	300
swing over bed	[mm]	ø130
swing over cross slight	[mm]	ø60
travel of cross slide (useable)	[mm]	48
travel of longitudinal slide (useable)	[mm]	228
maximum tool cross-section	[mm]	12 x 12
Headstock		
spindle nose according to manufacturer's standard		
hole through work spindle	[mm]	ø16
inner taper		MT2-shortend
chuck diameter	[mm]	ø80
clamping plate diameter	[mm]	ø90
spindle speed range	[rpm]	130-3000
mechanical speed steps		3
Drive motor		
3-phase AC-motor		
nominal motor speed	[rpm]	1370
capacity with 100%/60% DC	[W]	370/550
Feed motors		
step resolution	[mm]	0.001
working feed in X/Z (infinitely variable)	[mm/min]	0-750
rapid traverse in X/Z	[mm/min]	750
maximum feed force (until 500 mm/min)	[N]	600
Tailstock		
centre sleeve diameter	[mm]	22
stroke of centre sleeve	[mm]	35
tailstock taper		MT1
Electrical connection		
power supply, reversible	[V]	100/110/230
maximum voltage fluctuations	[%]	+ 5/-10
frequency	[Hz]	50/60
connected load	[kVA]	0,6
main fuse	[A-slow]	6,3
Machine dimensions		
total length x total width x total height	[mm]	840 x 695 x 345
total weight of the machine	[kg]	85

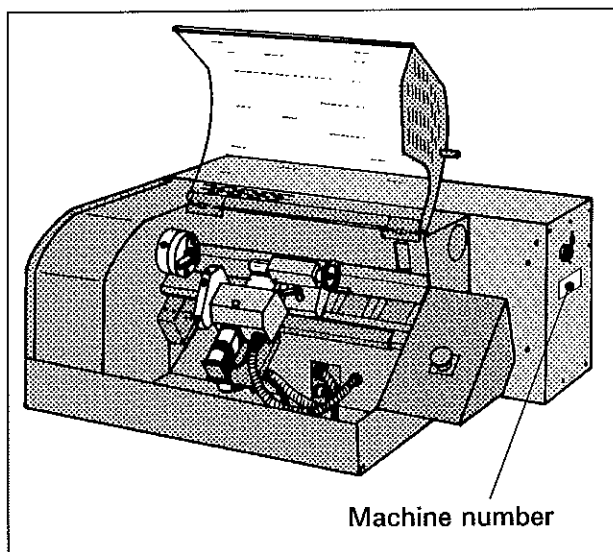
Technical modifications reserved!

PC Configuration

	minimum configuration	recommended configuration
IBM oder compatibel	PC 80386SX	PC 80486DX
hard disk	40MB	100MB
disk drive	3,5" and/or 5,25"	
operating system	MS DOS version 5.0	
main storge	1MB	4MB
graphics card	VGA color graghics card	
screen	color screen 14", resolution 640x480	
keyboard	MF-2	
BUS (plug in socket)	ISA or EISA Bus (no microchannel-IBM PS2) for installation of interface card RS485 (8 bit socket) has to be available	

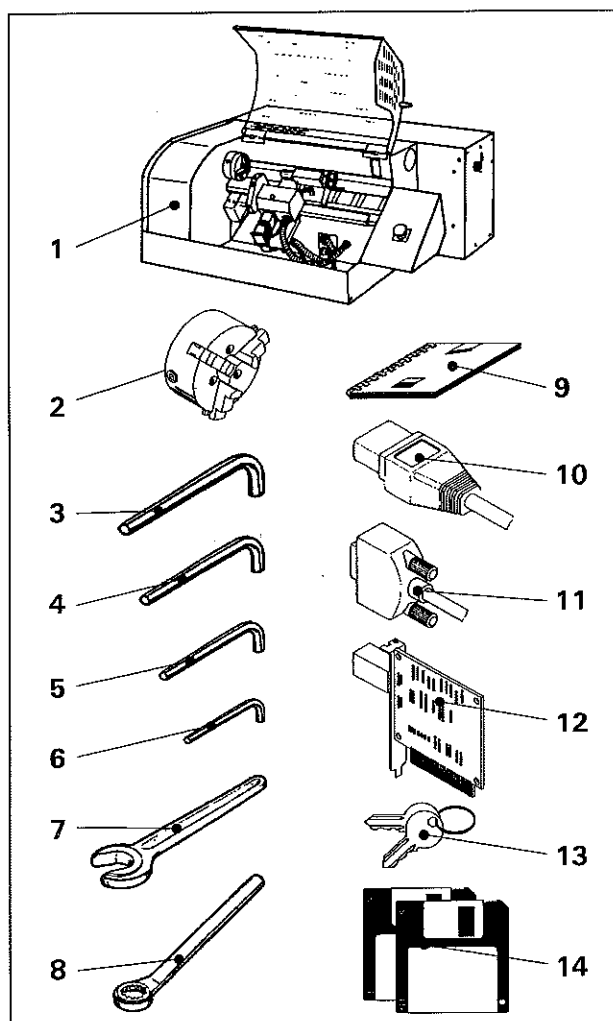
Technical modifications reserved!

A Installation of the machine



Machine acceptance

- Check the machine for any transport damage and completeness of the delivery. If you find any defects, please contact the dealer or the insurance company.
- In case of complaints always specify the exact designation of the machine and the machine number. The self-adhesive plate indicating the machine number is on the machine side below the key switch.
- The rust protection agent must be removed by the customer.

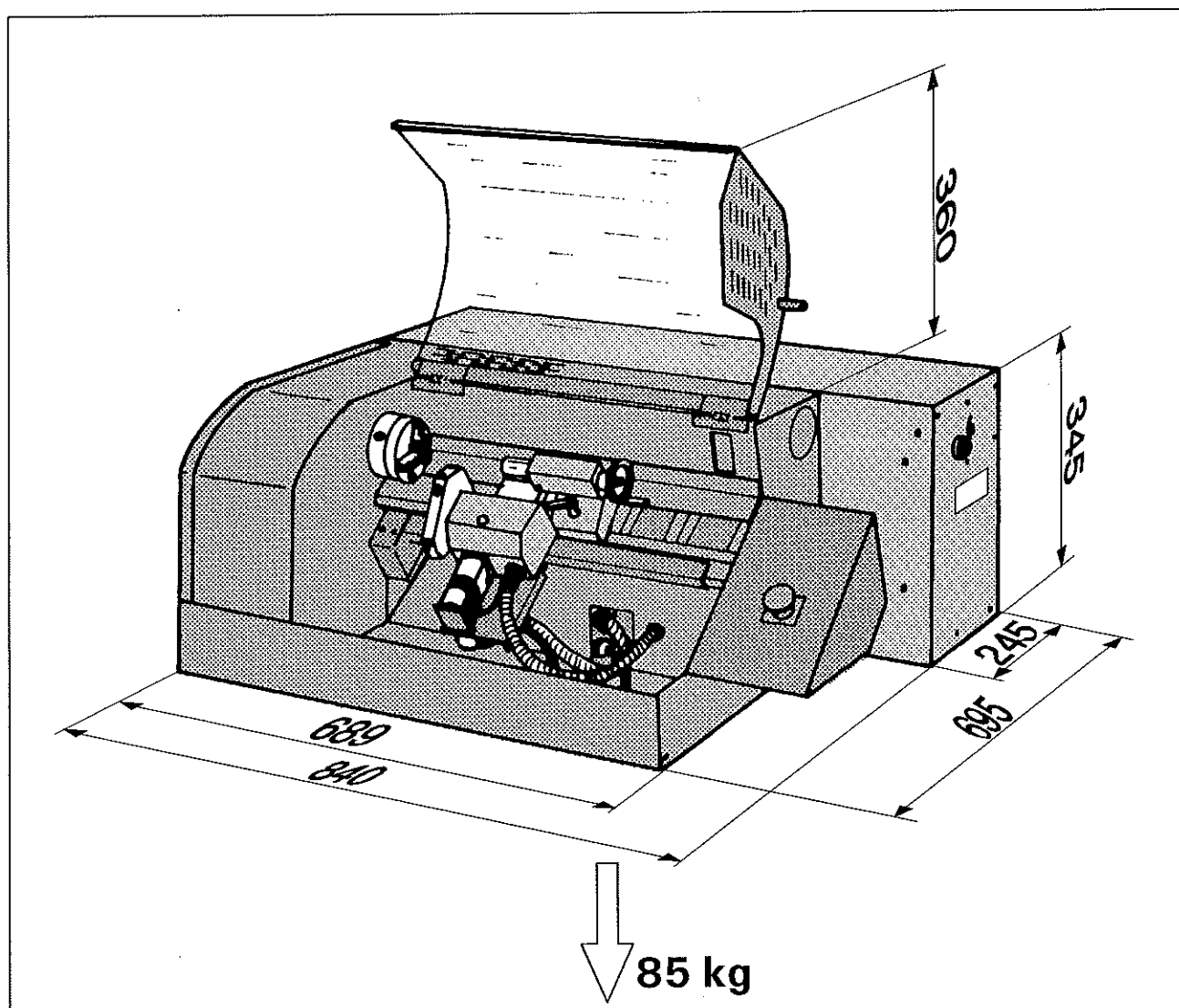


Scope of supply

Scope of supply

1. Inclined-bed turning lathe EMCO PCTURN 50 with quick-change toolholder, chip tray, splash board, tailstock, complete electric equipment, chip guard cover and safety package.
2. 1 three-jaw chuck
3. 1 hexagonal key SW8
4. 1 hexagonal key SW5
5. 1 hexagonal key SW4
6. 1 hexagonal key SW3
7. 1 single-ended spanner SW8
8. 1 ring spanner SW13
9. 1 operating instructions and programming instructions
10. 1 interface cable
11. 1 9-pole interface cable (RS 485)
12. 1 interface card RS 485 with end plug
13. 2 keys for main switch
14. Software (operating and programming surface according to order)

Dimensions of the machine



Dimensions of the machine

Installation requirement

Place the machine on a stable table.

Weight of machine 85 kg

Ideal table height approx. 650 mm

Installation width x depth 840 x 695 mm

Free foot space makes comfortable seating during operation.

Note:

Mind that the ventilation slots on the electric cabinet are not blocked or covered.

In case of insufficient ventilation disturbances on the machine due to too high temperature might occur.



Electrical connection of the machine



Safety instruction:

A ground wire contact has to be available at the socket.

Voltages: 100 V 1/N/PE~50/60 Hz
110 V 1/N/PE~50/60 Hz
230 V 1/N/PE~50/60 Hz

Connected load: 0.6 kVA

Preliminary fuse: max. 6.3 A slow

Max. voltage fluctuations: +5/-10%

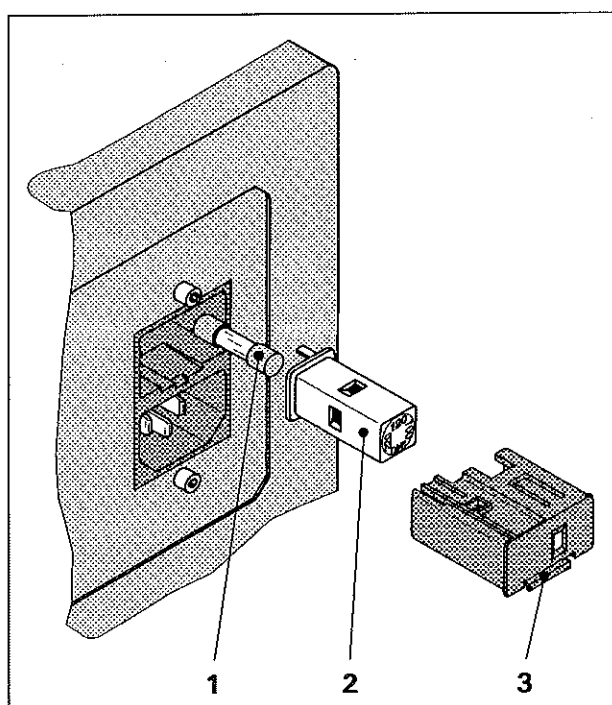
Adjustment of the required supply voltage

1. 110V and 230V mains supply

- Push up the latch on the casing (3) and remove the casing with the fuse (1) and the selector pin (2).
- Turn the selector pin (2) in such a way that in the window of the casing (3) the following voltage setting appears:

Mains supply	Setting in control window
110V mains	setting 100V
230V mains	setting 220V

- Put the whole unit with fuse (1), selector pin (2) and casing (3) again into the socket.



Adjustment of the supply voltage

2. 100V mains supply

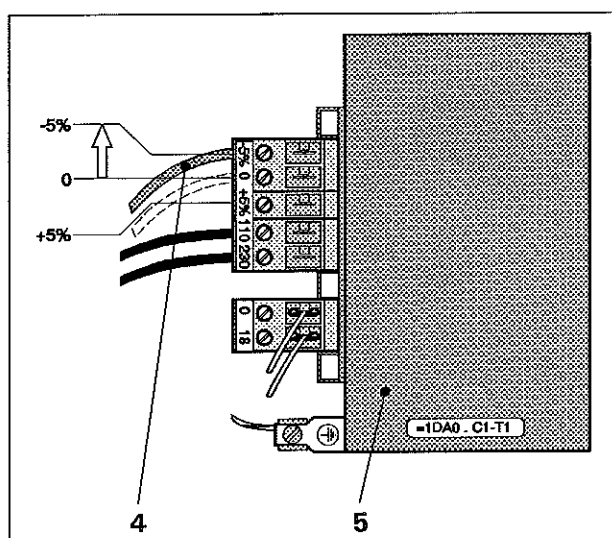
For setting the machine to a 100V mains supply the voltage allowance set on the transformer has to be modified.



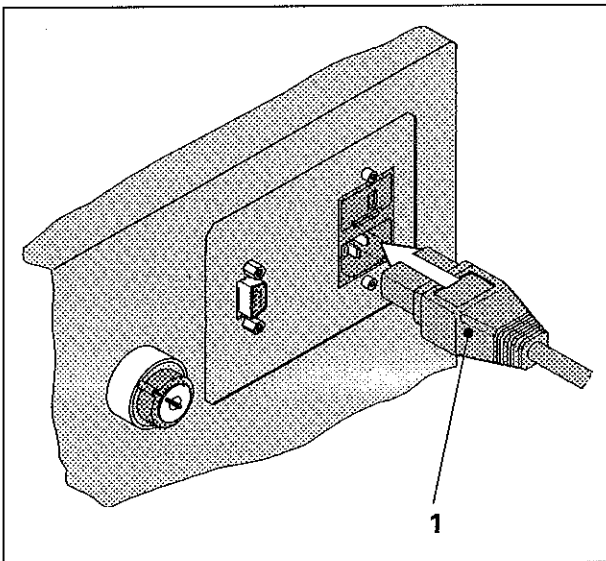
Safety instruction:

Modifications in the electric cabinet may only be carried out by an electrician expert.

- Unscrew cover of the electric cabinet on the rear side of the machine.
- Connect blue core (4) on the transformer (5) from setting "0" to setting "-5%".
- Remount cover of electric cabinet.
- Adjust the pin selector (2) in such a way that in the control window of the casing (3) the voltage setting 100V can be read (procedure see item 1 above on this page).



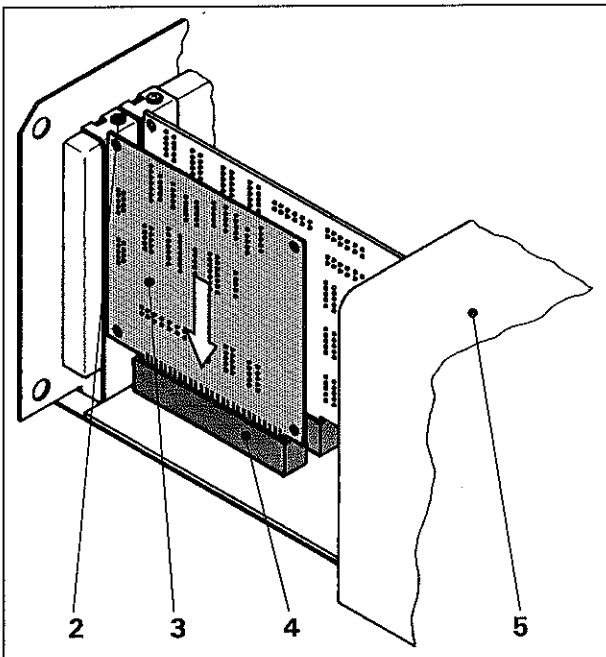
100V-voltage adjustment on the transformer



Electrical connection of the machine

Connection of the power cable

- Plug in the power cable (1) at the machine and the other end at a socket with ground wire contact.



Mounting the interface card

Installation of the interface card

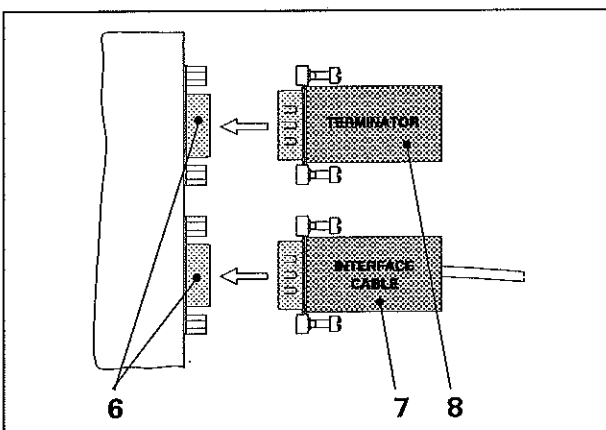
Prior to installing the software the interface card should be mounted.

The interface is a serial interface RS 485 and is used for connecting the computer with the machine.



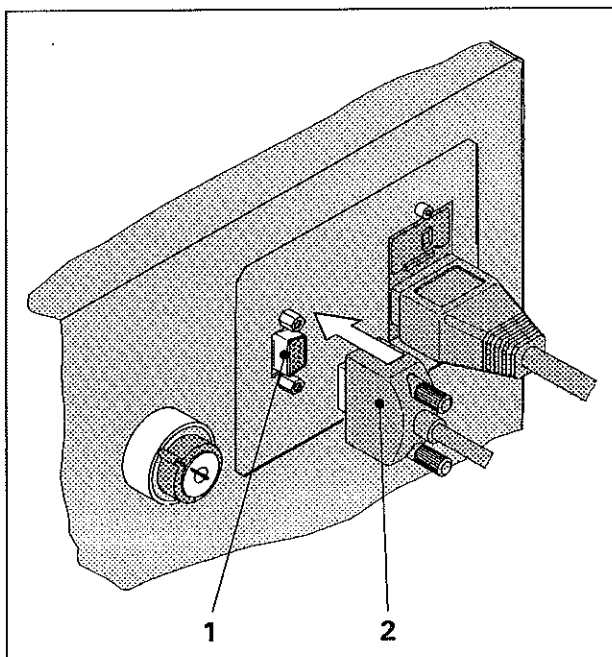
Safety instructions:

- The interface card may only be mounted if the computer is disconnected from the power supply (take off plug).
- The computer may be connected again to the power supply only if the frame is mounted again.



Connection of the interface cable

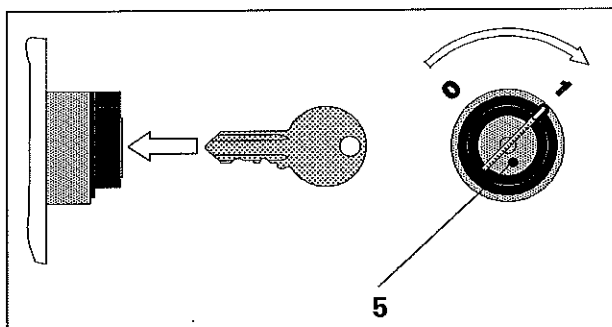
- Switch off computer and take off plug.
- Take off frame cover (5) of the computer.
- Insert interface card (3) in a free slot (4).
- Tighten interface card (2) with fixation screw (2).
- Remount frame cover (5).
- Connect power supply plug.
- Connect end plug (terminator-8) to one of either sockets (6) on the interface card.
- Connect the interface cable (7) to the second socket of the interface card.



PC connection to the machine

PC connection to the machine

- Plug the free end of the interface cable (2) into the socket (1) at the electric cabinet of the machine.



Key switch

Initial start-up

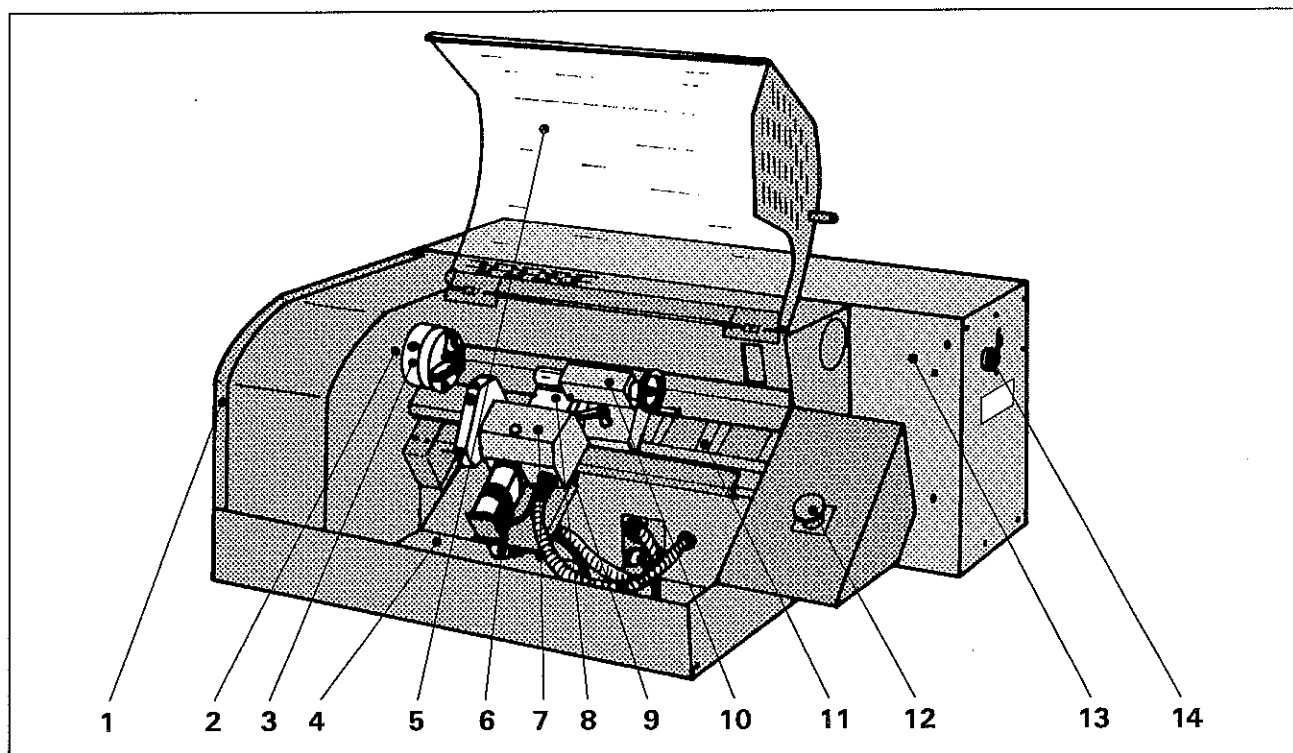
- Machine is to be cleaned from rust preventive agent with a clean cloth.
- Establish power connection.
- Switch on machine at key switch (5).

Note:

If the machine is not used for a longer period of time, slightly oil blank parts, protect machine against unauthorized start-up (take off key) and cover machine with dust protection.



Description of the machine



EMCO PC TURN 50

- | | |
|--------------------|-----------------------|
| 1. Wheel cover | 8. Cross slide |
| 2. Tailstock | 9. Longitudinal slide |
| 3. Three-jaw chuck | 10. Headstock |
| 4. Chip tray | 11. Machine bed |
| 5. Chip guard | 12. EMERGENCY-OFF key |
| 6. Step motor | 13. Electric cabinet |
| 7. Tool turret | 14. Key switch |

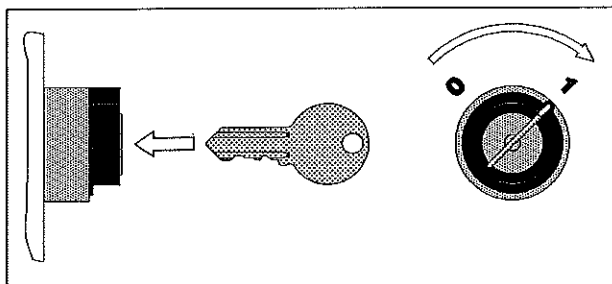
Operating elements

Key switch



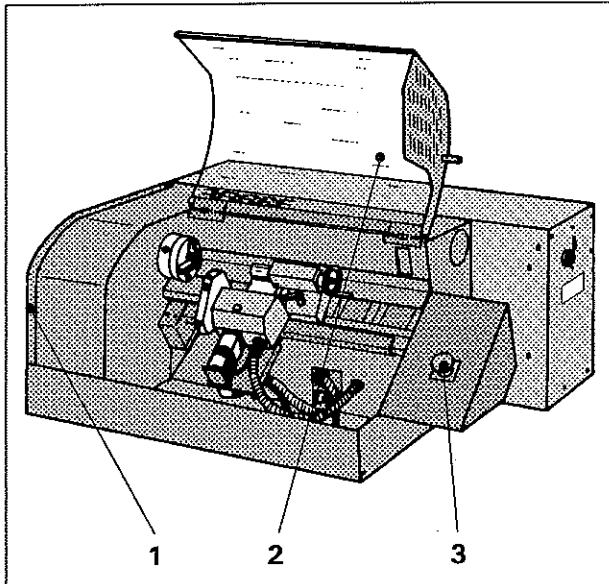
Safety instruction:

Always take off key to protect the machine against unauthorized start-up.



Key switch

With the key switch in position "1" the machine is ready for operation.
The main and feed motors are supplied with power.



EMERGENCY-OFF key, Safety package

EMERGENCY-OFF key



Safety instruction:

The EMERGENCY-OFF key is to be actuated immediately in any hazard situation.

When actuating the EMERGENCY-OFF key (3) the power supply to the main and feed motors is interrupted.

For unlocking turn knob in clockwise direction.

Safety package



Safety instruction:

Modifications on safety devices as well as bridgings of control devices are prohibited!

The safety package is contained in the base machine and facilitates generally risk-free operation of the machine.

The safety package comprises the following:

- Chip guard cover along the entire work area with limit switch (2)
- Wheel cover with limit switch (1)

Tailstock

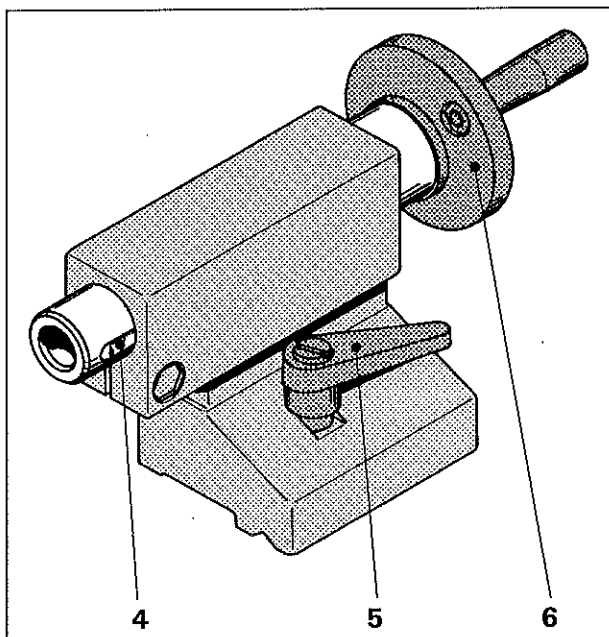
The tailstock serves for counter support of workpieces with the lathe centre and for drilling.

Sleeve diameter \varnothing 22 mm
 Inner sleeve taper MT1
 Stroke of centre sleeve max. 35 mm
 Stroke of centre sleeve with 1 hand turn .. 1 mm

The sleeve is moved via the hand wheel (6). At the sleeve side there is a millimeter scale (4) to adjust the sleeve stroke. Clamping of the tailstock is carried out at the clamping lever (5), the sleeve is clamped at the clamping lever at the reverse side of the tailstock.

The inner taper of the sleeve is used for mounting the tailstock accessory which is simply inserted into the taper.

When turning back the sleeve to the stop the tool taken up by the taper is ejected automatically.



Tailstock

Note:

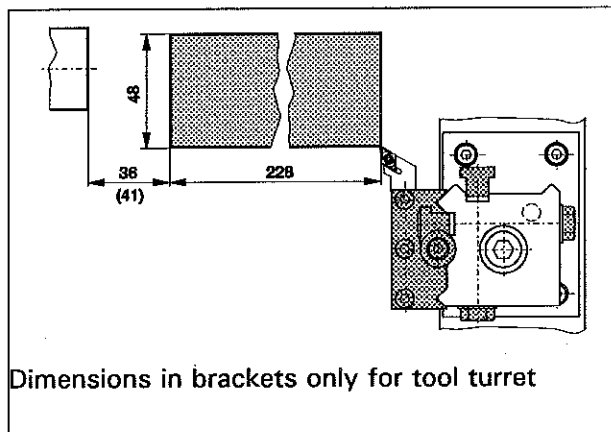
After clamping the tailstock always turn the shift clamping lever (5) to the right in order to avoid a collision with the tool turret.



The step motors

The step motors are used to drive the slides in X- and Z-direction.

feed speed 0-1500 mm/min
 minimum travel slide path 0,0025 mm
 travel path longitudinal slide 275 mm
 travel path cross slide 48 mm



Dimensions in brackets only for tool turret

Travel range of slides without clamping device

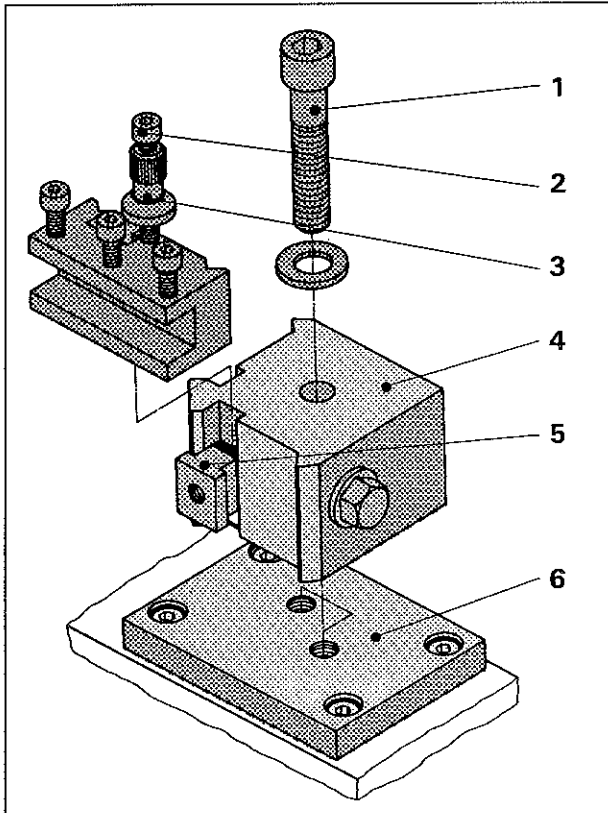
Limitation of travel paths

If you travel with the slides to the final positions or against an object you hear a "tack-tack" noise. The step motor receives a rotary momentum but cannot rotate any more. This will represent a burden to spindles, nuts and guides of the slides. The figure shows the maximum travel slide paths.

Note:

Mind that the travel range of the slides changes with the clamping device and the clamping mode applied (three-jaw chuck tailstock).





Mounting the toolholder

The toolholder

The toolholder is used for support of tools and can be mounted in a front or backward position at the cross slide.

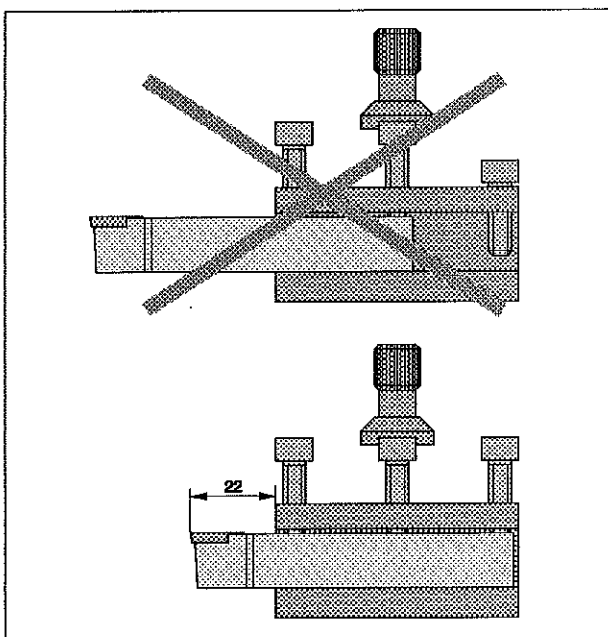


Safety instruction:

Mounting the toolholder and tool clamping may only be carried out during machine standstill.

Mounting the toolholder

- Place base (4) on toolholder support (6) and clamp with cheese head screw SW8 (1) in desired position.
- Release the T-nut (5) with the opposite hexagonal screw SW13 and thread in also the toolholder from above.
- Clamp tool.
- Screw off cheese head screw SW4 (2) and screw knurled nut (3) in or out until the main cutting edge of the clamped tool is exactly at center height.
- Screw in again cheese head screw (2) and tighten, thus securing the knurled nut against twisting.



Correct tool clamping

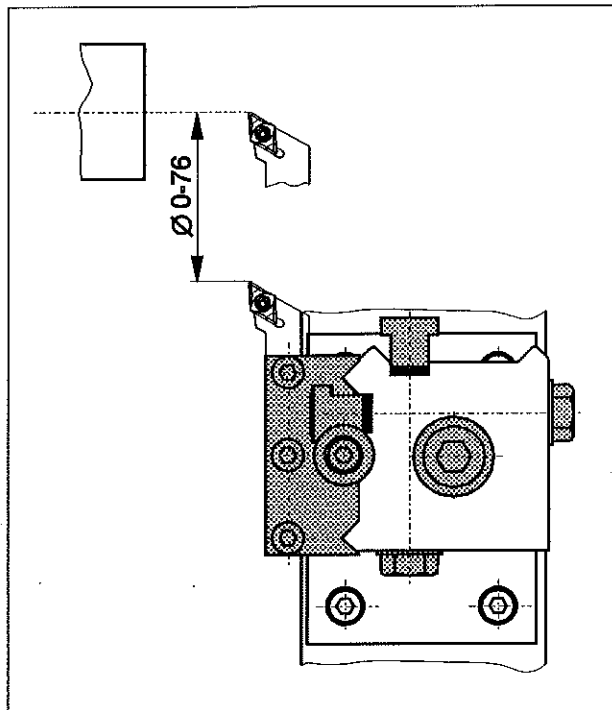
Tool clamping

The tool is to be clamped as short as possible at the toolholder.

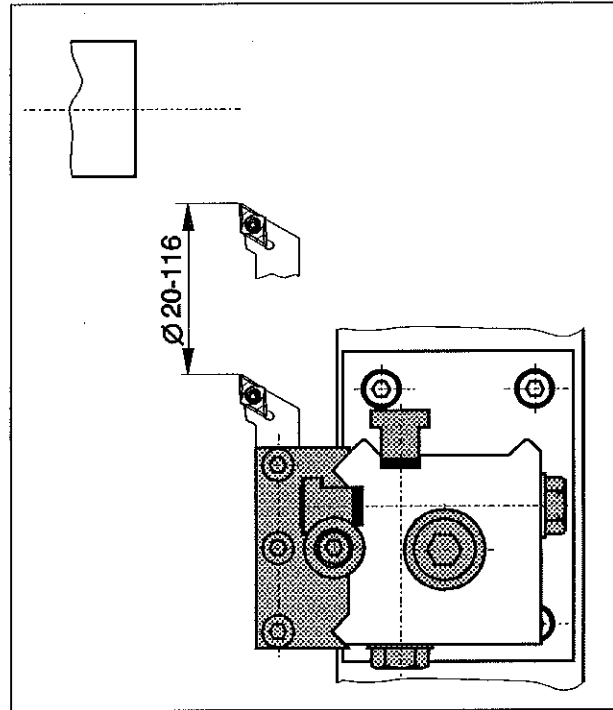
If a tool projects too much the tool will be resilient and cause "chattering", thus the surface on the workpiece will become coarse.

Positions of the toolholder

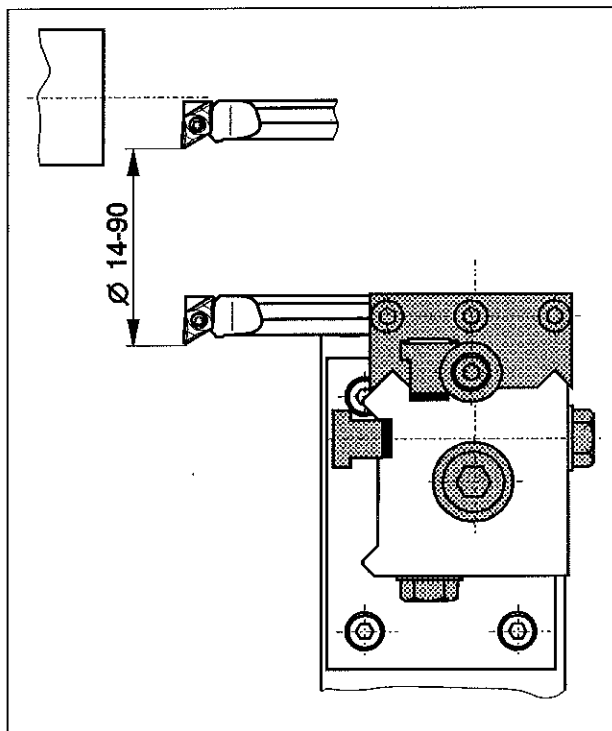
The speed ranges for external machining refer to tools with a projection of 22 mm.



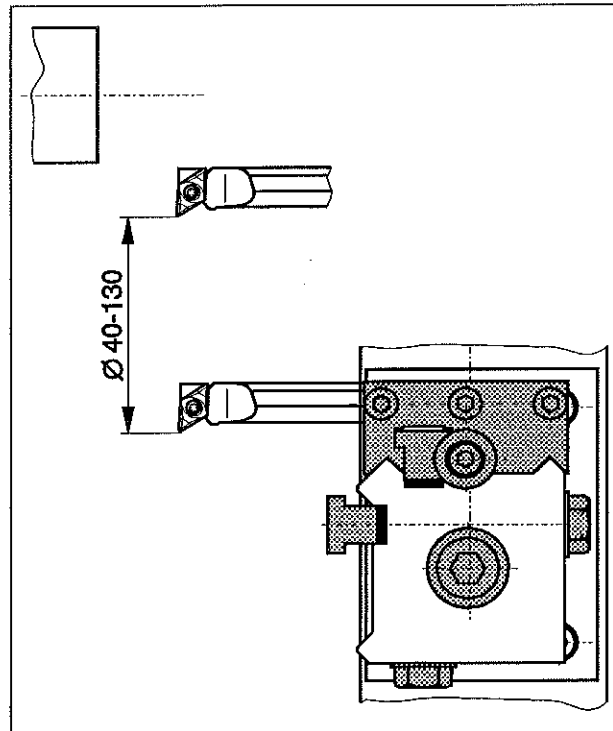
*Front position
External machining tools*



*Back position
External machining tools*



*Front position
Internal machining tools*

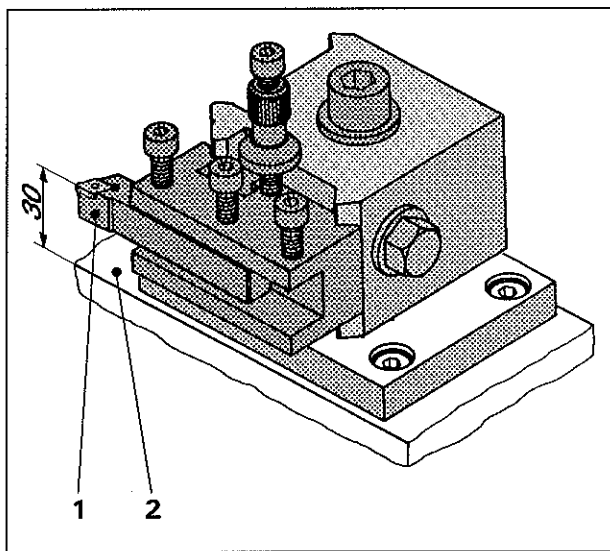


*Back position
Internal machining tools*

Adjustment of tools to centre height

Adjustment of tools to centre height means that the tool is adjusted in such a way that the edge tip is exactly in the rotary axis of the machine.

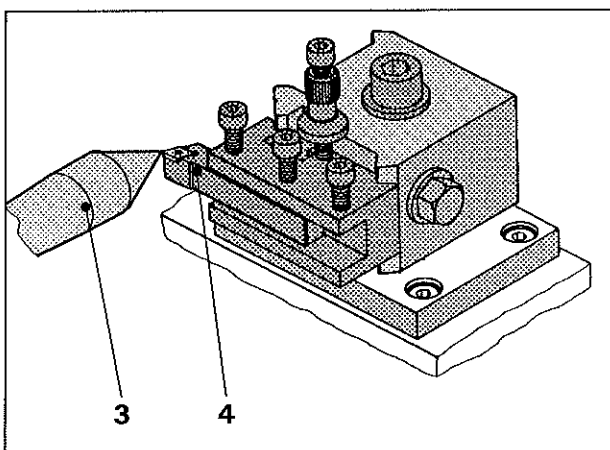
Adjustment may be carried out in two ways:



Measuring the centre height

1. Measuring the centre height

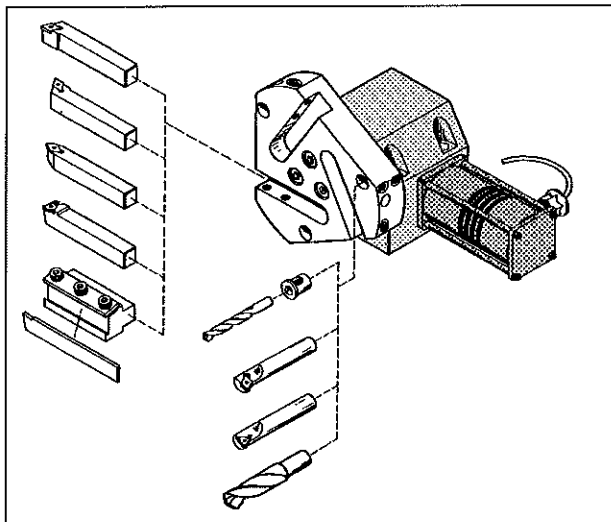
Adjust the tool in such a way that the distance between the cross slide surface (2) and the edge tip of the tool (1) is exactly 30 mm (adjustment see "Mounting the toolholder").



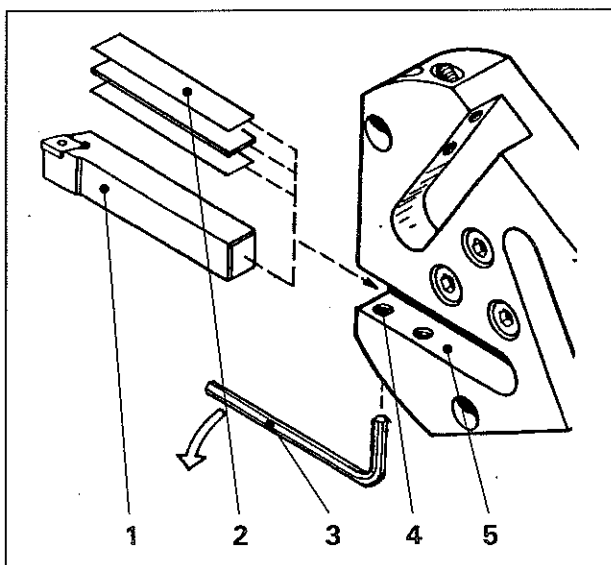
*Adjustment of centre height with reference tool
(centre tip in main spindle)*

2. Adjustment with reference tool

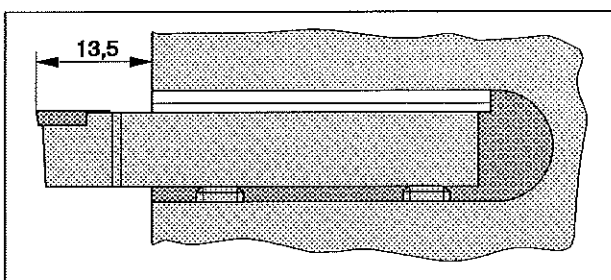
- Clamp as auxiliary means the centre tip (3) into the tailstock (MT1) or into the main spindle (MT2) or mount the chuck and clamp a centre drill.
- Adjust the tool (4) in such a way that the edge tip of the tool is exactly at the height of the centre tip or the centre drill tip (adjustment see "Mounting the toolholder").



Tool turret



Clamping of external machining tools



Adjust tool projection

The tool turret (accessory)

The EMCO Compact 5 PC lathe can also be provided with a tool turret. However, retrofitting is not possible since installation of the tool turret is carried out already in the manufacturer's plant.

Number of tool supports 6
(with 3 external and 3 internal machining tools each)

Maximum cutting circle diameter
turning tool 124 mm
cutting tool 140 mm

Clamping of tools and adjustment to centre height

Before clamping a tool, study operation of the tool turret via PC in chapter "C Operation and programming".



Safety instruction:

The tools may be clamped only during machine standstill.

External machining tools

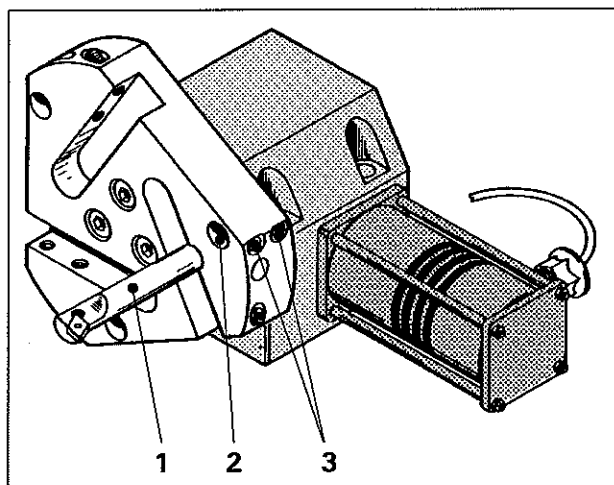
A maximum of 3 external machining tools can be clamped.

- Adjust desired tool turret position.
- Insert tool (1) in support (5) and adjust tool projection. The projection should be approx. 13.5 mm, with parting tools approx. 22 mm.
- Adjust tool to centre height by inserting shim platelets (2).
- The tool is clamped by tightening the two fixation screws (4) with a hexagon socket screw key SW 3 (3).



Note:

An aid for the adjustment to centre height is the value "30 mm" between tool edge tip and cross slide surface and/or the centre tip in the main spindle or tailstock or a clamped centre drill in the mounted 3-jaw chuck (see "adjustment of tools to tip height" in the chapter "Toolholder").



Clamping the internal tool

Internal machining tools

1. Internal tool

A maximum of 3 internal machining tools can be clamped.

Shaft diameter required $\varnothing 10$ mm

- The internal tool (1) is inserted in the support bore (2) at the tool turret.
- Turn tool (1) in such a way that the edge tip of the tool is exactly at rotary axis level.
- Clamp tool (1) by tightening the tool fixation screws (3) by means of a hexagon socket screw key SW3.

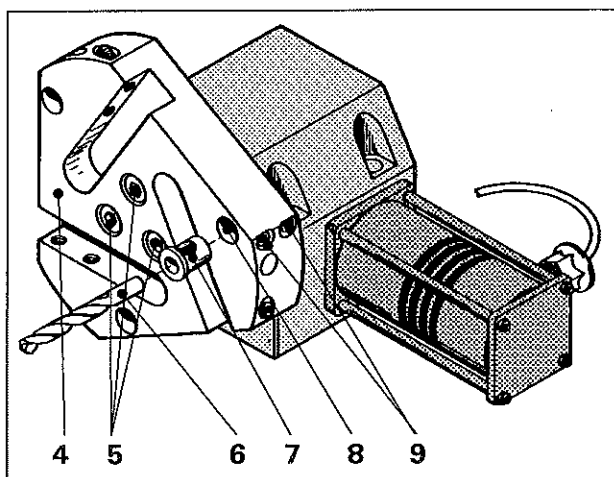
2. Drills

Maximum shaft diameter $\varnothing 10$ mm

- Push clamping sleeve (7) with adequate internal diameter on drill (6).
- Insert drill (6) with clamping sleeve (7) in support bore (8) of the tool turret.
- Clamp drill and clamping sleeve by tightening the two fixation screws (9) with a hexagon socket screw key SW3.

If the centre height is incorrect proceed as follows:

- Release the three hexagon socket screw keys SW5 (5).
- Turn tool turret disk (4) in such a way that the centre height of the drill is correct.
- Tighten again the three hexagon socket screws (10).



Clamping of drills

Note:

An aid for the adjustment to centre height is the value "30 mm" between tool edge tip and cross slide surface and the centre tip in the main spindle or tailstock or a clamped centre drill in the mounted 3-jaw chuck (see "adjustment of tools to centre height" in the chapter "Toolholder").

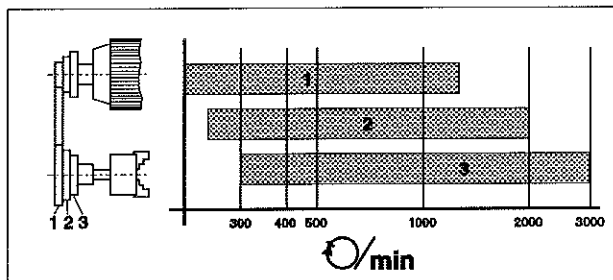


Adjustment of speed

The main spindle is driven by the drive motor via a V-belt.

By changing the V-belt 3 different speed ranges can be set.

The picture on the side is mounted inside the wheel cover and indicates the speed ranges with the corresponding belt position:



Speed plate

Belt position	Speed range (rpm)
1	130 to 1300
2	200 to 2000
3	300 to 3000

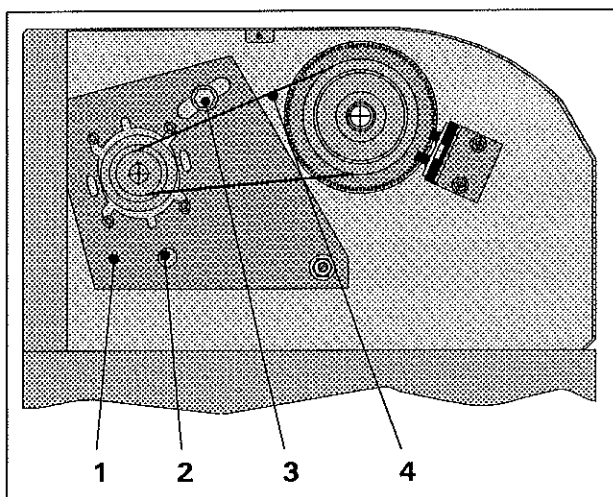
Switch-on of the main spindle as well as exact speed adjustment is carried out via the computer (PC). The speed display carried out on the PC screen (see "C Programming and operation").

Changing the V-belt



Safety instruction:

The V-belt may be changed only during machine standstill.



Changing the V-belt

- Open wheel cover.
- Untighten the hexagon head cap screw SW13 (3).
- Lift motor plate (1) at handle (2).
- Change V-belt (4) in desired position.
- Press motor plate (1) with the handle (2) slightly downward until the V-belt is tensioned.
- Tighten the screw (3) in this position.
- Close wheel cover.

Note:

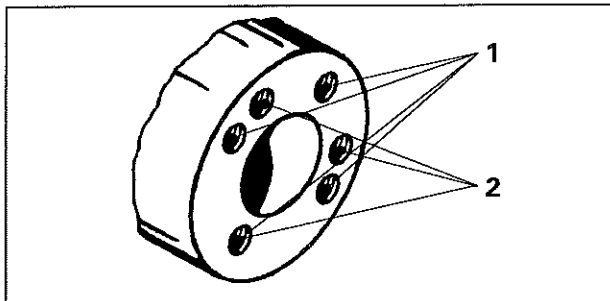
- Always adjust V-belt in such a way that the desired speed is in the upper range of the belt position. Thus, a larger torque is achieved and motor hot running is avoided.
- After changing the V-belt the V-belt position must be in any case set in the setting data of the software (see specific user instructions). This is necessary to avoid a wrong reaction of the monitoring devices and to guarantee a correct alignment between main and feed drives (thread cutting!)

Clamping devices (accessories)

Summary

Main spindle

The main spindle is manufactured according to the manufacturer's standard. Mounting of the chucks with 3 fixation screws is carried out at the support threads (2) at the spindle nose, the chucks with 4 fixation screws are mounted at the support threads (1).



Spindle nose of main spindle

3- or 4-jaw-chuck $\varnothing 80$ mm

Three-jaw chuck

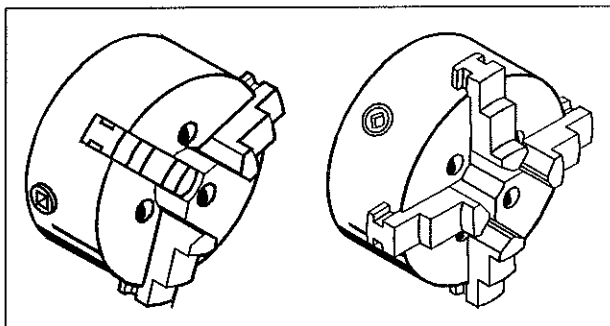
Order no. V3U 176

Serves for centre clamping of round, hexagonal and twelve-sided workpieces.

Four-jaw chuck

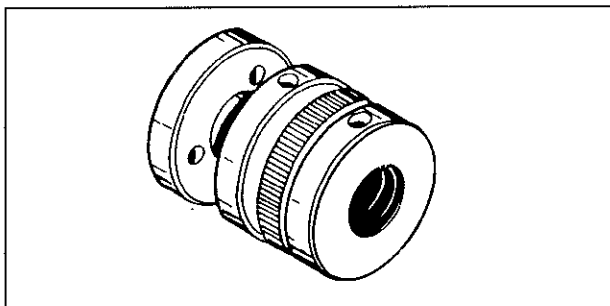
Order no. V3U 178

Serves for centre clamping of round, four-sided and eight-sided workpieces.



*Three-jaw chuck
Four-jaw chuck*

*V3U 176
V3U 178*



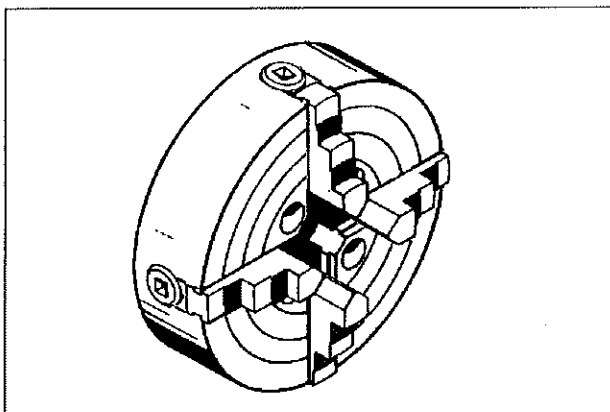
Collet chuck attachment

200 040

Collet chuck attachment

Order no. 200 040

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



Clamping plate

200 420

Clamping plate $\varnothing 90$ mm

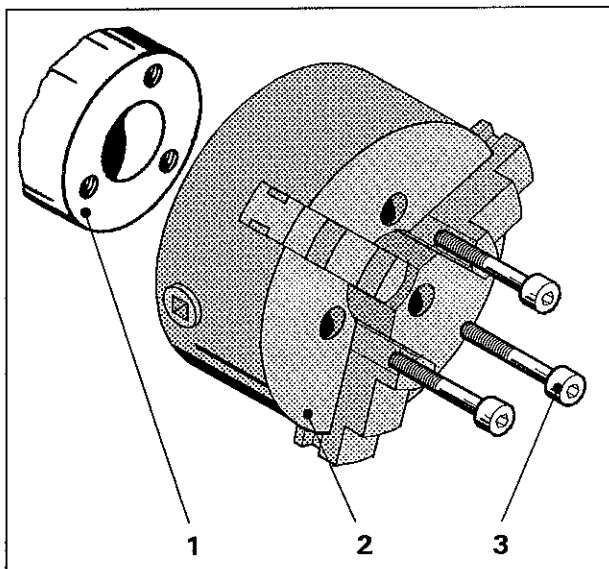
Order no. 200 420

With the clamping plate workpieces can be clamped centrically and eccentrically. Each jaw can be adjusted and reversed individually.

The 3-/4-jaw chuck

Also mind the instructions enclosed with the chuck.

Mounting the chuck



Mounting the chuck

Safety instructions:

- The chuck may be mounted only during machine standstill.
- For chuck mounting only screws M5x40 according to DIN 912 may be used. With longer screws the chuck might not fit tightly on the spindle nose, in case of too short screws these might tear out.

- Spindle nose (1) and chuck (2) bore have to be free from dirt.
- Screw the chuck (2) with the 3 cheese head screws M5x40 (3) onto the spindle nose and tighten screws.

Clamping ranges

Safety instructions:

- The maximum admissible clamping ranges must never be exceeded. Exceeding them may lead to jaw fracture.
- Jaw projection must never be more than 12 mm since otherwise there is risk of jaw fracture.
- After clamping of workpieces take off the chuck key.

d_5 min.	d_6 max.	d_7 min.	d_8 max.	d_9 max.	d_{10} min.	d_{11} min.	d_{12} max.	d_{13} max.
2	29	21	73	97	2	25	80	100

Maximum clamping ranges of the 3-/4-jaw chuck (values in[mm])

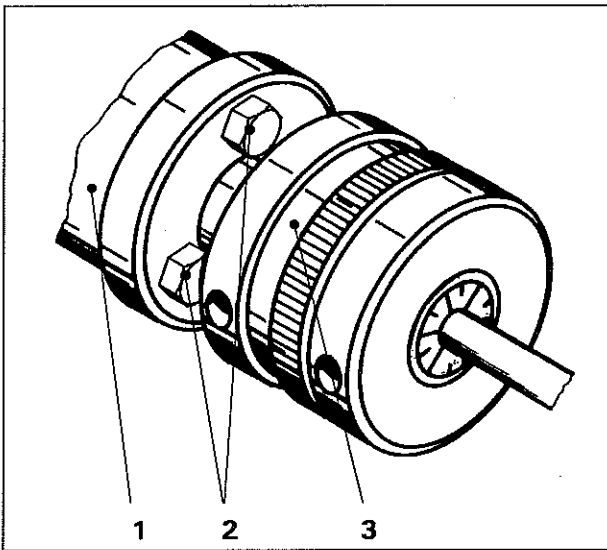
The collet chuck attachment

Mind the instructions enclosed in the collet chuck attachment.

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

Clamping range 1.5 to 14 mm

Collet type ESX 25



Mounting the collet chuck attachment

Mounting the collet chuck attachment



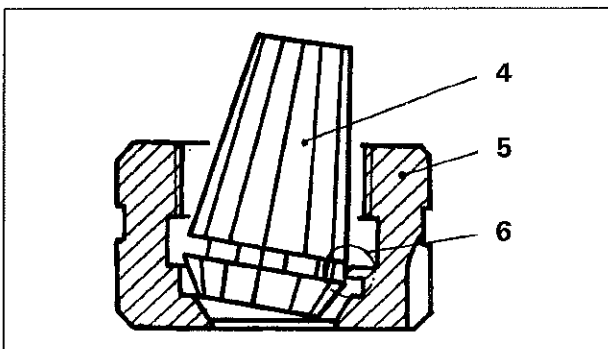
Safety instructions:

- The chuck may be mounted only during machine standstill.
- For chuck mounting only screws M5x10 according to DIN 933 may be used. With longer screws the chuck might not fit tightly on the spindle nose, in case of too short screws these might tear out.

- Spindle nose (1) and chuck bore (2) have to be free from dirt.
- Screw the collet chuck (3) attachment with the three cheese head screws M5x10 (2) onto the spindle nose and tighten screws.

Mounting the collet chucks

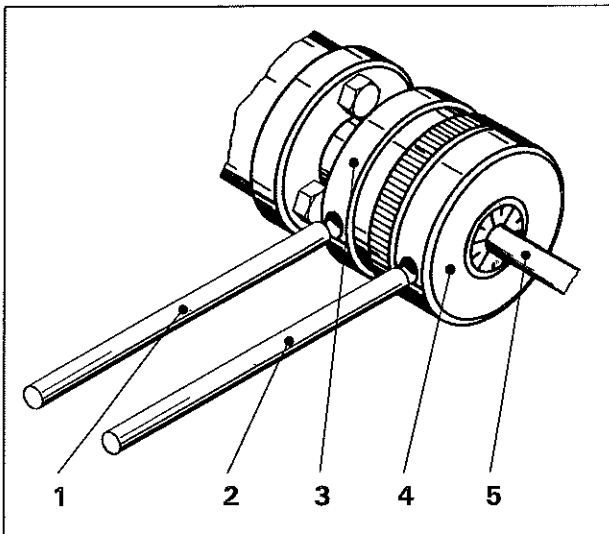
- Loosen clamping nut (5).
- Insert collet chuck (4) obliquely into the clamping nut (5) so that the eccentric ring engages in the groove of the collet chuck.
- Screw collet chuck with clamping nut onto collet chuckholder.



Mounting the collet chucks

Dismounting the collet chucks

- Tighten clamping nut (5).
- Via the eccentric ring (6) in the clamping nut the collet chuck (4) is pressed out when screwing off the clamping nut.



Clamping of workpieces

Clamping of workpieces

- Mount adequate collet chuck.
- Insert workpiece (5) into collet chuck. Mind that the workpiece is pushed in far enough into the collet chuck. When clamping too short the workpiece may be ejected from the attachment.
- Tighten clamping nut (4) with clamping pin (2). Countertighten the collet chuckholder (3) with the second clamping pin (1).

Clamping ranges



Safety instruction:

The clamping ranges indicated in the table always have to be complied with. With too large collet chucks the workpieces cannot be clamped safely.

Nominal diameter of collet chuck	Clamping range	
	[mm]	[inch]
2.0	1.5-2.0	1/16-5/64
2.5	2.0-2.5	3/32
3.0	2.5-3.0	7/64
4.0	3.0-4.0	1/8-9/64-5/32
5.0	4.0-5.0	11/64-3/16
6.0	5.0-6.0	13/64-7/32-15/64
7.0	6.0-7.0	1/4-17/64
8.0	7.0-8.0	9/32-19/64-5/16
9.0	8.0-9.0	21/64-11/32
10.0	9.0-10.0	23/64-3/8-25/64
11.0	10.0-11.0	13/32-27/64
12.0	11.0-12.0	7/16-29/64-15/32
13.0	12.0-13.0	31/64-1/2
14.0	13.0-14.0	33/64-17/32-35/64

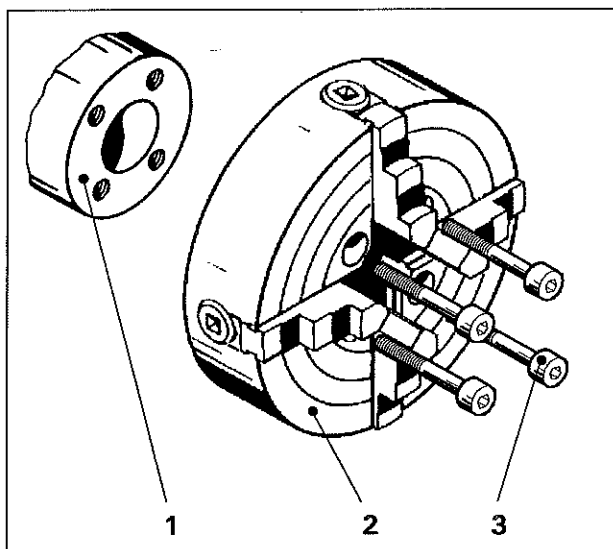
The clamping plate

Also mind the instructions enclosed with the chuck.

The clamping plate is used for clamping workpieces with round, square, rectangular or irregular cross-section.

Each jaw can be individually adjusted, the workpieces can be clamped centrally as well as eccentrically.

Mounting the chuck



Mounting the chuck



Safety instructions:

- The chuck may be mounted only during machine standstill.
- For chuck mounting only screws M5x40 according to DIN 912 may be used. With longer screws the chuck might not fit tightly on the spindle nose, in case of too short screws these might tear out.
- Spindle nose (1) and chuck bore (2) have to be free from dirt.
- Screw the chuck with the four cheese-head screws M5x25 (39) onto the spindle nose and tighten the screws.

Clamping ranges



Safety instructions:

- The maximum admissible clamping ranges must never be exceeded. Exceeding them may lead to jaw fracture.
- Jaw projection must never be more than 12 mm since otherwise there is risk of jaw fracture.
- After clamping of workpieces take off the chuck key.

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

Maximum clamping ranges of the clamping plate (values in [mm])

Maintenance of the machine

**Safety instruction:**

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

Clean the machine carefully from chips and other dirt after each operation.

Slightly oil the guideways with slideway oil.

Main spindle bearings and ball screws of the slide guides are maintenance-free.

Slightly oil the tailstock sleeve with rust-protecting slideway oil.

Slideway oil:

DIN designation: CGLP DIN 51 502 ISO VG 68

e.g.:

BP	Maccurat 68
CASTROL	Magnaglide D 68
ESSO	Febis K 68
KLÜBER	Lamora Super Pollad 68

Technological data

1. Cutting speed V

$$V \text{ [m/min]} = \frac{D \text{ [mm]} \times \pi \times S \text{ [rpm]}}{1000}$$

V [m/min] cutting speed
 D [mm] dia. of workpiece
 S [rpm] speed of main spindle

The max. admissible cutting speed depends on:

- **Material of workpiece**
 The higher the strength of the material, the lower the cutting speed.
- **Material of tool**
 Hard metal tools allow for a higher cutting speed than HSS-tools.
- **Feed value**
 The larger the feed the lower the cutting speed.
- **Depth of cut**
 The larger the depth of cut the smaller the cutting speed.

Cutting speed for programming exercises on the Compact 5 PC:

Workpiece material: Automatic aluminium
 Cutting tool: hard metal
 Cutting speed for turning: 150-200 m/min
 Cutting speed for parting-off: 60-80 m/min
 Feed size for turning: 0,02-0,1 mm/rev.
 Feed size for parting-off: 0,01-0,02 mm/rev.

2. Speed S

$$S \text{ [rpm]} = \frac{V \text{ [m/min]} \times 1000}{D \text{ [mm]} \times \pi}$$

The cutting speed and the workpiece diameter enable you to calculate the speed of the main spindle.

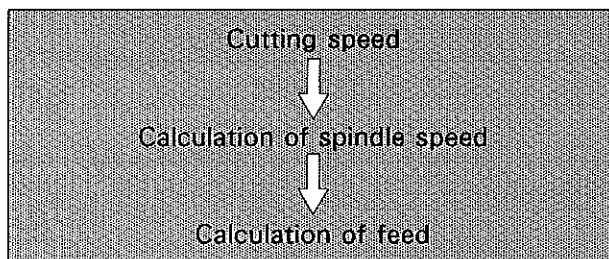
3. Feed F

On the Compact 5 PC the feed F is programmed in [mm/min].

$$F \text{ [mm/min]} = S \text{ [rpm]} \times F \text{ [mm/rev]}$$

F [mm/min] feed in [mm/min]
 F [mm/rev.] feed in [mm/rev.]
 S [rpm] speed of main spindle

Summary



The charts on the following page save the calculation work.

Finding the cutting values

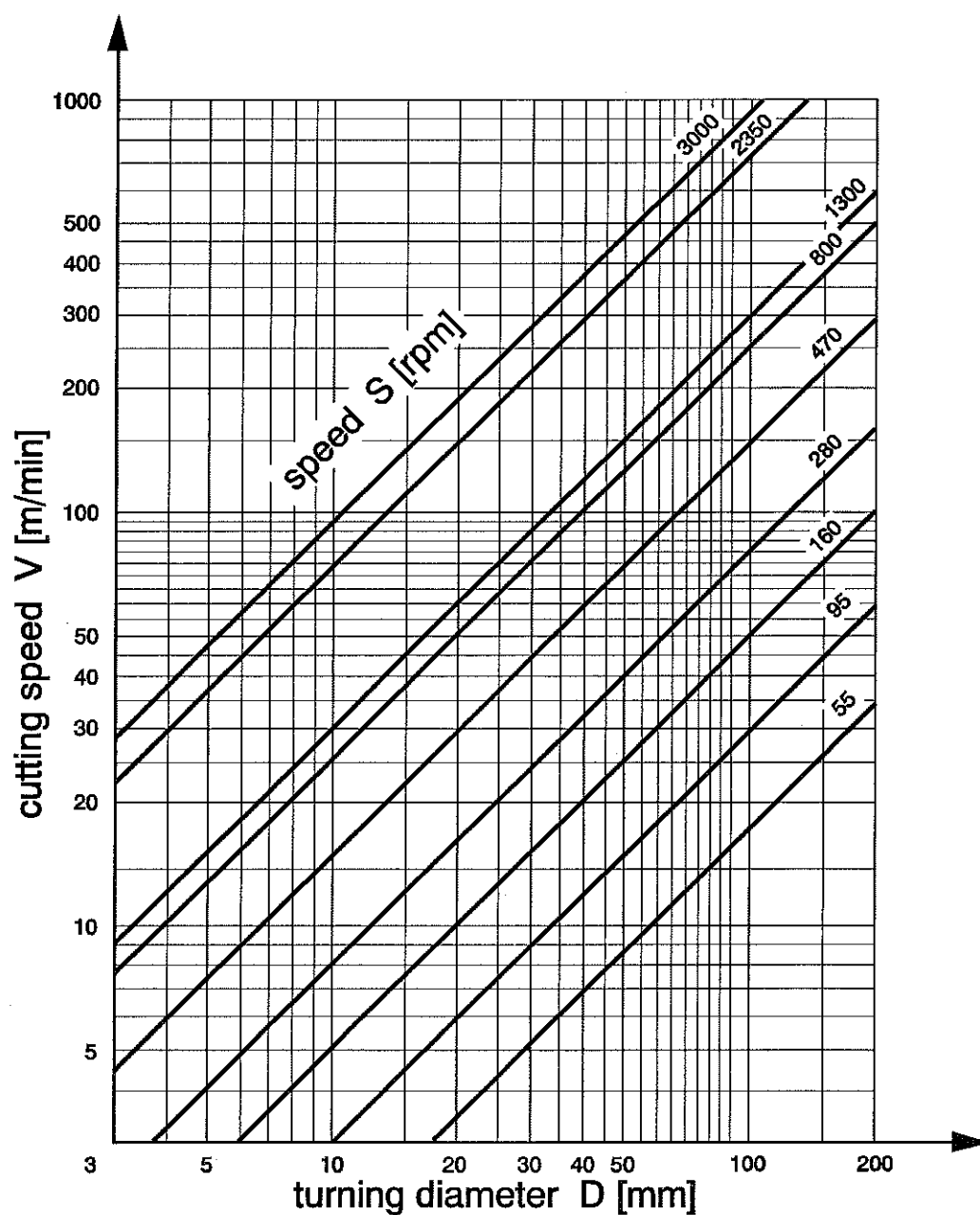
Example

You know:

- turning diameter $D = \varnothing 50 \text{ mm}$
- cutting speed $V = 150 \text{ m/min}$

You want to know

- spindle speed $S = 1300 \text{ rpm}$



Finding the spindle speed S with selected V and D

Finding the feed speed

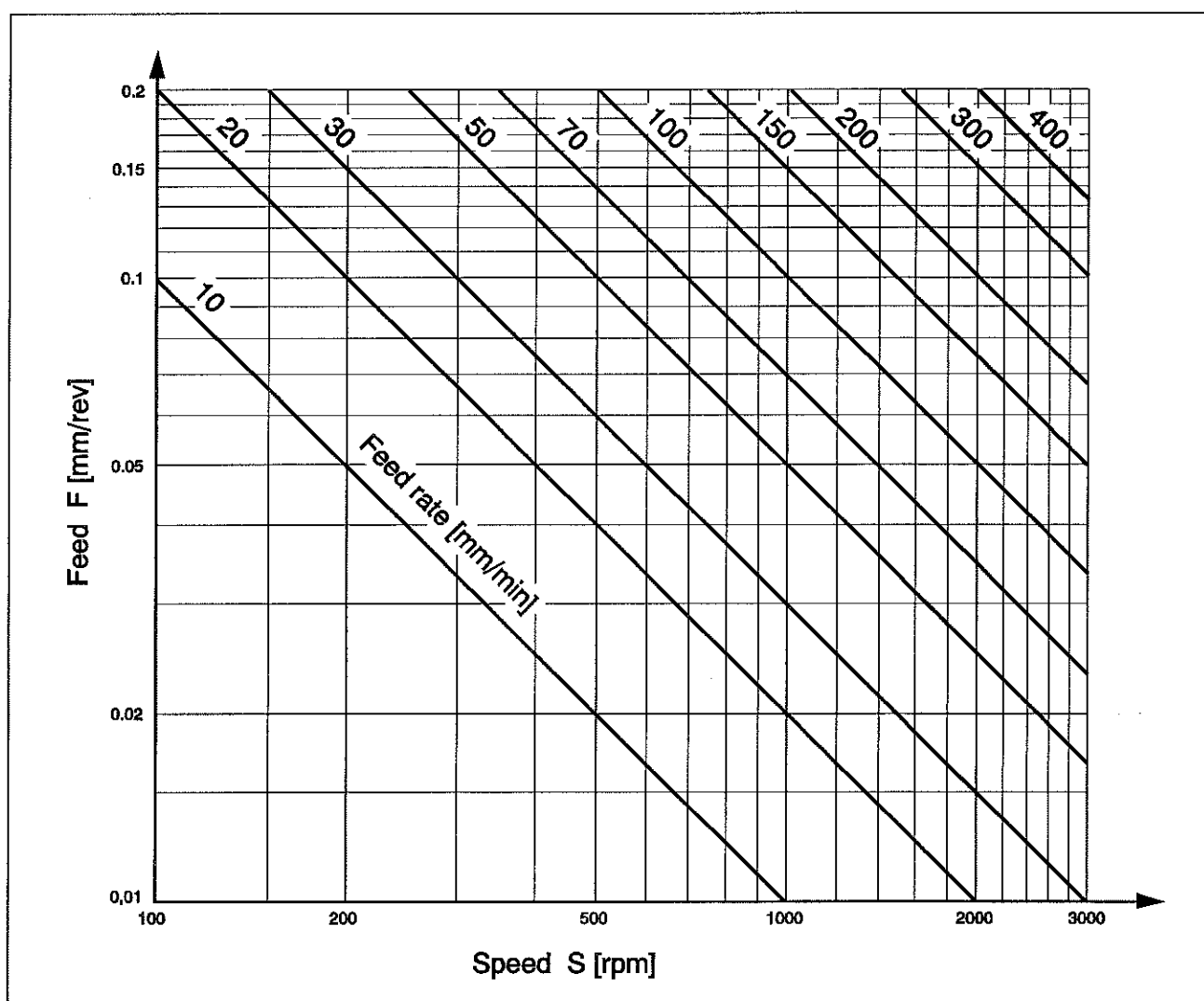
Example

You know

- main spindle speed $S = 1700$ rpm
- feed $F = 0,06$ mm/rev.

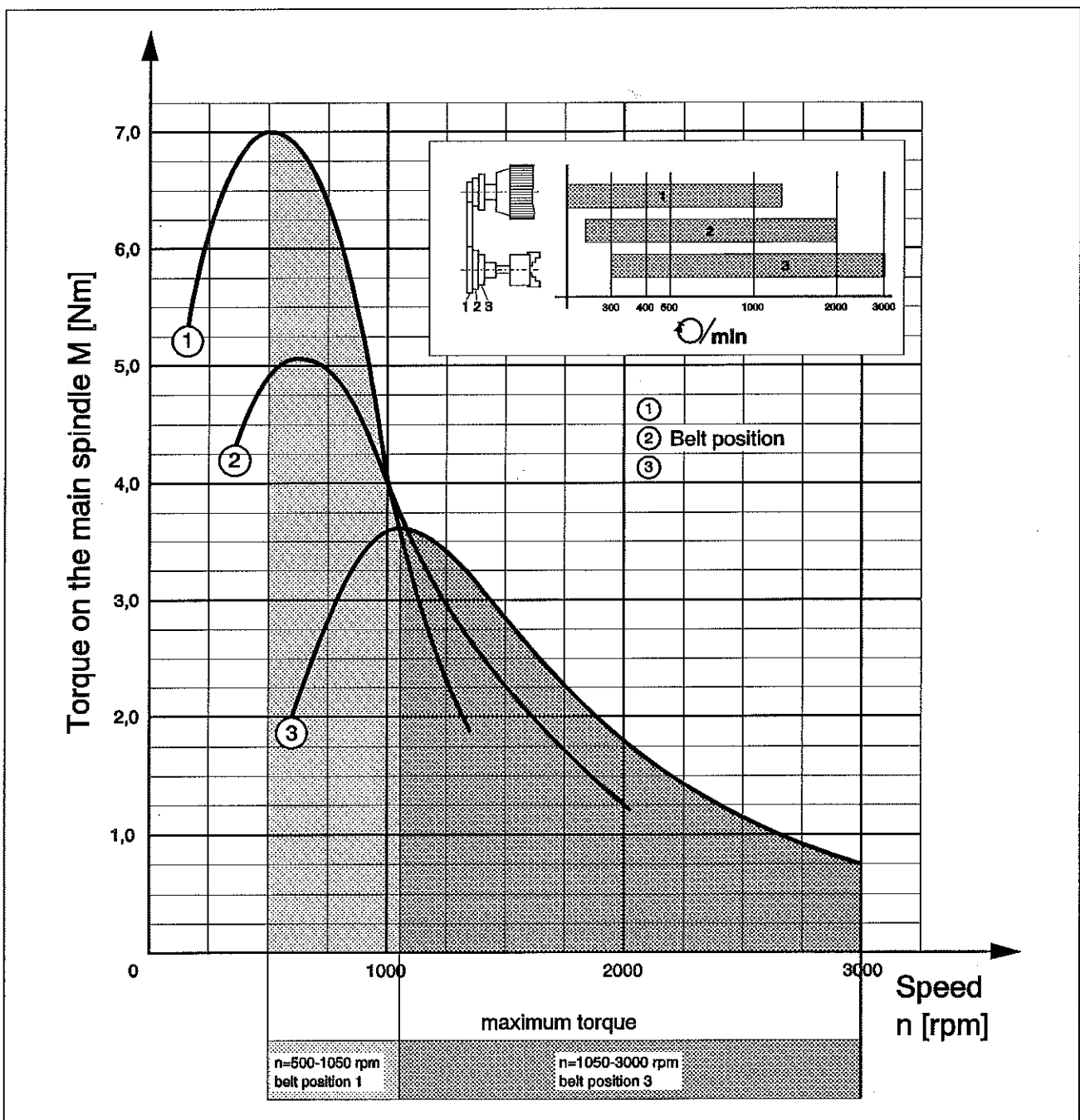
You want to know

- feed speed $F = \text{approx. } 100$ mm/min



Finding the feed F of [mm/rev] in [mm/min]

Speed-torque characteristic line

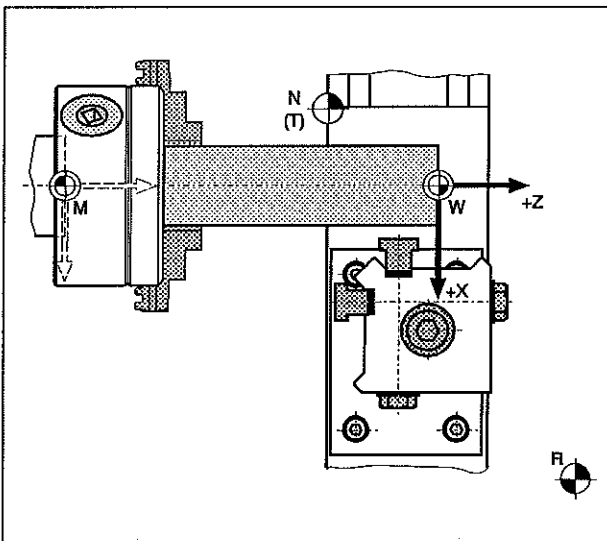


For the desired speed the speed range (1, 2 or 3) offering the largest torque is to be set.

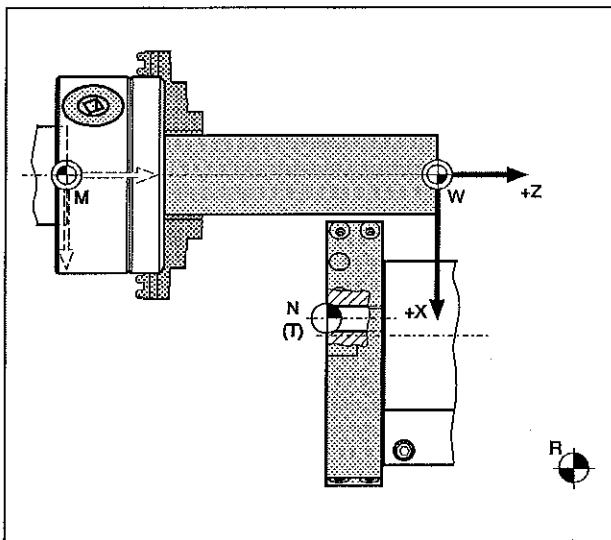
Examples:

You achieve 500 rpm with all three belt positions but with belt position 1 you get the largest torque.

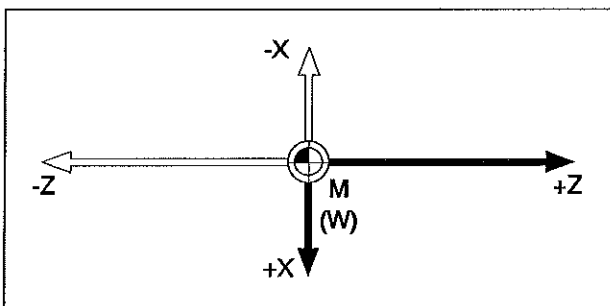
For speed ranges exceeding 1000 rpm only belt position 3 is to be used.



Points at the machine with toolholder



Points at the machine with tool turret



Coordinate system

Points at the machine - coordinate system

Machine zero point M

The machine zero point M lies in the rotary axis at the front of the spindle nose.

The machine zero point is the origin of the coordinate system.

Reference point R

The reference point is a fixed point on the machine. It serves for the calibration of the measuring system.

The reference point must be approached after each switch-on of the machine to communicate the exact distance between the points M and N (T) to the control.

Workpiece zero point W

The workpiece zero point W can be freely selected by the user.

By programming a workpiece zero point the origin of the coordinate system M is displaced from the machine zero point into the workpiece zero point W.

Tool-holding fixture reference point N (T)

With respect to this point we distinguish between machines with toolholder and machines with tool turret. From this point the distances to the tool tip are measured.

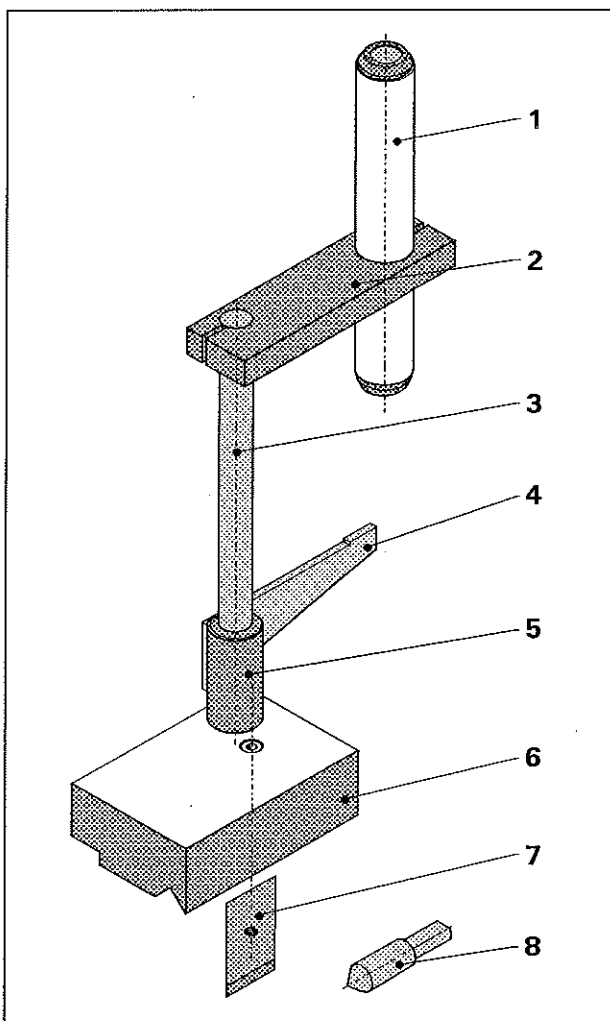
Machines with toolholder:

The tool-holding fixture reference point N (T) lies exactly on the left front edge on the surface of the cross slide (see upper figure).

Machines with tool turret:

The tool-holding fixture reference point N (T) lies exactly on the front surface of the tool turret disk in the axis of the support bore for the internal machining tools.

However, the support bore must be swivelled in (see figure at the centre).



Optical tool pre-setting device

The optical tool pre-setting device (accessory)

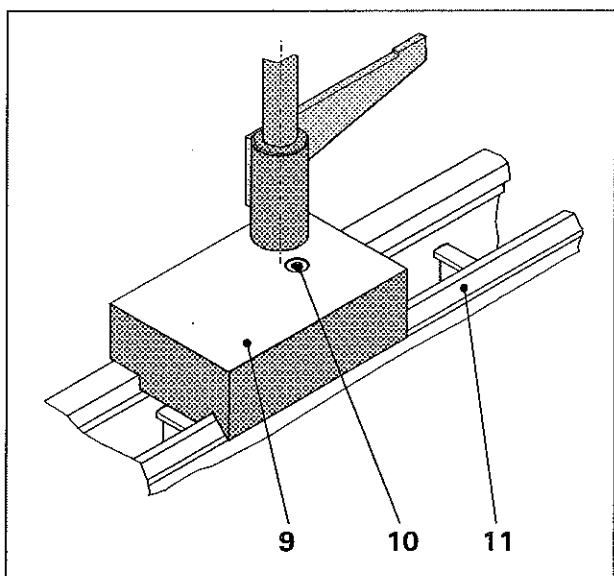
Order no. 260 060

By means of the optical tool pre-setting device the distance between tool-holding fixture reference point N (T) and the blade tip of the tool is measured.

Scope of supply

- Tube (1) with enlargement factor 10x with index arm (2)
- Levelling element (4) with guide (5) for adjusting the tools to tip height.
- Base (6) with gauge column (3) and clamping plate (7)
- Reference tool (8)

Another, less accurate tool measurement method is marking a trial workpiece with known diameter and known length (see user instructions of the respective software).



Mounting the optics onto the machine bed

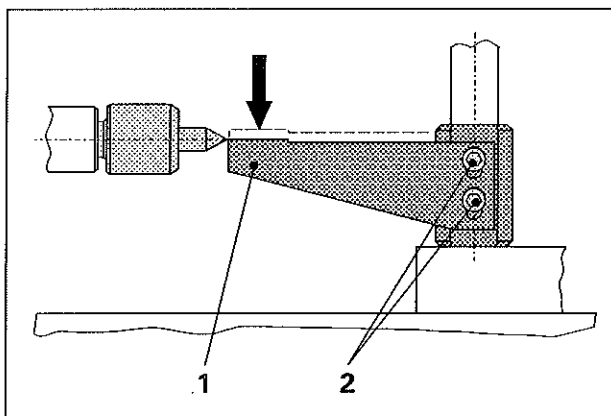
Mounting the optics

Safety instruction:

Mounting and adjusting work on the machine may only be carried out with machine switched off.



- Place optical pre-setting device with the base (9) between spindle nose and tool turret on the machine bed (11) and tighten with the hexagon socket screw SW5 (10). Mind that the clamping plate engages on the lower side of the bed guides.



Adjust levelling element to tip height

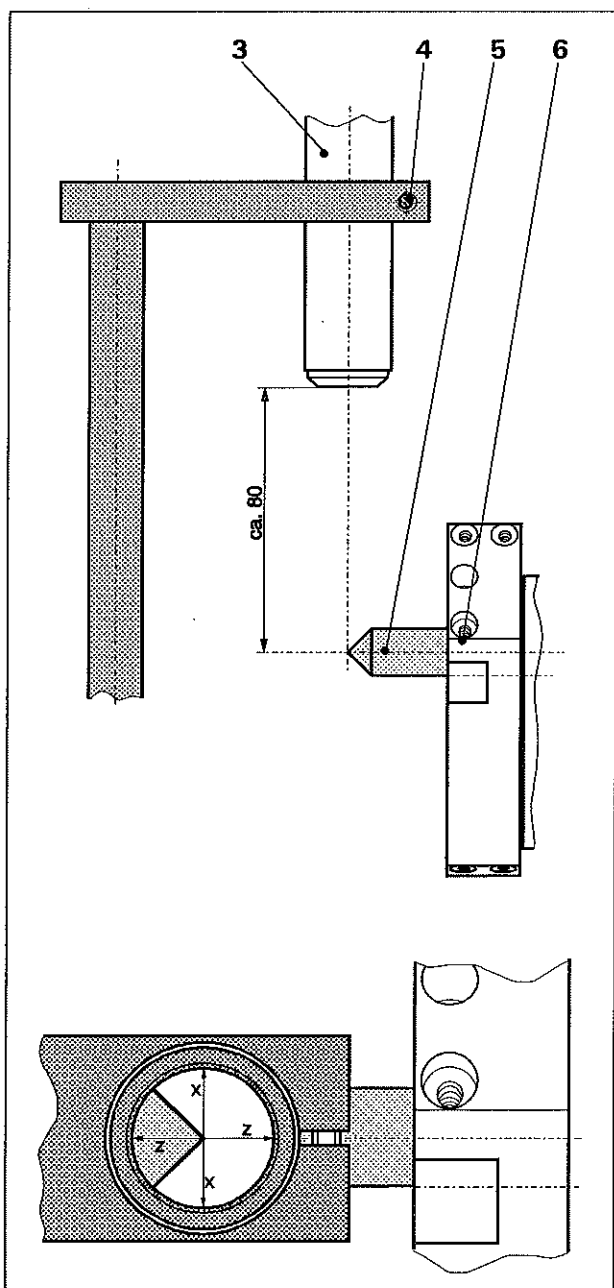
Adjustments at the optics

Adjust levelling element to tip height

- By loosening both hexagon socket screws (2) the levelling element (1) can be regulated in its height.

The tip height can be either adjusted by means of a reference tool (rolling center punch in the tailstock) or measured (see under "toolholder" above in this chapter).

Once adjusted the levelling element serves as setting gauge of all tools to tip height.



Adjusting the tube

Adjust tube

- Clamp reference tool (5) into one of the support bores for internal machining tools on the tool turret disk (6).
 - Swivel in reference tool (5).
 - Traverse slide in such a way that the reference tool is exactly below the optics.
 - Set the tube (3) by loosening the hexagon socket screw SW3 (4) in such a way that a precise picture of the tip of the reference tool can be seen when looking through.
- The distance between tip of the reference tool and the lower edge of the tube is approx. 80 mm.

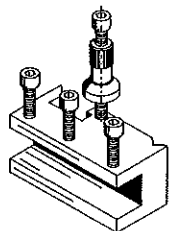
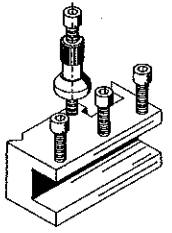
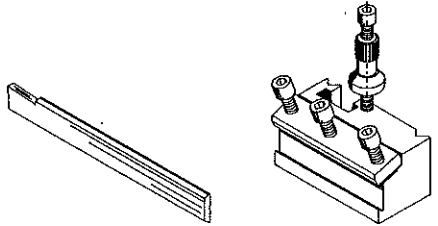
Note:

When looking through the lens system in the tube you see the pictures of the tool tips mirrored in both axes (inverted picture).

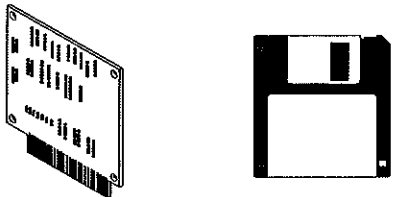
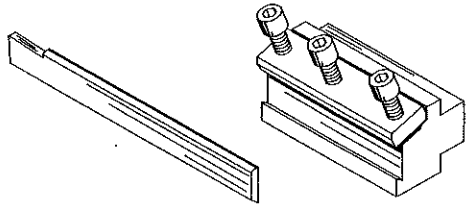
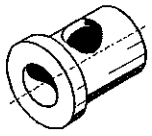
- Turn the tube until the reticle in the tube is aligned exactly in X and Z direction.
 - Clamp the tube in this aligned position by means of the hexagon socket screw SW3 (4).
 - The optical tool pre-setting device is ready for the tool measurement.
- Further information concerning the execution of the tool measurement can be seen from the user instructions for your software.

Accessories

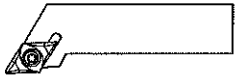
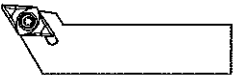
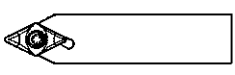
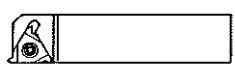
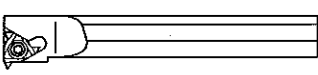
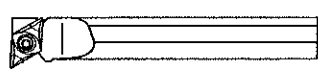
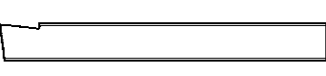
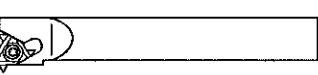
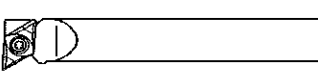
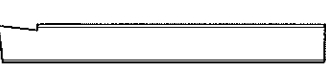
Accessories for quick-change device

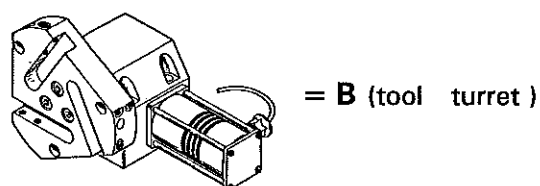
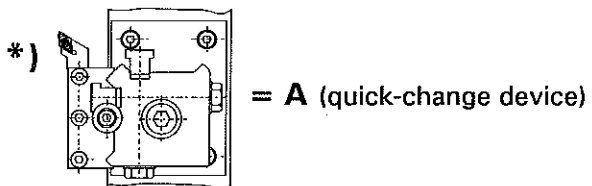
	<p>Standard toolholder</p> <p>For supporting side tools and threading tools</p>
	<p>Drilling bar holder</p> <p>For supporting boring bars and internal thread tools</p>
	<p>Cutting-off toolholder</p> <p>Cutting-off toolholder complete with 1 cutting-off tool</p>

Tool turret accessories




	<p>Memory programmable control (SPS)</p> <p>Necessary for controlling the tool turret from the PC</p>
	<p>Cutting-off toolholder</p> <p>Cutting-off toolholder complete with 1 cutting tool</p>
	<p>Reducing bushes</p> <p>8 reducing bushes $\varnothing 2$ up to $\varnothing 9$ mm for clamping drills.</p>

Turning tools

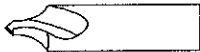
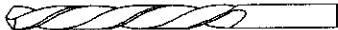

Tool no.	Description		suitable for *)
1		Side tool right	A, B
2		Side tool left	A, B
3		Side tool neutral	A, B
4		External thread tool maximum pitch 1.5 mm	A, B
5		Internal thread tool maximum pitch 1.5 mm	A
6		Boring bar	A
7		Cutting-off tool for cutting-off toolholder	A
8		Internal thread tool ø10x60 mm maximum pitch 1.5 mm	B
9		Boring bar ø10x60 mm	B
10		Cutting-off tool for cutting-off toolholder	B



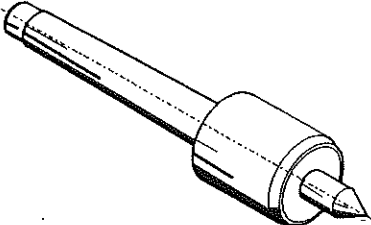
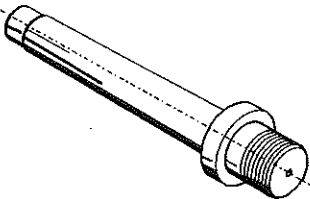
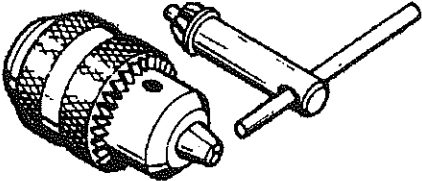
HM-indexable inserts

Description		suitable for tool no.
	Set of 10 HM-indexable inserts	1, 2, 3, 6, 9
	Set of 5 HM-indexable inserts for external threads, maximum pitch 1.5 mm	4
	Set of 5 HM-indexable inserts for internal threads, maximum pitch 1.5 mm	5, 8

Drilling tools

	Centre drill A8, HSS, DIN 633
	1 set of twist drills $\varnothing 2$ bis $\varnothing 12$ mm, graduation 1 mm
	Twist drill $\varnothing 12$ mm

Tailstock accessories

	Lathe centre MK1 Lathe centres with 3 bearings for the counter-support of long workpieces.
	Plug-in pivot MK1 Plug-in pivot with connection thread M14x1 for the support of the chuck
	3-jaw chuck Chuck clamping from 1-8 mm, connection thread M14x1, with chuck wrench

Declaration of conformity

Product: PC-controlled lathe for training

Machine data:	Model	Type
	EMCO	PC TURN 50

Address of manufacturer: Emco Maier Ges.m.b.H
Friedmann-Maier-Str. 9
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, 21.12.95

Authorized person: Head of quality department Dr. Wilfried Brugger

