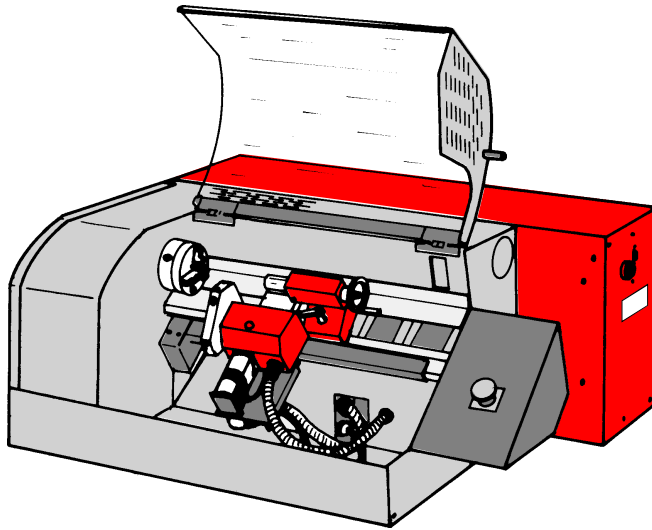


Emco PC Turn 55-II

Inclined-bed turning lathe



Machine Description

Emco PC Turn 55-II

Ref. No. EN 4306 Edition C2002-08

EMCO Maier Ges.m.b.H.
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emco
Industrial training systems

Introduction

For more than five decades EMCO has been developing 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 via a control keyboard.

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.

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

EC conformity



The CE mark certifies, together with the EC declaration of conformity, that the machine and the guidelines are in conformity with the regulations of the directives applicable to the products.

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Adequate use

The machine is designed for turning of machinable metals 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.

In case of installation of the machine in an overall plant and/or with other modifications in the machine, their conformity with the CE provisions as well as the directives and regulations have to be established with the start-up of the plant and/or the machine. Before that, a start-up is definitely prohibited.

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 instructions

Read the instructions completely before you start up the machine.

Prior to start of work get familiar with all functions and operating elements. During the work it might be too late.

Electrical connection

Electrical connection of the machine must only be carried out by an authorized electrician expert. Local protection measures have always to be borne in mind.

Observe local regulations

Observe your country's regulations for work involving machine tools and CNC machine tools

Authorized operation

The machine may only be operated by authorized persons.

Authorized persons are exclusively persons familiar with operation, maintenance and repair and who are instructed on hazards.

Protect machine

Protect the machine (main switch can be locked) during adjustment, maintenance and repair work against unauthorized start-up.

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 are prohibited.

In case of hazards EMERGENCY-OFF

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

Tool change

Change machining tools only during standstill of machine. Only use tools and sealing bolts with O ring on the shaft, always close all stations (otherwise danger of coolant and chip entry in the internal area of the tool turret!).

Personal protective equipment

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

Mind that your hair does not get caught in the machine (in such a case wear hair protection).

Protect your eyes with safety-glasses.

When removing chips use a chip hook and gloves.

Setting, maintenance and adjusting work

All setting, maintenance and adjusting work must only be carried out during standstill of machine and EMERGENCY-OFF key actuated.

The inspection and maintenance instructions for machine and accessories are to be observed. This saves costs, excludes major standstills of the machine, reduces hazards and saves the environment.

Tools, operating materials and spare parts

Only use tools, operating materials and original spare parts recommended by EMCO.

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

Disposal of noxious materials

When handling auxiliary and operating materials (cooling lubricants, cleaning solutions, lubricating oils, etc.) observe the safety regulations for these materials.

Take adequate measures for the appropriate storage and disposal of noxious materials.

Claim

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

In case of complaints, damage, confusions and spare part orders always indicate the machine number, electric number and software version.

Machine supervision

Never leave running machine unattended.

Before leaving the working place switch off machine and protect against unauthorized start-up (lock main switch and remove key).

Technical data of the machine

Working area		
centre height	[mm]	65
distance between centres	[mm]	280
swing over bed	[mm]	ø130
swing over cross slight	[mm]	ø60
max. part length	[mm]	215
max. turning diameter (chuck-parts with tailstock)	[mm]	ø52
travel of cross slide (useable)	[mm]	48
travel of longitudinal slide (useable)	[mm]	236
Headstock		
spindle nose according to manufacturer's standard		
hole through work spindle	[mm]	ø16
inner taper		MT2-shortened
chuck diameter	[mm]	ø74
clamping plate diameter	[mm]	ø90
spindle speed range	[rpm]	120 – 4000
mechanical speed steps		2
Torque at the main spindle	[Nm]	max. 14
Drive motor		
3-phase AC-motor		
nominal motor speed	[rpm]	1400
capacity	[W]	750
Feed motors		
step resolution	[µm]	0,5
working feed in X/Z (infinitely variable)	[mm/min]	0 – 2000
rapid traverse in X/Z	[mm/min]	2000
maximum feed force X/Z	[N]	1000
Medium positioning variation X/Z according to DIN VDI 3441	[µm]	6 / 8
Tool turret		
number of workholders	[1]	8
workholders internal / external	[1]	4 / 4
Shank section for ext. tools	[mm]	12 x 12
Shank bore for int. tools	[mm]	ø10
Tailstock		
centre sleeve diameter	[mm]	22
stroke of centre sleeve	[mm]	35
tailstock taper		MT 1

Subject to technical modifications!

Electrical connection		
power supply, reversible	[V]	100/110/230
maximum voltage fluctuations	[%]	+5/-10
frequency	[Hz]	50/60
connected load	[kVA]	0,85
main fuse	[A-slow]	12
Machine dimensions, weight		
Height of the turning axis above floor	[mm]	320
total length x total width x total height	[mm]	840 x 696 x 395
total weight of the machine	[kg]	85
Sound pressure level		
Medium sound pressure level	[db(A)]	65
With the following conditions		
Measuring method: enveloping surface according to DIN 45635		
Operating mode: maximum speed during idle running		

PC-Configuration

	Minimum configuration
IBM or IBM compatible	Celeron 433 MHz
Hard disk	4 GB
Drives	3½" floppy drive CD-ROM drive
Operating system	Windows 98
Main memory	64 MB
Graphics card	8 MB VGA colour graphics card
Screen	Colour screen 14"
Keyboard	MF-2
BUS (free slot)	1 free ISA or EISA slot for the installation of the interface board

Subject to technical modifications!

Declaration of conformity

Product: PC-controlled lathe for training

Machine data:	Model	Type
	EMCO	PC Turn 55-II

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; EN 954-1;
EN 1037; EN 1050; EN 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 22th, 1998 for the alignment of the legal stipulations of the member states for machines (98/37/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).

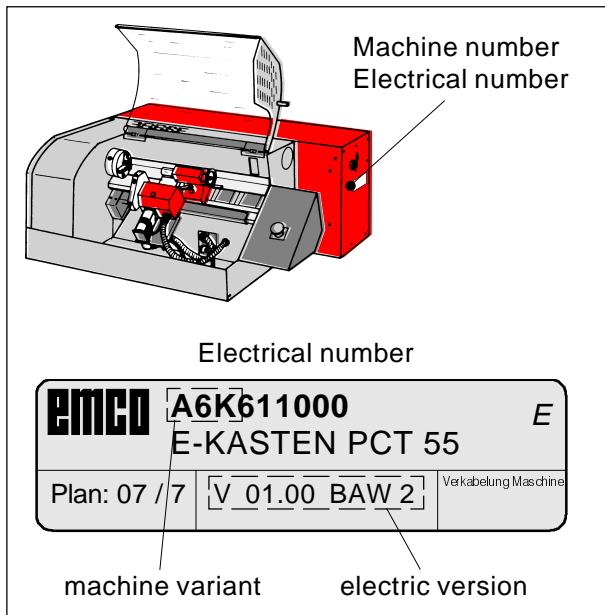
Furthermore, the conformity of the subject product with the above-mentioned standard bases and regulations is effective.

Place, date: Hallein, 27.12.00

Authorized person: Head of quality department Peter Binggl



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 and the electric number is on the machine side below the key switch.

On the plate with the electric number you'll find:

- machine variant (e.g. "A6P")
- Electric version (e.g. "V 01.00 BAW 2")

The available circuit diagrams for this machine you will find in the Electrical Documentation, which is put inside of the electrical cabinet of the machine.

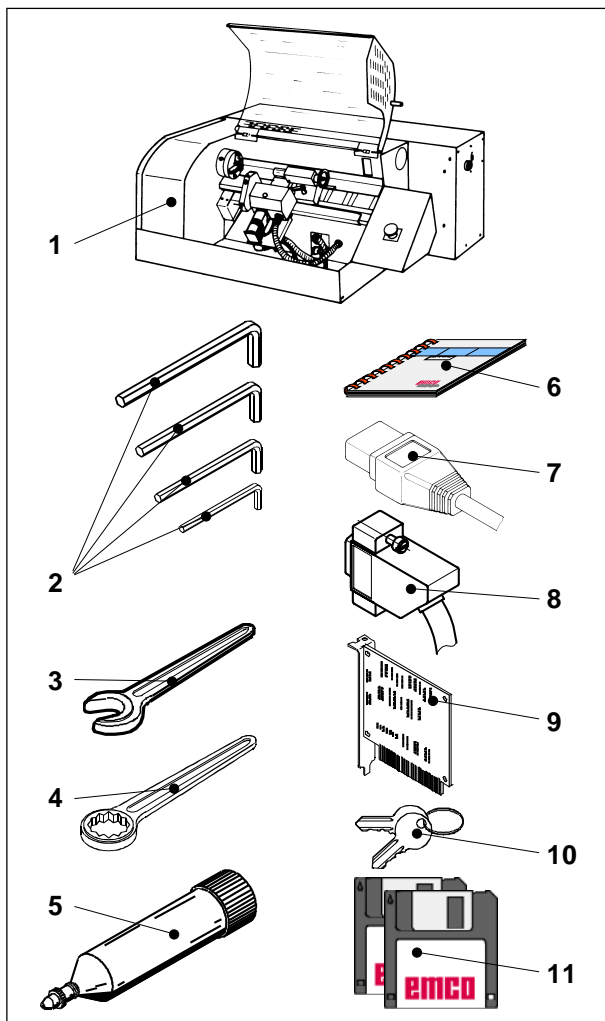
The Electrical Documentation may also be ordered from EMCO:

Electrical Documentation EMCO PC TURN 55-II
Ref. No. ZVP 675 010

Version A6P_V01.00 BAW 2

(= machine variant and electrical version of your machine)

- The rust protection agent must be removed by the customer

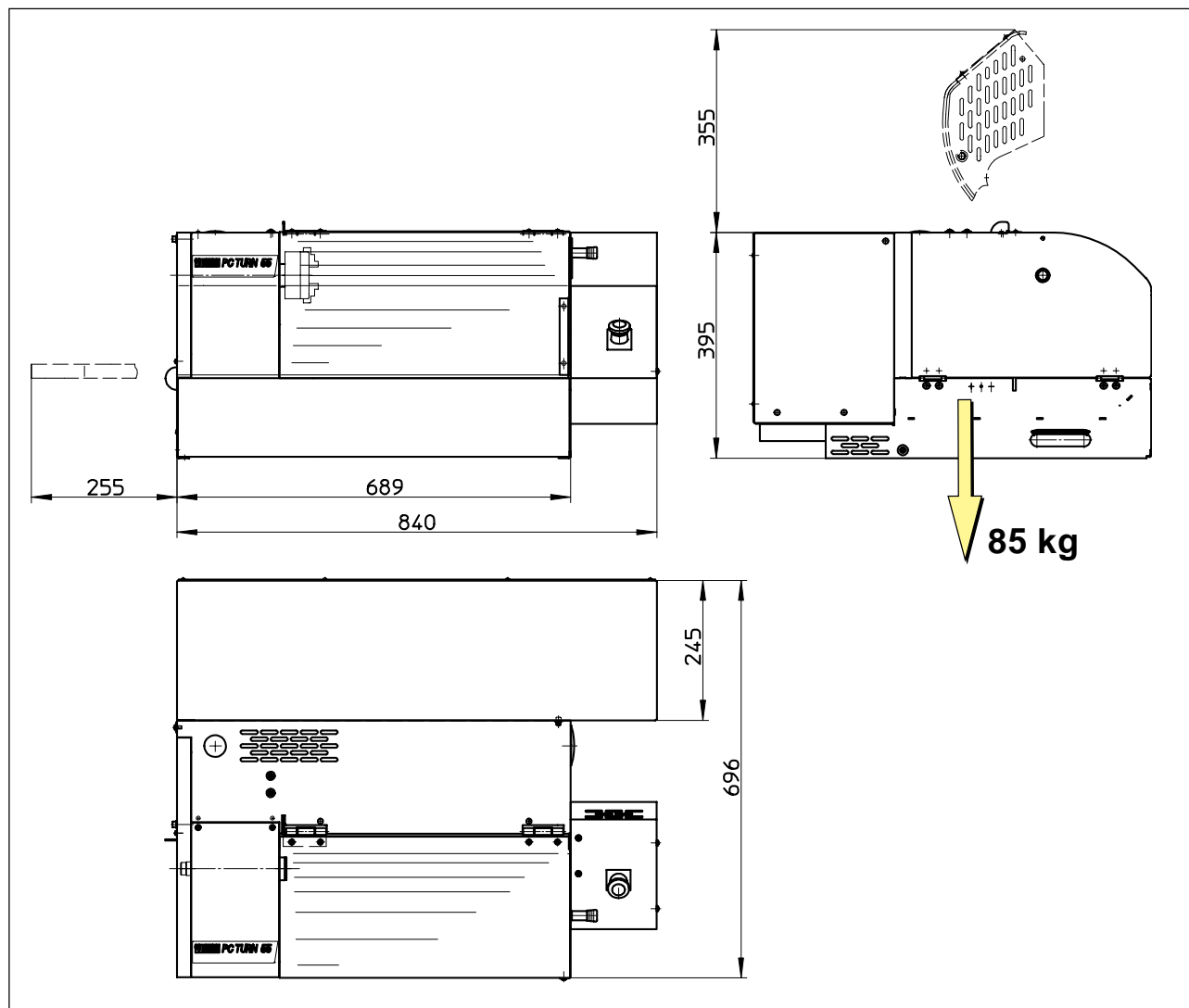


Scope of supply

Scope of supply

1. Inclined-bed turning lathe Emco PC Turn 55-II with 8-fold toolholder, chip tray, splash board, tailstock, complete electric equipment, chip guard cover and safety package.
2. 1 hexagonal key size 8, 5, 4, 3
3. 1 single-ended spanner SW8
4. 1 ring spanner SW13
5. 1 grease gun
6. 1 operating instructions and programming instructions
7. 1 interface cable
8. 1 9-pole interface cable (RS 422)
9. 1 PC interface card PCCOM (RS 422/CAN)
10. 2 keys for main switch
11. 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 696 mm

Free foot space makes comfortable seating during operation.

Note:

Mind that the ventilation slots on the electric cabinet and the filter-load on the bottom of the electrical 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



Danger:

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: 0,85 kVA

Preliminary fuse: max. 12A slow

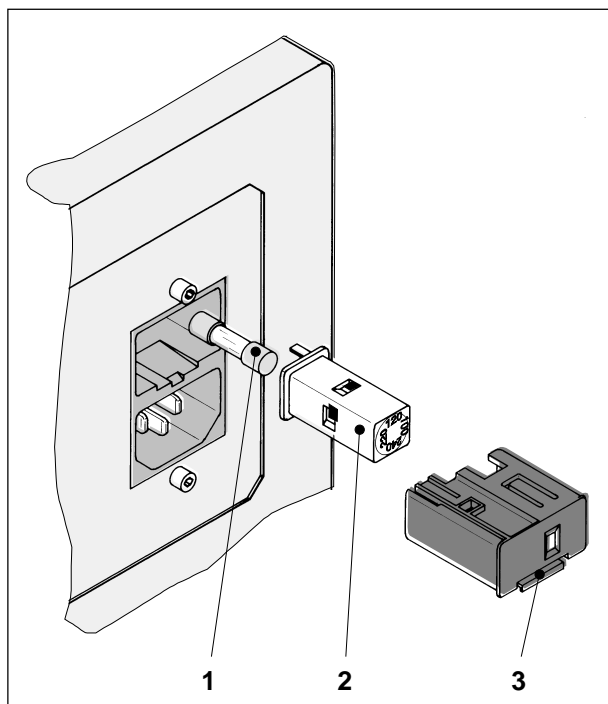
Max. voltage fluctuations: +5/-10%

Adjustment of the required supply voltage

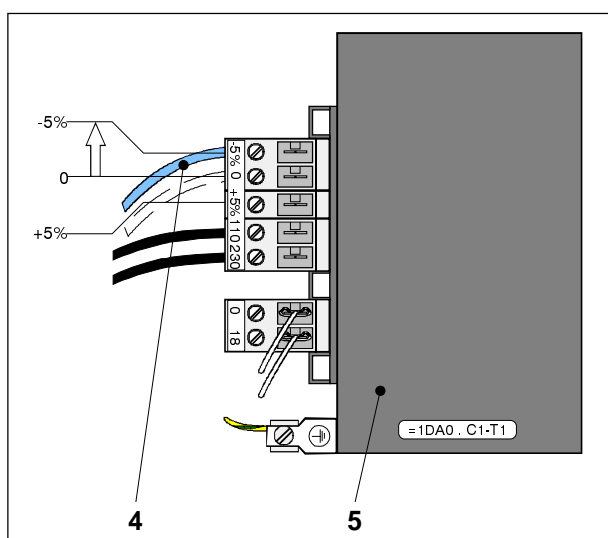
- Push up the latch on the casing (3) and remove the casing with the fuse (1) and the selector pin (2).
- Turn the selector pin (2) in such a way that in the window of the casing (3) the following voltage setting appears:

Mains supply	Waardes op het kijkglas
*100V-mains	setting 100V + transformer
110V-mains	setting 120V
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



100V-voltage adjustment on the transformer



Attention:

With the 100V mains supply there has to be done a modification on the transformer of the machine!

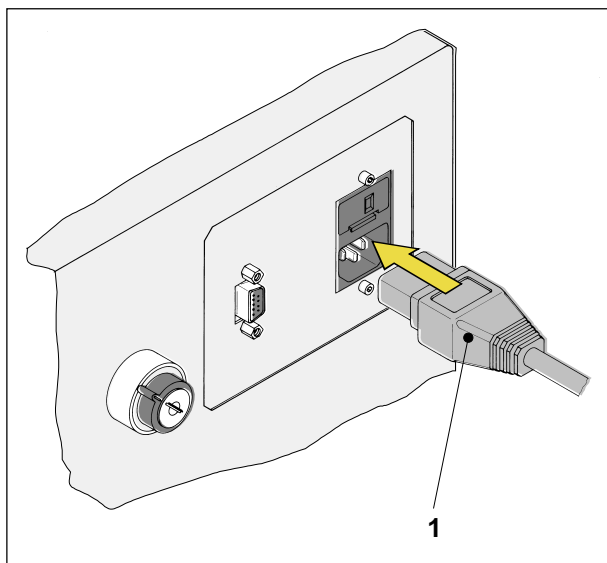
Modification on transformer for 100V mains supply



Danger:

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.



Power connection of the machine

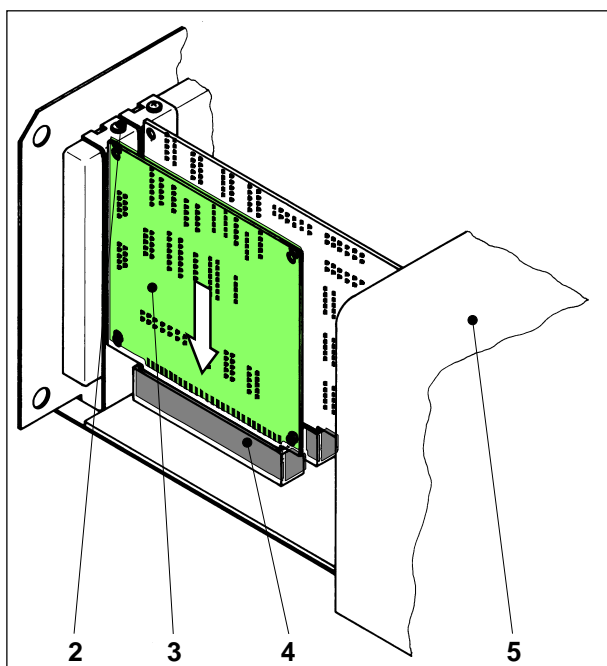
Connection of the power cable

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

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.



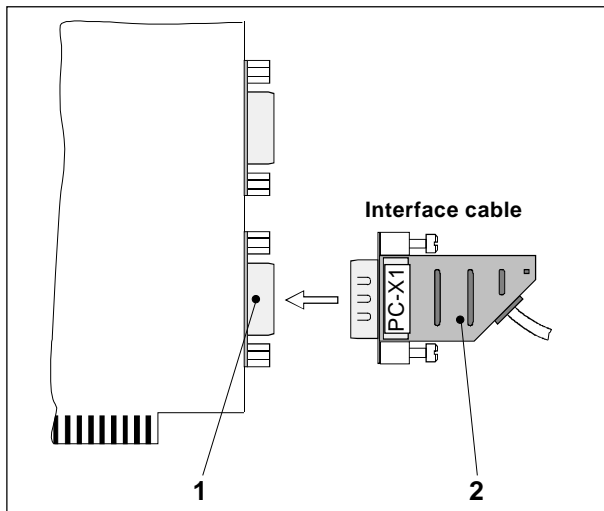
Installation of the interface card



Danger:

- The interface card may be 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.

- 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.



Connection of interface cable to the PC

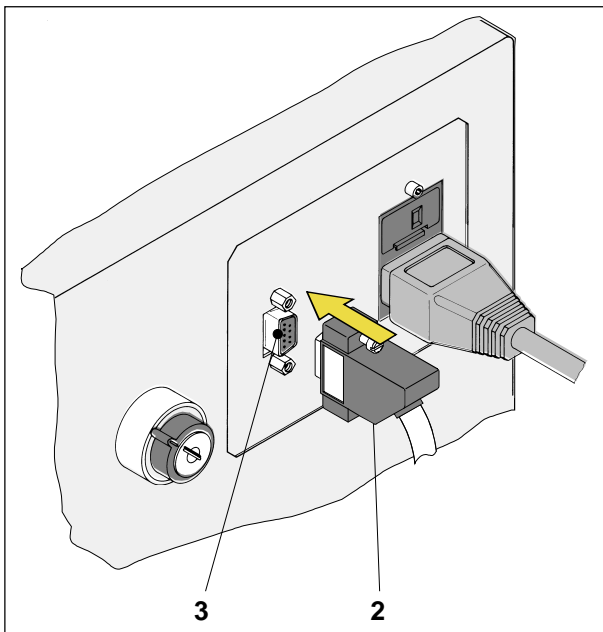
Connection PC-machine



Attention:

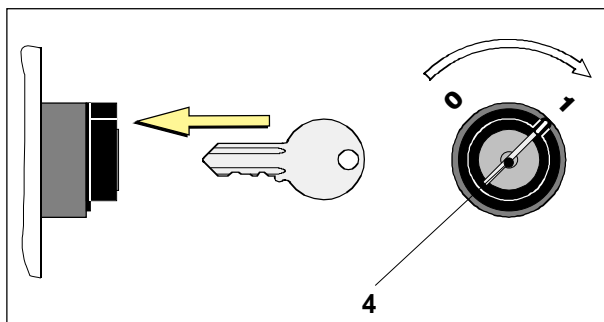
The machine cannot be controlled, if the interface cable will be connected wrongly.

- Connect interface cable (2) with the plug named "PC-X1" on the lower socket of the interface card (1).



Connection of interface cable to the machine

- The free end of the interface cable with the plug named "Maschine-X300" has to be connected on the socket (3) of the machine.



Key switch on the machine

Initial start-up

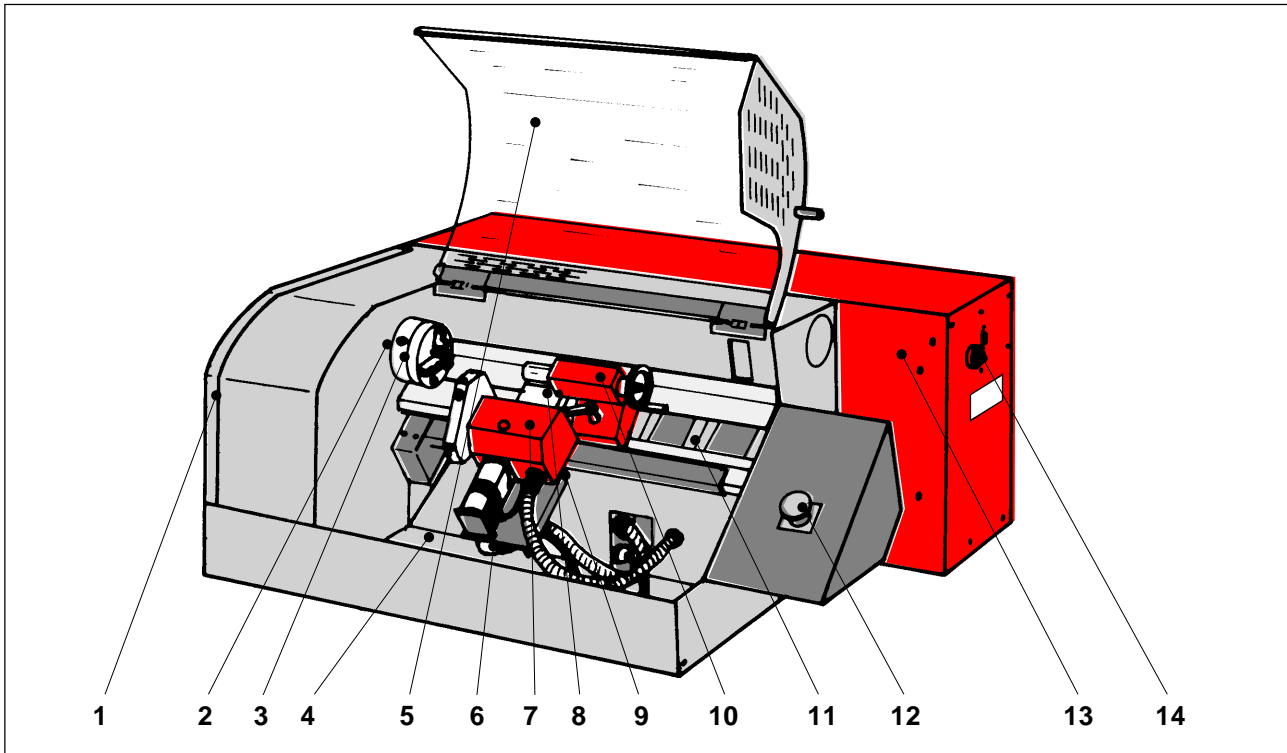
- Machine is to be cleaned from rust preventive agent with a clean cloth.
- Establish power connection.
- Switch on machine at key switch (4).

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.



B Description of the machine



EMCO PC TURN 55

- | | |
|--------------------|-----------------------|
| 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 |

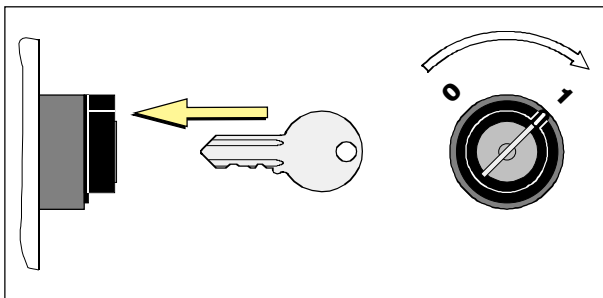
Operating elements

Key switch



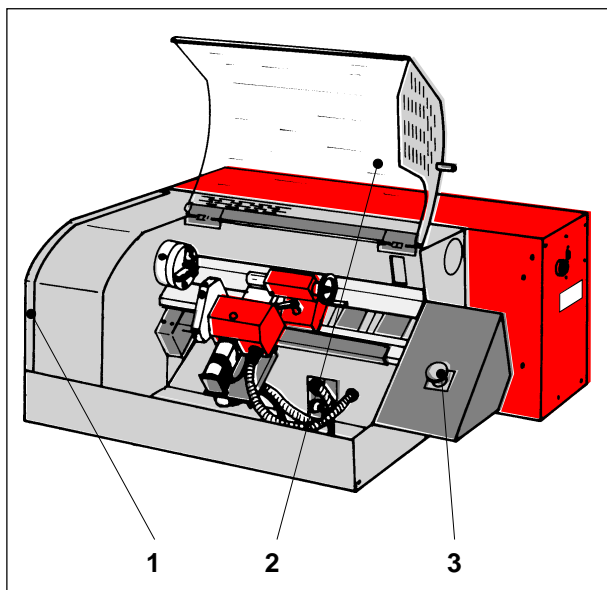
Danger:

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



Danger:

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



Danger:

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:

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

Tailstock

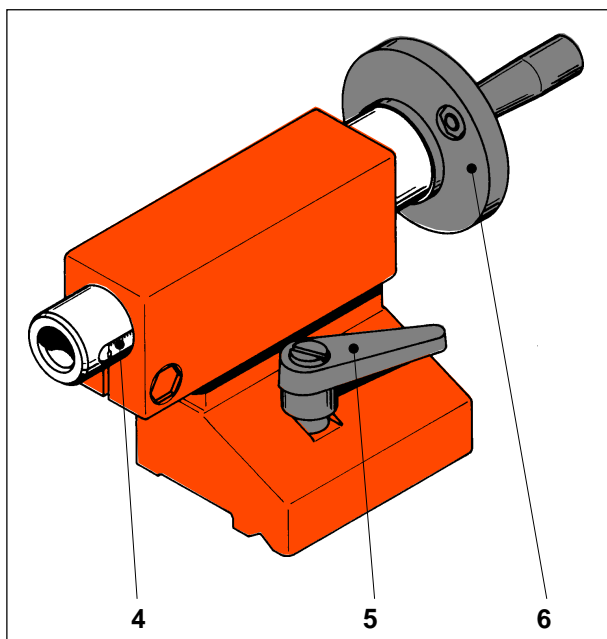
The tailstock serves for counter support of workpieces with the lathe centre and for drilling.

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:

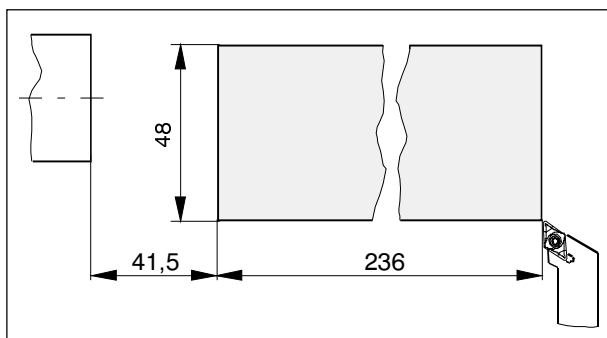
After clamping the tailstock always turn the shift clamping lever (5) to the right in order to avoid a collision with the tool turret.



The step motors

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

feed speed 0-2000 mm/min
minimum travel slide path 0,5 µmm
travel path longitudinal slide 236 mm
travel path cross slide 48 mm



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:

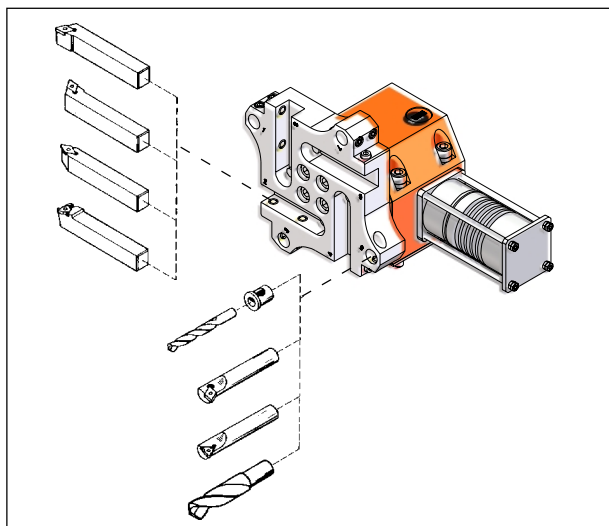
Mind that the travel range of the slides changes with the clamping device and the clamping mode applied (three-jaw chuck tailstock).



The tool turret

Number of tool supports 8
(with 3 external and 3 internal machining tools each)

Maximum cutting circle diameter
turning tool 125 mm
cutting tool 133 mm



Tool turret

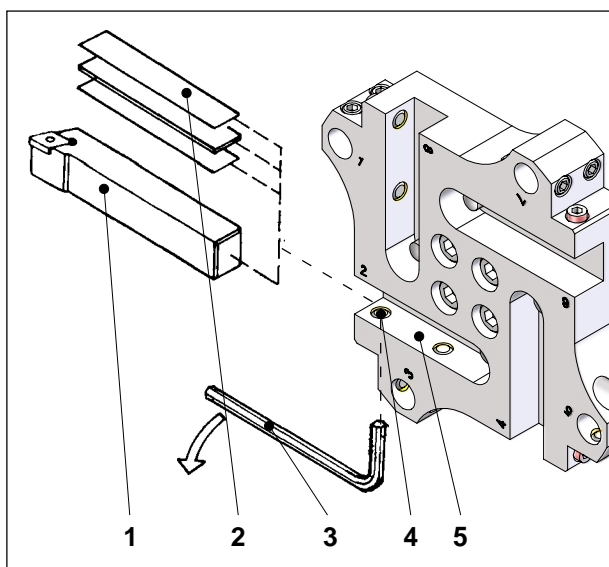
Clamping of tools and adjustment to centre height

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



Danger:

The tools may be clamped only during machine standstill.

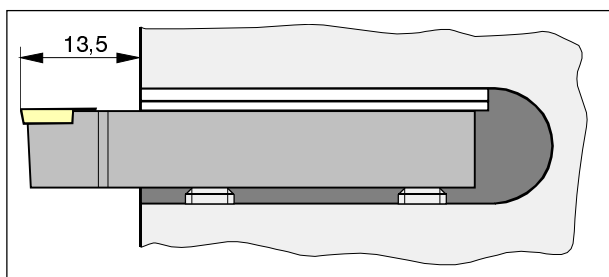


Clamping of external machining tools

External machining tools

A maximum of 4 external machining tools can be clamped.

- Adjust desired tool turret position.
- Insert tool (19 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).

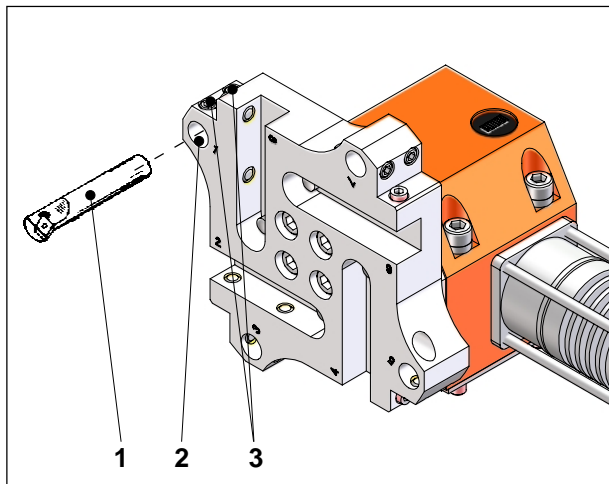


Adjust tool projection

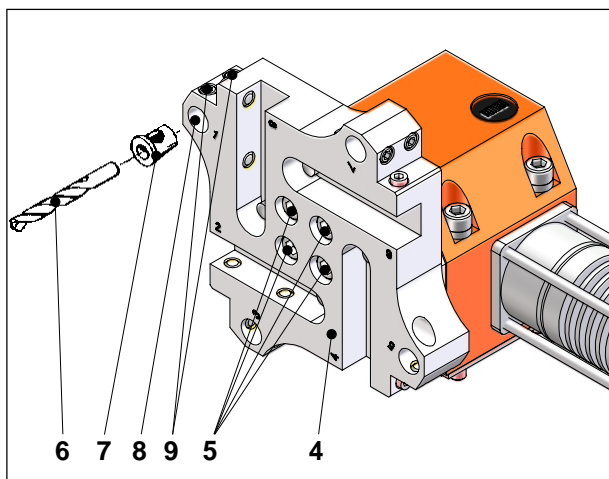
Note:

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



Clamping of drills

Internal machining tools

1. Internal tools

A maximum of 4 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 four 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 four hexagon socket screws (10).

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

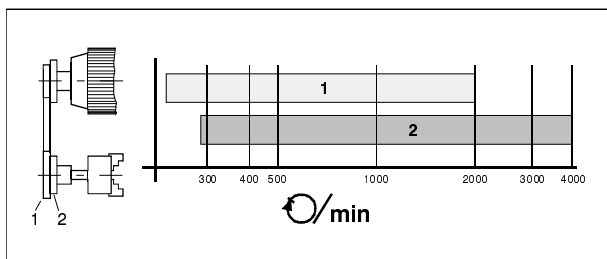
The main spindle is driven by the drive motor via a V-belt.

By changing the V-belt 2 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:

Belt position	Speed range [rpm]
1	120 to 2000
2	280 to 4000

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").



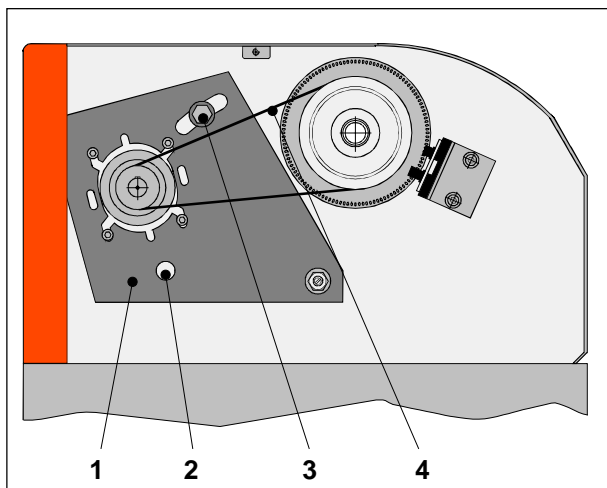
Speed plate

Changing the V-belt



Danger:

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!)



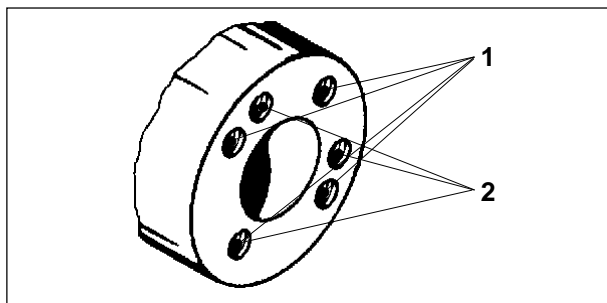
Accessories

Clamping devices

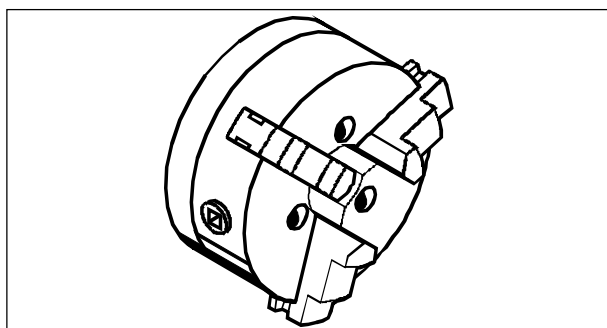
Summary

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



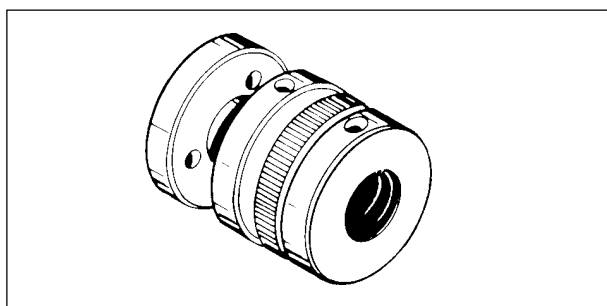
Three-jaw chuck

A6Z 630

Three-jaw chuck $\varnothing 74$ mm

Order no. A6Z 630

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



Collet chuck attachment

A5Z 040

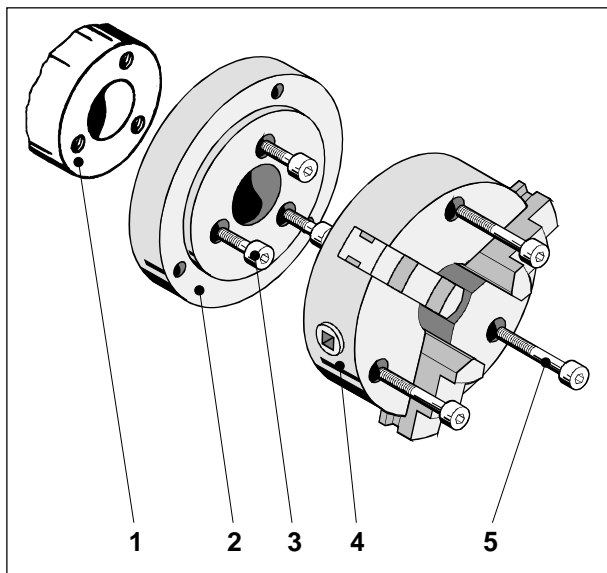
Collet chuck attachment

Order no. A5Z 040

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

The 3-jaw chuck

Also mind the instructions enclosed with the chuck.



Mounting the chuck

Mounting the chuck



Danger:

- The chuck may be mounted only during machine standstill.
- For chuck mounting only screws M5x12 according to DIN 912 may be used, the chuck may only be mounted with screws M5x35. 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 bores of the flange (2) bore have to be free from dirt.
- Screw the flange (2) with the 3 cheese head screws M5x12 (3) onto the spindle nose and tighten screws.
- Mount chuck (4) with the socket head screws M5x35 (5) on the flange (2).

Clamping ranges



Danger:

- The maximum admissible clamping ranges must never be exceeded. Exceeding them may lead to jaw fracture.
- Jaw projection must never be more than 7 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	24	23	68	88	2	23	68	88

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

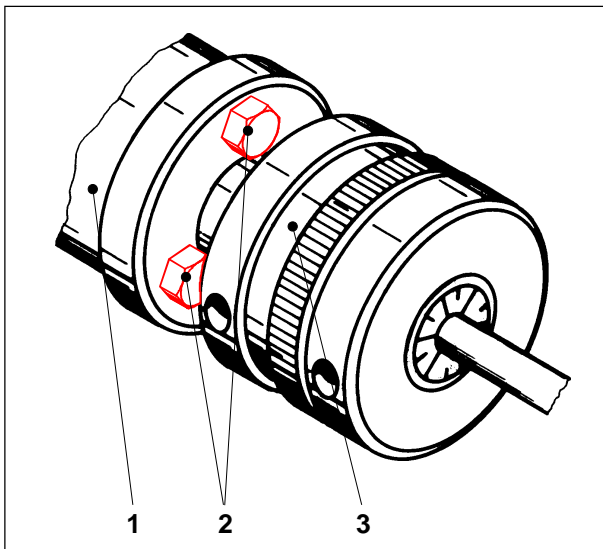
The collet chuck attachment

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 16 mm

Collet type ESX 25



Mounting the collet chuck attachment

Mounting the collet chuck attachment

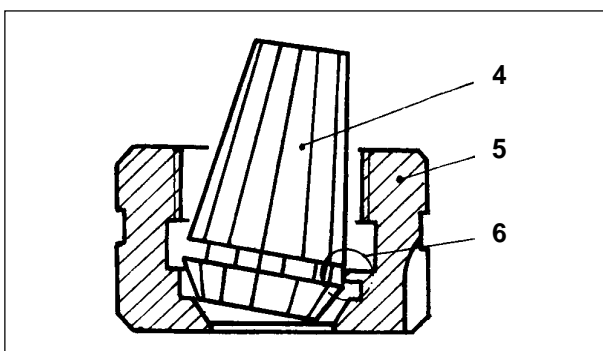


Danger:

- 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

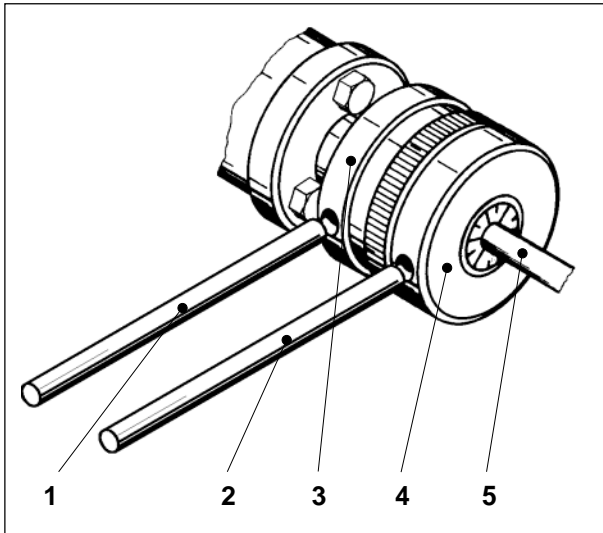


Mounting the collet chucks

- 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.

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).

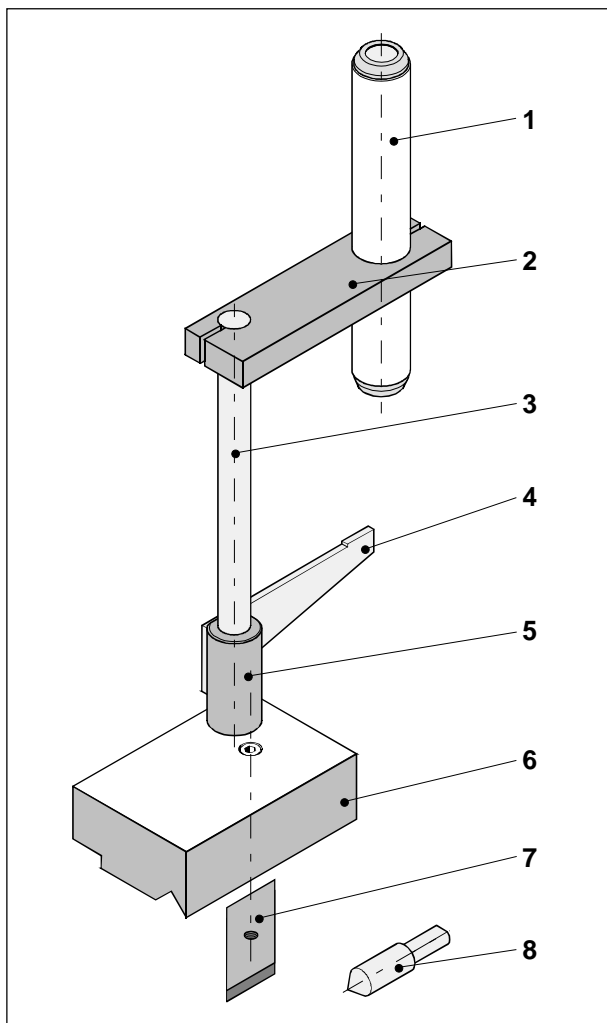
Clamping ranges



Danger:

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	Clamping range		Order-No.
	[mm]	[inch]	
2,0	1,5-2,0	1/16-5/64	225 020
2,5	2,0-2,5	3/32	225 025
3,0	2,5-3,0	7/64	225 030
4,0	3,0-4,0	1/8-9/64-5/32	225 040
5,0	4,0-5,0	11/64-3/16	225 050
6,0	5,0-6,0	13/64-7/32-15/64	225 060
7,0	6,0-7,0	1/4-17/64	225 070
8,0	7,0-8,0	9/32-19/64-5/16	225 080
9,0	8,0-9,0	21/64-11/32	225 090
10,0	9,0-10,0	23/64-3/8-25/64	225 100
11,0	10,0-11,0	13/32-27/64	225 110
12,0	11,0-12,0	7/16-29/64-15/32	225 120
13,0	12,0-13,0	31/64-1/2	225 130
14,0	13,0-14,0	33/64-17/32-35/64	225 140
15,0	14,0-15,0	9/16-19/32	225 150
16,0	15,0-16,0	10/16-5/8	225 160
Set of collets completely			225 000



Optical tool pre-setting device

The optical tool pre-setting device

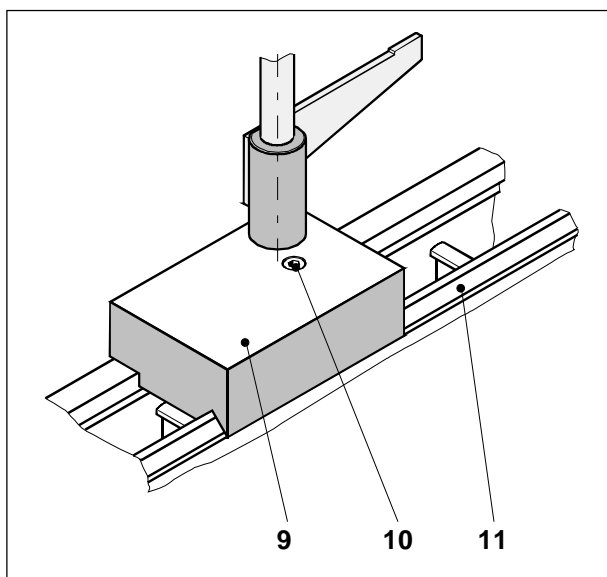
Order no. **A6Z 060**

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

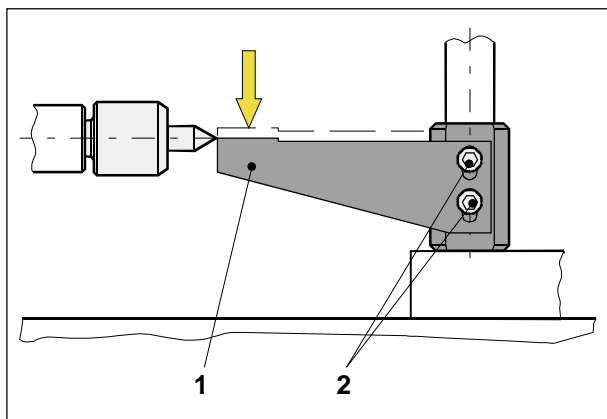
Mounting the optics

Danger:



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

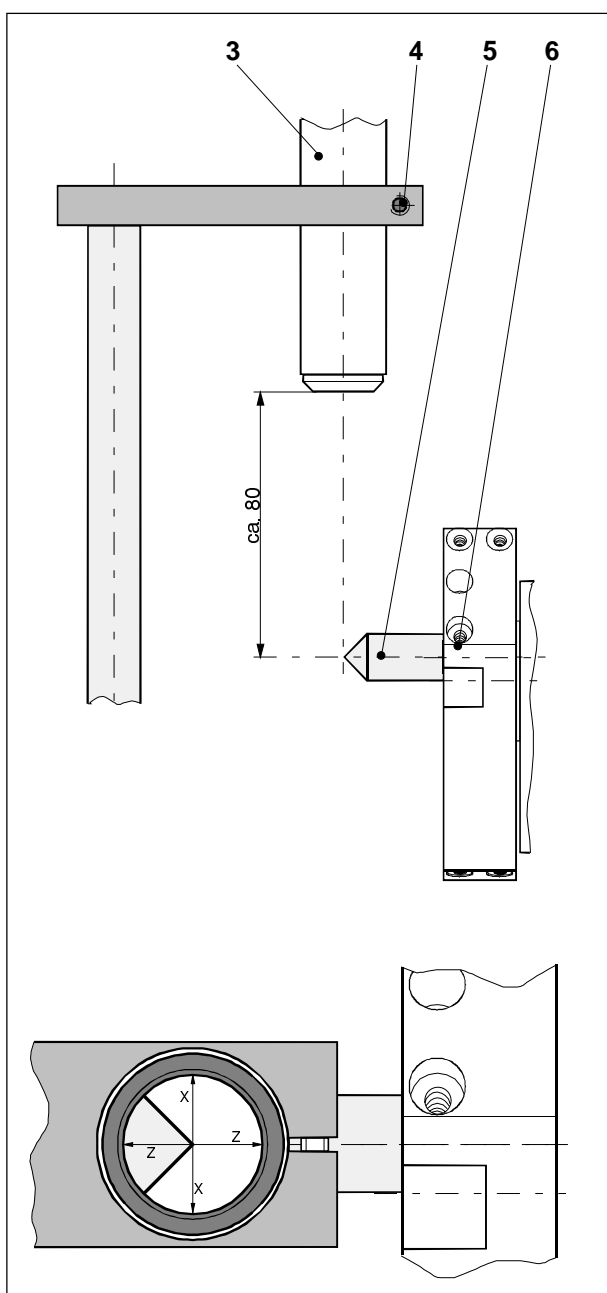
Adjustments at the optics

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.

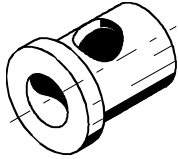
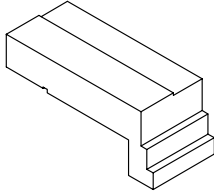
Note:

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

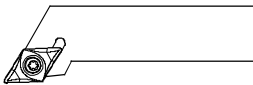



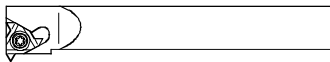

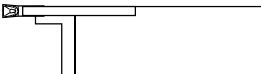
- Turn the tube until the reticle in the tube is aligned exactly in X and Z direction.
 - Clamp the tube in this aligned position by means of the hexagon socket screw SW3 (4).
 - The optical tool pre-setting device is ready for the tool measurement.
- Further information concerning the execution of the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






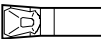
Tool turret accessories

	Reducing bushes Order-No. A6Z 270 8 reducing bushes $\varnothing 2$ up to $\varnothing 9$ mm for clamping drills.
	Setting gauge Order-No. A6Z 590




Turning tools

Tool-Nr.	Order-No.	Description
1	260 601	 Side tool right
2	260 602	 Side tool left
3	260 603	 Side tool neutral
4	260 620	 External thread tool max. pitch 1.5 mm
5	260 627	 Internal thread tool $\varnothing 10 \times 60$ max. pitch 1.5 mm
6	260 606	 Boring bar $\varnothing 10 \times 60$ mm
7	264 020	 Cutting-off tool

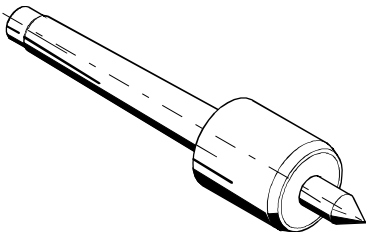
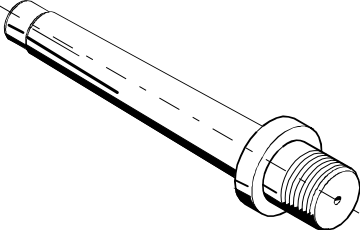
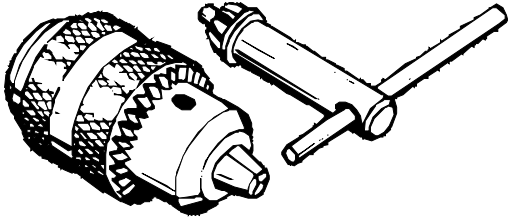
HM-indexable inserts

HM- plate	Order-no.	Description	suitable for tool no.
	260 610 271 056	Set of 10 HM-indexable inserts for steel Set of 10 HM-indexable inserts for aluminium	1, 2, 3, 6
	260 621	Set of 5 HM-indexable inserts for external threads, max. pitch 1.5 mm	4
	260 626	Set of 5 HM-indexable inserts for internal threads, max. pitch 1.5 mm	5
	271 086	Set of 5 HM-indexable inserts for cutting-off tool	7

Drilling tools

	Centre drill A8, HSS, DIN 633 Order-no. 271 220
	1 Set twist drills $\varnothing 2 - \varnothing 12$ mm, graduation 1 mm Order-no. 260 628
	Twist drill $\varnothing 12$ mm Order-no. A6Z 050

Tailstock accessories

	Lathe centre MT1 Order-no. A5Z 260 Lathe centres with 3 bearings for the counter-support of long workpieces.
	Plug-in pivot MT1 Order-no. A5Z 280 Plug-in pivot with connection thread M14x1 for the support of the chuck
	3-jaw chuck Order-no. 152 500 Chuck clamping from 1-8 mm, connection thread M14x1, with chuck wrench

Technological data

1. Cutting speed V

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

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 PC Turn 55-II:

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

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

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

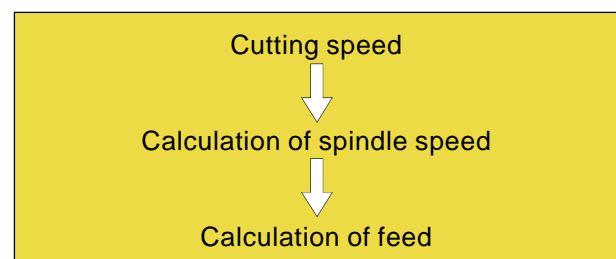
3. Feed F

On the PC Turn 55 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

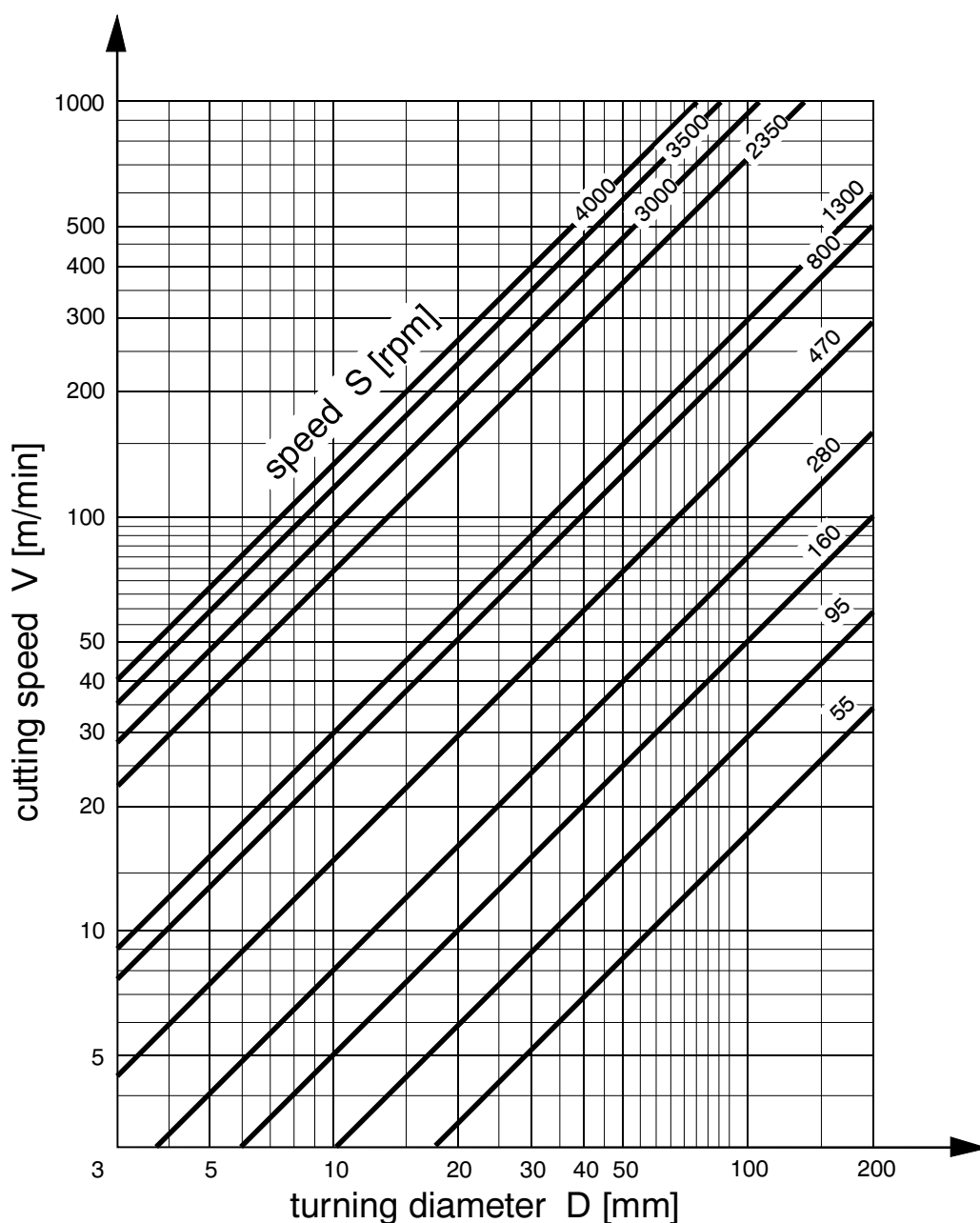
Example

You know:

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

You want to know

- spindle speed $S = 1300$ rpm



Finding the spindle speed S with selected V and D

Finding the feed speed

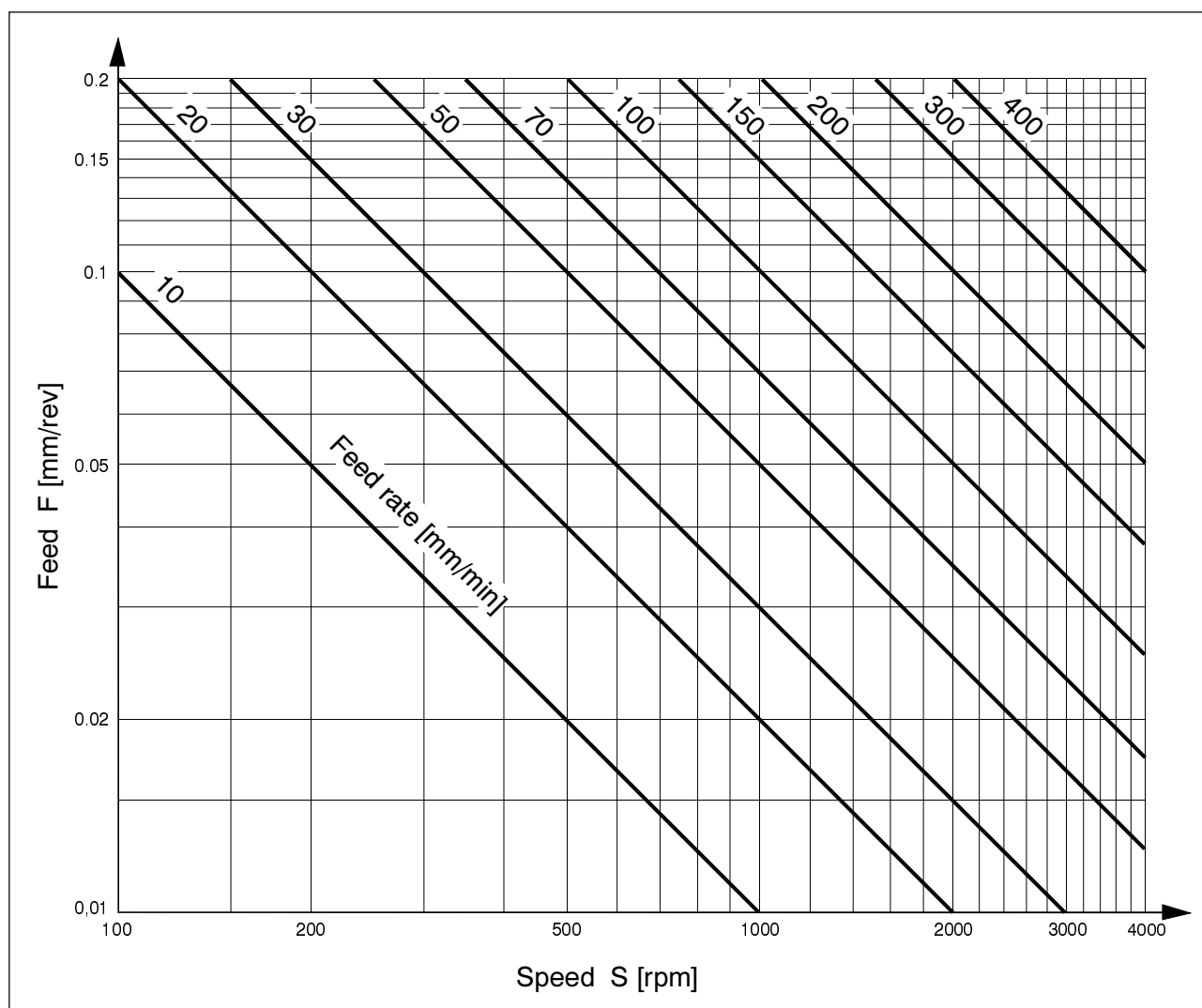
Example

You know

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

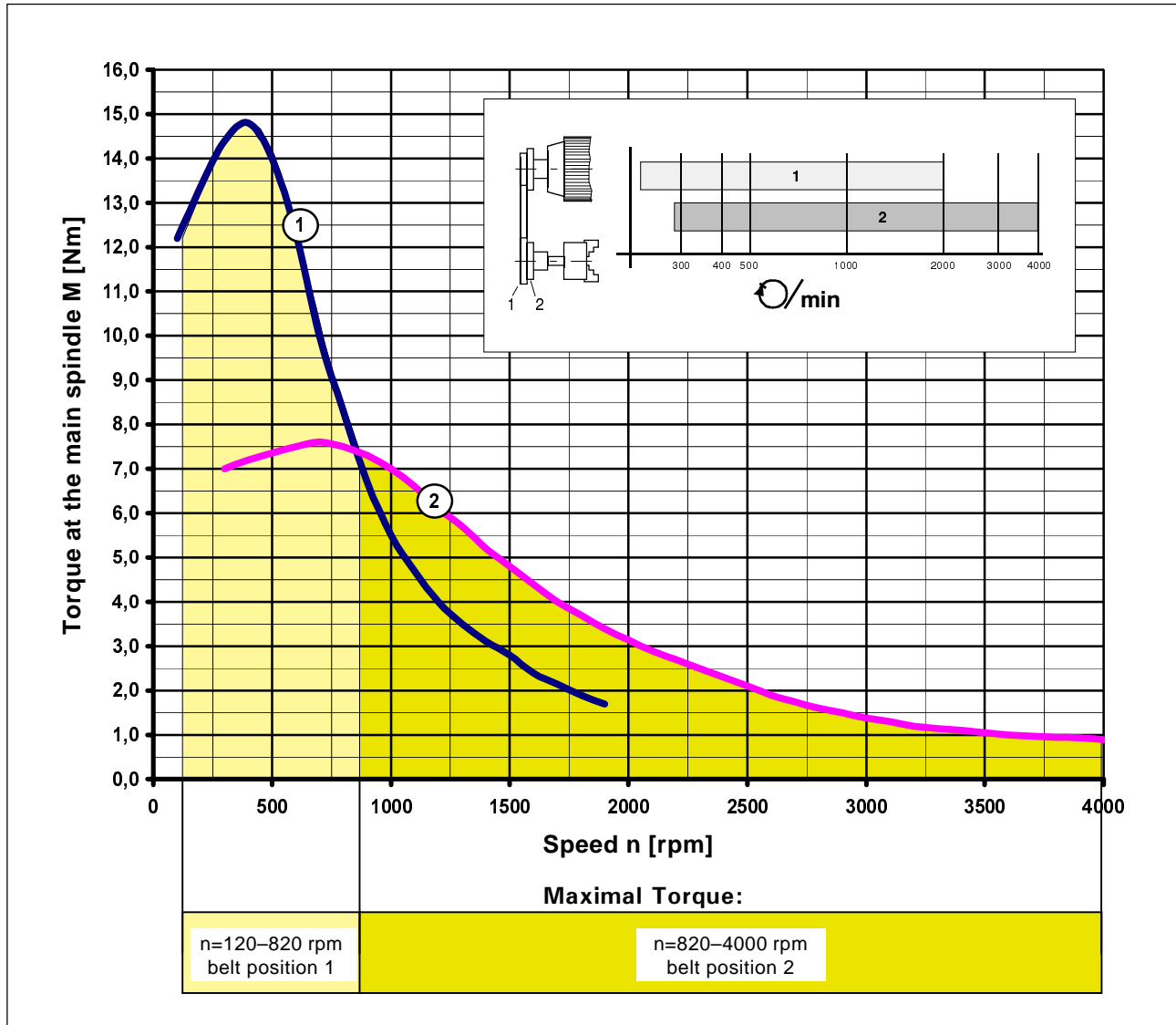
You want to know

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



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

Speed-torque characteristic line

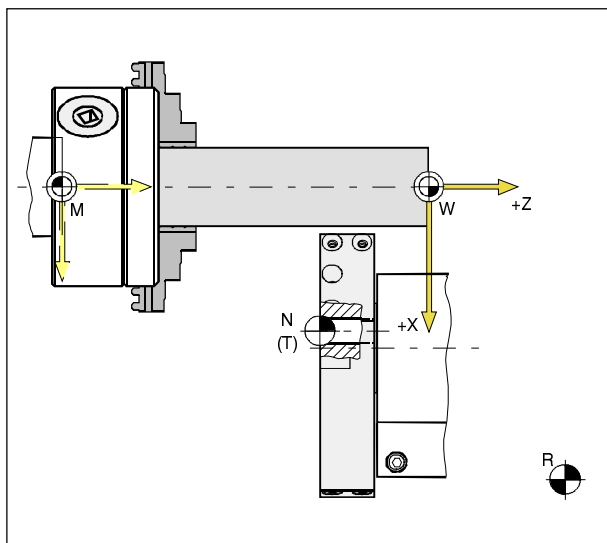


For the desired speed the speed range (1 or 2) offering the largest torque is to be set.

Examples:

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

For speed ranges exceeding 900 rpm only belt position 2 is to be used.



Points at the machine with tool turret

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

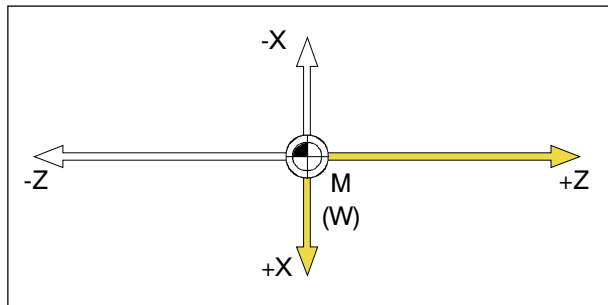
The reference point is a fixed point on the machine. It serves for the calibration of the measuring system.

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.



Coordinate system

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.

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).

Maintenance of the machine



Danger:

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

Guideways/Tailstock

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

Slightly oil the guideways with slideway oil.

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

ESSOFebis K 68

KLÜBER Lamora Super Pollad 68

MOBIL Vactra No. 2

Longitudinal, and cross spindle

Longitudinal and cross spindle are ball threaded spindles of high production quality.

Therefore mind that the spindle nuts are regularly supplied with lubrication grease to avoid damage.

Lubrication interval weekly

Lubrication via lubrication nipples (1) and (2)

Lubrication grease

DIN designation: DIN 51804/T1 NLGI 2

e.g.:

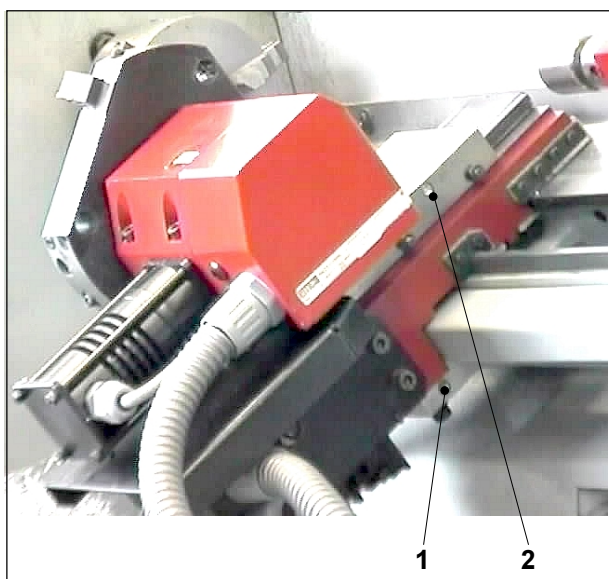
EMCO Gliding Paste

BP L2

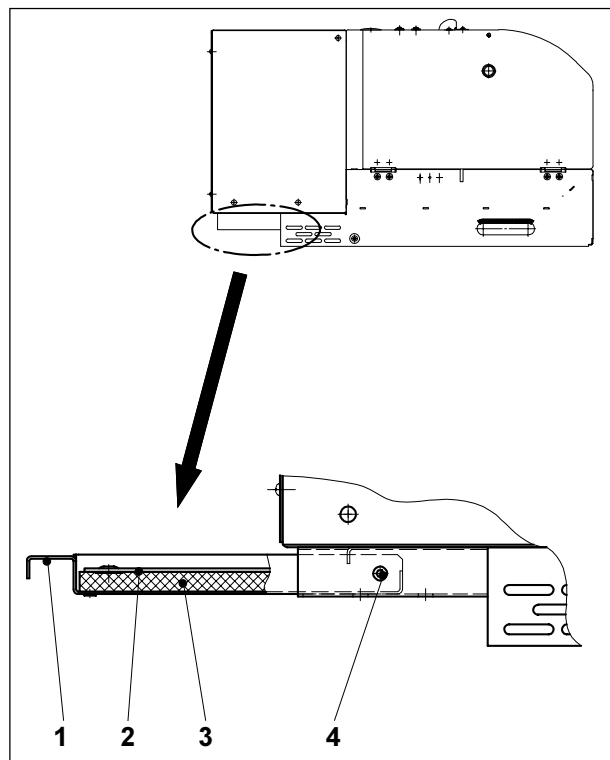
CASTROL Greace MS3

KLÜBER Altemp Q NB 50

RÖHM F 80



Lubrication nipples for feed spindles



Cleaning the filter mat

Cleaning / Exchanging the filter mat

Cleaning interval weekly

Exchanging the filter mat annual

Order-no. A6L 311 140

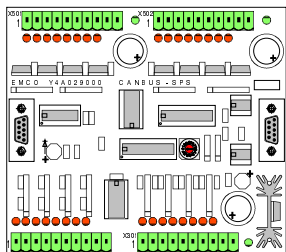
- Unscrew socket head screw - size 4 - (4).
- Draw out filter load (1) by lifting up lightly.
- Take out grate (2) and filter mat (3) and clean them (beating out, air pressure) or renew the filter mat.
- With the assembly take care, that the grate (2) will be putted on the filter mat (3). Otherwise the danger exists, that the filter mat would be pulled up into the blower.
- Screw in and tighten screw (4) after slipping in the load (1).



Attention:

The machine may not be operated without the filter mat, because of the danger of a damage in the electrical cabinet!

Automatization-Survey

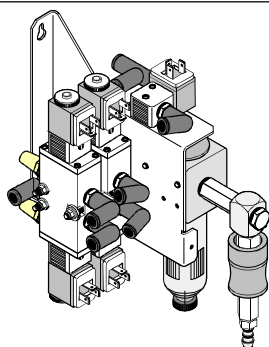


I/O-Extension Board (CAN-BUS-Board)

Prerequisite for:

- Automatic door mechanism
- Pneumatic chuck
- Electrically actuated tailstock
- Robotics interface

Order-no. A6Z 610

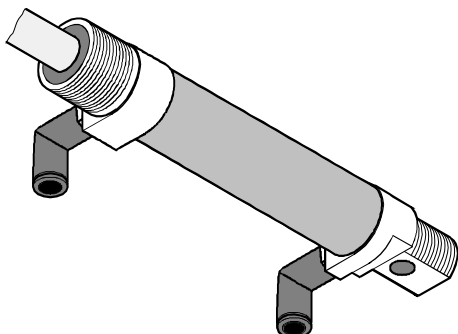


Pneumatic unit for

Order-no. A6Z 550

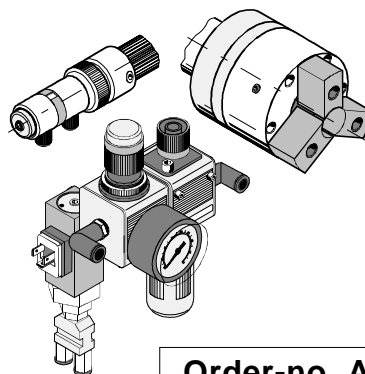
and/or

Automatic door mechanism

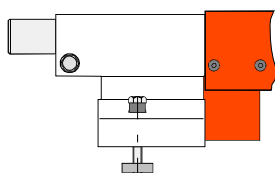


Order-no. A6Z 510

Pneumatic chuck with blow-out device



Order-no. A6Z 530



Electrically actuated tailstock

Order-no. A6Z 520



Robotics interface

Order-no. X1A 000

