Instruction Book EMCOTURN 120/120P with EMCOTRONIC TM 02

Edition 1993

Ref. No. EN 2725

Instruction book EMCOTURN 120 B91-9 EN 2725



Warranty conditions for new EMCO machines

- 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.
- Occuring defects must be immediately reported to the EMCO respresentative 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 respresentative, 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 occured 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.

Preface

The Instruction Book contains specific information on the machine.

Machine Set-up, electrical connections, accessories, working tips, technological data, maintenance and adjustment jobs.

The description on programming and operating the control is to be found in the "Programming and Operating Instruction Book".

The basic equipment may differ, therefore accessories are not determined. You will find exact specifications in catalogues respectively in offers.

Ad) Working Tips:

It is taken for granted that the machine operator is aware of safe and correct clamping of workpieces and of tools. Furthermore he should be capable of selecting the correct tools and cutting data for the relative job.

Remark:

Please note, that on some pictures in this instruction book the tool turret disk doesn't agree with your version of tool turret disk.

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10. Service parts lists

Safety Tips

- * Bear in mind the general safety rules for machine tools and CNC machine tools.
- * Only qualified and authorized persons are allowed to use the machine. It has to be protected against unintentional operation (remove switch key).
- * In case of emergency use mushroom push button.
- * Clamping devices: The chuck comes with an instruction book. Pay attention to safety instructions and maintenance tips. The gripping range of the various jaw steps must not be surpassed.
- * Do not touch the electrical part of the machine. If you change control devices any warranty claim will become unvalid.
- * Do not operate the switch key whilst machine is running.
- * Observe the inspection and maintenance instructions for machine and accessories.
- * If the clamping cylinder is activated during the assembly of clamping fixtures, never reach between spindelnose and the clamping fixture.
- * Keep the chip protecting door closed even in the settingup mode.
- * Clamping features are subject to speed and clamping pressure limits.
- * EMCO accepts no liability for parts which it has not supplied.
- * In the event of complaints, damage, queries and spare parts order, always indicate the machine number and control number.
- * Be careful not to place your hand in the quills when clamping workpieces manually.

 An unintentional actuation of the quill could cause possible injury.

Technical Data Machine

Emcoturn 120P

Emcoturn 120

•			ĺ	Lineotai II 120	
	Working Area				
	Swing over bed			180 mm (7.0)87 ")
	Swing over cros	s slide		75 mm (2.9	
	Max. length of			160 mm (6.2	
	Max. diameter o		1	88 mm (3.4	
	Slide way (long			176 mm (6.9	
	Slide way (cros			56 mm (2.2	
	olide way (clob	b) (A GAIS)		30 nan (2.2	. + /
	Main Spindle				
	Spindle-bearing	•		20.7 mm (.8	R15")
	Speed range			150 - 4000 rev.	· · · · · · · · · · · · · · · · · · ·
	Speed control				oless
	_			2001	
	Main Drive				
	Direct drive (n				
	DC-motor, power	· (100/60%dc	:)	2.2/4 kW (3/5.4	
	Max. torque			23 Nm (17 ft	lbf)
	Feed Motors				
	Step motors in	X- and Z-ax	is		
	Feed			(.039-47.244 in/	min)
	Feed power		,	2000 N (450	•
	Rapid traverse			3 m/min (9.8 ft/	•
	_			, (,
	Electrical Conn	ection			
	Main Supply			3x380V/N/PE, 50/6	
	Avail. voltage		l		5/-5%
	Connection load			5	5 kVA
	Main fuse machi	ne			16 A
	Tool System				
	Automatic turre	t.			
	No. of tools				8
	Location hole			16 mm (.6	
	Height of tool	shank		12 mm (.4	
	Cycle time per				sec
	1,110 unime F01			1.1	. 500
Tailstock			<u>Tailstock</u>		
Operation		operationed	. –		pneumatically
Dia. of quill			Dia. of qui		35 mm (1.378")
Stroke of quil			Stroke of o		120 mm (4.724")
Live lathe cen	ter	integrated	Live lathe	center	integrated

Lubrication System

Main spindle, ballscrews grease lubrication Slideways autom. oil central lubrication

Subject to Technical Modifications!

Emcoturn 120

Emcoturn 120P

Pneumatical Connection

Service Unit, adjustable for Clamping

Cylinder and Tailstock Quill (with oiler and filter)

Control range

1.8-8 bar 0.8-8 bar)

(option

6 bar

Supply pressure

Connection service unit

dia. 10 mm

Coolant Facility (option)

Tank volume Delivery pipe Delivery pressure

80 l (21 US gal) 15 1/min (4 US gal/min)

0.5 bar

Dimensions

Machine (W x D x H) 1035x853x750 mm (40.7"x33.6"x29.6") Control (W x D x H) 810x745x715 mm (31.9"x29.3"x28.1")

Gewicht

Machine Control approx. 225 kg (496 lbs)

approx. 115 kg (254 lbs)

Subject to Technical Modifications!

Technical Data EMCOTRONIC TM 02

Microprocessor 2-axis contour control Linear and circular interpolation (2 1/2 D) Permanent program memory (50 kB, corresponds approx. 270 m tape) for machine data, tool data register and part programs, position-shift register.

Additional memory extension (option)

The memory extension (ord.no. 276 110) consits of 3 memory modules for extension to 128kB.

Actual position
Distance left to traverse
Spindle speed
Tool compensation
Feed
Further parameters
9" monochrome monitor
Input accuracy

Thread pitch
Feed override
Spindle speed override
Interpolation range
Tool memory
Circle radius
Circular interpolation

0.001 mm (0.0001") 0.01 - 32 mm 0 - 120 % 50 - 120 % + 9999.999 mm 99 tools

to 20 m

to 360°

Operating modes

Manual mode (manual slide movement)

Execute (processing the input memory)

Edit (program input via keyboard, interfaces, tool data and position shift register, operator monitor)

Automatic (execution of the NC programs)

Program format

Structure according to DIN 66025 Decimal point input

Data input/output

RS 232 C interface (V24), 150 - 4800 bd Disk drive 3 1/2"

Technical data subject to changes and amendments!

Structure and Initial status of G-Codes

	1	
Group 0	1	G00: Rapid traverse
		G01: Linear-interpolation
		G02:7 Circular-interpolation
1	ł	(603.)
-	*	G04: Dwell
	ļ	G33: Thread cutting in single block
	*	G84: Face and longitudinal turning cycle
1		G85: Threading cycle
1	*	G86: Grooving cycle
	*	G87: Drilling cycle with chip breaking
	*	G88: Drilling cycle with chip breaking and return to
		start point.
Group 1		C96: Constant gutting and
Group 1	**	G96: Constant cutting speed G97: Direct speed programming
		or. Direct speed programming
Group 2		G94: Feed rate data in mm/min or 1/100 inch/min
	· * *	G95: Feed rate data in \(\mu\)m/rev. or 1/10.000 inch/rev.
		The fact the payles. Of 1/10.000 flich/rev.
Group 3	**	G53: Cancel workpiece zero point 1 and 2
		G54: Calling up workpiece zero point 1
		G55: Calling up workpiece zero point 2
<u></u>	ļ	J. L. Land Bolling E.
Group 4		G92: 1. Speed limitation
1	*	2. Changing of workpiece zero point coordinates
		in position shift offset 5 over NC-program.
	 	
Group 5	**	G56: Cancel workpiece zero point 3, 4 and 5
		G57: Calling up workpiece zero point 3
		G58: Calling up workpiece zero point 4
		G59: Calling up workpiece zero point 5
Guarante		
Group 6		G25: Subroutine call
		G26: Polygon call
	*	G27: Unconditional jump
Crown 7		C70. Na
Group 7		G70: Measurement data in inch
	النا	G71: Measurement data in mm
Group 8	**	G40: Neutralization of the tool correction
		G41: Tool path correction left hand
		G42: Tool path correction left hand
		our, root pach correction right hand
Group 12	**	G50: Deselect scaling factor
		G50: Deserted Scaling Factor G51: Select scaling factor
L		our percet scarring ractor

^{*} Effectiv block by block

^{**} Initial status

Initial status in mode of operation MON can be determined

Structure and Initial status of M-Codes

Group		•	
Group	0	Řά	M03 Spindle ON in clockwise rotation M04 Spindle ON in counterclockwise rotation M05 Spindle STOP M19 Precise spindle stop
Group	1	**	M38 Precise stop ON M39 Precise stop OFF
Group	2	*	M00 Programmable intermediate stop M17 Subroutine end M30 Program end with return to program start
Group	3	*	MO8 Coolant ON MO9 Coolant OFF
Group	5		M25 Open workholding tool M26 Tension workholding tool
Group	6		M20 Reverse tailstock sleeve M21 Forward tailstock sleeve
Group	7		M23 Reverse workpiece catcher M24 Forward workpiece catcher
Group	9		M52 Deselect of chip guard door automatic M53 Select of chip guard door automatic

^{*} Blockwise effective

☐ Initial status to determine in mode MON

Note:

If you have each M-code on your control depends on the hardware of your machine.

^{**} Initial status

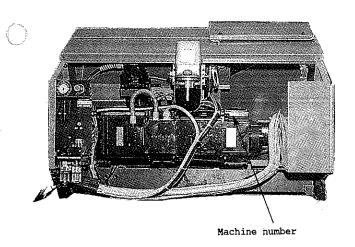
1. Machine Set-up

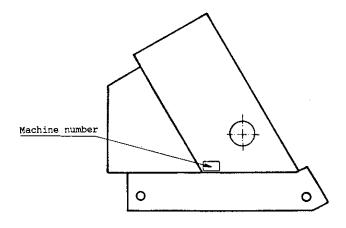
1.1 Machine Take-Over

- Check machine and control for possible transport damages. If you find damages - contact dealer and insurance company.
- 2) Check consignment for missing parts contact dealer if parts are missing.

3) Machine Number

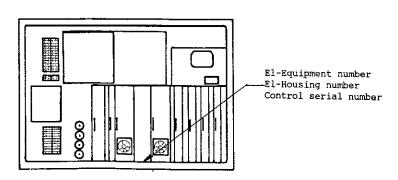
If you have claims, service parts orders etc. always indicate the machine number.





4) Control Serial Number

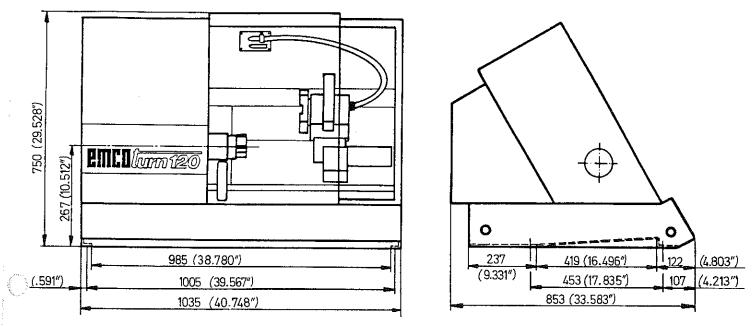
If you order service parts or in case of claims always indicate control number and control serial number.



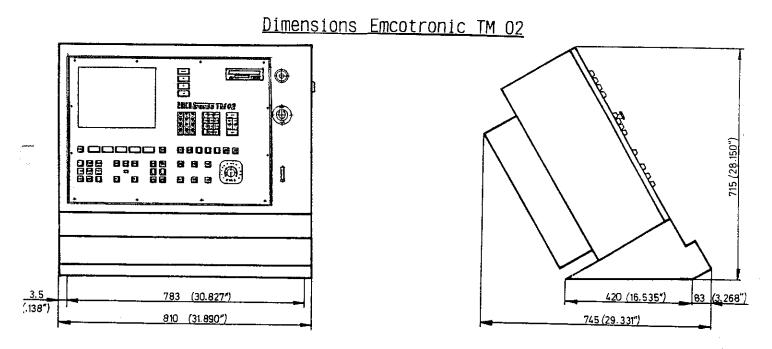
1.2 Basic Equipment Emcoturn 120, 120P

Machine bed, machine base with chip tray, drive motor, feed drives in 2 axes, 8 station turret, headstock, tailstock, closed housing, chip protection door, control EMCOTRONIC TM 02, machine lamp.

1.3 <u>Dimensions</u> <u>Dimensions Emcoturn 120, 120P</u>



The dimensions 1005 x 453 mm (39.567" x 17.835") refer to the 4 threaded holes M10 which serve for tightening the machine to the transport pallet resp. to the machine stand.

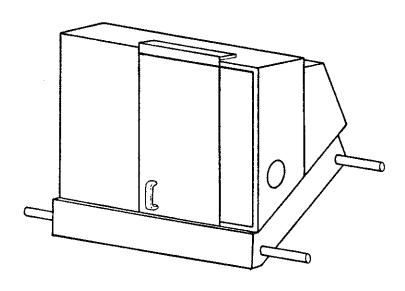


The dimensions $783 \times 420 \text{ mm}$ (30.827" \times 16.535") refer to the 4 threaded holes M10 which serve for tightening the machine to the transport pallet resp. to the machine stand.

1.4 Transport and Machine Set-up

Machine and control unit are shipped, both being bolted to a wooden pallet. After loosening of bolts transport machine and control to the set-up place using two rods.

Machine weight: approx. 225 kg (496 lbs) Control weight: approx. 115 kg (254 lbs) Length of rods: approx. 1400 mm (55.118") Max. diameter of rods: 30 mm (1.181")

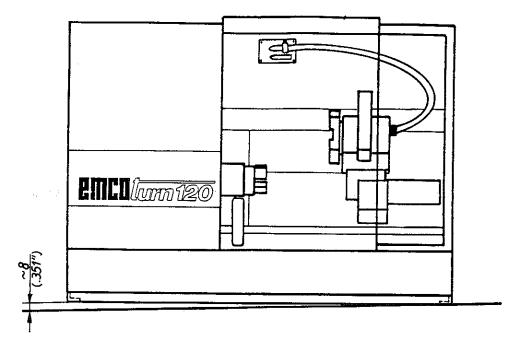


Stands for Machine and Control

Machine and control unit have to sit on stable stands. The operator may position control unit and machine to easily reach both when working.

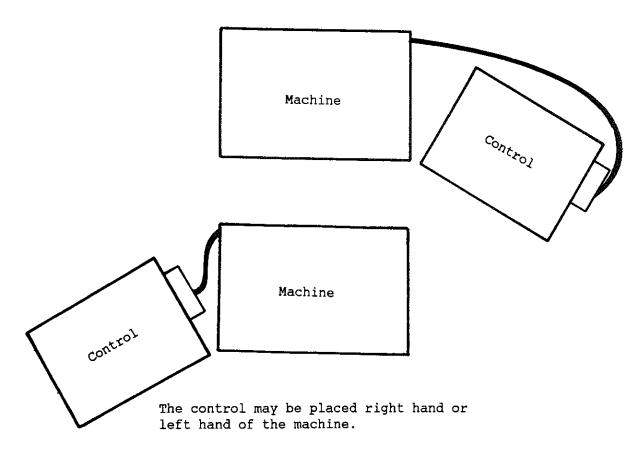
A bolting down of machine and control onto the stands is not necessary.

Advisable height of stand: 830 mm (32.677")



The machine has to be inclined approx 0.4°

approx. 8 mm to the right, in order to make remaining coolant liquid run back out from the spindle bore to the chip area.

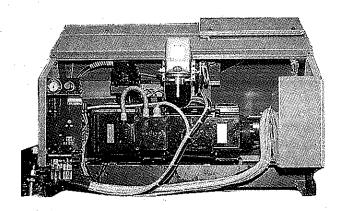


Note:

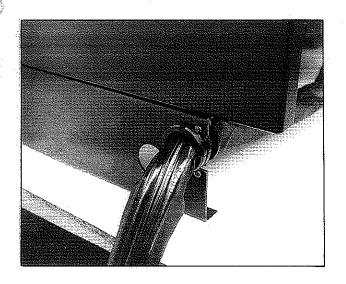
Before starting to work remove rustpreventive and oil/grease machine properly. For oiling and greasing of machine compare point 1 Cross slide and Longitudinal slide guideways.

2. Electrical Connections

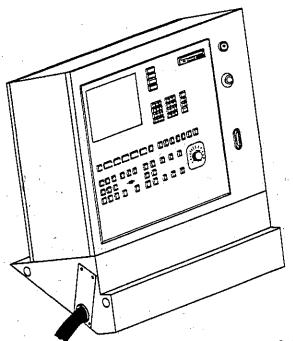
2.1 Connection Machine - Control



Depending on the position of the control to the machine, the cable conduit is led out from the machine housing left or right hand side.



Slide eye with cable conduit into slot of housing and secure with two self-tapping screws.



Mount eye with cable coduit in the same way into control.

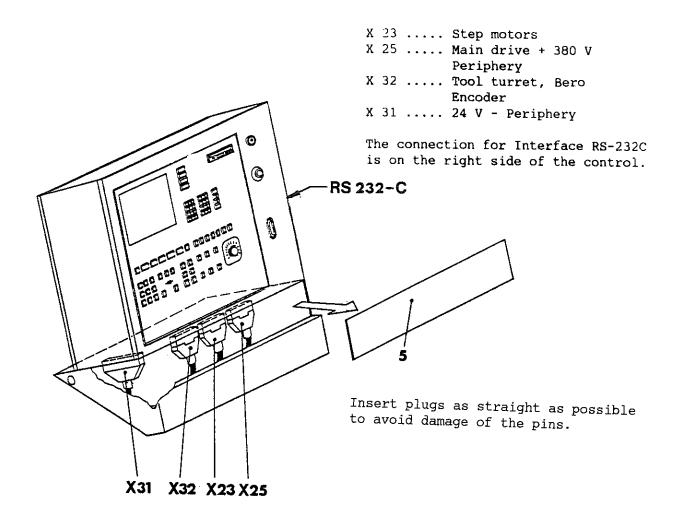
Connection of Machine Cable to Control

Note:

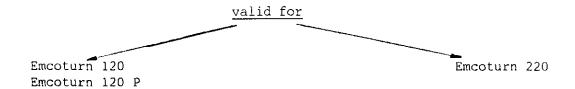
Dismount cover sheed (5) before connecting machine plugs to the control.

Attention!

When connecting or disconnecting, Switch off the the main switch, machine is already connected to main supply, otherwise electr. elements could be distroyed.



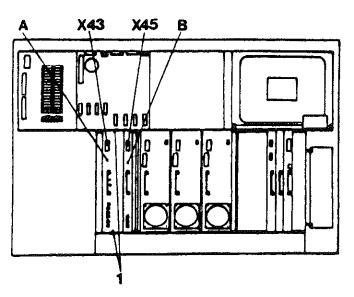
2.2 Mounting the Phase Angle Control Board R3D 417 000



If the board is not mounted A020 appears when switching on the control (main drive not ready).

Attention!

Before opening the control cover disconnect power supply.

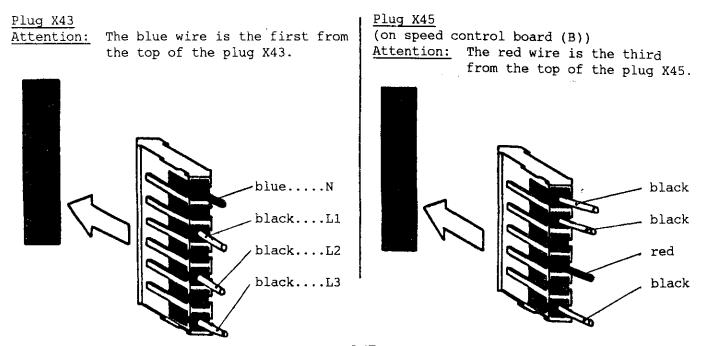


Mounting:

- Remove rear cover of control
- Insert phase angle control board (A) and fix it with the two screws M 2,5 x 6 (1).
- Connect plugs.
- Mount rear cover.

Attention:

Note correct position of the plugs X43 and X45.



2.3 Power supply for Emcoturn 120/120P

Voltage:

230/400V +6%/-10%

(changeable neutral wire must

be available)

Frequency:

50 cy or 60 cy

Fuse:

16 A slow-blowing

On the power supply no additional apparatus may

be connected.

Connection value: 5 KVA

2.4 Main Supply

Note:

The el.connection of the machine must be done by an authorized expert.

Wire with		Plug, Net	
color	Nr.		
black	1	L 1	·
black	2	L 2	phase s
brown	3	L 3	
brown	4	N	ziro wire
blue		ре 🕕	earthing

Ensure the plug is connected correctly to the mains supply.

Brown and black wires L1, L2, L3. Blue wire N (with plug, possibly designation MP or N). Yellow-green wire PE (PE or 🕒).

Warning:

Control of the supply voltage before turning on the main switch.

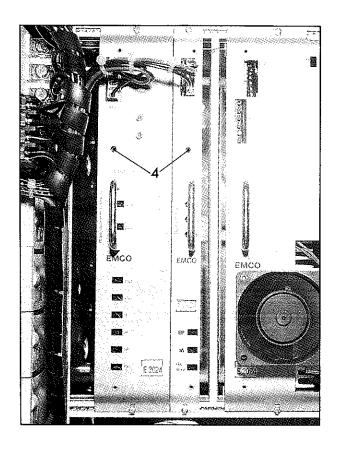
* Phase against phase

400V (+6%/-10%)

* Phase against zero wire

230V (+6%/-10%)

Check of correct Connection



Switch on main switch.

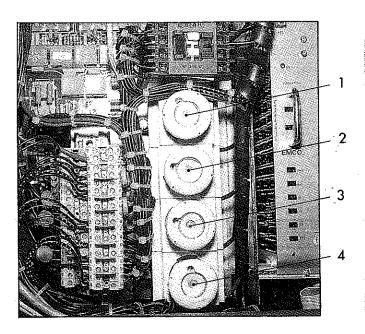
If the lamps 4 are flashing on part 2 and on controller card 3, two phases (e.g. L1 and L2) must be changed.

Switch off main supply when connecting!

Warning:

Before changing the phase connections, disconnect the power cable from the power supply.

2.5 Main Fuses



Positions 1 - 3 are the fuses for the power supply (L1/L2/L3). Position 4 is the fuse for the armature of the main drive motor.

Type of Fuse:

SILIZED 25 A (super fast)

(for screw base E 27)

Note: Fuses in your home don't have superfast character and cannot be used.

Type of Fuses for USA: Fuse A 70 P 20 form 101

2.6 Connection via isolating transformer

The isolating transformer may serve for

- 1. Creation of a changeable neutral wire with power supply 3 x 380 V.
- 2. Transformation of other voltages to $3 \times 380 \text{ V}/220 \text{ V}$.

Ad) item 1:

The main supply must have a changeable neutral wire Mp (= neutral wire N), because some parts of the control and accessories are supplied with only one phase and the neutral wire.

If there is no changeable neutral wire available in the main supply, it is necessary to create a changeable neutral wire. An isolating transformer (adjusting transformer) has to be built between power source and machine.

Recommended isolating transformer: 440/380/220/208 Volt.
Ref.No.: 271 030.
With this isolating transformer a changeable neutral wire is created.
A connection instruction comes with above tranformer.

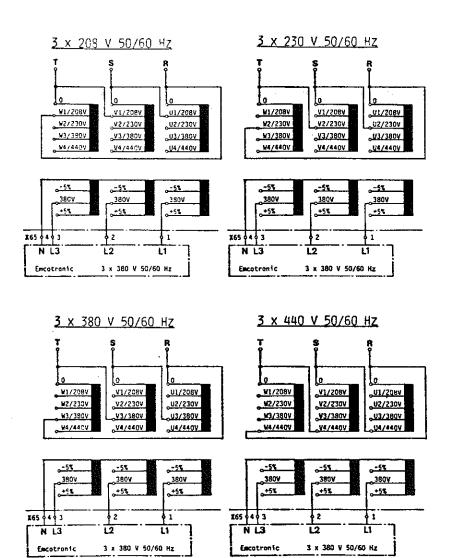
Ad) item 2:

Compare the connections for the specific voltages on the following pages of the instruction.

TRAFO Type DTS 5/5 kVA Ref. No. 271 030

<u>Iransformator Anschlußbeispiele:</u> <u>Iransformer Connection Examples:</u>





Hinweise:

- Zwischen 50/60 Hz kein Unterschied im Anschluß.
- Beim Emcotronic Anschluß muß ein belastbarer Mittelpunktsleiter vorhanden sein.
- Ein belastbarer Mittelpunktsleiter wird durch den Trafo geschaffen.
- Schlechte Netzverhältnisse:

<u>Dauernde</u> Unter- und überspannungen können durch die ±5% Voltanschlüsse geglichen werden.

Beispiel: 3 x 440 V Nennwert jedoch dauernde Unterspannung von -5 %, das heißt effektive Netzspannung 3 x 418 V.

Ausgleich: L1, L2, L3 der Emcotronic an +5 % anschließen.

Remarks:

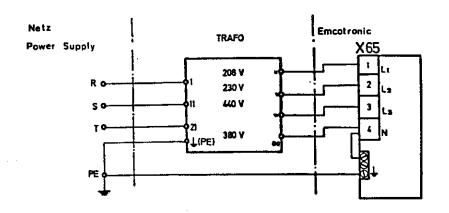
- No difference in 50/60 Hz cycle supply.
- A neutral wire (N) is necessary for EMCOTRONIC connection.
- With the Trafo the neutral wire (N) is generated.
- Bad Voltage Conditions:

Permanent high or low voltages can be compensated by connecting the EMCO-TRONIC to the ±5% Volt connections of the transformer.

Example: Nominal voltage 3 x 440 V
 -5 % permanent low voltage
 therefore effective voltage:
 3 x 418 V.

Compensation: L1, L2, L3 on EMCOTRONIC are connected to + 5 %.

Anschlußschema allgemein mit TRAFO General Connection Scheme with TRAFO



Achtung:

Bei Trafoverwendung \underline{muB} in der EMCOTRONIC N(4) mit PE ($\frac{1}{2}$) gebügelt werden.

Bei Direktanspeisung (3 x 380 V, N, PE) <u>darf N und PE nicht ge-</u> <u>bügelt</u> werden.

Attention:

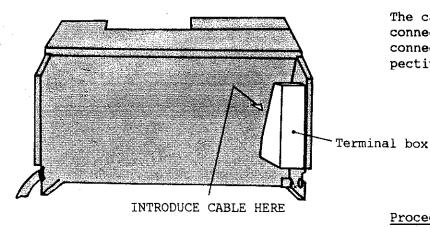
Using the Transformer N(4) and PE (1) have to be jumped in the EMCOTRONIC:

No jumpering of N(4) and PE $(\frac{1}{2})$ if no Transformer is used (ie. Direct Power Supply with 3 x 380 V, N, PE)

2.7 El. Connection of Accessories

<u>Warning:</u> Before connecting, switch off the machine and pull out the main plug.

The electrical connections may only be made by an electrical specialist.



The cables for the accessories are connected in the terminal box. A cable connection is enclosed with the respective accessory.

Plate with PG connections Emcoturn 120/120P

<u>Procedure for Making an electrical</u>
<u>Connection</u>

Bores are provided in the terminal box for introducing the cables and making the cable connections.

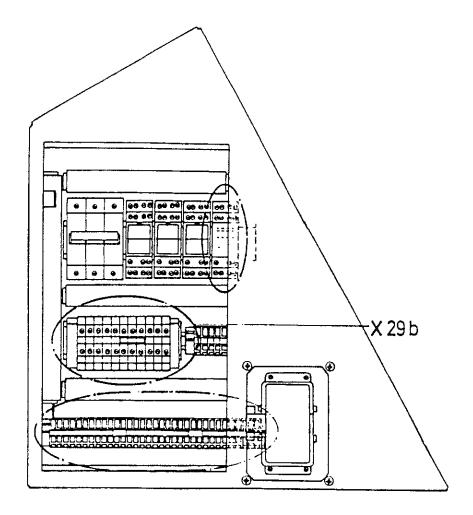
Positions of the Cable Connections for the relevant Accessory on the Terminal Box:

2... Cable connection for coolant pump

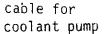
Screw cable connection. Attach leads.

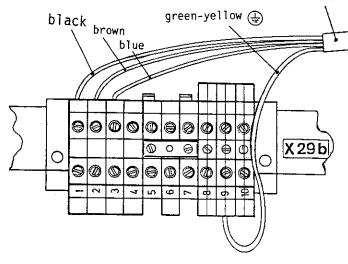
Connecting the Cables:

Terminal Box



Electrical connection of the coolant pump





1 L1 Kühlmittelpumpe coolant pump

2 L2 Kühlmittelpumpa coolant pump

3 Kühlmittelpumpe coolant pump

Schmiermittelpumpe lubrication pump

Schmiermittelpumpe lubrication pump
Maschinenleuchte machine lamp
Maschinenleuchte machine lamp

- Open door
- Insert cable for coolant pump into terminal box and secure with cable connection.
- Attach yellow-green wire to earth terminal 9.
- Connect the phases L1, L2, L3 to the contacts 1, 2, 3.

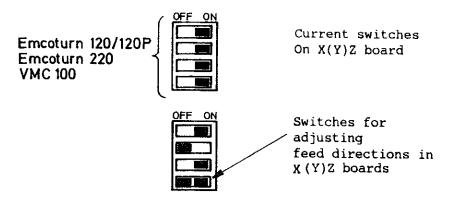
Check:

The correct direction of rotation of the coolant pump is indicated on the pump housing. Reconnect two wires (e.g. L1, L2) if the direction of rotation is wrong.

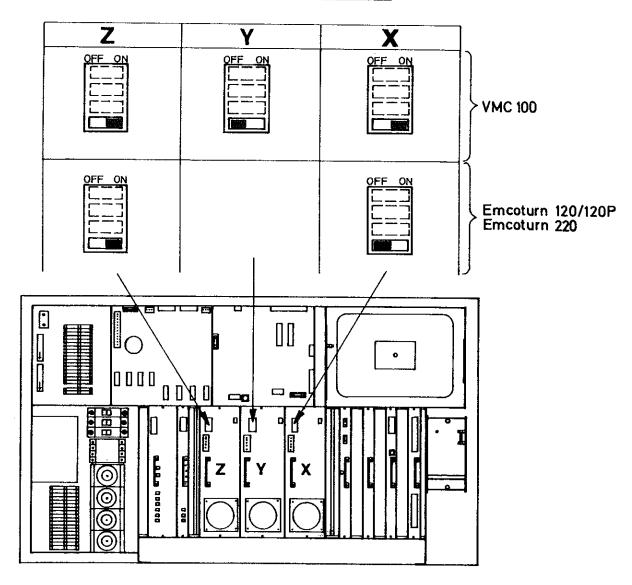
ATTENTION !!!

2.8 Changing Stepper Motor Board R3D 413 001

Before mounting the board R3D 413 oo1 the Dip-switches for current adjustment and feed directions have to be set in correct way. Otherwise the board will be disturbed.

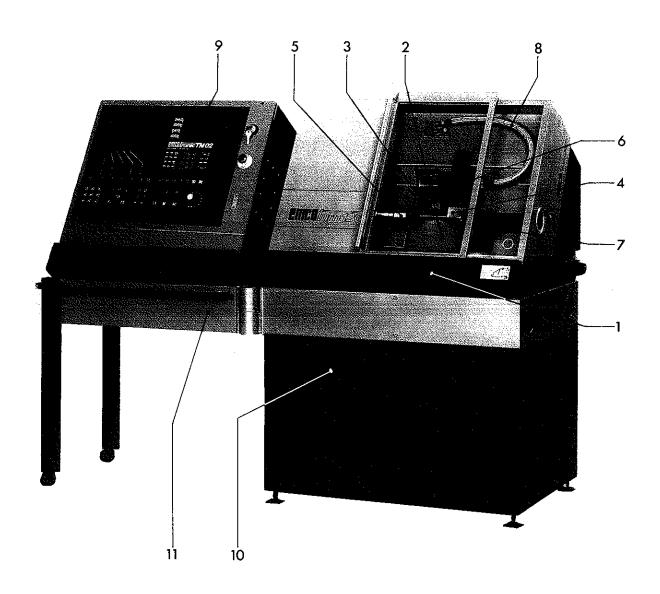


Adjusting feed directions



3. Machine Description

3.1 Main Elements



- 1 Chip tray
- 2 Machine bed, covered
- 3 Longitudinal Slide
- 4 Cross Slide
- 5 Chuck (accessory)
- 6 8-Station Turret
- 7 Tailstock
- 8 Coolant Conduit
- 9 Control Unit
- 10 Machine Base (accessory)
- 11 Control Base (accessory)

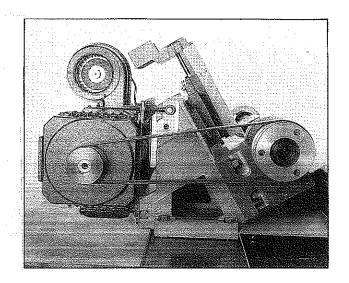
3.2 Construction Principle

Machine Base:

Welded metal sheet construction with integrated chip tray and coolant drip pan.

Machine Bed:

The grey cast iron machine bed is of boxtype design, extremely torsion-resistant and shock absorbing. Tailstock, slide unit and headstock sit on the machine bed. It is screwed onto the machine base according to the three-point contact principle. Thus no spanning is possible which could result in less accuracy.

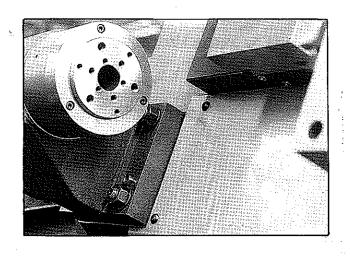


The Torque-Pickup on the Main Spindle

Its enclosed construction guarantees high operation safety.

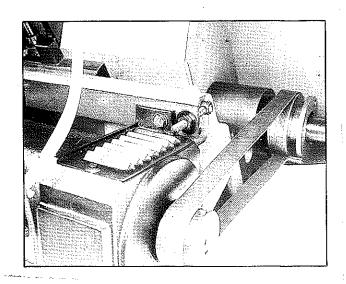
The Headstock / The Main Spindle

The stiff main spindle runs in taper roller bearings. The bearings are lubricated for life-time and thus maintenance-free. The head is laid out "thermo-symmetrically" When warming up there is no deviation in the alignment.



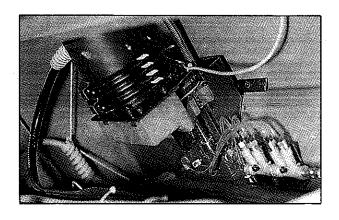
Cover of Slides

Slides are completely covered, so there is no thermal influence by chips or coolant liquid.



Drive of Main Spindle

The main spindle is directly driven by the direct current motor via a multi Veebelt.



Axes Drives

The slides are moved by step motors via high precision ball bearing spindles.

The large-sized spindles together with stiff spindle nuts and play-free axial bearing guarantee high positioning and working accuracy.

Step motors and machine bed are thermally separated, so there is no negative influence by thermal expansion possible.

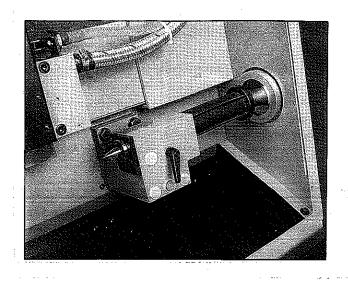
Working Area

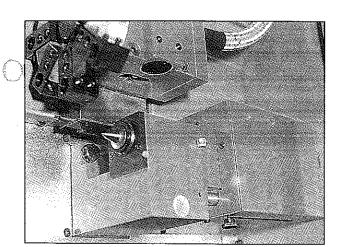
Stainless sheet metal separates the working area from the machining elements: no negative thermal influence possible. Easy to clean by smooth surfaces.

Measuring/Control System

By approaching the reference point we fix the position of the machine zero-point M in relation to the tool mount reference point N $\,$

In traverse operation the slide position is controlled each 5 mm. If the drive is out of step, an alarm is indicated. The reference point has to be approached.





Hand-operated Tailstock

The tailstock sits stationary. This is of advantage, resulting in high stability and free access to the working area.

The heavy-duty quill with integrated center bit allows for stable counter- support of workpieces.

The center can be aligned ± 0,05 mm parallel to the Z-axis using an eccentric mechanism built-in. Thus elastic cutting power is compensated when manufacturing precision parts. Absolutely parallel workpieces can be achieved.

Pneumatic Tailstock

The tailstock sits stationary. This is of advantage, resulting in high stability and free access to the working area.

The heavy-duty quill with integrated center bit allows for stable counter-support of workpieces.

The center can be aligned ± 0,05 mm parallel to the Z-axis using an eccentric mechanism built-in. Thus elastic cutting power is compensated when manufacturing precision parts. Absolutely parallel workpieces can be achieved.

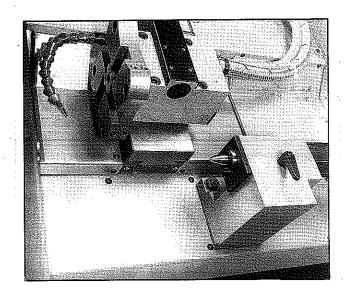
Magnetic switches are installed in the pneumatic tailstock to monitor the rear end position and the clamping position of the tailstock sleeve.

The sleeve is activated by the control, either manually or automatically via the program. The sleeve pressing force can be adjusted with the pressure regulator.

The Central Lubrication System

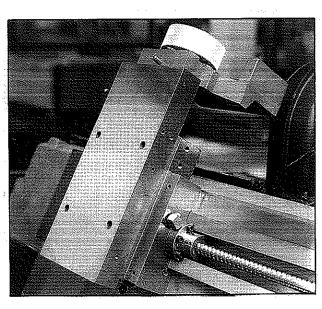
The longitudinal and cross slides are supplied with slideway oil by the central lubrication system.

The pump is switched on for 8 seconds after 20 m of slide travel. This interval and the activation period are established by the works.



Coolant Liquid

The coolant conduit sits on the tool turret and travels with it. The coolant jet can always be positioned towards the chip-removal point.



Slide Unit

Longitudinal and cross slide glide on highprecision ground dovetail-guideways.

The guidance ratios are optimized. The play can be adjusted by two tapered gibs.

The sophisticated lubrication system (distribution channels, oil pockets) guarantees a liquid film on all gliding surfaces.

Safety Devices

- The main spindle only runs when door is closed (manual mode, automatic mode)
- If door is opened during operation, main drive and slide stop.

The tool turret

o <u>Technical data (metric version)</u>

In the tool turret up to 8 external or internal tools can be clamped.

Shaft height of external tools: 12 mm

Shaft width of external tools: 10 or 12 mm

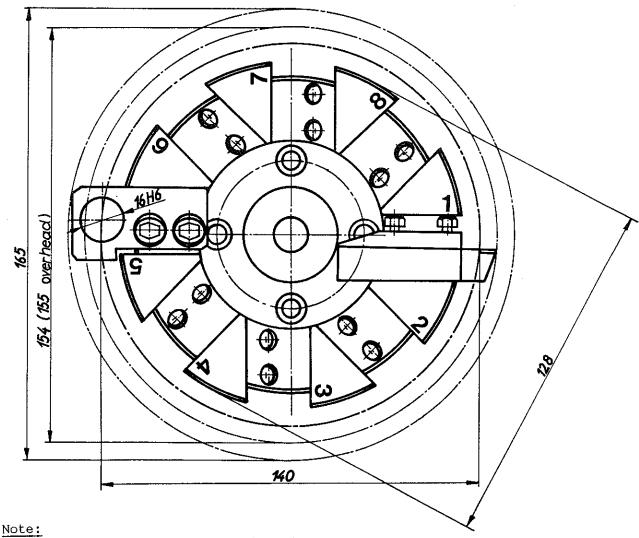
Bore for internal tools: ∅ 16H6

Swing of external tools: 154 mm (155 mm overhead)

Height of mounting groove for external tools: 24 mm

Station Time:

Swivel from - to	Swivel Time
1 to 2	1,1 sec.
1 to 3	2,2 sec.
1 to 5	3,3 sec.
360°	5,3 sec.



Mind that when clamping external tools overhead the swing is 155 mm.

o <u>Technical data (inch version</u>)

In the tool turret up to 8 external or internal tools can be clamped.

Shaft height of external tools: 0,5"

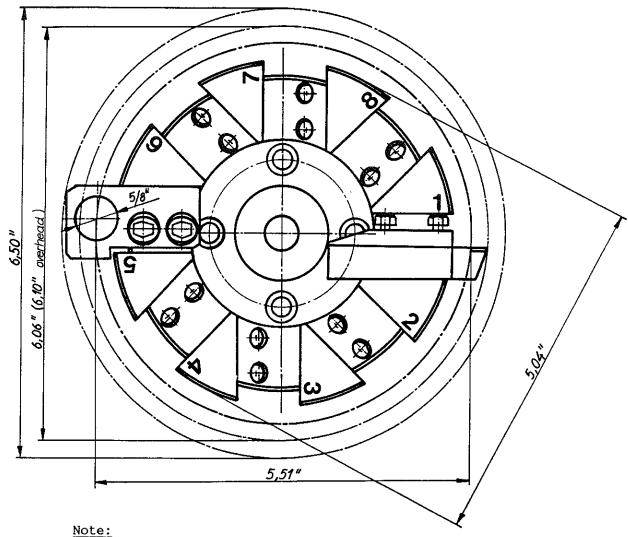
Shaft width of external tools: 0,5"

Bore for internal tools: ϕ 16H6 (5/8")

Swing of external tools: 6,06" (6,1" overhead)

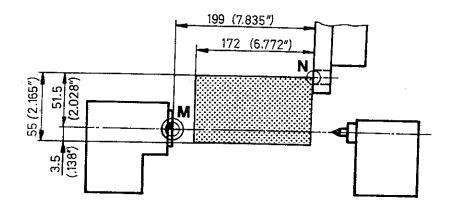
Height of mounting groove for external tools: 1" Station Time:

Swivel from - to	Swivel Time
1 to 2	1,1 sec.
1 to 3	2,2 sec.
1 to 5	3,3 sec.
360°	5,3 sec.

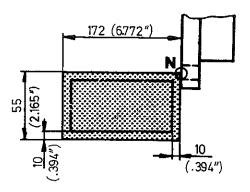


Mind that when clamping external tools overhead the swing is 6,1".

3.3 Working Area



It is determined by the mechanical limits of the slides. Approx. 0,5 mm (.020") in front of these limits there are software limits. The software limits prevent the slides from running into the mechanical limits. The measures of the drawing refer to the reference point N.



In manual mode the control indicates "target limis exceeded" approx. 10 mm (.394") before reaching the software limits. Within this intermediate area the feed is automatically halved (in manual mode).

The measures for reading "target limits exceeded" can be modified in the mode "User Monitor".

3.4 Reference Points on the Emcoturn 120/120P Axis System

Machine Zero Point M:

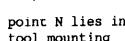


The machine zero point M is situated at the face side of the main spindle. The machine zero point is the origin of the axis system.

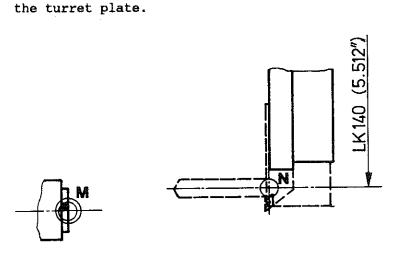
Axis system:

Right hand rotating coordinates system.

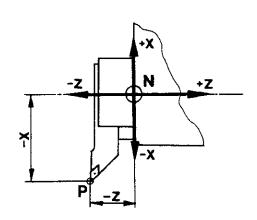
Tool Mount Reference Point N:



The tool mounting reference point N lies in the axis of the bore of the tool mounting device (X-axis). In Z-dirction it lies at the face side of



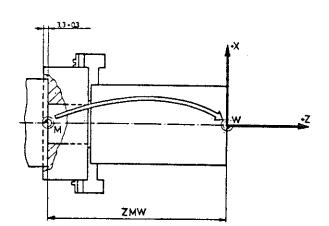
Tool Data - Cutting Point P:



Imagine the coordinates system in point N. The tool data X, Z are gauged from point N. These measures are entered into the tool data memory.

The respective cutting point P is defined about the tool data.

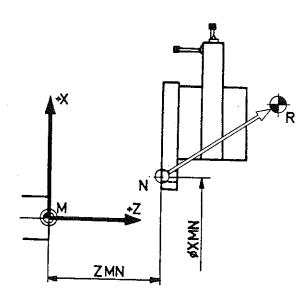
Workpiece Zero Point W:



The coordinates system can be offset from the machine zero point to any desired point. The workpiece zero point is fixed by the programmer. The offset measure ZMW is put in the PSO.

Reference Point R:





It must be approached after switching on the control. Thus the distance M-N is registered by the control, the measuring system is calibrated.

Compare "Approach of the Reference Point".

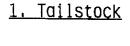
3.5 Pneumatic Emcoturn 120P

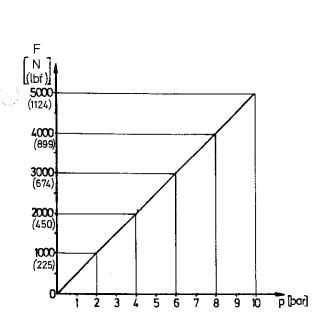
3.5.1 Connection data

Maximum admissible pressure: 10 bar Recommended service pressure: 6-7 bar Minimum service pressure: 5 bar

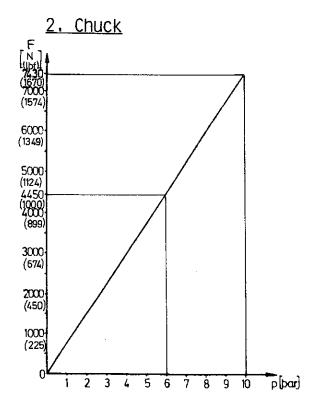
Connection for compressed air line: \emptyset 10 mm(.394") An alarm is given if the pressure falls below 5 bar.

3.5.2 Relationship between Air pressure - Clamping force





total clamping force



<u>Description</u>

(see also pneumatics diagram)

3.5.3 Manual slide

You can switch the pressure off and on with the manual slide. Slide moved to front: valve open.

Note:

When the clamping cylinder for the power chuck is being greased, the compressed air must be switched off as otherwise the grease will be pressed out.

3.5.4 The service unit

Function:

- Separation of the air from water and dust. Slightly open the screw (A) at the bottom of the filter
 → automatic draining of the tank.
- 2. Oiling the air. For the lubrication of the moving elements (valves, pistons).

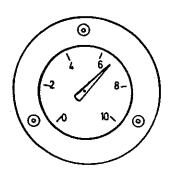
Maintenance:

- Check that there is enough water in the separating tank.
 Weekly check.
- 2. Oil check:
 At weekly intervals. The marks indicate the maximum and minimum oil levels.

Oil grade: Uncompounded hydraulic oil of the viscosity class 32 e.g.: Tellus 32 (Shell)
DTL light (Mobil)
Nuto S32 (Esso)

DIN designation: hydraulic H DIN 51524/ISO VG32

3.5.5 Possibilities of setting the service unit



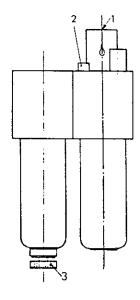
1. Tailstock pressure



Pull out black ring and turn.
The pressure can be read off the pressure gauge.
Press in ring again —>
It can no longer be turned.

black ring

2. Oil quantity for air oiling



2 possibilities for empty the water-separator

Possibility A:

- Loose screw (3) lightly → water streams out under pressure.
- Tighten screw (3).

Possibility B:

- Turn off compressed air supply (on manual slide)
- Dismount screw (3)→water flows out.
- Mount screw (3) and tighten.

The oil quantity is set at the works. You can change the oil admixture with the screw (1). Turning screw clockwise: less oil in mixture.

Delivery:

The oil consumption is minimal. (1 drop of oil should be added with an air throughput rate of 1000 l/min) (264 US gal/min).

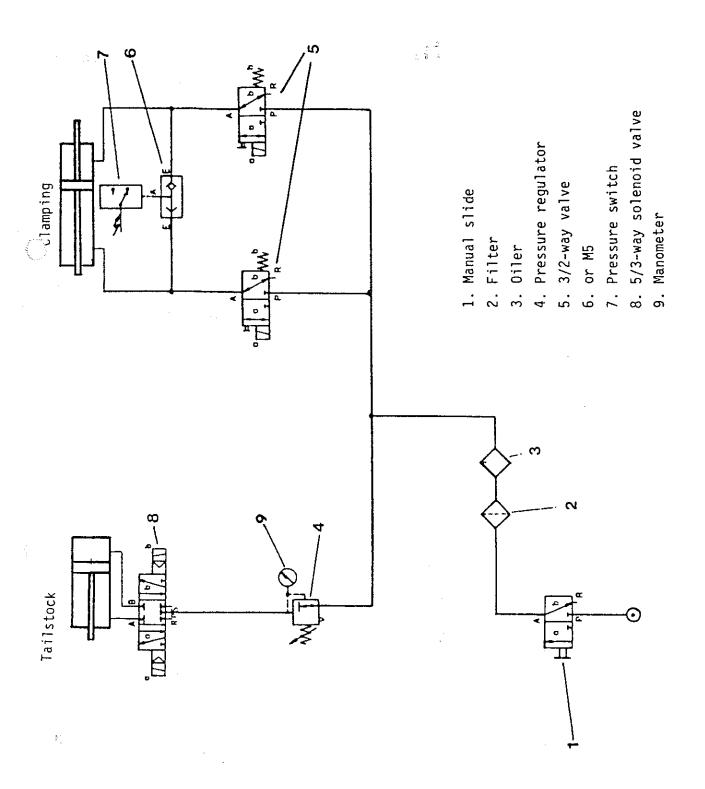
Replenishing oil:

Unscrew filler screw (2) and top up with oil.
The replenishing of oil is also possible under pressure.

Note:

The valves are always to be slightly oily.

3.5.6 Pneumatics diagram



3.5.7 Checking the pneumatics by manual activation of the valves

Switch off control before check.

If the tailstock or chuck cannot be activated by the control, check pneumatics function before checking the control pulses.

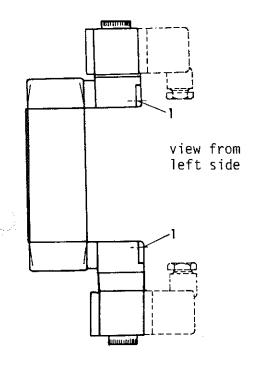
You can activate the valves by hand.

Manual activation of the pneumatics for chuck and tailstock

On the pneumatic unit of the Emcoturn 120P there are one 5/3-way valve for activating the tailstock and two 3/2-way valves for activating the chuck.

Tailstock:

The 5/3-way valve for the tailstock has two screws (1) for the manual activation of the tailstock sleeve.



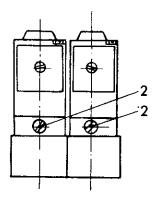
Note:

Press in screws (1) with screwdriver and turn from position 0 to position 1. When moving one screw, the other one must be turned back to its starting position.

Chuck:

Two 3/2-way valves are installed for the activation of the chuck. Each valve has a screw (2) for manual activation of the chuck.

view from left side



Note:

Press in screws (2) with screw-driver and turn from position 0 to position 1.
When moving one screw, the other one must be turned back to its starting position.

3.5.8 Remarks on the Pneumatic Emcoturn 120P

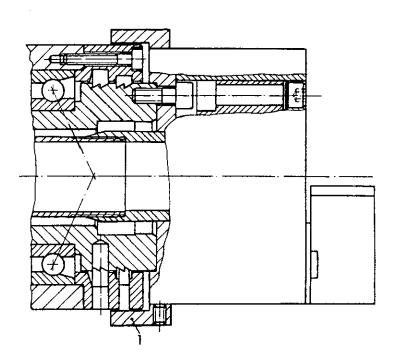
If the machine is switched off by the main switch but the air supply is not interrupted with the shut-off valve (hand slide), the tailstock sleeve may move forwards independently within a few hours.

This fact has no consequences for the machine's function since the sleeve returns to its starting position when the main switch is switched on.

Remedy:

Before switching off the machine, close the shut-off valve (hand slide) for the air supply. (Refer to pneumatics diagram, item 1.)

3.6 Remarks on the working with synthetik materials



Some synthetic materials e. g. Nylon give ductile, thread shaped chips. Those chips can (by a thickness of 0,08 mm) (.003")) penetrate through the labyrinth and destroy the bearing application. Therefore use for working with those materials a self made tube (1), which you mount on the different clamping devices (chuck, collet chucks).

4. Start-up of Machine

- Remove rust-preventive
- Before machine start, oil longitudinal- and cross-slide quideways, tailstock quill and axial bearings of tailstock.

 (See chapter 8 "Lubrication of the machine").
- Pay attention that workpieces and tools are tightened firmly and properly.

4.1 Switching the machine ON

- Switch on key-operated switch on the control panel. (cabinet fan starts to run)
 The EMERGENCY-OFF key must be unlocked.
 The screen display appears after about 20 seconds.
- The machine is switched to MANUAL/REFERENCE Mode.
- 2 alarms appear on the screen:
 ALARM 060 TOOL TURRET NOT READY
 ALARM 460 REFERENCE POSITION NOT ACTIVE



- The alarms are cancelled by pressing the C.E. key (CLEAR ENTRY).



- The auxiliary drives are switched on with the AUX ON key.



 By pressing the CYCLE-START key both slides are automatically traversed to the reference position.





 By pressing the MANUAL-JOG key and the Tool Turret key at the same time, a defined position of the tool turret is determined (synchronisation).

4.2 Switching the machine OFF

- Switch off the key-operated switch on the control panel.

Note:



- Operation is interrupted with the RESET key.

- There must be at least 20 seconds between switching the machine off and on.

Caution:

The key-operated switch may be switched off only if the main spindle is stopped, otherwise the main drive fuses may melt.

4.3 Loading the Machine Data

If the machine has not been in use for more than 3 months - it could happen that the MS data have gone. In this case the screen shows alarm 130.

Furthermore in the position shift offset (PSO) and in the tool data register (TO) incorrect values are being indicated.

Measures:

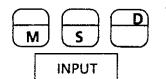
Machine data have to be read in from a diskette or perforated tape. (A machine data diskette as well as a punched tape with the MS data are supplied with the machine).

4.3.1 Loading the MSD from diskette

- EDIT mode
- Insert diskette

CASSETTE PORT

- The control switches over to diskette mode when the CASSETTE PORT softkey is pressed.

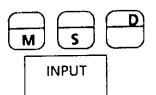


- The data are loaded. On completion of the loading procedure the control reports in the MAN mode.

4.3.2 Loading the MSD from punched tape via the interface RS 232

- EDIT mode
- Insert punched tape

RS 232 PORT - The control switches over to interface mode when the RS-232-PORT softkey is pressed.



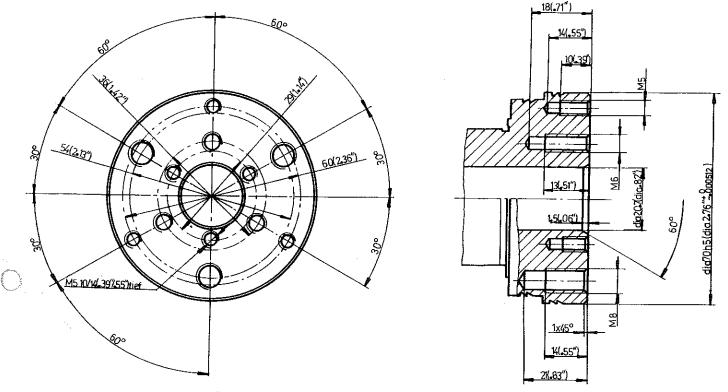
- Loading procedure is started. This process must be performed three times.

Programme Control

<u>5. Clamping Device,</u>

Mounting of Accessories

5.1 Main spindel-connection dimensions:



5.2 The 3-jaw Chuck, dia, 85 mm

Mounting of Chuck:

Screw chuck onto spindle nose using 3 socket-head srews M5 x 40 DIN 912-6.9.

Reversing the Jaws

The jaws can be inserted reversed: outside stepped jaws or inside stepped jaws. Pay attention to insert the jaws in the correct sequence. Clean the jaws before you insert them.

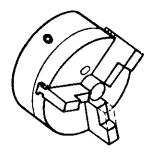
Inserting the Jaws: Sequence:

-

- 1. Jaw 1 in groove 1
- 2. Jaw 2 in groove 2
- 3. Jaw 3 in groove 3

Soft Jaws for 3-jaw Chuck

The changing shoulders for the soft jaws have to be machined by yourself. When machining, the jaws must be tightened.



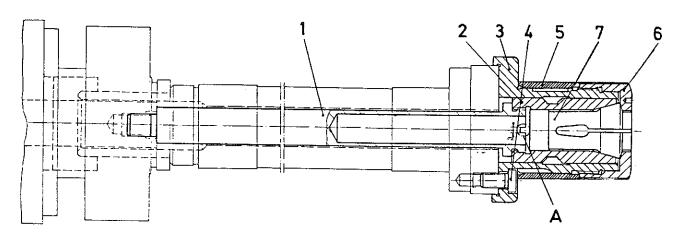
Procedure:

Clamp a round bar and then turn the shoulder.

Safety Tips:

- The jaws must not protrude more than 12 mm (.472"). Otherwise danger of breakage and of injury to operator.
- The clamping shoulders must be machined deep enough to guarantee a safe clamping of workpieces.

5.3 Power chuck for collects DIN 6343



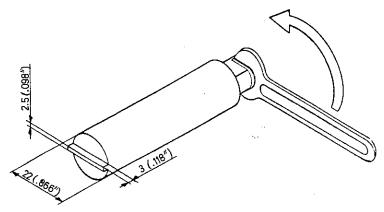
Assembly:

- Screw in pressure bar (1) (see Notes: Special tool)
- Screw pressure sleeve (2) onto connecting bar.
- Mount main bearing section (3) onto main spindle with the three cheese head screws M8 (4).
- Push cover sleeve (5) onto main bearing section.
- Insert desired collet (7).
- Screw on retaining nut (6).

Collets DIN 6343:

Collets are already enclosed with the chuck in a set of 7 (sizes 6,8,10,12,14,15,16 mm).

Each collet has a nominal clamping tolerance of - 0.5 mm.

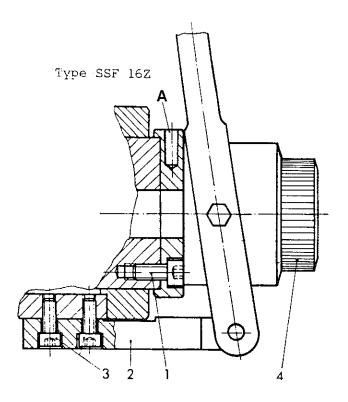


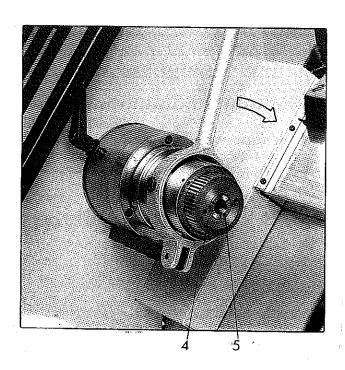
Notes: Special tool for self-making

On the front end of the pressure bar there is a groove (A) in which a special tool can be inserted for screwing in the pressure bar.

The shown tool is an example to make it self.

5.4 The Quick-Action Chuck





Mounting the Quick-Action Chuck

- Mount chuck onto main spindle with 3 socket head screws M8(1) (Centering shoulder already there).
- 2) Secure bracket (2) on headstock with 2 socket head screws M6 x 16 (3).

A...Bore for straight pin $6h11 \times 100 \text{ mm}$ for countering when the retaining nut is being tightened.

Collet DIN 6343

Each collet has a clamping capacity of \pm 0,2 mm. Collets are added to the chuck as set consisting of seven pieces (sizes 6,8,10,12,14,15,16 mm).

Inserting the Collets

Screw off clamping nut (4), insert collet with desired clamping capacity. Turn the clamping nut (4) to the stop.

(Countering with straight pin $6h11 \times 100$ in bore A)

Attention.

When clamping nut is off, do not move clamping lever too far in direction of arrow; clamping balls could fall out.

Clamping of Workpieces

Put workpiece into collet (5). Move clamping lever forward.

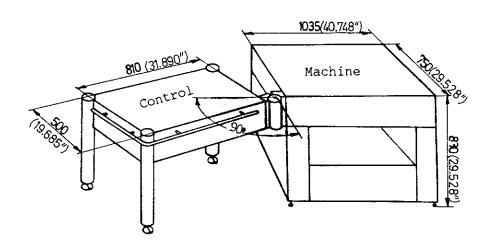
Note:

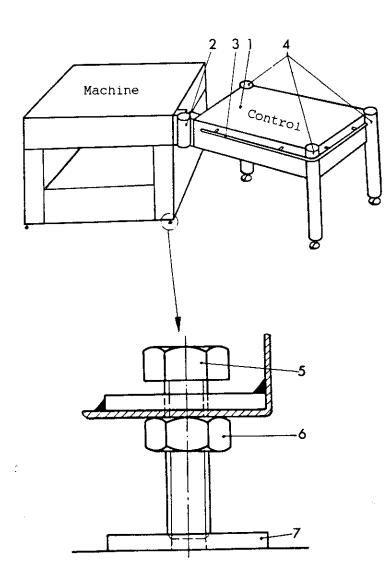
Do not under any circumstances insert screws M6x16 when the rapid-action chuck is dismantled. (Insert cheese head screws M6x8 again!)

5.5 Machine Basis for Machine and Control

The stand for the control can be turned 90° .

Sizes of tables: See illustration





The stand for the control(1) can be mounted to the left or to the right side of the machine stand.

The joint(2), the handle(3) and the legs(4) have to be mounted in the correct way.

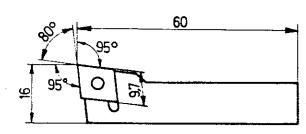
Adjusting the Height of the Machine Stand

- Adjust the height with the hexagon screws M16 x 60 (5).
- Counter the hexagon screw with the hexagon nut M16(6).

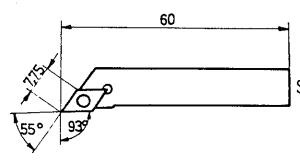
Note:

The hexagon bolts can be placed directly on the floor, but it is advisable to place metal sheets (7) underneath.

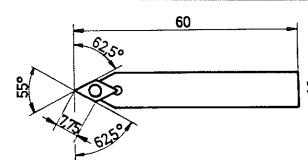
5.6 External Tools (Dimensions)



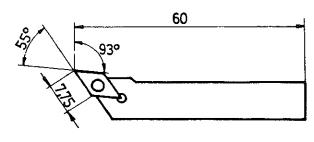
Shaft 12 X 12 Left hand scrumb tool holder



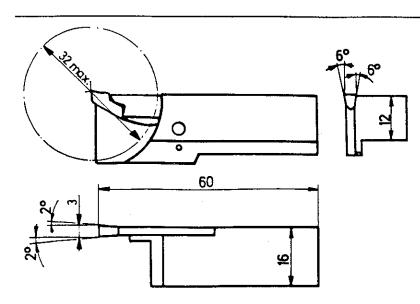
Shaft 12 X 12 Right hand side tool holder



Shaft 12 X 12 Neutral side tool holder

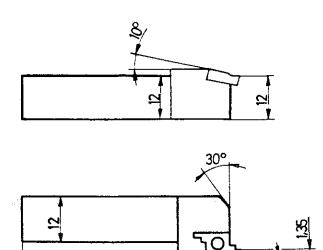


Shaft 12 X 12 Left hand side tool holder



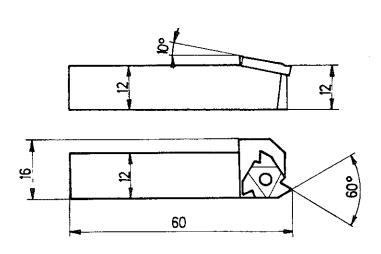
Parting-off tool holder

Measures in mm!

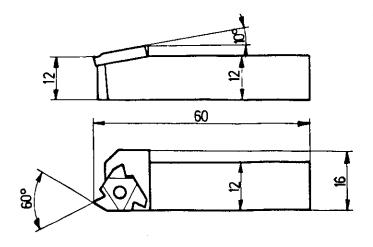


60

Plunge cutting tool



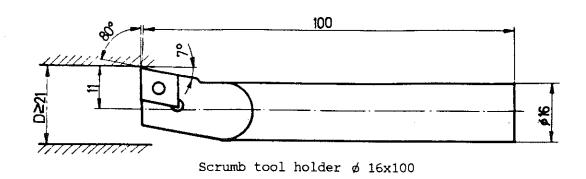
Left hand threading tool holder

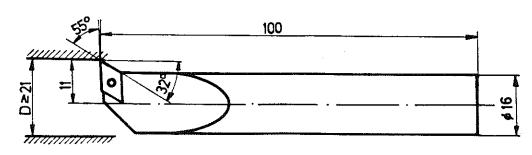


Right hand threading tool holder

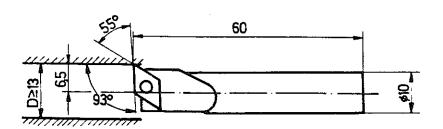
Measures in mm!

5.7 Internal Tools (Dimensions)

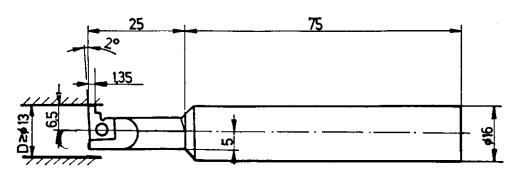




Bore tool holder ϕ 16x100

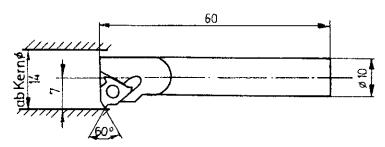


Bore tool holder ∅ 10x60

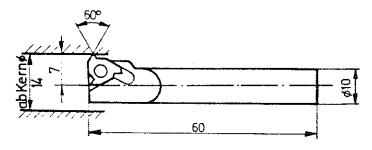


Plunge Cutting tool \(\phi 16x100 \)

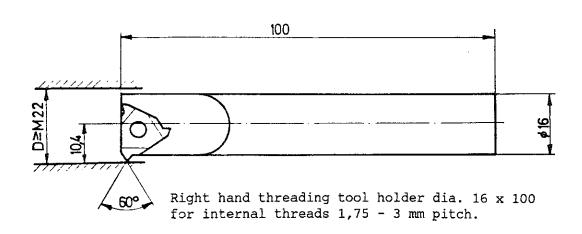
Measures in mm!

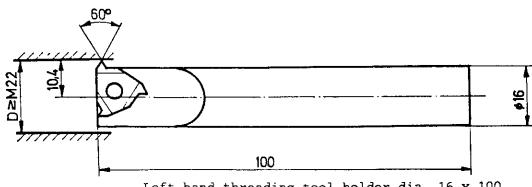


Right hand threading tool holder dia. 10 x 60 for internal threads 0.5 - 1.5 mm pitch.



Left hand threading tool holder for internal threads 0,5 - 15 pitch.

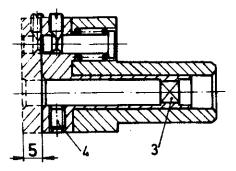




Left hand threading tool holder dia. 16 \times 100 for internal threads 1,75 - 3 mm pitch.

5.8 Holders for Tapping Tools with Length Compensation

For tapping tools M3,M4, M5, M6, M8 and M10 Length compensation: 5 mm



Mounting:

- * The holder for tapping tools is directly clamped in the toolholder.
- * Insert the tapping tool with the square shank (3) into the holder and clamp it with the set screw M5 x 6 (4).

Holder-Nr.	Tapping Tool
1	М3
2	M4
3	M5, M6, M8
4	М10

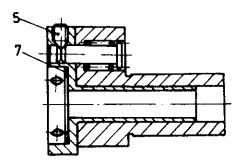
5.9 The Die Holder

The die holder serves to clamp die rings for cutting external threads.

2 die sizes:

Die holder 16 for die rings M 2 to M 2,5. Die holder 20 for die rings M 3 to M4 with shim ring 1 mm. Die holder 20 for die rings M 5 and M6 without shim ring (7).

The length equalisation of a die holder is 5 mm.



Assembly:

- Insert die holder into bore of the tool turret disc up to the stop and clamp.
- Insert die ring and secure with setscrews M4x5 (5).

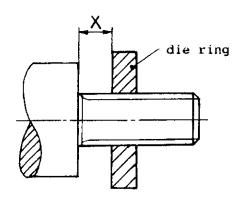
Recommended speeds for thread-cutting

Steel	max.	200	rpm
Cast iron	max.	250	rpm
Brass	max.	400	rpm

Note:

During the thread-cutting cycle G33 please observe the following if a shoulder limits the thread run-out. The slide is stopped first and then the main spindle. Owing to the length equalisation the die ring is still moving as the main spindle slows down. Therefore, never program the die right up to the thread shoulder but to a certain distance from the shoulder (distance X).

Therefore observe the reference values in the table.



Material at speed	Distance X
Steel at 200 rpm	арргож. 2 mm (.0787")
Cast iron at approx. 250 rpm	арргож. 2,5 mm (.0984")
Brass at approx. 400 rpm	approx. 3,5 mm (.1378")

5.10 The collet facility ESX 16

The collet device permits workpieces with cylindrical shafts to be clamped.

Clamping range:

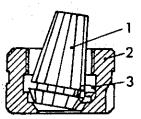
0.5 - 10 mm (1/32" - 25/64")

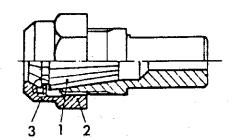
<u>Graduations:</u>

from \emptyset 0.5 - \emptyset 3 mm collets in graduations of 0.5 mm from \emptyset 3 - \emptyset 10 mm collets in graduations of 1 mm.

Assembly:

- * Undo clamping nut size 24 (2).
- * Insert collet (1) at an angle into the clamping nut so that the eccentric ring (3) engages the groove of the collet.
- * Screw clamping nut (2) with collet (1) onto collet holder (do not tighten).
- * Insert tool.
- * Tighten clamping nut.





Dismantling the collet:

Undo clamping nut.

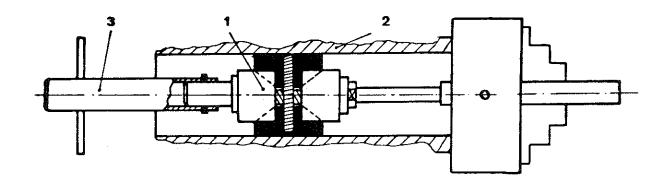
While the nut is being unscrewed, the collet is pushed off by the eccentric ring in the nut.

Care:

Before and after use clean and oil collets and collet holders. Chips and dirt can damage the clamping taper and cone and reduce precision.

Collet - dia (mm)	Clamping range (mm)
1,0	0,5 - 1,0
1,5	1,0 - 1,5
2,0	1,5 - 2,0
2,5	2,0 - 2,5
3,0	2,5 - 3,0
4,0	3,0 - 4,0
5,0	4,0 - 5,0
6,0	5,0 - 6,0
7,0	6,0 - 7,0
8,0	7,0 - 8,0
9,0	8,0 - 9,0
10,0	9,0 - 10,0

5.11 Rapid adjustment hollow spindle stop for Emcoturn 120/120P



Assembly:

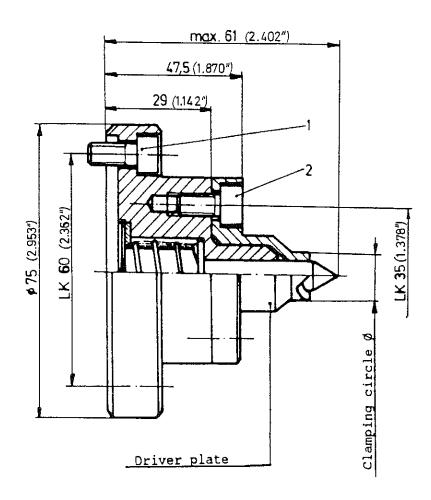
Insert the hollow spindle stop (1) into the main spindle (2) and clamp it in the required position with the spanner (3).

Safety warning:

- Always remove the spanner after assembly.
- Make sure that the hollow spindle stop is securely clamped before switching on the machine.

5.12 The workpiece driver

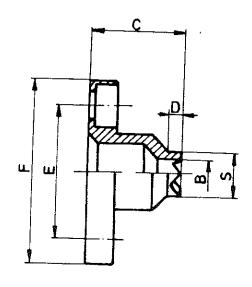
<u>Dimensions:</u>



<u>Installation:</u>

- * Disassemble connecting tube.
- * Set workpiece driver onto spindle nose and tighten with 3 socket head screws M5x12 (1) at hole circle \emptyset 60mm.
- * Tighten selected driver plate at workpiece driver using 3 socket head screws M6x12 (2).

<u>Dimensions of driver plates</u>



Clamping circle 0 S	Standard value for turning range	Rotating sense	В	С	D	£	F
12 (.472")	13 - 19 (.512" ~ .748")	R + L	8,2 (.323")	26 (1.024")	4 (.157")	LK 35 (1.378*)	48 (1.890°)
20 (.787 *)	20 - 33 (.787" - 1.299")	R + L	15,2 (.598")	26		LK 35 (1.378")	48 (1.890")

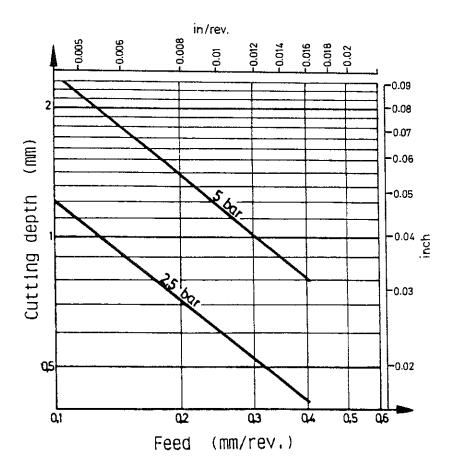
Max. machining values for workpiece driver

Material: 9S20

Cutting speed: 170 m/min (558 ft/min)

Diameter: 33 mm (1.299")

Clamping diameter 22 mm (.866") Feed, cutting depth variable



The diagram shows the maximum cutting values as a function of cutting depth, feed and sleeve pressure. If the characteristic line is exceeded, the workpiece driver might slip through. In case of harder materials the cutting values and the sleeve pressure have to be adjusted correspondingly.

5.13 The Pneumatic Tailstock (Emcoturn 120P)

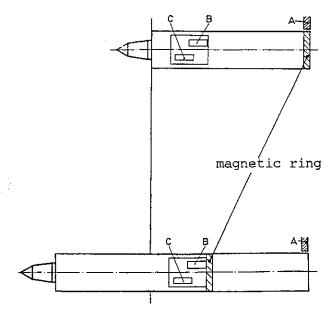
Setting the solenoid switches

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The position of the tailstock sleeve is controlled from the three solenoid switches A, B, C, which is activated by magnetic ring.

Description of principle

On the end of the tailstock sleeve a magnetic switch is activated by the magnetic ring.



1. Rear End Position:

When the tailstock sleeve is at the rear end position, the fixed limit switch A is activated.

A report is made to the control that the tailstock is in the rear end position.

2. Clamping Position of the Sleeve:

Two limit switches are mounted on a movable slide. When the sleeve moves forward, the first limit switch (B) reports "clamping position reached", the second limit switch "clamping position exceeded".

When the limit switch C is activated:

- in manual operation the alarm 930 is given
- in automatic operation the program run is also aborted.

Purpose of the End Switches B and C

Switch B:

"Tailstock sleeve in clamping position" is reported to the control. Full power is supplied to the clamping cylinder. Only then can a CNC program be started or the main spindle switched on.

Switch C:

If the workpiece was ejected by the machining pressure, the sleeve would traverse forward.

The limit switch C would then cause immediate interruption.

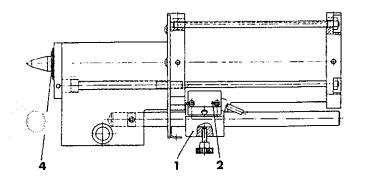
Setting the Clamping Position

The limit switches B and C are mounted on a slide. This slide must be clamped in the correct position depending on the lenght of the workpiece.

(JE)

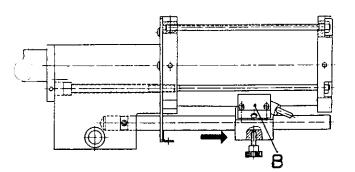
Procedure:

- Control ready for operation; approach reference point; workpiece (5) in chuck (3).
- Completely reverse tailstock sleeve
 (4) (Symbol "Sleeve back"
 illuminates constantly).
- 3. Clamp slide (1) on the left.





4. Traverse tailstock sleeve in clamping condition (workpiece centering). The symbol flashes as the limit switch slide has not yet been clamped in the correct position.



- 5. Move slide slowly to the right until the symbol stops flashing and remains constantly illuminated (limit switch B activated).

 While switch B is being activated, you will hear that compressed air is being supplied to the valve. The sleeve is now clamped.
- 6. Clamp the slide in this position.

Note:

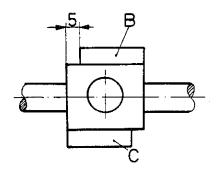
If you move the slide too quickly, you might activate the limit switch C. In this case alarm 930is given.

Both LED's Flash

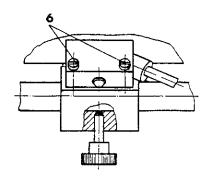
Remedy:

- Cancel alarm (C.E. or Reset)
- Proceed as described under points 2 to 6.

<u>Position of the Limit Switches B and C</u> <u>in Relation to each other</u>



The limit switches B and C are mounted at the works in such a way that they respond at a distance of 5 mm.

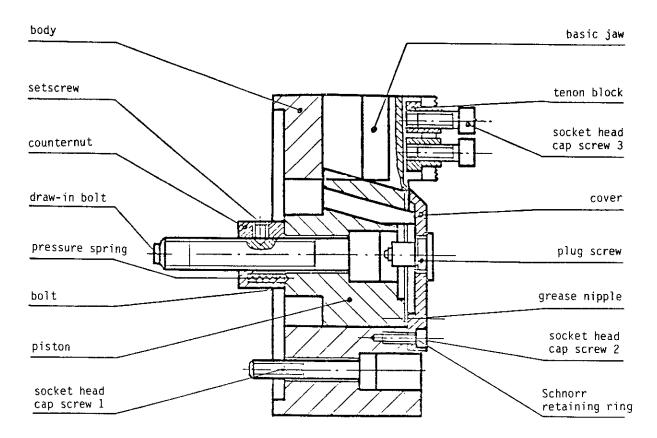


The limit switch B can be moved on the slide after the screws (6) have been removed. In this way you can change the relative distances

"clamping postion reached (switch B)" and

"clamping position exceeded (switch C)".

5.14 Operating instructions for power chucks



1. Dismantling the chuck:

- Unscrew cover.
- Pull piston out forwards.
- Take out jaws.

Clean all components, check and grease with "Klüber Altemp Q NB 50".

2. Assembling the chuck:

- Insert basic jaws (observe the 1, 2 and 3 marks).
- Install piston and move to and fro several times.
- Screw on cover.

3. Chuck lubrication:

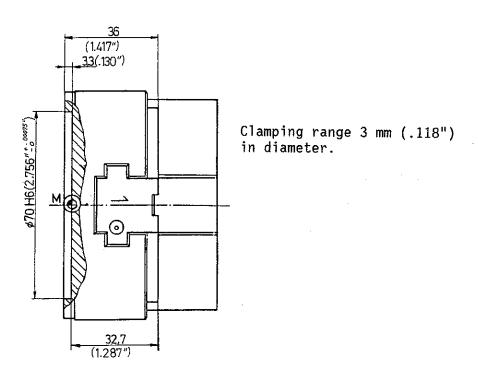
- Move piston to foremost position.
- Press grease through the grease nipple in cover.
- Activate chuck several times.
- Move chuck back to foremost position.
- Regrease.

The chuck must be lubricated every day.

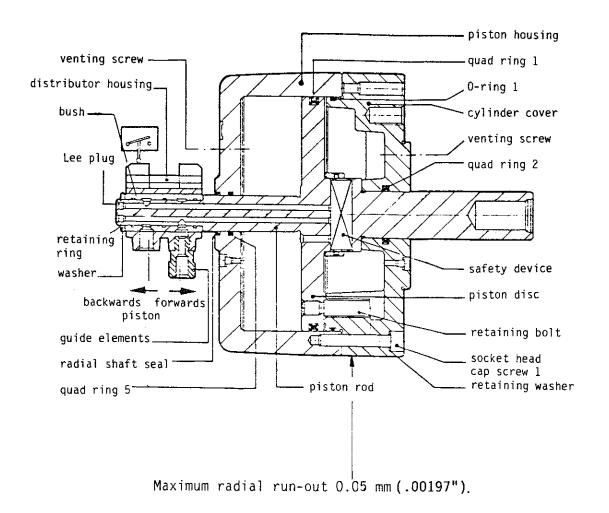
Only use acid-free viscous grease with Molykote additive.

(e.g. Klüber Altemp Q NB 50).

<u>Chuck dimensions</u> <u>Position of Machine Zeropoint</u>

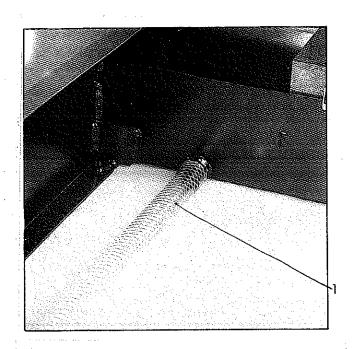


5.15 Design of the gir/clamping cylinder without bore



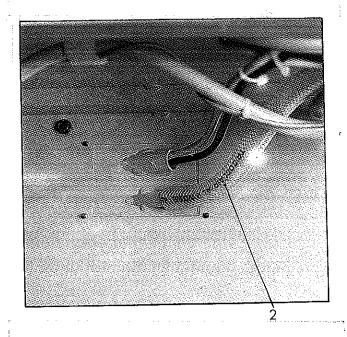
Work on the cylinder may only be performed by qualified service personnel.

5.16 Connecting the Coolant Equipment



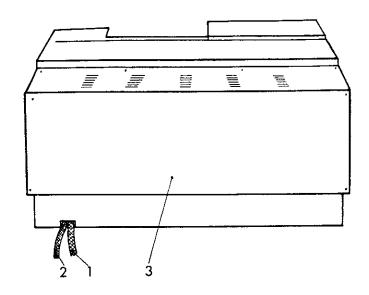
The liquid container is put to the floor.

Discharge hose (1) to be connected to the pipe connection in chip tray.

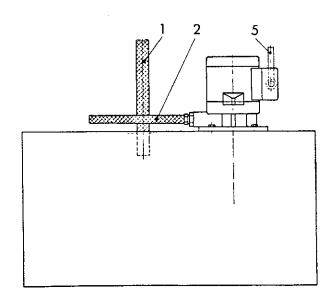


Inflow hose (2) to be connected to the coolant conduction.

Coolant hose (4) to be guided on the backside of the turret and to be fixed on the turret with 2 hexagon head screws M6x12 (6) and washer B 6.4. Put on hose (3) and connect it to the supply cable for the turret using hose clamps.



Guide discharge hose (1), inflow hose (2) and connecting cable (5) through the backside cover (3).



Put discharge hose (1) into coolant container, connect inflow hose (2).

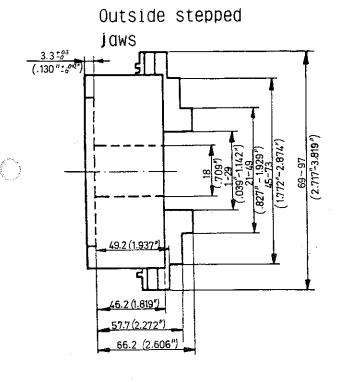
Contents of container: approx. 30 l Pump capacity: 15 l/min

Pay attention to the correct direction of revolution of the coolant pump.

El.connection instructions to be found in chapter El. connections.
Position 5:cable for el. connection

6. Operating Material. Operating Instructions

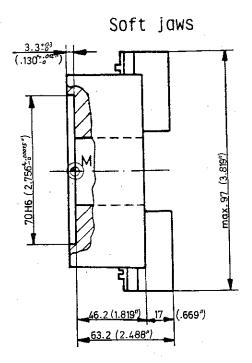
6.1 Dimensions, Chucking Devices EMCO Chuck, dia, 85 mm.



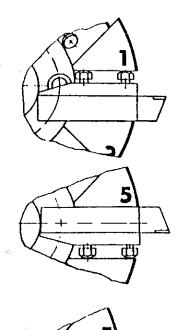
Inside stepped
jaws
3.3*83*
(.130***,0*2*)
46.2(1.819*)
49.2(1.937*)
57.7(2.272*)
66.2 (2.606*)

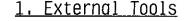
Pay attention to instructions on service and maintenance tips and to safety tips.

An instruction book comes with each chuck.



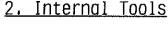
6.2 Mounting of Tools





Insert tool and clamping device in mounting groove until stop (compare drawing). Clamp tool using clamping device. Diameter of tool bits mounted as illustrated 154 mm.

Tools can be clamped "overhead" too. In each case, the cutter edge is at center height. Diameter of tool bits mounted as illustrated 155 mm.



Internal tools are clamped into the tool holders.

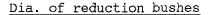
Mounting of the tool holders on tool turret plate

Insert tool holder up to the stop into mounting groove of tool turret and clamp with both socket head screws (1).

Mounting of tools in the tool holders

Inside tools with a shank dia. of 16 mm are clamped directly with the two set screws.

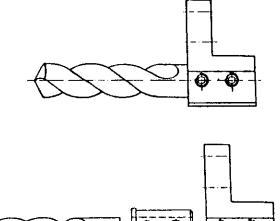
For tools with a smaller shank dia. reduction bushes are to be used. Pay attention that the screws clamp direct onto the tool through the bores of the reduction bush.



Dia. 2, 3, 4, 5, 6, 7, 8, 9, 10, 12 mm

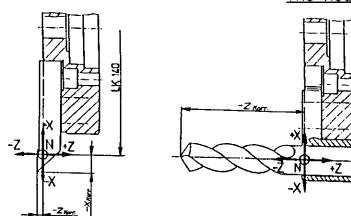
Note:

Pay attention that the tools do not protrude over the backside bore, since this may block the rotating movement.



6.3 Taking the Tool Data

The Measures for the Tool Data

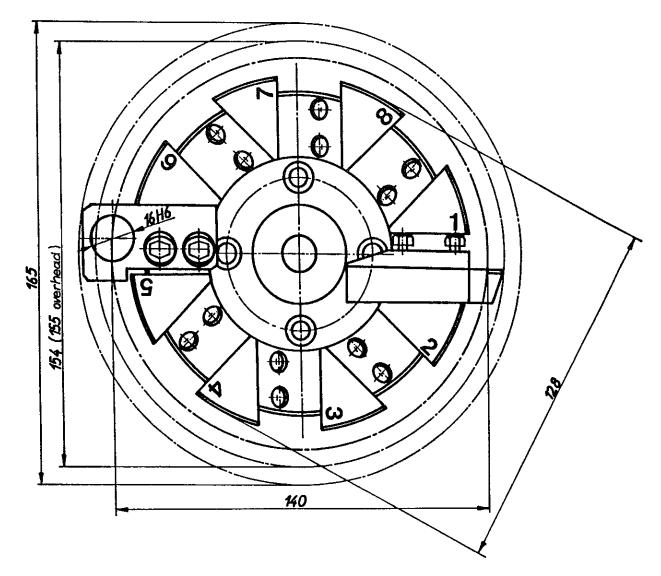


The measures are taken from point N (tool mounting reference point) and written into the tool data memory with the correct sign (incrementally).

Possibilities to Take Tool Data

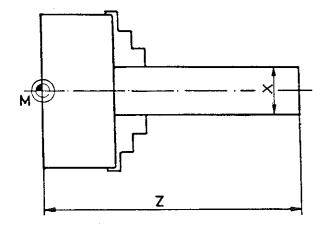
1. Sliding Caliper

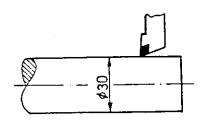
The drawing indicates, from which point you can take the measures. Exact measures only from N or the bore of the turning axis. All other measures at the turret are free measures.

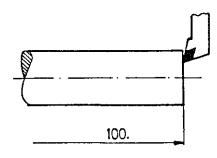


2. Scratching of a known Dia, and of a Face Side

Mode of Operation MAN







Note:

You can only take-over the X- resp. the Z.value. Point 3 resp. 2 is then skipped.

Preparations:

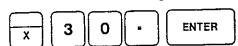
- 1. Set parameter O_{40} Bit 1 to High (Value for Bit 1 = 2). The control status is now set for direct take over by scratching.
- Mount a workpiece with a known dia. and a known length.

Tool Measure Take-Over

1. Scratch in X

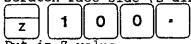


2. Put in dia. of workpiece.



X-value of tool is registered.

Scratch face side (Z-direction)



Put in Z-value.

The Z-value is calculated from the active zero-point.



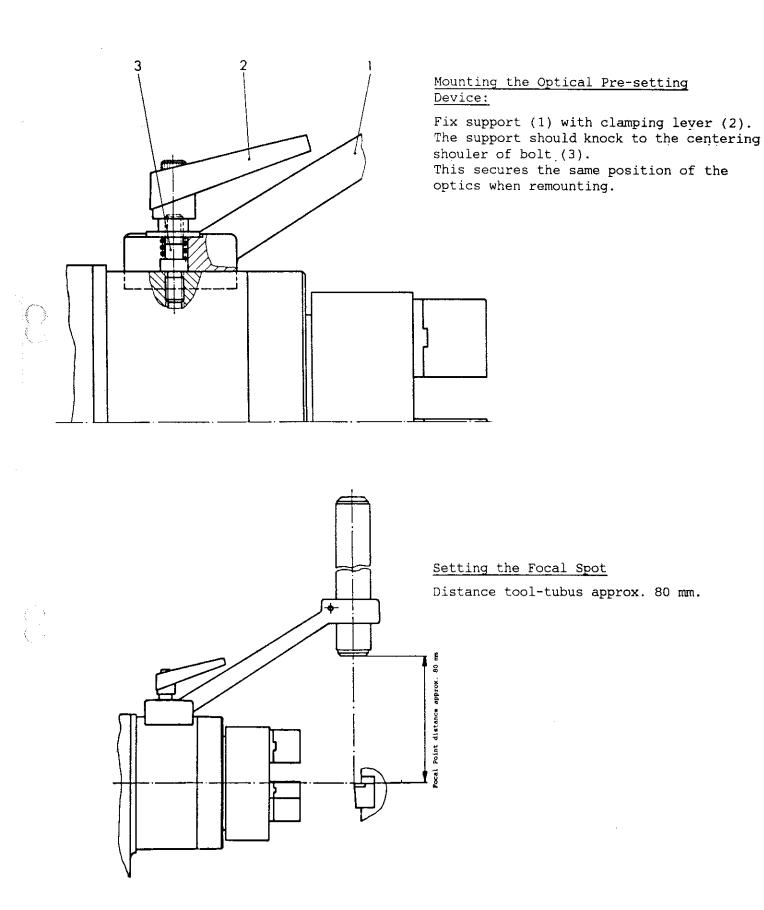
Z-value of tool is registered.

4. Put in tool number.

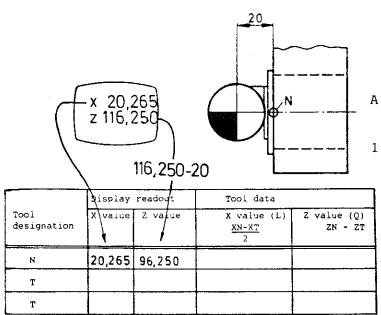


X- and Z-values of the tool are registered under correction number 01.

3. Taking the Tool Data, Using the Optical Pre-setting Device.



3.a) Calculation of the Difference Measures: Cutting Tip to Point N



A chart is useful.

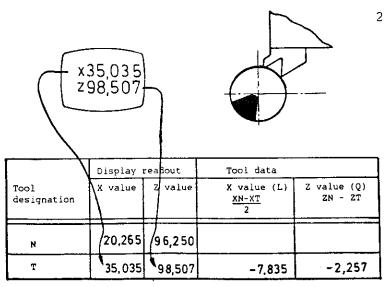
 Mount setting gauge for inside tools in turret. Setting gauge is necessary because you cannot take point N with the optics.

Move with corner point into the cross hairs.

Enter values X = 20,265 mm and Z = 116,250 - 20 mm in chart.

Note:

The optical system is reflecting, image reversion.



2. Mount tool, move cutting tip into cross hairs. Enter Display values in chart.

Tool Data:

Difference measures N minus T to be calculated.

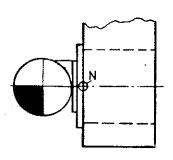
X-Value:

$$\frac{ZN - ZT}{2} = \frac{20,265 - (+35,035)}{2} = -7,385$$

Z-Value:

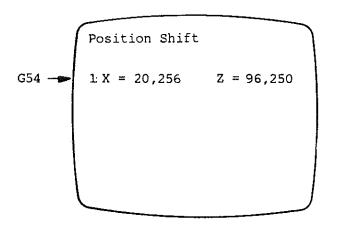
$$ZN - ZT = 96,250 - (+98,507) = -2,257$$

3.b) Zero Point Offset in Cross Hairs



Example:

 Move with setting gauge into the cross hairs.

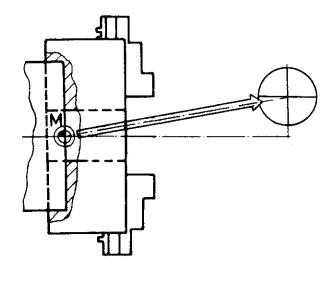


- Enter display values in PSO

$$X = 20,256$$

Z = 116,250 -20 = 96,250

to be entered.



- Zero point to be offset by these values.











MAN.

Door must be closed, otherwise alarm.

Display shows

X = 0

Z = 0

if point N is in cross hairs.

- Move tool in cross hairs.

Display values show

Ø X --> (value has to be halved)

Z --> (direct reading)

Note:

Signs must be reversed.



3.c) Change of User Monitor to Radius Measure

Fixing at the User Monitor:

Parameter O₁₁ Bit 0 HIGH (Value 1): Dia. Programming

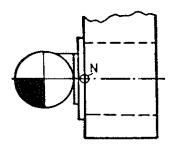
Parameter O₁₁ Bit LOW (Value 0): Radius Programming

Then you may (if you procede as under 3.b) read the X-value directly.

The signs on the read-out must however, be reversed

3.d) Direct Take-Over of Tool Data into Memory

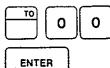
Mode of Operation MAN



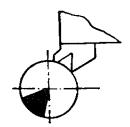
Note: Parameter O₄₀ Bit 1 have not to be set!

1 Position Take-Over of setting gauge in cross hairs

Move with setting tool in cross hairs.

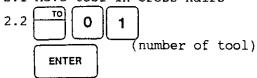


The computer knows the position of the cross hairs in relation to point N.



2 Tool Data Take-Over

2.1 Move tool in cross hairs



The X- and Z-value are registered in the tool data memory.

Note:

- * The selected tool receives the identical correction number.
 - e.g. T01 --> correction number 01
- * Correct the X-value with drills, if necessary, in the usual way.

Interruption:

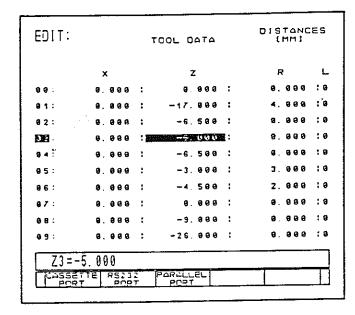
RESET

4. Direct input in the tool data memory

Mode of Operation EDIT

1. Select operating mode

The EDIT operating mode must be selected.



2. Calling the tool data memory

The tool data memory is called with 70

3. Calling the tool data register

Input the number of the register.



4. Changing data

-With C.W. or C.E., the existing values can be erased.

- Input of the required figure and store with ENTER

5. Exit from the tool data memory:

By pressing RES. or EDIT

5. Offset Arrays fro Cassette into the Machine Memory

1.	General	:

Press softkey

The PSO and TOOL-Data can be read out and loaded as so called "Offset Arrays".

2. Call up - Diskette mode:

The control is in diskette-mode.

3. Selection of the "Offset Arrays"
e.g. 70 3 0 ENTER

The Offset Array will be called up and with softkey | INPUT | loaded in the machine memory.

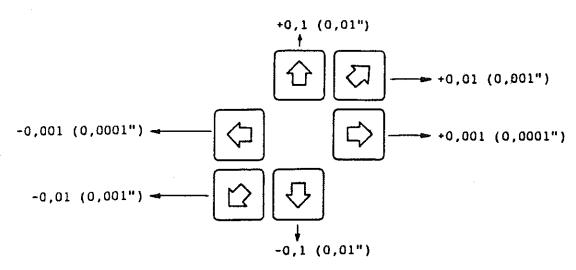
4. Abbortion:

Press RES.

6. Changing existing figures in the tool data memory

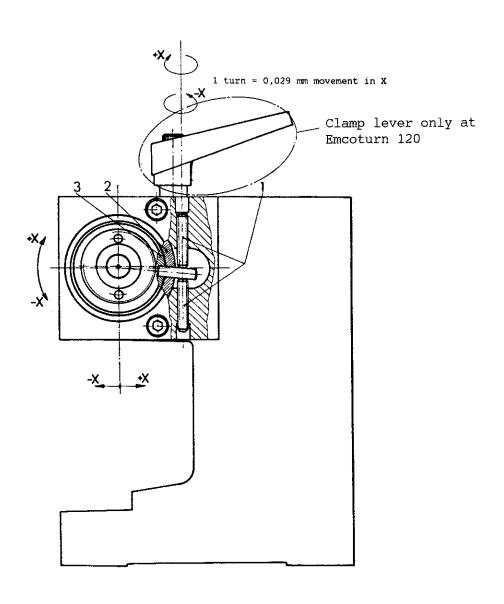
The figures in the tool data memory can be changed in stages of 1/10 mm, 1/100 mm and 1/1000 mm with the keys (see drawing).

MANUAL-JOG



6.4 Adjusting the Center Point

The center point is eccentrically built in the quill. By turning the quill the center point is adjusted in $\dot{}$ X direction. Thus enables an exact adjustment.



By adjusting the threaded bolts M4 \times 20 (1) the setting ring (2) and the quill (3) is moved.

One complete turn of the threaded bolt (1) adjusts the center point by 0,029 mm (.00114").

Note:

The second socket head screw has to be counter-secured.

7. Technological Data/ Cutting Data

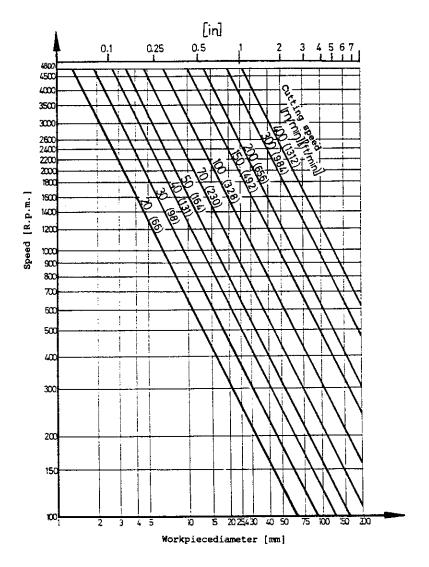
7.1 Correct Reading of Speed

You know:

- * Workpiece dia. mm (in)
- * Cutting speed m/min (ft/min)

You look for:

Speed [R.p.m]



7.2 Correct Reading of Cutting Speed

You know:

- * Workpiece diameter mm (in)
- * Speed R.p.m.

You look for:

Cutting speed m/min (ft/min)

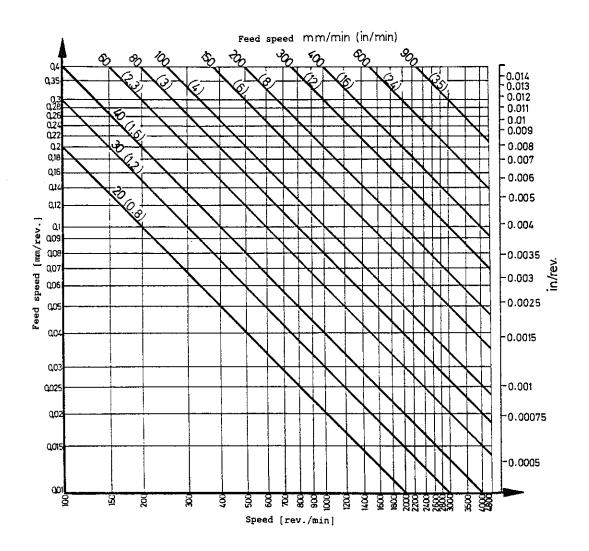
7.3 Correct Reading of Feed Speed (mm/min)

You know:

- * Speed R.p.m.
- * Feed speed mm/rev. (in/rev.)

You look for:

Feed speed mm/min (in/min)



7.4 Correct Reading of Feed in mm/rev.

You know:

- * Speed R.p.m
- * Feed speed mm/min (in/min)

You look for:

Feed speed mm/rev (in/rev)

7.5 Correct Reading of Cutting Depth resp. of Feed with known Workpiece Dia.

You know:

- * Workpiece diameter mm (in)
- * Feed mm/rev. (in/rev.)

You look for:

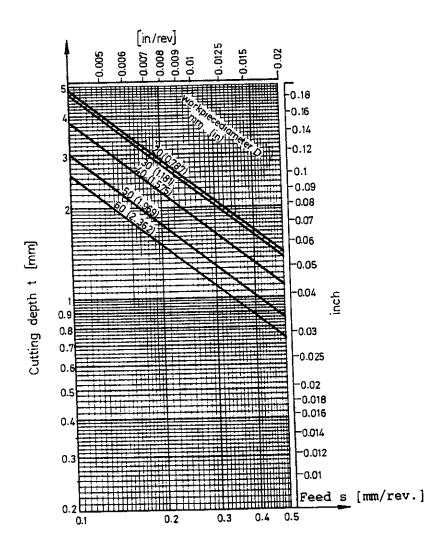
Cutting depth mm (in)

You know:

- * Workpiece diameter mm (in)
- * Cutting depth mm (in)

You look for:

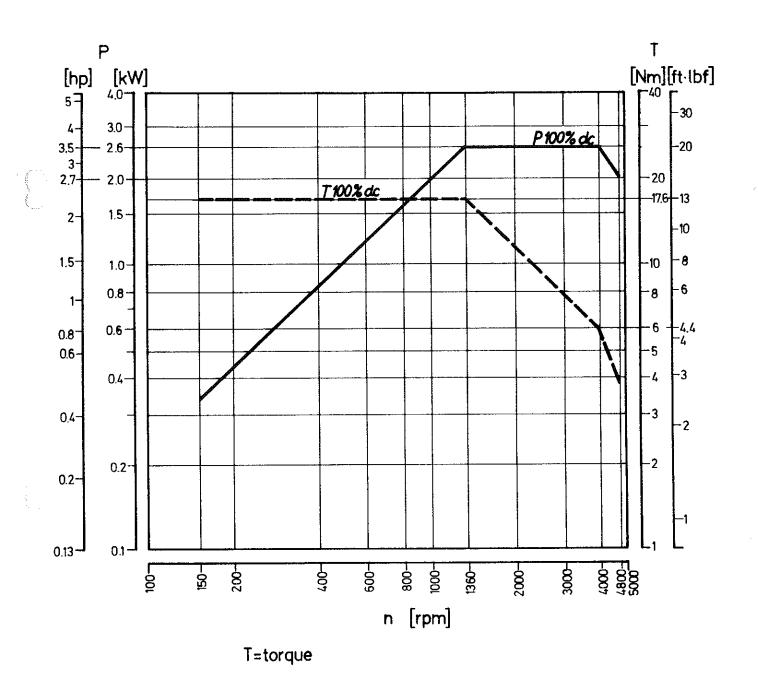
Feed mm/rev. (in/rev.)



The chart shows the admost (maximum) cutting values, for Emcoturn 120/120P, i.e. for steel 9S20 and a cutting speed of 170 m/min (558 ft/min).

With harder resp. softer materials: reduce resp. increase values.

7.7 Speed Rating Chart



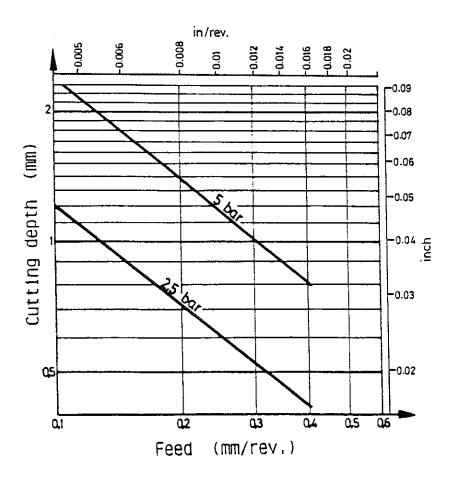
7.8 Max, machining values for workpiece driver

Material: 9S20

Cutting speed: 170 m/min (558 ft/min)

Diameter: 33 mm (1.299")

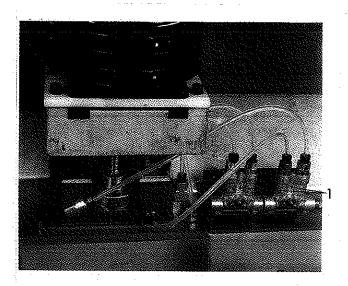
Clamping diameter 22 mm (.866") Feed, cutting depth variable



The diagram shows the maximum cutting values as a function of cutting depth, feed and sleeve pressure. If the characteristic line is exceeded, the workpiece driver might slip through. In case of harder materials the cutting values and the sleeve pressure have to be adjusted correspondingly.

8. Lubrication and oiling of machine

Remark: Never use compressed air for cleaning the machine, to avoid getting shaves into the slideways.



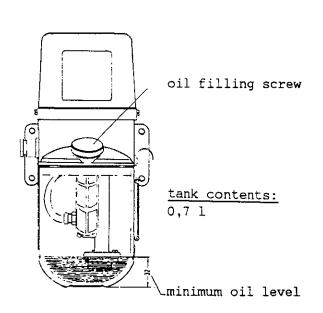
1. Cross and longitudinal Slide Guideways

The longitudinal and cross slides are supplied with slideway oil by the central lubrication system. For this purpose the pump for central lubrication is activated at certain intervals and a specific quantity of oil fed to the lubrication points via metering elements (1).

Oil grade: slideway oil (see lubricant recommendations).

The lubrication intervals and the pump running time is set by the works. After slide travel of 20 m the pump is switched on for 8 sec.

Technical Data of the Pump



Notes on Venting:

After the lubricant pump has been switched on, alarm 030 appears (pressure too low in the lubricant line). Cancel alarm 030.

Then activate lubricant pump until the ail locks have escaped from the lubricant lines.

By removing the rear of the machine frame you gain access to the lubrication pump. A slot is located in the rear for checking the tank contents.

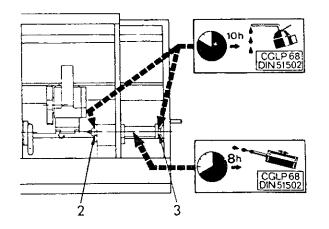
Oil Consumption:

Every 20 m of total travel of the slides a lubrication pulse is emitted by the control. Approx. 0,24 cm³ of oil per lubricating pulse are pumped to the lubrication points. The oil consumption per hour depends on the travel of the slides. It is roughly 1 litre per 100 hours of operation.

Venting the Lubricant Lines

If air enters the lubricant line owing to too low an oil level in the lubricant tank, the lubricant line must be vented. (air locks can be seen in the lubricant lines downstream of the metering elements).

For venting, unscrew the lubricant line upstream of the metering elements. Switch on lubricant pump and let it run until oil emerges from the unscrewed lubricant line. Retighten lubricant line.



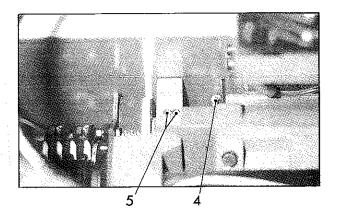
2. Tailstock Pinon (Pos.2)

Axial Bearing (Pos.3)

Interval: Every 10 working hours

with oil can.

Lubricant: Guideway liquid



3. Spindle Nuts and Axial Bearing of

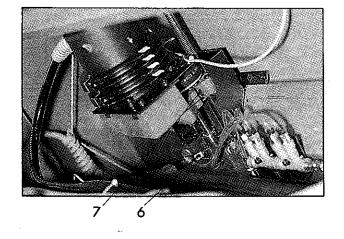
Feed Spindles

Note: Take-off backside cover of machine.

3.1 Longitudinal Spindle

Nut (4) and axial bearing (5) to be greased once monthly.

Pay Attention: Two grease nipples at axial bearing.



3.2 Cross Spindle

Nut (6) and axial bearing (7) to be greased once monthly (two grease nipples at axial bearing)

Remark:

Main spindle bearing is greased for life time.

4. Additional notes on oil and lubrication

Emcoturn 120P

An oil press (large press) and a grease gun are supplied with the Emcoturn 120P.

Notes on filling the grease gun with grease:

The gun must be filled with grease in such a way that no air pockets are produced in the front section of the gun. Only fill a partial amount of grease initially. Then press in the stopper so that the air can escape. Then fill the gun with more partial amounts of grease.

Notes on oil and lubrication

1) Tailstock sleeve:

Jil the tallstock sleeve every day. The grease nipple is located on the tailstock housing.
Oil grade: slideway oil.

2) Pneumatic chuck

The pneumatic chuck must be greased every day at all three jaws.

Grease grade: Acid-free, viscous grease with Molycote additive, e.g. Klüber Altemp Q NB 50.

3) Clamping cylinder

- The grease nipple is located on the left-hand side of the machine. Access to the grease nipple is gained through the opening in the cover. For this purpose, traverse the clamping cylinder to the left (chuck closed).
- Before greasing switch off compressed air!

Push back the manual valve on the rear of the machine. This closes off the supply of compressed air. If the compressed air was not shut off, the grease would spray out during the greasing operation.

Greasing interval: daily

Grease grade: Anti-friction bearing grease: e.g. Centoplex HO, from Klüber

<u>Lubricant Recommendations</u> <u>Coolant Liquid Recommendations</u>

The reference temperature for the viscosity details is 40°C (104°F) (ISO VG), the reference temperature according to DIN is 50°C (122°F).

Slideways

Slideway oil with adhesive additives and wear-reducing additives. Prevention of the stick-slip effect. 73 mm²/sec. (cSt)(0.11 in²/sec) at reference temperature 40°C (104°F) CASTROL MAGNA BDX 68. Complies with Cincinnati Milling Specification P 47.



Greasing points

Lithium saponified multipurpose grease with high dropping point. Penetration about 285. NLGI Class 2. CASTROL SPHEEROL EPL 2
This grease has an operating temperature range of -30°C (-22°F) to +110°C (+230°F).

0r

CASTROL GREASE LM -Lithium saponified multipurpose grease of NLGI Class 2.





Coolant

CASTROL SYNTILO R - biostabile longterm coolant lubricant. No adhesion, skin compatible, excellent corrosion protection, neutral odour. High wetting and cooling action, can be used for every type of material. Recommended mixing ratio 1: 30.

CASTROL CLEAREDGE EP - for true-to-size machining with high surface finish, combined with long tool times between overhauls. Recommended mixing ratio 1:30.





The products CASTROL VARIO HDX
CASTROL MAGNA BDX 68
CASTROL SYNTILO R

are attuned to each other, and are available as the COMPLETE CASTROL SYSTEM.

Special note:

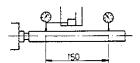
The required lubricating oil and media can be obtained in the trade (with the particular national or federal organisations of the petroleum companies). These recommended oils and greases differ in principle from the products available at filling stations.

9. Readlustment work Emcoturn 120/120P

1. Readjustment of the headstock

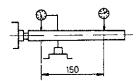
The headstock is accurately set at the works. The admissible deviations are shown in the schematic drawings.

A collision may result in the headstock being displaced. This is intended to avoid mechanical damage.

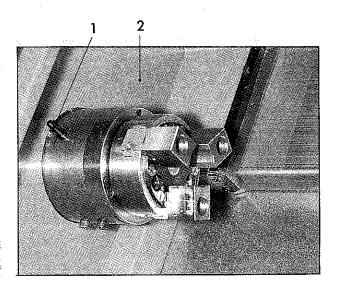


Parallelism of the working spindle to the bed slide movement (parallel to bed guide). Admissible deviation: 0.01 mm (.00039") over

150 mm (5906"). View: horizontal

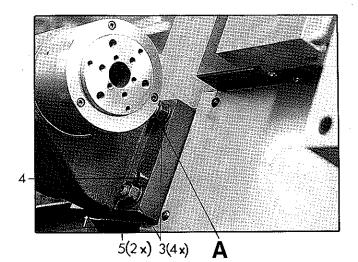


Parallelism of the working spindle to the bed slide movement (perpendicular to slide plane). Admissible deviation: 0.01 mm (.00039") over 150 mm (5906"). View vertical



Readjustment procedure:

- Remove screw (1)
- Dismantle side cover on headstock (2).



- Loosen the four lock nuts M12 (3) until they are only just gripping.
- Force in dowel pin (4) until it is flush with the housing surface (A) (this pin functions as a pivot point and facilitates adjustment).
- The exact position of the headstock is set with the two setscrews (5).
- Retighten screws M12. (tightening torque 80 Nm - 8 kpm-59 ft 1bf)

Measurement of setting: Trial turning, plug gauge

Notes:

- * Tighten the four lock nuts before each measuring operation and before each trial turning operation.
- * When the headstock has been adjusted, remove dowel pin (4) again, otherwise it could be damaged in a collision and its function as an adjustment aid would be lost.

 (Pull out dowel pin about 5 mm over surface A).

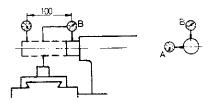
Diagram for dowel pin remover

Bore diameter on top plate for screw $M6x35 = 7 \text{ nm}(.276^{\circ})$

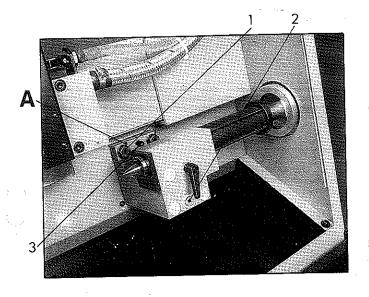
2. Readjustment of the Tailstock

The tailstock is accurately set at the works. The admissible deviations are shown in the schematic diagram.

It is possible that a collision may displace the tailstock.



Parallelism of the tailstock sleeve to the bed slide movement. A is parallel to the slide plane; B is perpendicular to the slide plane. Admissible deviation: 0.02 mm over 100 mm (.001" over 3.937")



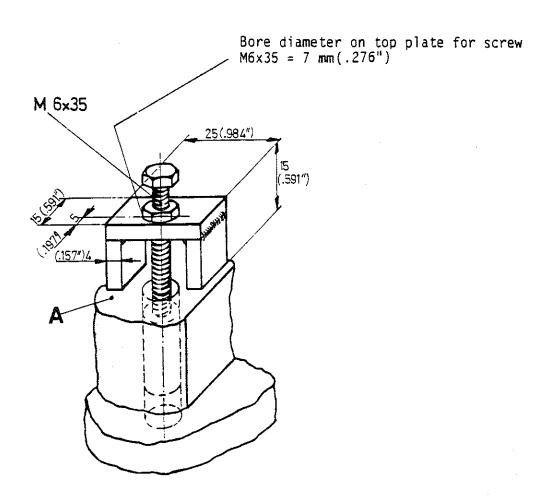
Procedure:

- Loosen the two socket head screws M12x40 (1) until they are just gripping.
- Remove cover (2) and loosen the hexagon socket screw M12x120 underneath it until it is just gripping.
- Force in dowel pin (3). It is to be flush with the housing surface (A). (The dowel pin has the function of a pivot point and facilitates adjustment).
- Adjust tailstock and retighten the loosened screws.
 (tightening torque 80 Nm-59 ft lbf).
- Mount cover (2).

Notes:

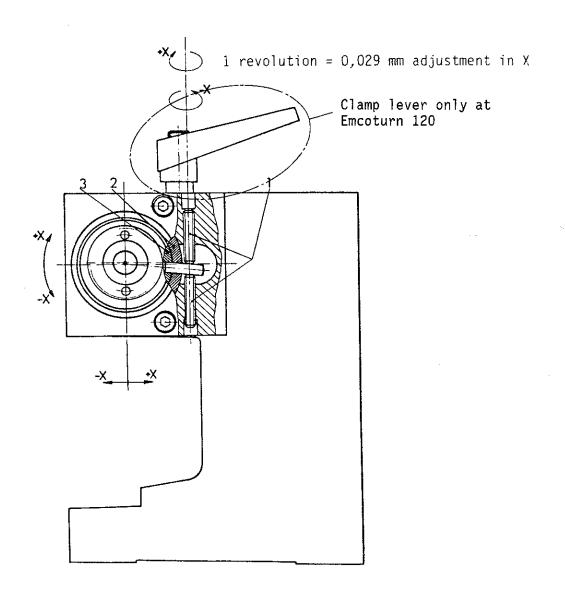
- * Tighten the three fastening screws before each measuring operation and before each trial turning operation.
- * When the headstock has been adjusted, remove dowel pin again, otherwise it could be damaged in a collision and its function as an adjustment aid would be lost. (Pull out dowel pin about 8 mm over surface A).

Diagram for dowel pin remover



<u>Additional possibilities of adjusting the Tailstock</u>

The tailstock centre is installed in the sleeve eccentrically. When the sleeve is turned, the dead centre is moved in +/- X-direction. In this way accurate adjustment is possible.



If the two setscrews M4 \times 20 (1) are adjusted, the setting ring (2) is turned and thus the sleeve (3) as well.

If one setscrew (1) is turned through one revolution, the dead centre is moved by $0.029 \text{ mm} (0.00114^{\circ})$.

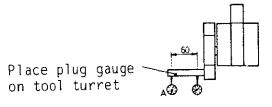
Note:

The second setscrew must be locked.

3. Readjustment of the tool turret

The tool turret is accurately set at the works. The admissible deviations are shown in the schematic drawing.

It is possible that a collision may displace the tool turret.



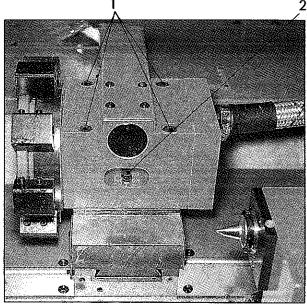


gauge	length	diameter
metr.	70,5	16,00
inch ·	70,5	15,88

Parallelism of the tool turret to slide movement:

A: parallel to slide plane - adm. deviation = 0.03 mm over 60 mm (.001" over 2.362")

B: perpendicular to slide plane - adm. deviation = 0.05 mm over 60 mm. (.002" over 2.362")



Procedure:

- Loosen the four socket head screws M8x90 (1) until they are just gripping.
- Screw dowel pin (2) right in. (Dowel pin has the function of a pivot point and facilitates adjustment).
- After adjustment retighten the socket head screws (tightening torque = 25 Nm = 2.5 kpm-18,4 ft lbf).

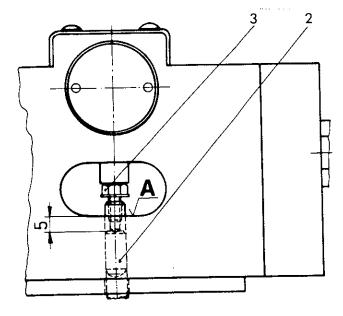
Screwing in dowel pin:

Hold hexagon head screw M5x10 (3) up and turn counterclockwise until dowel pin (2) is about 5 mm below the surface A.

Unscrewing the dowel pin:

Turn hexagon head screw M5x10 (3) clockwise until the dowel pin is flush with the surface A.

After adjustment the dowel pin must definitely be removed again as otherwise it could be damaged after a collision and thus lose its function as an adjustment aid.



4. Measurement of the reversing play of the slides

The reversing play is set with the slide play. Slide play and reversing play are decisive factors governing the operating accuracy.

The reversing play occurs when a slide is traversed from, for example, +direction to -direction. In this case the control indicates travel but in fact the slide does not traverse at all (dead travel). The reversing play is measured about 30 mm in front of the two end positions of the respective slide and should not exceed 0.008 mm for the X-slide and 0.01 mm for the Z-slide. If the reversing play is 0.02 mm, the slide play should definitely be readjusted.

Measurement of the reversing play:

- Mount dial gauge with magnetic foot.
- Approach dial gauge with slide.
- Set dial gauge to O.
- Traverse slide about 1-2 mm towards the dial gauge (dial gauge and display indicate the same value).
- Reverse slide with control back to 0.
- Calculate the difference between display and dial gauge reading (= reversing play).
- Repeat this procedure for the other end position of the respective slide.

Note: Relationship slide play - reversing play

The tighter the taper gibs are set, the lower the slide play is but the greater the reversing play is. Reversing play and slide play must therefore be set together.

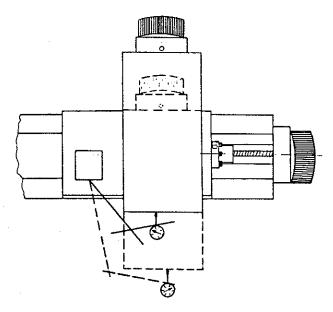
The respective tolerances for slide play and reversing play must not be exceeded.

Note:

In this connection, also consult the chapter "Readjustment of the slide play".

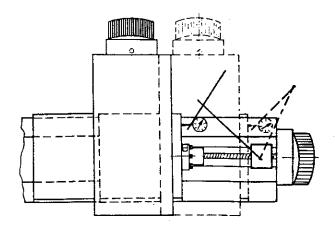
<u>Dial gauge set-up for measuring the reversing play of the slides</u>

a) Reversing play X - slide (vertical slide)



Dial gauge mounted on longitudinal slide

$\frac{\text{b) Reversing play Z - slide}}{(\text{longitudinal slide})}$



Rear covering of machine dismantled

Dial gauge mounted on bed

5. Readjustment of the slide play

General:

- Readjust the slide guideways after extended use.
- Slides with too much play can cause chattering during machining operations.
- The play is set with two taper gibs per slide.
- Slide play and reversing play are always set together. Both measurements are necessary.

Procedure:

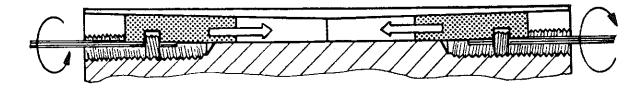
5.1 Measure reversing play:

(See description "Measurement of reversing play"). Measure reversing play before readjusting the slide play!

5.2 Readjust slide play:

5.2.1 Principle:

The slide play is readjusted on the slide with the two relevant taper gibs. Guideways of the taper gib and taper gib itself are tapered. The taper gibs are moved in the direction of the arrow by screwing in the setscrew (size 2.5). The play is reduced.



Procedure:

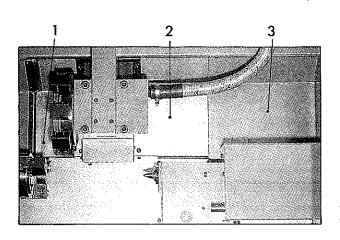
Readjust the setscrew slightly, measure slide play. Repeat procedure until measurement produces \sim 0.005 mm.

5.2.2 Check of the slide play of longitudinal and vertical slides:

The slide play is measured on both sides of each slide and should be ~ 0.005 mm. From 0.015 mm play upwards, the slide play must be readjusted. When the play is being measured, the slides are swivelled back and forth with a force of 300 N (=30 kp) at the respective measuring point.

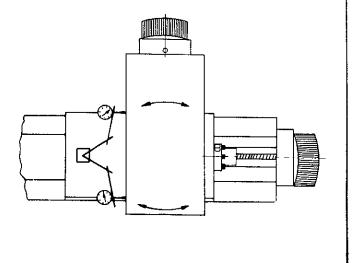
5.2.3 Dial gauge set-up

Remove the metal sheets (1,2,3) before mounting the dial gauge.



X-slide play

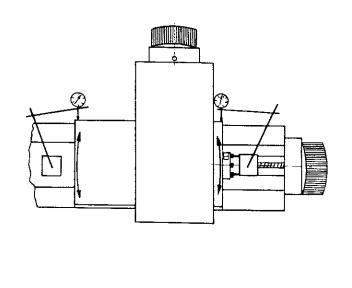
Dial gauge on Z-slide. (If the dial gauge is mounted on the bed, the Z-slide play is measured!)



F = 300 N (30 kp) at the respective measuring point.

Z-slide play

Dial gauge on bed

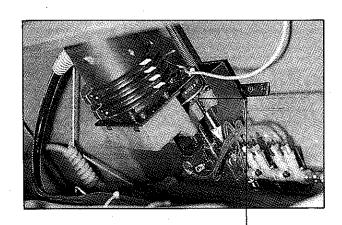


F = 300 N (30 kp) at the respective measuring point.

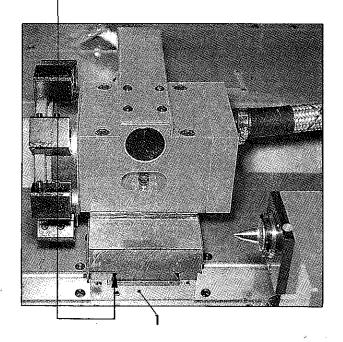
5.2.4 Position of the taper gibs

a) On the vertical slide:

Dismantle rear cover from machine.



Taper gib ⁻

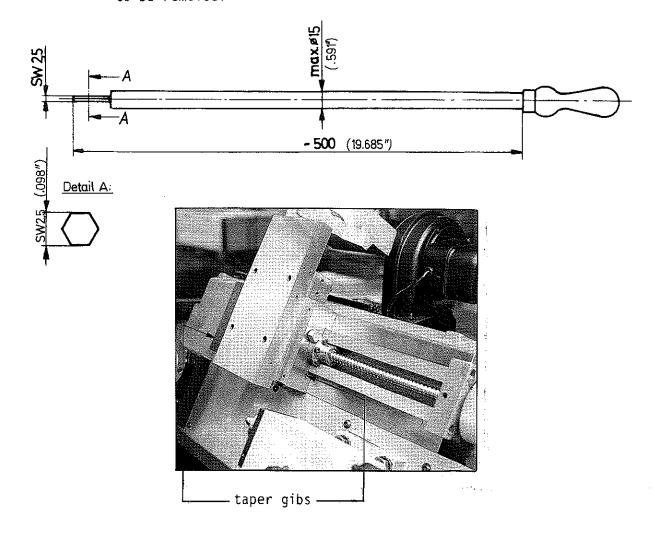


Dismantle scraper plate (1).

b) On longitudinal slfde:

Note:

In order to gain access to the taper gibs, a special tool is required; otherwise the metal covers would have to be removed.



5.3 Measure reversing play

It is possible that the slide may become jammed owing to excessive readjustment of the taper gibs. In this case measure the reversing play again (see Measurement of the reversing play). Always set the slide play and reversing play together.

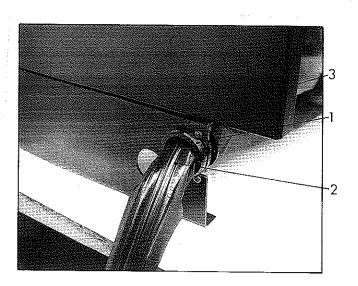
6. Replacement of the stepping motors (Changing the toothed belts)

The assemblies for the X and Z stepping motors are identical. Each stepping motor assembly comprises stepping motor proper, speed sensor, motor base plate, cables and plugs.

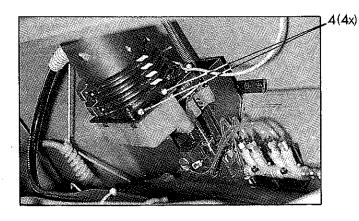
Note:

Disconnect mains plug before dismantling or installing the stepping motors.

Dismantling principle: (using X-slide as an example)



- Remove rear of machine.
- * Dismantle lug (1) with bunched cables (2) from machine frame.
- *- Take bunched cables out of lug and open up.
- *- Remove cable for relevant stepping motor from cable sheathing.



- Unscrew the four fastening screws (4) and dismantle stepping motor with motor base plate.
- Remove belt.

* This points only apply to replacing the stepping motor (not to changing the belt).

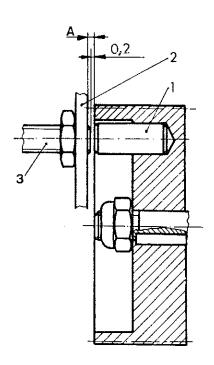
Installation principle: (using X-slide as an example)

- Insert belt.
- Mount stepping motor and screw in the four fastening screws (but do not tighten yet).
- Tension belt and tighten fastening screws! (To tension belt, press on stepping motor with about 10--15~N).
- \star Place cable for stepping motor in cable sheathing and close sheathing.
- * Insert bunched cables into lug.
- * Install lug into machine frame.
- * Set speed sensor (see next page).
 - Connect plug to control.
 - Re-assemble rear cover.

* These points only apply to replacing the stepping motor (not to changing the belt!).

Setting the proximity detector

When setting the proximity detector, attention must be paid to the space between the bolt (1) and the sensor (2). This space is 0.2 mm (+/-0.1 mm).



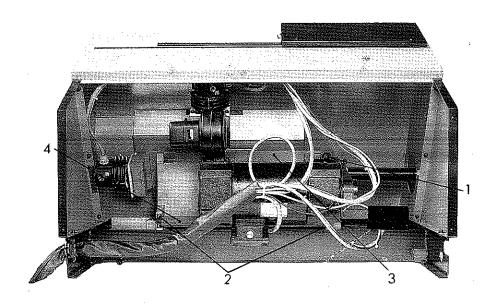
Setting procedure:

- * Measure space between assembly plane for motor base plate (2) to front end of bolt (1) (distance A).
- * Set proximity detector (3) on motor base plate so that the distance bolt to sensor is 0.2 mm (.008").
- * Lock proximity detector again. Nm) (max. 6 Nm) (max. 4.4 ft lbf). lbf).

Functional check of the proximity detector

Approach reference point or execute trial program.

7. Replacement of the main motor (Changing the main drive belt)



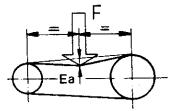
(illustration shows Baumüller motor; producedure for Siemens motor identical))

Dismantling:

- Remove rear machine cover.
- Take cable for main motor out of cable sheathing.
- Loosen lock nut (1) until belt can be removed.
- Unscrew the four screws (2).
- Screw on lock nut (1).
- Remove motor.
- Dismantle plate (3).
- Dismantle rod (4).

Installation:

- Screw plate (3) onto main motor.
- Screw rod (4) onto main motor.
- Insert motor and fasten with four screws (2).
- Mount lock nut (1).
- Mount belt.
- Tighten belt.



Ea = 10 mm (.394") at F = 60N (13,5 lbf)

- Insert cable into cable sheathing.
- Connect plug to control.
- Mount machine cover.

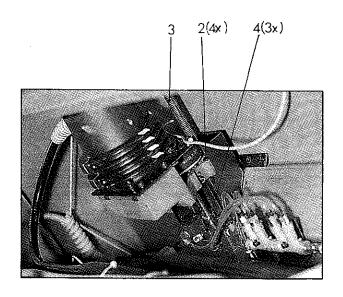
8. Replacement of the X- and Z-spindles

The spindles are only replaced as complete assemblies. The X and Z assemblies are different. Each assembly comprises the spindle, spindle nut holder, spindle support and belt pulley. Ensure that the spindles are not bent during storage or

Ensure that the spindles are not bent during storage or assembly.

The spindles must not be unscrewed from the nut as otherwise the balls could fall out.

Spindle dismantling: using X spindle as an example



- Dismantle rear machine cover.
- Remove stepping motor and belt.
- Unscrew the four cheese head screws (2).
- Detach draw spring (3).
- Unscrew the three cheese head screws (4).
- Remove the spindle assembly.

Spindle installation using X spindle as an example

Grease spindles before installation. (See greasing of cross and longitudinal spindles in operating instructions Compact 6 CNC).

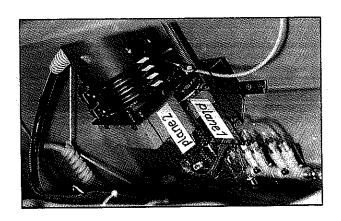
Installation of the spindles

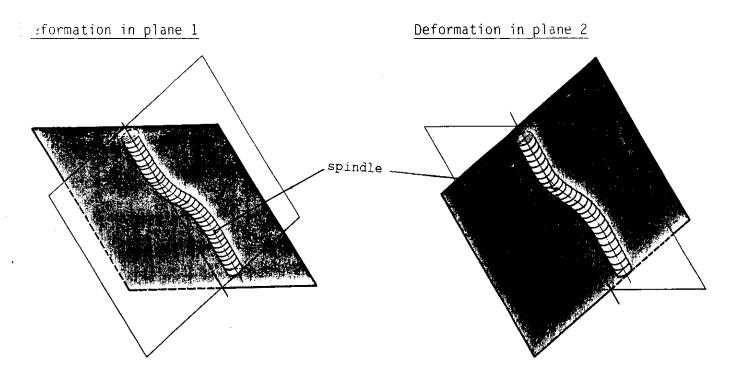
The spindles must not be installed deformed.

Consequences if spindle is deformed:

Rapid wear, damage (balls break out).

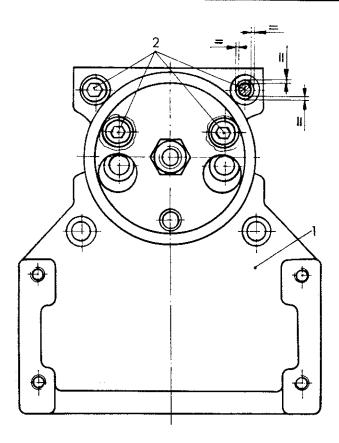
<u>Possibilities of deformation using X spindle as an example</u>



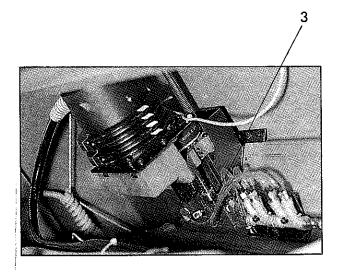


<u>In order to aviod deformation during the installation of the spindles, the following procedure applies as a rule:</u>

X spindle as an example:

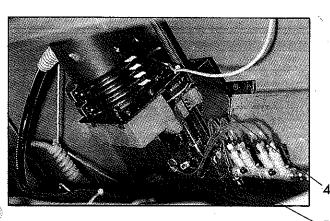


 Screw on spindle support (1) so that the four cheese head screws (2) are centric in the four clearance holes (=).



- Screw spindle nut holder (3) tight.
- Traverse slides by hand in -X-direction so that the distance between the spindle supports and nut holders is as small as possible.

 It is now possible that the spindle is deformed in plane 2.



Remedy:

- Loosen the four cheese head screws (4) of the spindle support; the spindle will thus align itself in plane 2. Retighten the cheese head screws (4) of the spindle support.

Possibility:

- Spindle may now be deformed in plane 1.

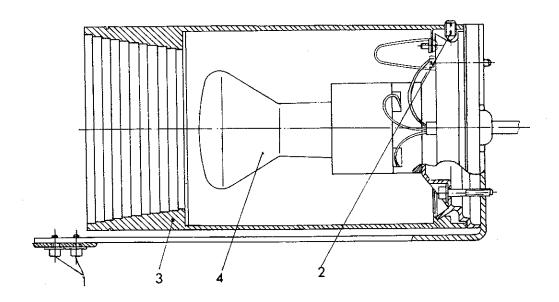
Therefore:

- For safety's sake loosen the three cheese head screws (5) of the nut holder; the spindle will align itself in plane 2.
- Retighten the cheese head screws of the nut holder (5).
- Re-install the remaining components which were dismantled.

9. Changing of the bulb in the machine lamp

Warning:

Disconnect mains plug before changing the bulb.

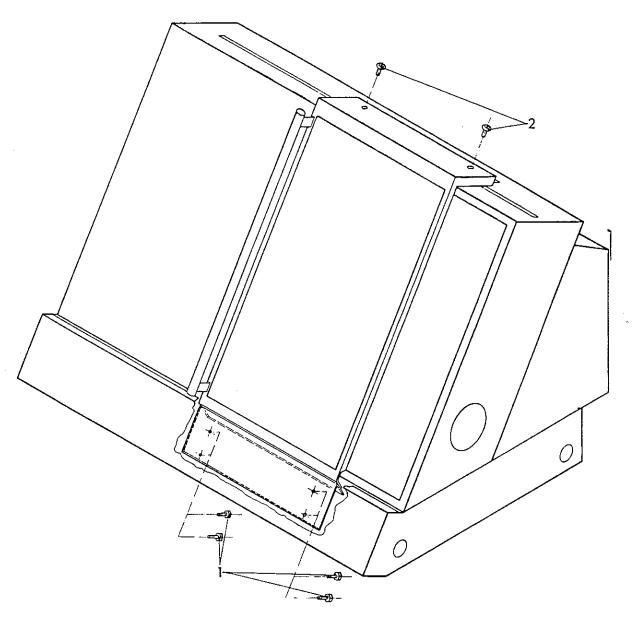


Dismantling:

- Remove rear cover of machine.
- Dismantle machine lamp from machine by unscrewing the two cheese head screws (1).
- Unscrew setscrew (2) and remove deep bowl reflector (3).
- Change bulb (4).

Assembly in reverse order to dismantling.

Changing of the door on the Emcoturn 120/120P



Dismantling:

- Unscrew the 4 cheese head screws $M6 \times 10$ (1). (Access to the screws from the bottom of the machine).
- Unscrew the two oval head cap screws $M6 \times 10$ (2) on the top.
- Remove door.

Assembly:

- Hang door on its hinges.
- Screw in all fastening screws so that the door does not jam when being moved.

Note:

If machine is mounted to the stand, remove bolts pull machine forward, so that you access to the socket head screws.