

Emco Concept Turn 155

PC-controlled CNC-Lathe for training



Machine Description
Emco Concept Turn 155
Ref.-No. EN 1155 Edition A2003-10

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emco
Industrial training systems

Introduction

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

This high degree of experience is a profit for the turning and milling machines of the **EMCO Concept Turn** and **EMCO Concept Mill** model series.

The newly designed compact machines meet entirely today's requirements in construction and set up as well as safety.

The PC machines are operated via a conventional personal computer (PC). This kind of operation permits an efficient training of the most different CNC controls (SIEMENS, FANUC, etc.) with one and the same machine.

The CNC monitor of the installed CNC control is simulated on the PC screen, input of data is carried out via a control keyboard.

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

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

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

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

Therefore read this instructions completely before machine start-up.

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EC conformity



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

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Tool Turret without driven tools

Tool Turret with driven tools

Adequate use

The machine is designed for turning of machinable metals and machinable synthetic materials.

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

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

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

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

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

Warranty conditions for new EMCO machines

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

Safety recommendations

Read instructions

Read the instructions completely before you start up the machine.

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

Electrical connection

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

Observe local regulations

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

Authorized operation

The machine may only be operated by authorized persons.

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

Protect machine

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

Start-up

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

No modifications on machine

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

In case of hazards EMERGENCY-OFF

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

Tool change

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

Personal protective equipment

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

Mind that your hair does not get caught in the machine (in such a case wear hair protection). Protect your eyes with safety-glasses.

When removing chips use a chip hook and gloves.

Setting, maintenance and adjusting work

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

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

Tools, operating materials and spare parts

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

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

Disposal of noxious materials

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

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

Claim

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

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

Machine supervision

Never leave running machine unattended.

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

Danger, Attention, Note

Please always mind the regulations for prevention accidents and safety rules indicated in the individual chapters and the additional instructions. Important instructions concerning the technical safety and the staff protection are emphasized particularly:

**Danger**

refers to possible danger to persons during working and operating procedures.

**Attention**

is indicated in working and operating procedures which have to be observed exactly to avoid possible damage of the machine and slight danger of injury for operators.

**Note**

is indicated if something particular has to be observed when an activity is carried out.

**Environmental Protection Notes**

refer to the avoidance of special waste, responsible handling of environmentally noxious substances as well as possibilities for saving auxiliary and operating materials.

Technical data of the machine

Working area		
Distance height	[mm]	125
Distance width (spindle nose - tailstock center punch)	[mm]	405
Turning diameter over bed	[mm]	ø250
Turning diameter over cross slide	[mm]	ø85
Slide traverse X	[mm]	100
Slide traverse Z	[mm]	300
Max. workpiece size for chuck parts with tailstock	[mm]	ø85x245
Main spindle		
Spindle mounting (connection, nose?)		Manufact. stand.
Ext. diameter of spindle in front bearing	[mm]	ø45
Max. chuck size	[mm]	ø100
Main spindle - drive		
AC-motor, output (100%/60% D.C.)	[kW]	2.2 / 2.8
Speed range (infinitely variable)	[min ⁻¹]	150 - 4000
Max. torque with 60% DC	[Nm]	19
Feed drives		
AC-Schrittmotoren in X and Z axis		
Step resolution	[µm]	1.25
Max. feed force X/Z	[N]	2500
Arbeitsvorschub in X/Z (infinitely variable)	[m/min]	0 - 4
Rapid speed X/Z	[m/min]	7.5
Medium positioning variation X/Z according to DIN VDI 3441	[µm]	3 / 4
8-fold tool turret, tool station		
Revolver-type turret without direction logic		
Toolholder		Manufact. stand.
Anzahl der Werkzeugaufnahmen, wahlweise außen/innen		8 / 8
Schaftquerschnitt für Außenwerkzeuge	[mm]	12 x 12
Aufnahmebohrung für Innenwerkzeuge	[mm]	ø16
Schaltzeit (T1/T2/T3 = 45°/180°/315°)	[s]	1.4 / 3.5 / 5.5
12-fold tool turret, tool system		
Revolver-type turret without direction logic, optionally with driven tools		
Toolholde according to DIN 69880		VDI 16
Number of the tool tool stations / thereof driven ones (option)		12 / 6
Schaltzeit (T1/T2 = 180°/30°)	[s]	2.8 / 1.0
Driven tool stations (optional)		
Max. drive power (40% D.C.)	[kW]	1.2
Max. torque	[Nm]	4
Speed range	[min ⁻¹]	200 - 6000
C axis (round axis) - option for machine with driven tools		
Resolution of round axis	[°]	0.01
Max. speed	[min ⁻¹]	20
Max. torque	[Nm]	25

Subject to technical modifications!

Tailstock		
Tailstock with integrated centre punch		
Sleeve diameter	[mm]	ø35
Tailstock traverse	[mm]	200
Sleeve stroke (manual / as option pneumatic)	[mm]	120
Max. sleeve thrust (pneumatic)	[N]	3000
Lubrication system		
Guideways, feed spindle nuts	autom. oil central lubrication	
Main spindle	life time lubrication	
Coolant device (option)		
Tank capacity	[l]	140
Max. conveying capacity	[l/min]	20
Max. conveying pressure	[bar]	0.75
Pneumatic unit (option)		
Basic pneumatics for options with pneumatic actuation		
Supply pressure	[bar]	min. 5 – 6
Flexible tube connection	[mm]	ø10
Automatic clamping device (option)		
Pneumatic 3-jaw chuck with cylinder without bore, final position control and blow-out device		
Spindle bore	[mm]	ø20.5
Chuck diameter	[mm]	ø95
Automatic door mechanism		
pneumatically actuated, incl. final position control		
Workpiece collection device (option)		
Pneumatic actuation with	[bar]	6
Maximum length of the finished parts	[mm]	125
Maximum diameter of the finished parts	[mm]	ø25
Electrical connection		
Power supply	[V]	3/N/PE 400~
Max. voltage fluctuations	[%]	±10
Frequency	[Hz]	50/60
Connected load of the machine	[kVA]	5
Max. preliminary fuse for the machine	[A-slow]	20
Dimensions, weight		
Height of the turning axis above floor	[mm]	1120
Total height	[mm]	1750
Installation surface WxD	[mm]	1628x1174
Total weight of the machine	[kg]	700
Sound pressure level		
Medium sound pressure level	[db(A)]	69
With the following conditions		
Measuring method:	enveloping surface according to DIN 45635	
Measuring point:	1m distance and 1.6 m above the ground	
Operating mode:	maximum speed during idle running	

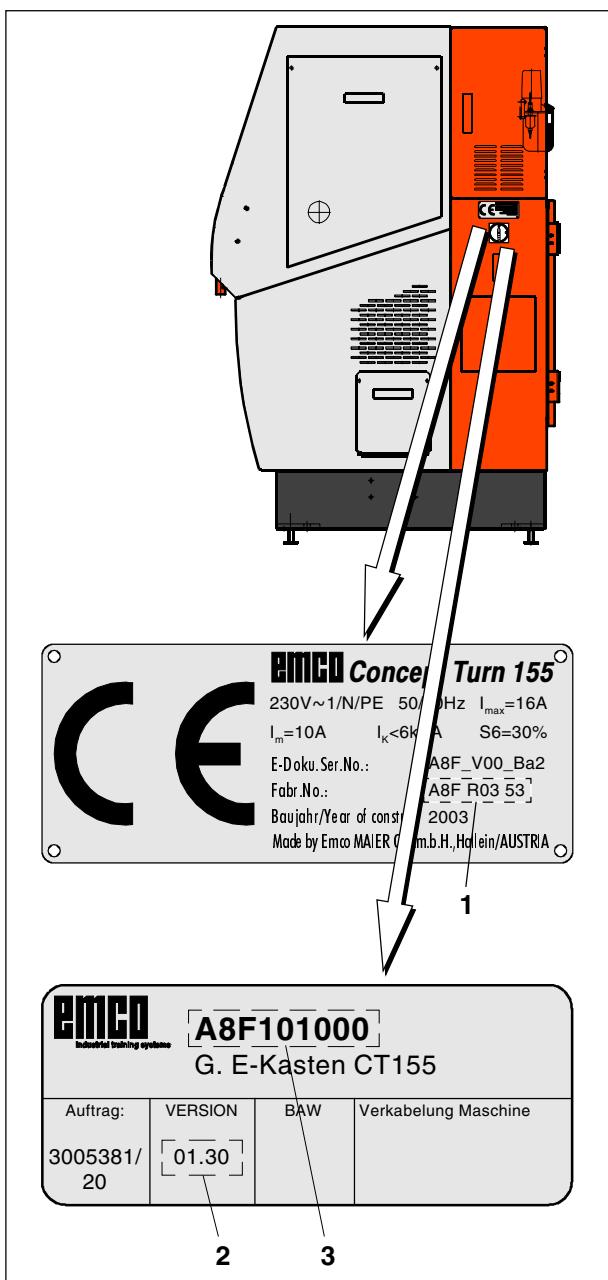
Subject to technical modifications!

Technical data of the PC control

PC control	
Separate set-up of machine operating board and replaceable control-specific keyboard	
Control display	12" colour flat screen
PC configuration (PC integrated in the machine)	
Processor (min.)	Celeron 850 MHz
Main storage	128 MB RAM
Disk drive	3½"
CD-ROM drive	integrated
Hard disk memory	20 GB
Display Interface	DVI
Keyboard	MF-2 (US-layout)
PC mouse	✓
Interfaces	2 × RS232, 1 × USB, 2 × LAN-100Mbit
Operating system	Windows 98SE

Subject to technical modifications!

A Installation of the machine



Machine number and electrics number

Machine acceptance

Check the machine for any transport damage and completeness of the delivery.

If you find any defects, please contact the dealer or the insurance company.

In case of complaints always specify the exact designation of the machine and the machine number and the electric number.

Machine number

The adhesive plate with the machine number (1) is to be found laterally on the machine above the lockable main switch.

The machine number is also stamped into the machine bed.

Electrics number

The adhesive plate with the electrics number is mounted on the right side of the machine below the main switch.

The electrics number consists of a 9-digit number (2) followed by the version number (3).

Example of a complete electrics number:

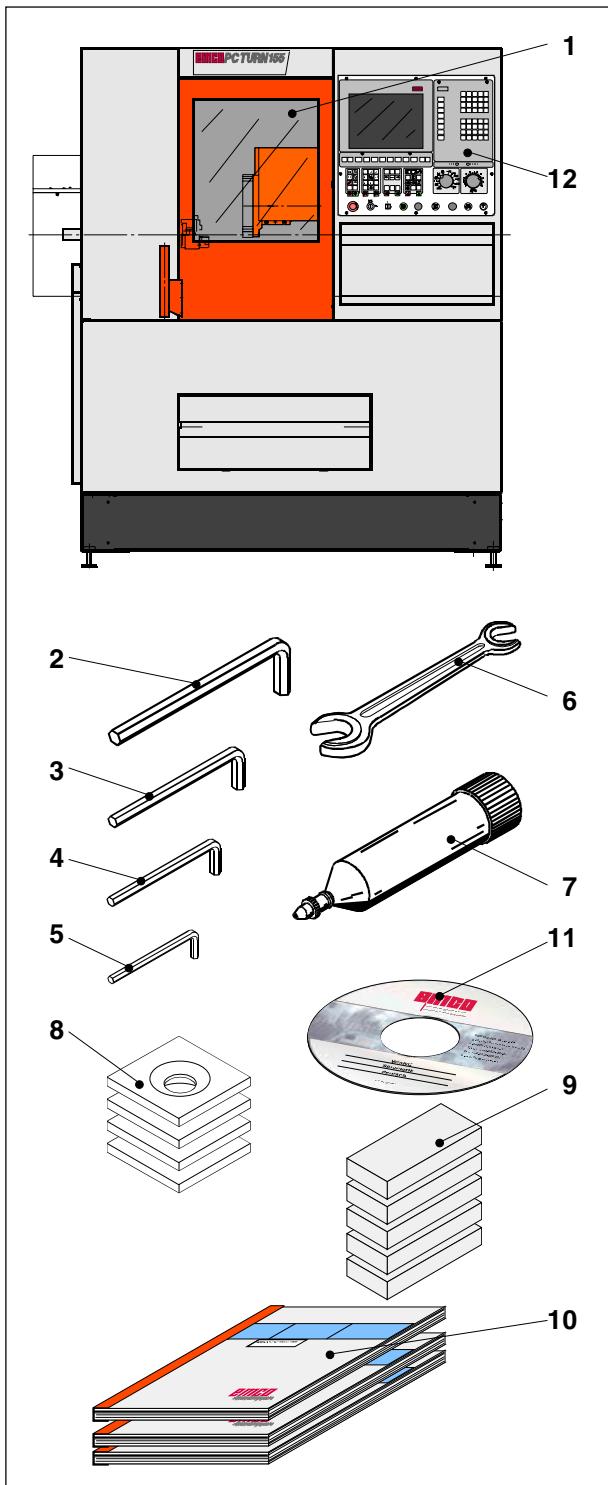
A8F 101 000 V1.30 (see illustration)

Note:

The wiring diagrams valid for your machine are to be found in the **electrical documentation** which is in the switch cabinet of the machine.

An electrical documentation can also be obtained under order number **ZVP 677 917** and indicating the version number (e.g. **V1.30**) from EMCO.

Scope of supply



Scope of supply

Basic machine

- (1) PC-controlled 2-axes Concept Turn 155 lathe with:
 - full shell with chip tray
 - safety devices according to CE-standard
 - machine lamp
 - central lubrication
 - integrated PC with keyboard and PC mouse
 - 12" colour flat display
- (2) hexagonal screw driver wrench size 10
- (3) hexagonal screw driver wrench size 5
- (4) hexagonal screw driver wrench size 4
- (5) hexagonal screw driver wrench size 3
- (6) double-ended spanner SW8x10
- (7) oil press
- (8) machine supports (4pcs.)
- (9) 5 pcs. filter cartridges for PC cooling device
- (10) machine description, software description and electrical documentation

Control software (11)

- Siemens 810/820
- Siemens 810D/840D
- GE Fanuc Series 0
- GE Fanuc Series 21

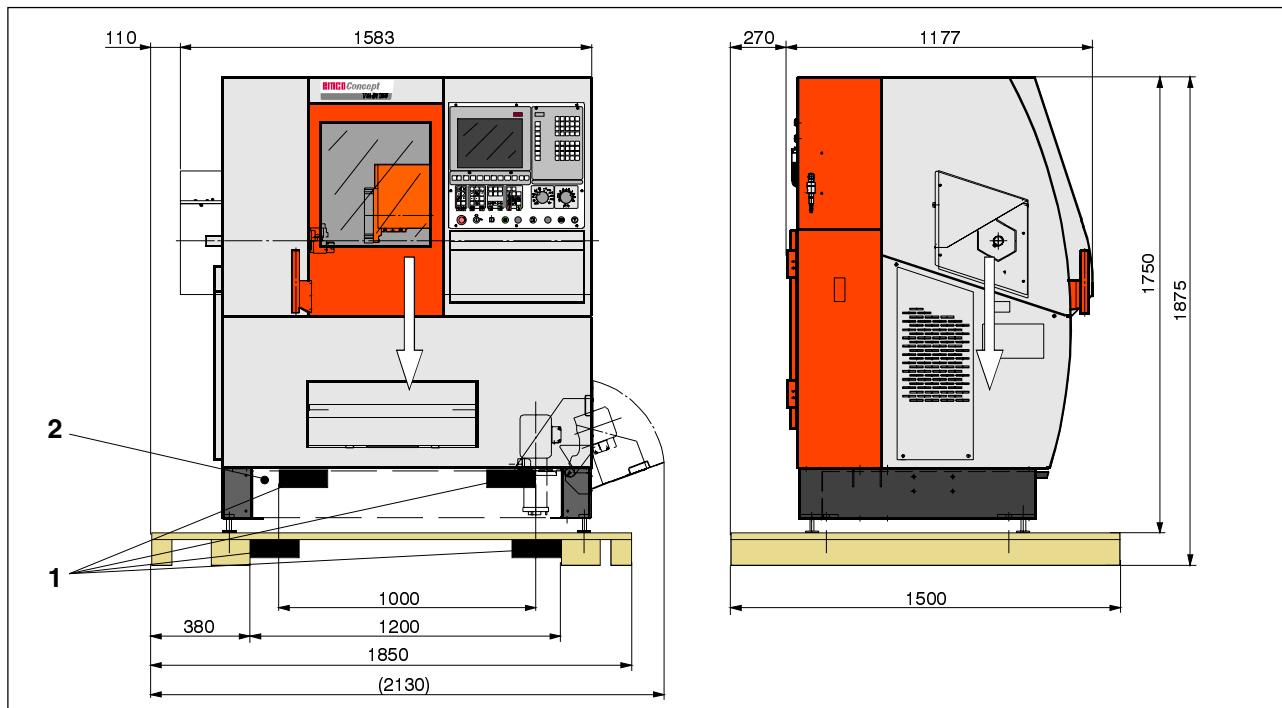
Control keyboard (12)

- Siemens 810
- Siemens 820
- Siemens 810D/840D
- GE Fanuc Series 0
- GE Fanuc Series 21

Modules/options

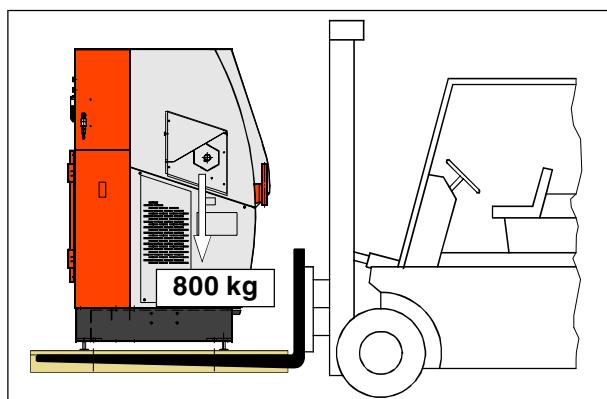
- 8-fold tool turret
- 12-fold tool turret
- 12-fold tool turret with driven tools
- standard tailstock
- automatic tailstock
- C-axis for main spindle
- coolant device
- workpiece collection device

Transport of machine



Position of stack forks(1) and of center of gravity of the machine with the transport

Transport with pallet



transport with pallet

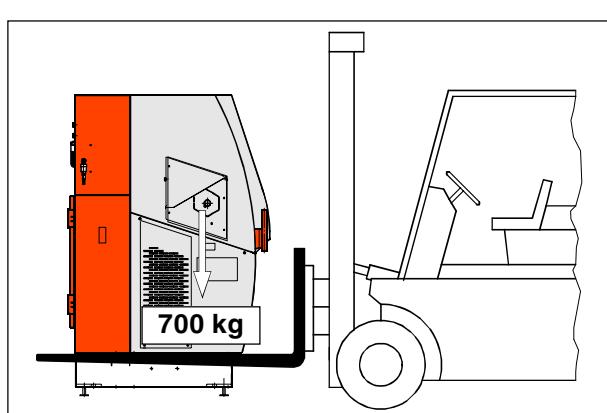
Attention:

The machine may only be transported on the pallet if the machine is fixed on the pallet by means of anchor bolts.



Lifting capacity min. 800 kg
 Fork width 1 000 - 1 200 mm
 Fork length min. 1 300 mm

Transport without pallet



transport without pallet

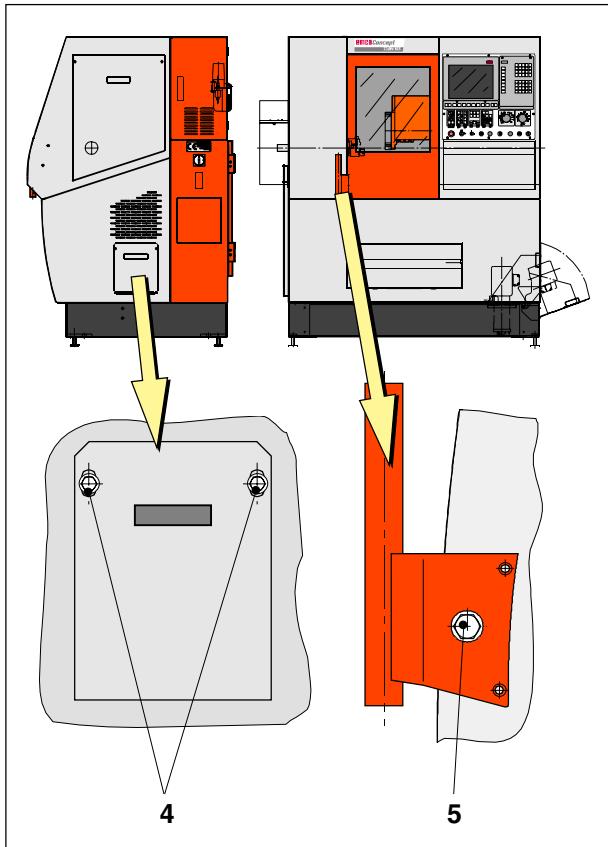
Attention:

- The lifting points and the fork widths have to be adhered to exactly so that there is no deformation at the machine base.
- The foot panel (2) and/or coolant tray (accessories) must be removed during transport.
Furthermore, the coolant pump must be swivelled out (see "transport safety devices" in this chapter).



Lifting capacity min. 700 kg
 Fork width 700 - 1 000 mm
 Fork length min. 1 300 mm

Transport safety devices



Transport safety devices at the machine



Attention:

- Prior to start-up of the machine all transport devices have to be removed.
- Keep the transport safety devices and remount them when transporting the machine again.

Machine door

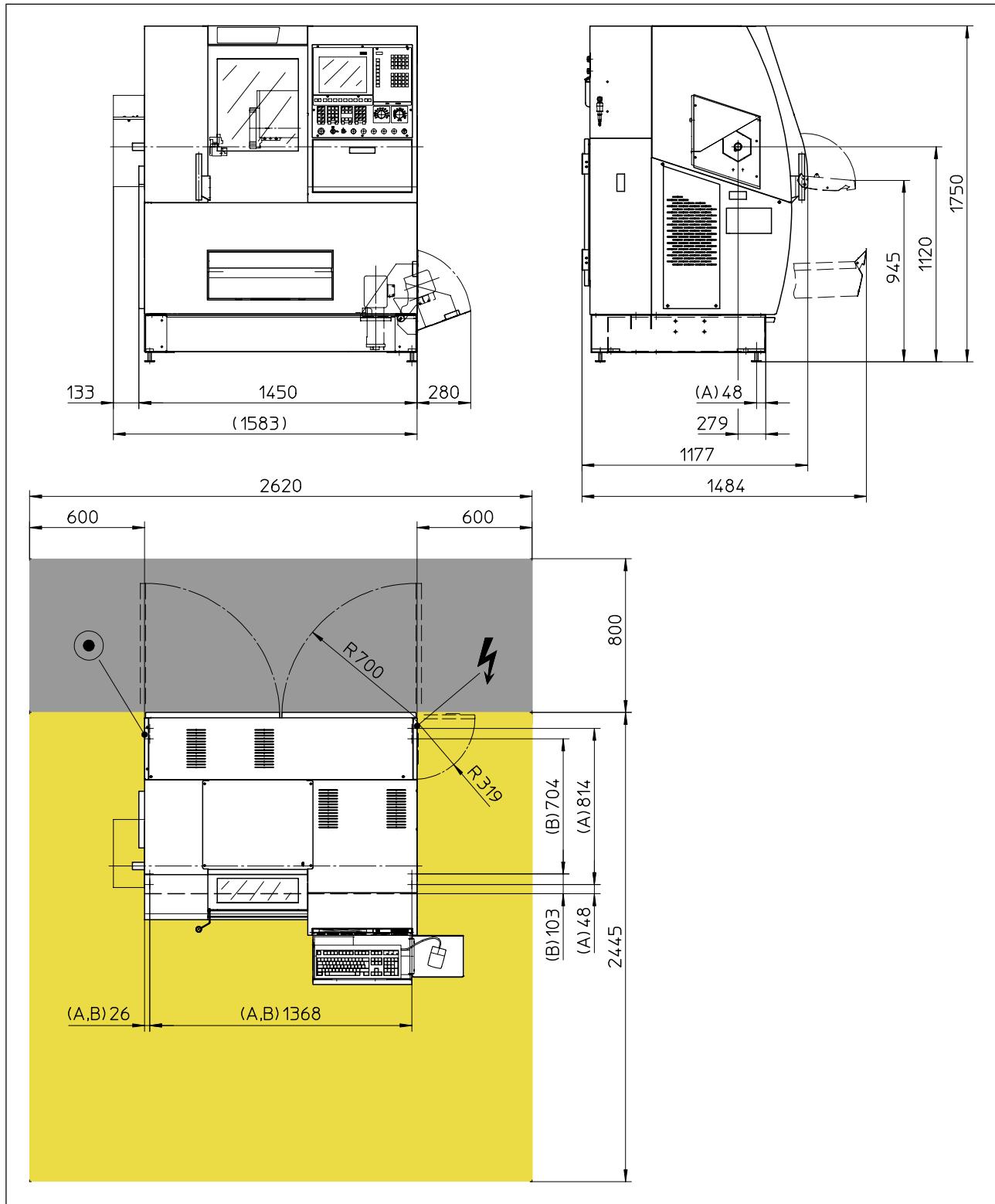
The machine door is fixed by a securing screw (5) at the left machine panelling - remove screw (5).

Coolant device (accessory)

If the machine is equipped with the "coolant device" accessory, the transport safety device for the coolant pump must be removed:

Screw out securing screws (4).
Now the coolant pump can be swivelled out laterally.

Installation plan, dimensions of the machine

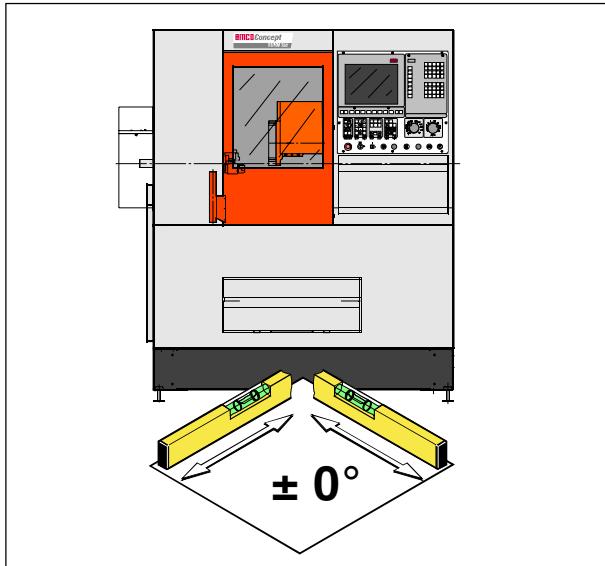


A Setting screws (8) resp. levelling elements (4)
(see "Installation criteria" in this chapter)

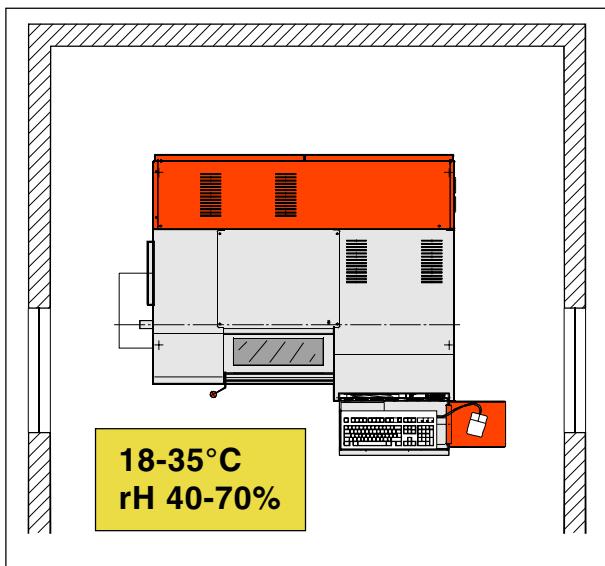
Space for operation

B Bores ø18x120 for anchor bolts

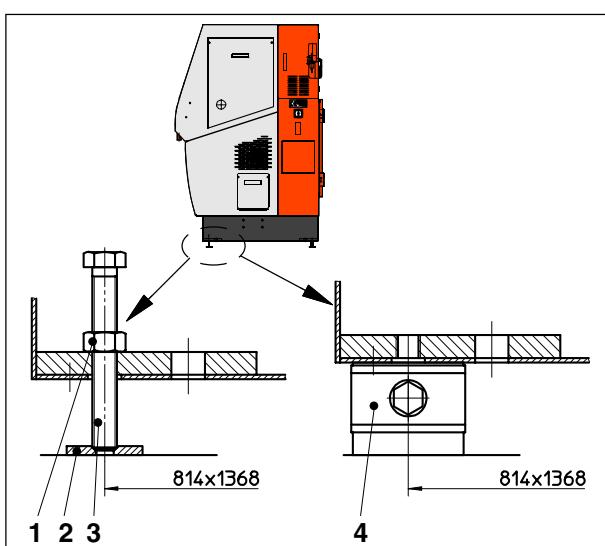
Space for maintenance



Aligning the machine



Room climate at installation site



Installation without anchoring

Installation criteria

Requirements on installation surface

The machine is to be installed on a pavement as horizontal as possible with adequate carrying power and vibration stability.

When screwing down the machine bores for the anchor bolts have to be mounted.

Installation site

Mind that the selected installation site is adequately clean (free of excessive dust exposure etc.) to take care of the machine as well as the PC and the peripheral devices.

Furthermore, the following requirements must be met:

Room temperature 18-35°C
Atmospheric moisture 40-70%

Ergonomy

Due to its ergonomic design the machine provides optimum operation.
However, when choosing the installation site pay attention to sufficient lighting.

Installation without anchoring

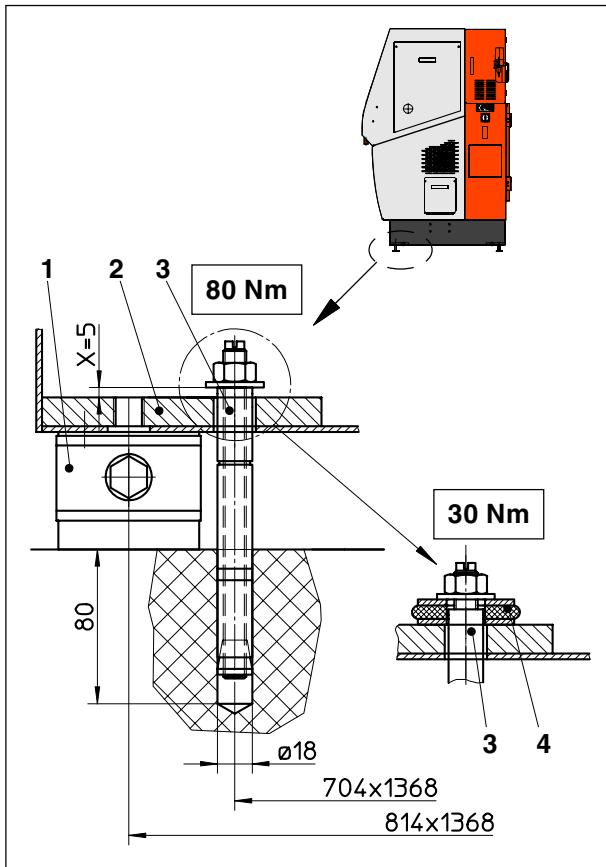
In general, screwing down the machine on the floor is not necessary.

However, anchoring is possible.

- Use the supports supplied with the machine (2) as a base.
- Align the machine horizontally at the setting screws (3).
- Fix alignment by tightening the counter nuts (1).

Note:

- This kind of installation is the easiest one, however, there is no vibration damping.
- As a remedy you can use also vibration damping levelling elements (4) instead of the supports (2).
Levelling element order no. **881 500**
(4 pcs. necessary)

*Anchoring on the ground*

Anchoring on the ground

Required accessories (order no.):

4 pcs. levelling elements 881 500
4 pcs. anchor bolts FHA 1860 B 573 045

- Drill 4 anchor bolts $\varnothing 18 \times 120$ in a distance of 1368 x 704 mm (see installation plan).
- Place the machine above the bores.
- Insert levelling elements (1) and align machine horizontally.
- Thread in anchor bolts (3) and push them into the anchor bore until the distance between the washer of the anchor bolt and the setting angle (2) is approx. 5 mm (see sketch - distance X).
- Pretension anchor bolts (3) with 80 Nm. (anchorage in the ground)
- Reloosen hexagon nuts of the anchor bolts and attach insulating disk (4).
- Tighten anchor bolts with 30 Nm (holding down the machine).

Additional criteria for installation

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

- The installation site has to comply with building authority regulations so that in case of possible leakage of cooling lubricant, lubricating and hydraulic oil, the environment is not burdened.
- An ideal situation would be provided if the installation site at the same time fulfilled the function of a collecting tray.
- Vibration-proof features as favourable as possible to avoid a transmission of vibrations (particularly when working in the upper speed range, with bar work, when machining heavily unbalanced workpieces, with interrupted cut, when using driven tools etc.) to nearby objects.
- Good and sufficient lighting of the working space facilitates operation of the machine and increases quality and security of work.

- The specific noise load of a machine operator is to be noted.
- It has to be taken into account that in accordance with the operating situation a highly qualified operator works on the lathes who has to carry out exacting programming and supervising activities.

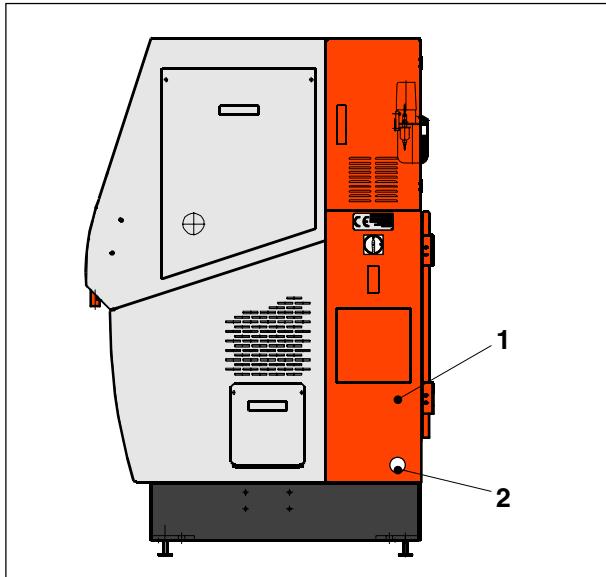
Sometimes the situation can be improved by sound insulation walls.

From studies we know that the double distance to a nearby source of noise decreases the sound level by 3 to 5 dB(A).

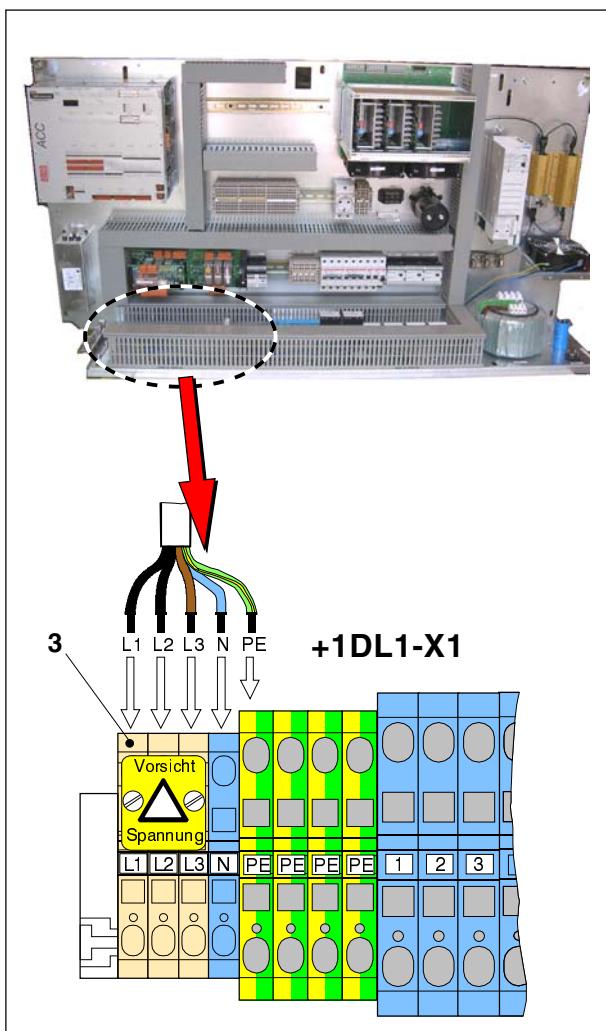
When doubling the number of similar sources of noise the level is increased by 3 dB(A).

- Heat sources with inconstant temperature near the machine as well as air drafts will influence the quality of the place of work as well as the operating position of the machine. If necessary, adequate measures for protection are to be taken.





Cable screwed joint at the machine



E-cabinet and connecting terminal

Electrical connection



Danger:

The electrical connection of the machine and its accessories may only be established by an electrics expert.
Feed cables must be idle during the connection.

- Thread feed cable through the cable screwed joint (2) laterally at the electrical cabinet (1).
- Connect the three phases L1, L2 and L3 to the terminal strip +1DL1-X1 (3)(connecting terminals L1, L2 and L3).
- Connect zero conductor to terminal N of the terminal strip +1DL1-X1 (3).
- Connect earth contact (yellow/green core) to the connecting terminal PE of the terminal strip (3).

Control of the correct connection

Control the connection by checking the rotary direction of the main motor fan.
The rotary direction of the fan is marked on the fan cover.
In case of wrong rotary direction switch off machine immediately and interchange two phases of the main connection.



Attention:

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

Reason:

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

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

SIEMENS 5 SZ6 468 - OKG00
EMCO-Order-No.: ZME 280 720

Alternative:

ABB F804 - 63/0,3

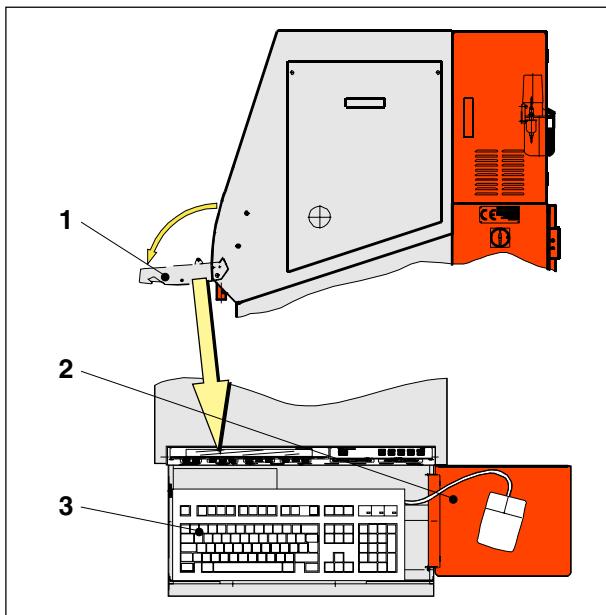
Mains connection data



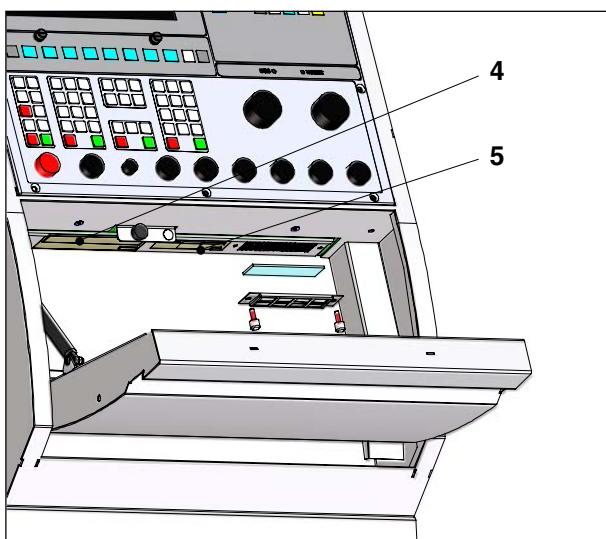
Attention:

A preliminary fuse is ordered forcible!
The specified value of the fuse has to be kept strictly.

Power supply 3/N/PE ~ 400 V
 Frequency 50/60 Hz
 Max. voltage fluctuations ±10%
 Connected load 5 kVA
 Max. preliminary fuse 20 A/slow
 Required short circuit power 1100 kVA
 Feed cross section acc.to local regulations



Opening the PC compartment



PC with floppy - and CD-drive

Note:

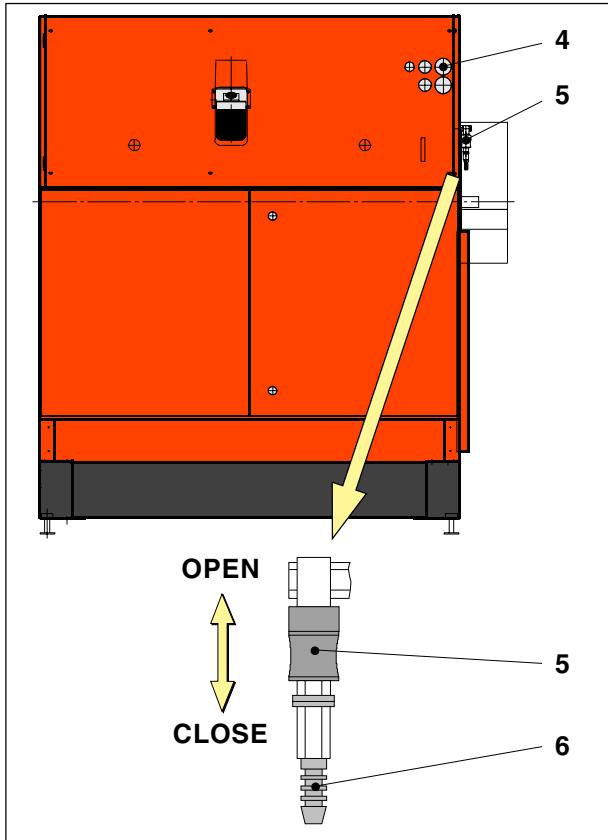
Further information about electrical connection is to be found in the electrical documentation of your machine.
 In case of different specifications the data in the electrical documentation are valid.



PC connection

The PC is already installed and cabled in the machine by the manufacturer.

- Access to the PC keyboard (3) by opening the cover (1).
- To use the PC mouse swivel out integrated mouse tray (2) laterally.
- Floppy (5) and CD-drive (4) are above the PC-keyboard.

*Pneumatic connection of the machine*

Pneumatic connection (Option)

By machines with automatization (pneumatic chuck, automatic tailstock, ...) laterally on the machine there is a pneumatic connection device.

Working pressure min.5 – max.6 bar

Note:

If the working pressure is too low, the C-axis won't work correctly.

- Connect air supply at the connection piece (6) of the pneumatic unit laterally at the machine (compressed air hose ø10 mm).
- The set pressure can be read at the manometer (4) at the rear side of the machine.
- By pushing the manual slide (5) upwards the filter and the valves are supplied with compressed air.

Initial start- up

- All blank parts are to be cleaned from rust preventive agent with a clean cloth.
- Prior to start-up grease the machine (see maintenance of the machine).
- Check oil level of central lubrication, if necessary refill oil (see maintenance of the machine).
- Tool and workpiece must be clamped tightly and safely.
- For further operation please see switch-on and switch-off procedure of the machine as well as software description.

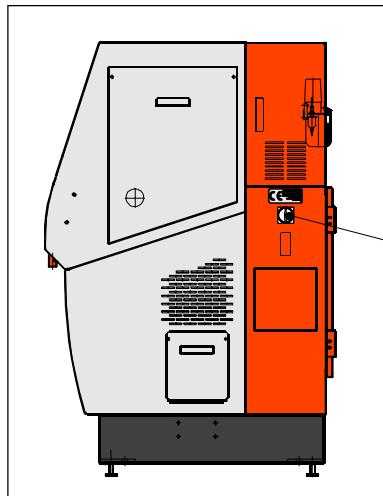
Note:

If the machine is not used for a major period:

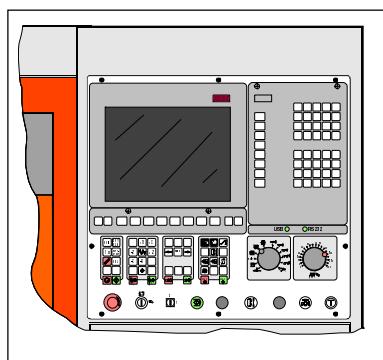
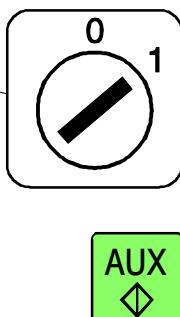
- Clean machine carefully
- Slightly oil blank parts.
- Protect machine against unauthorized start-up (key switch at the operating panel, lockable main switch).
- Cover machine with dust protection (packing).

After a major standstill of the machine all operations as described under "Initial start-up" are to be carried out.

Switch On/Off Sequence



Main switch



Control panel



Switch On the Machine

Open air supply (option).

Switch on main switch at the electrical cabinet (cabinet fan runs).

Open and close the chip guard door once for checking the door safety switch.

After a major standstill of the machine press "AUX ON" key for approx. 1 minute.

By pressing the "AUX ON" key all drives are supplied with current. With a steady pressure on the key also the central lubrication is activated approx. every 6 seconds in order to lubricate the slide guides.

Approach Reference Point

Possibility A:

Referencing axis by axis

Press the +Z key

The slide traverses to the reference point in Z.

Press the +X key

The slide traverses to the reference point in X.
(Only after the collision-free area was reached in Z)

Press the tool turret key to reference the tool turret.



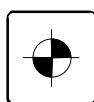
Note:

After reaching the reference points the software limit switches are active.

Possibility B:

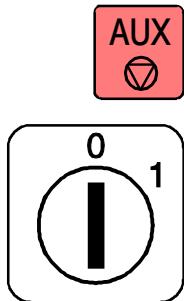
Automatic referencing

Press the key "reference". The axes traverse to the reference point one after the other.



For further operation of the machine please see your "**Software description**" .

Switching off the machine



Press key AUX OFF.

Terminate control software (WinNC).

Terminate Windows.

Switch off main switch

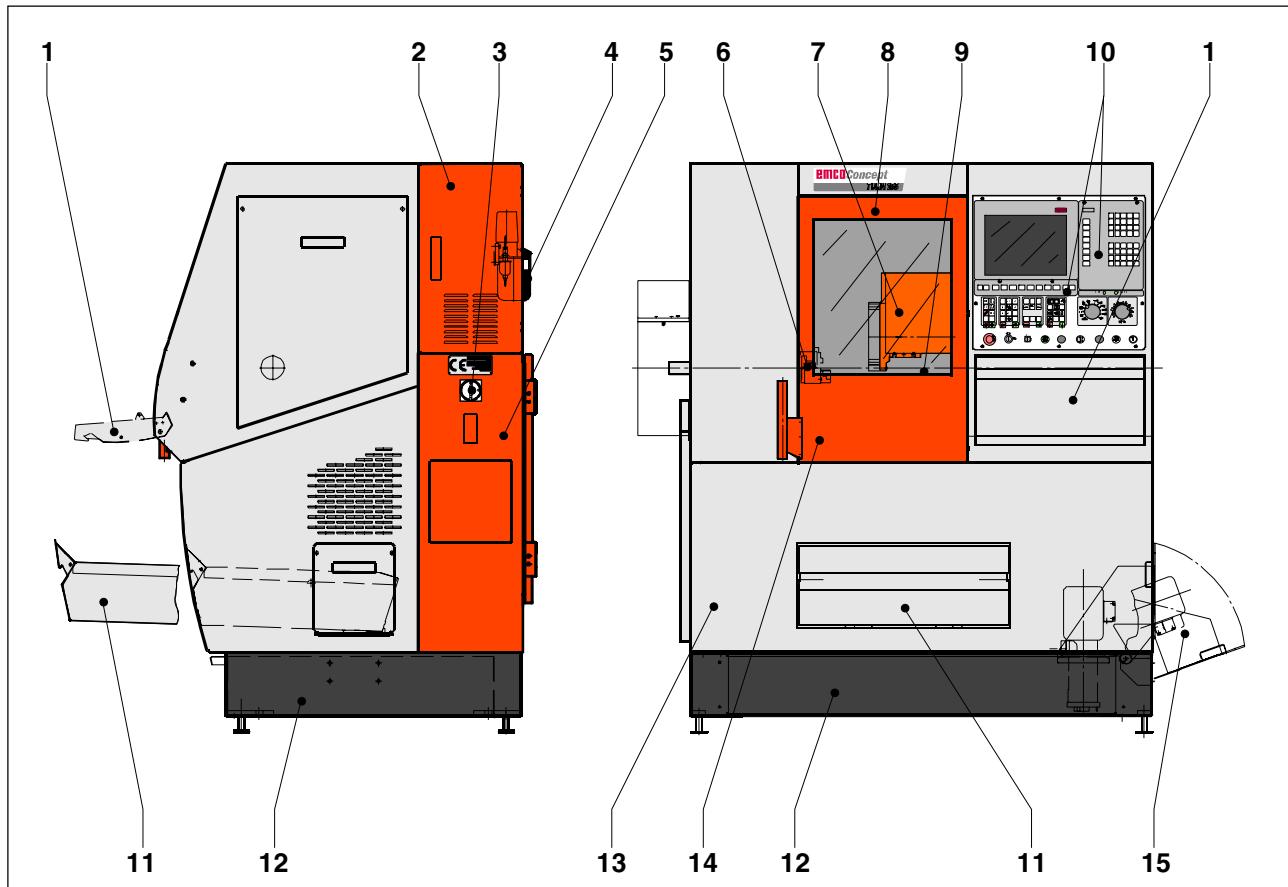
Lock air supply.



Notes

- The machine is switched off by means of the main switch.
We recommend to switch off the machine only in inoperative position of the tool turret.
- Operation is interrupted by means of the Reset key.
All current machine functions are interrupted with RESET.

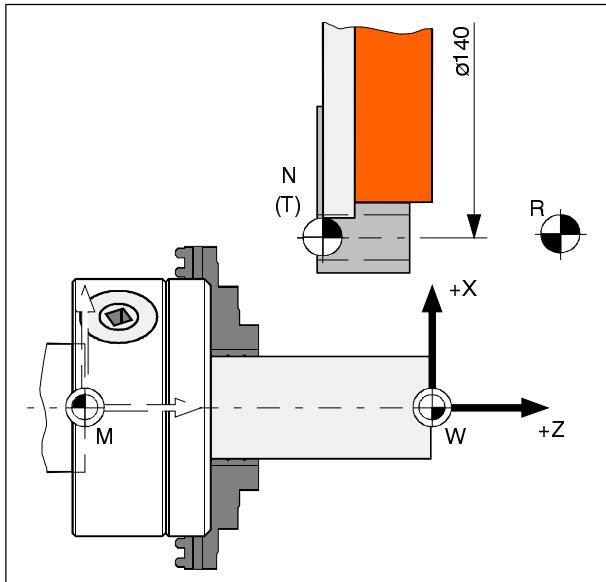
B Description of the machine



Machine elements - survey

- | | |
|--|---|
| 1 PC keyboard drawer (folding, with integrated mouse tray) | 8 Machine lamp |
| 2 PC box | 9 Manual tailstock or automatic tailstock |
| 3 Main switch | 10 Control-specific keyboard (exchangeable) |
| 4 Central lubrication plant | 11 Chip tray (to be pulled out) |
| 5 E-cabinet | 12 Coolant tray |
| 6 Main switch | 13 Machine base with chip area |
| 7 Tool turret (8-fold, 12-fold or 12-fold with driven tools) | 14 Chip guard door |
| | 15 Coolant pump (swivelling) |

Points at the machine



Points at the machine with 8-fold tool turret

Machine zero point M

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

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

Reference point R

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

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

Workpiece zero point W

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

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

Toolholding-fixture reference point N (T)

The toolholding-fixture reference point N or T is a fixed point. It serves as reference point for measuring the tools.

The toolholding-fixture reference point lies on the tool turret disk.

Machine with 8-fold revolver:

X-direction ("diameter direction"):

With mounted toolholder for internal machining tools exactly in the axis of the support bore ($\varnothing 140$ mm).

Z-direction ("longitudinal direction of rotation"):

At the front side of the tool turret disk.

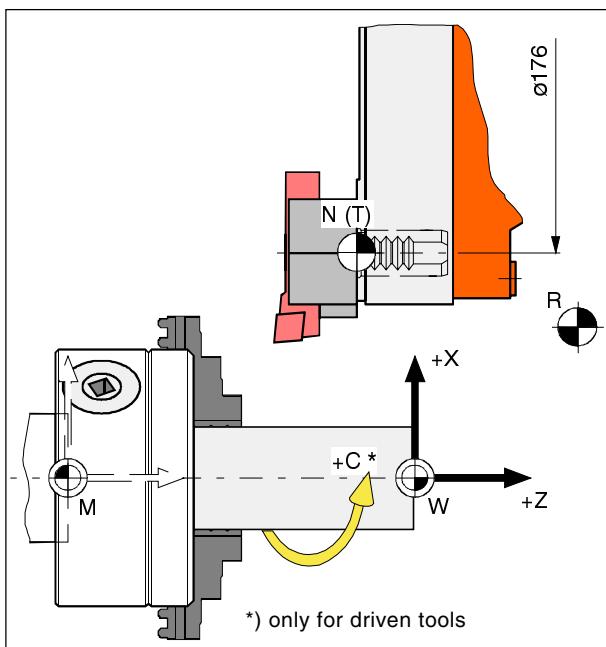
Machine mit 12-fold revolver:

X-direction ("diameter direction"):

Point T lies at the hole circle of the tool supports for non-driven tools ($\varnothing 176$).

Z-direction ("longitudinal direction of rotation"):

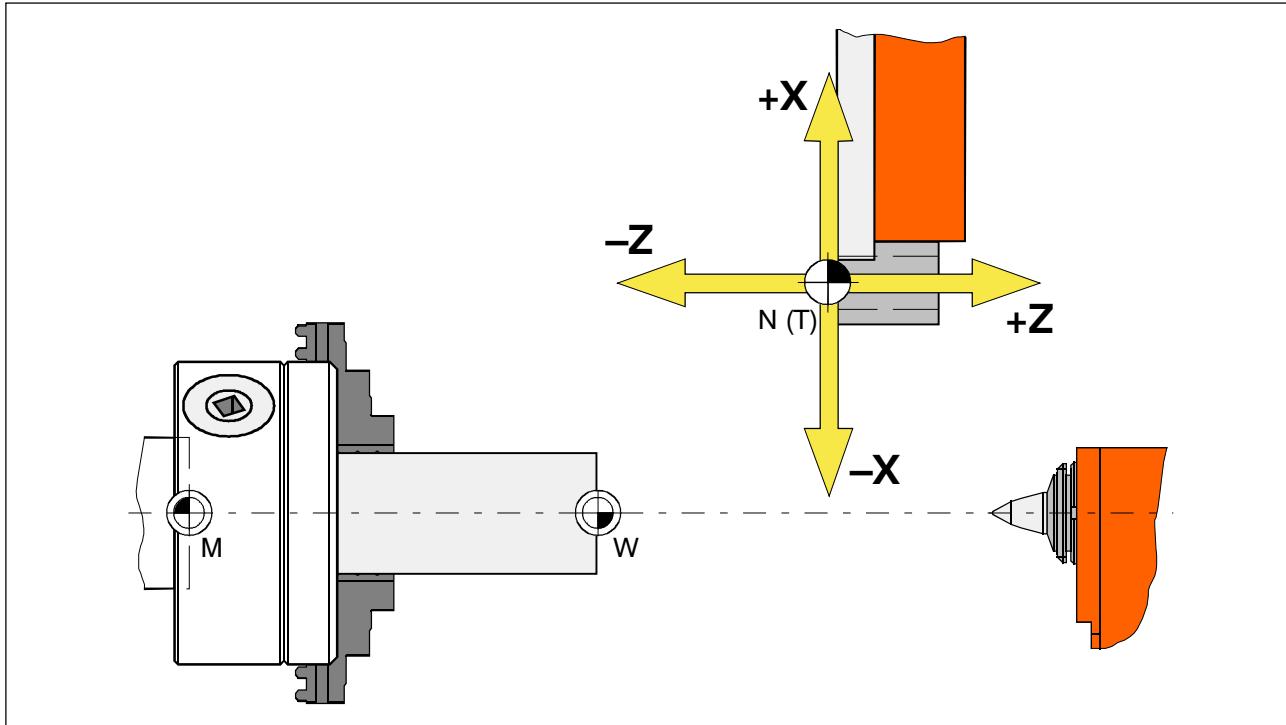
At the front side of the tool turret disk.



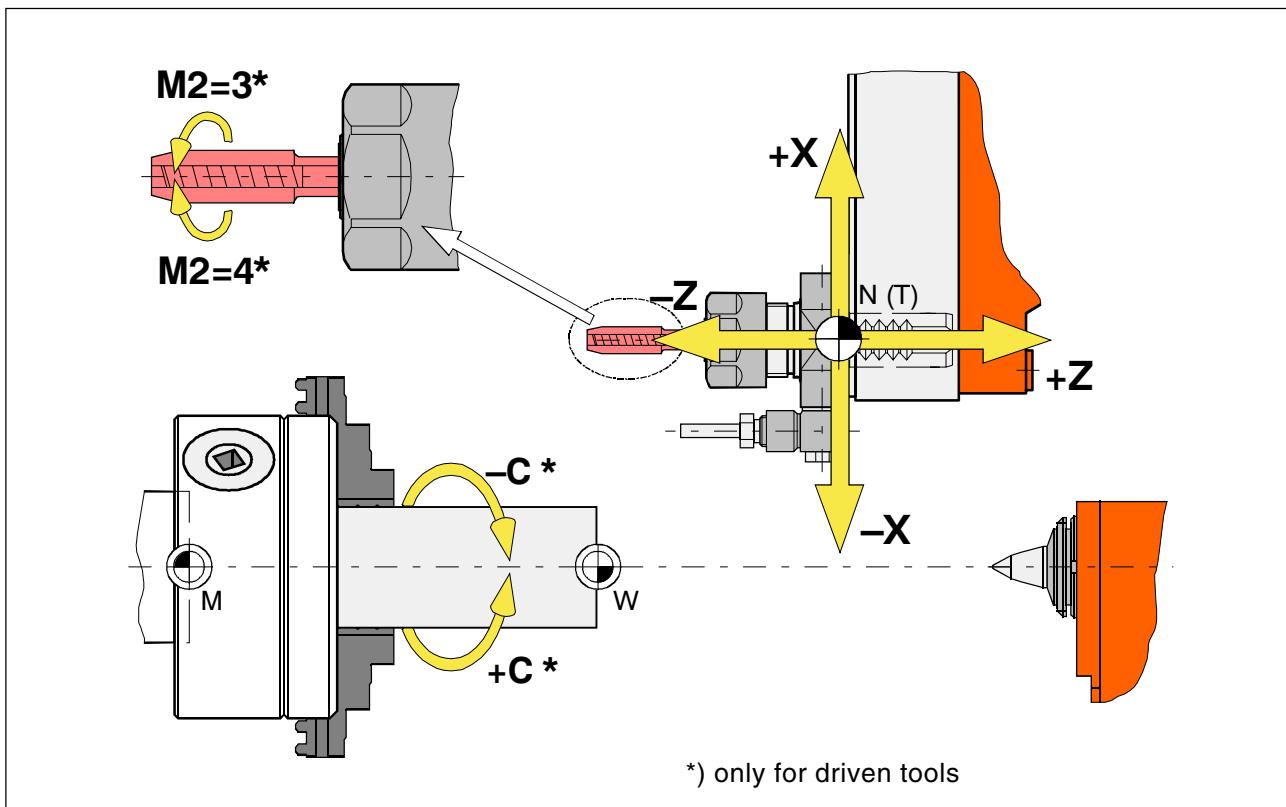
Points at the machine with 12-fold tool turret

System of coordinates

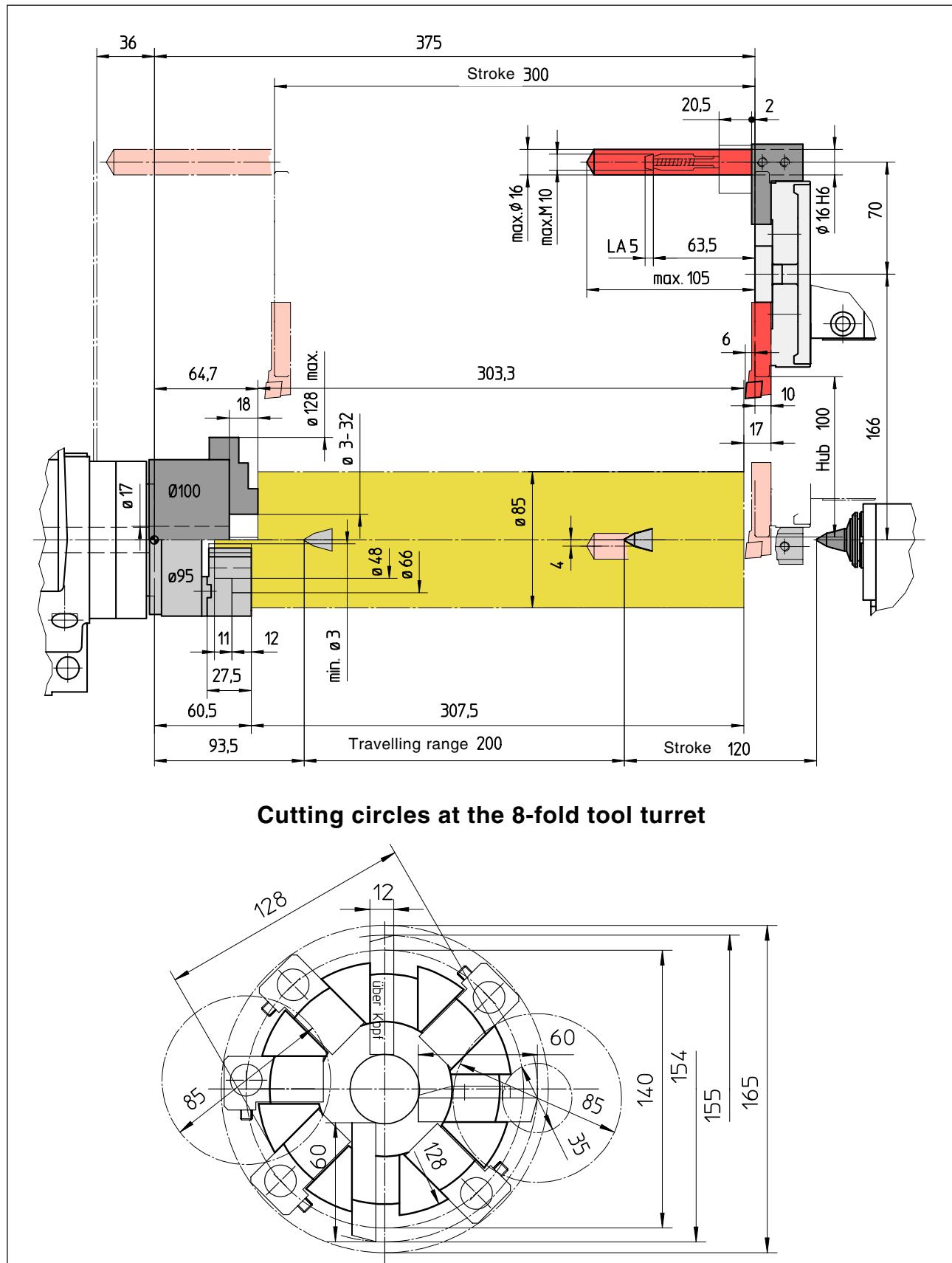
Machine with 8-fold tool turret



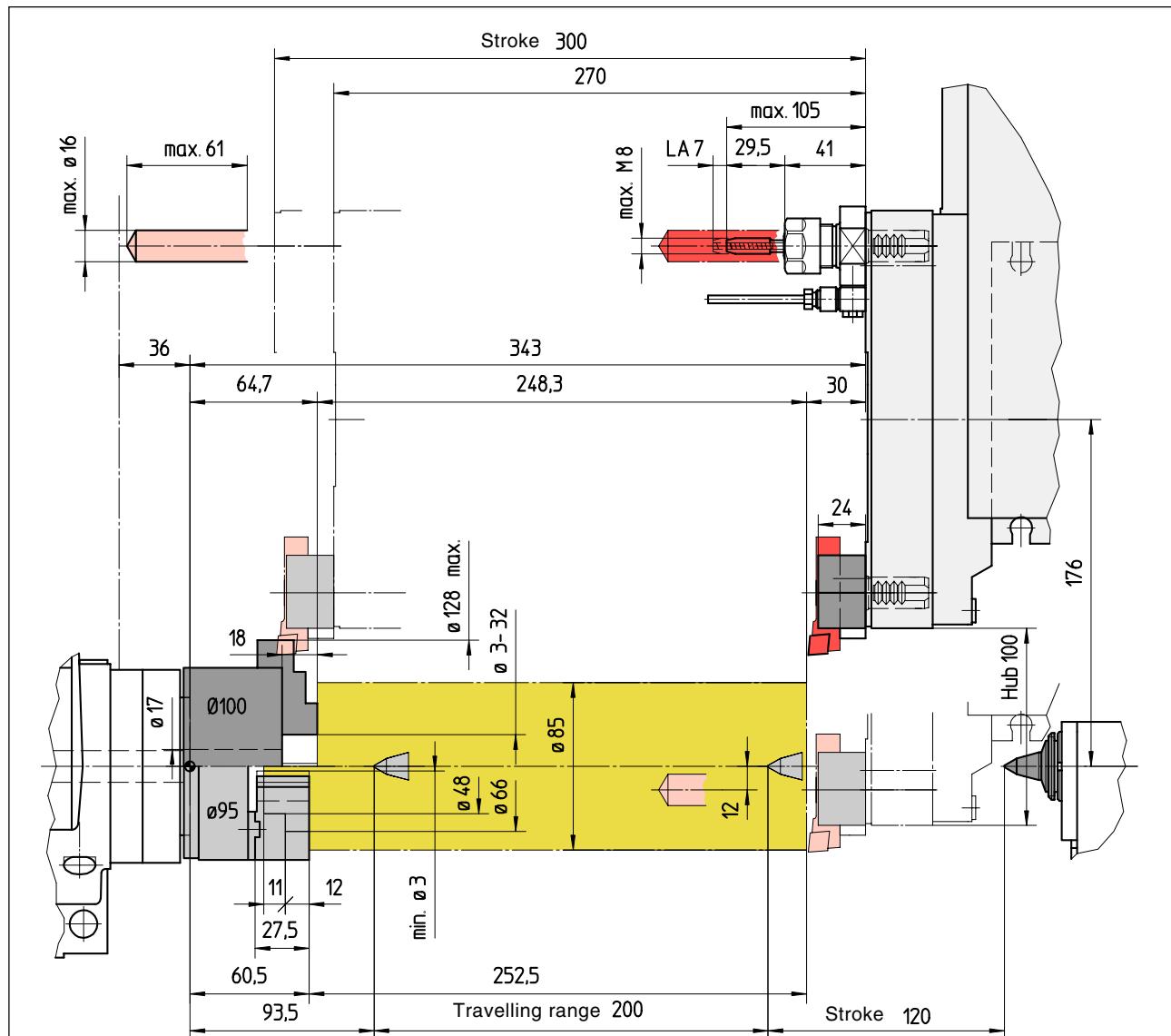
Machine with 12-fold tool turret



Working area - machine with 8-fold tool turret

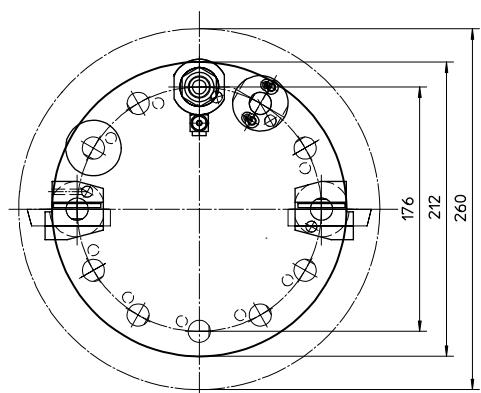


Working area - machine with 12-fold tool turret

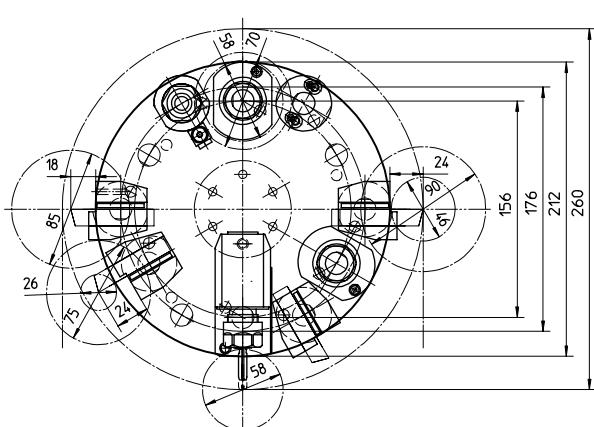


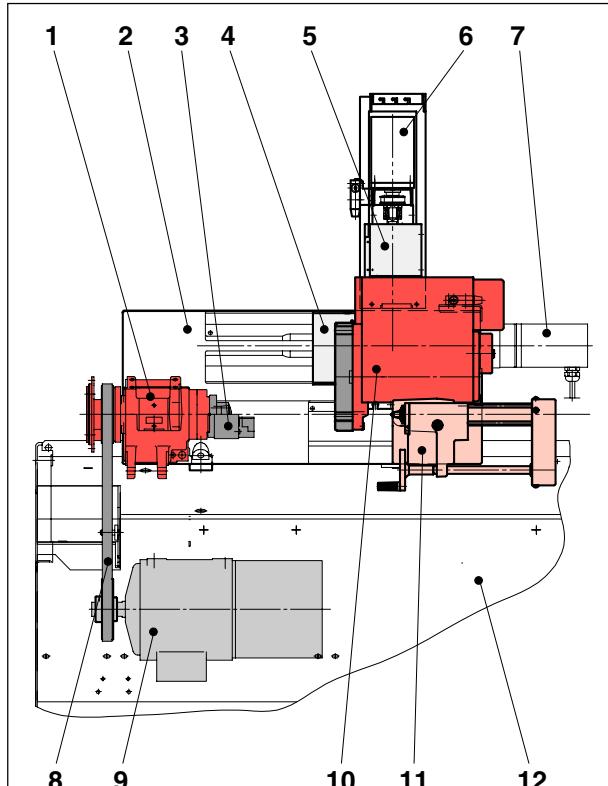
Cutting circles at the 12-fold tool turret

without driven tools

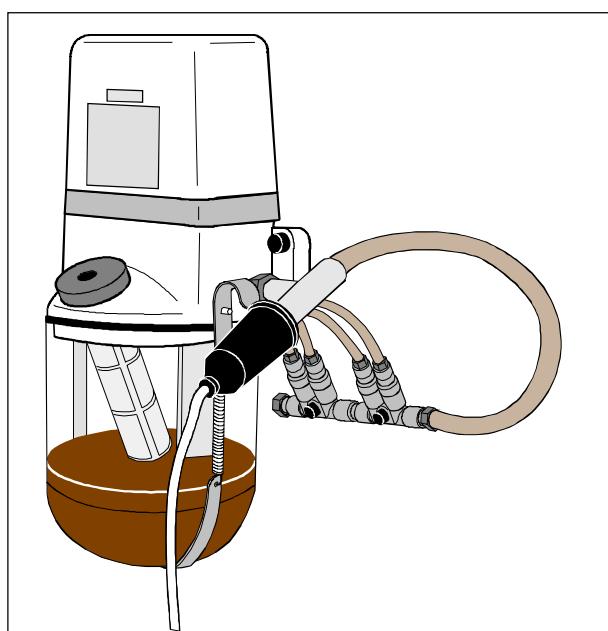


with driven tools





No.	Component	No.	Component
1	Main spindle	7	Drive Z-slide
2	Machine bed	8	Drive belt
3	Clamping device	9	Main motor
4	Z-slide	10	Tool turret
5	X-slide	11	Tailstock
6	Drive X-slide	12	Machine base

Slide and drive system*Central lubrication*

Machine base

The machine base is of solid welded design, for supporting the machine bed, the control with the PC as well as the whole electrical equipment. A coolant tray (accessory) can be inserted at the lower part of the base.

Machine bed

The machine bed is made of cast iron, extremely resistant to torsions and vibration-damping . The headstock, slide unit and tailstock are mounted on the machine bed. Due to the three-point support of the machine bed a distortion and thus an impairment of the accuracy is avoided.

Slides

Longitudinal and cross slide run in precisely ground dove-tail guides. The clearance of the slides can be readjusted via tapered gibbs. The slides are supplied with oil via the central oil lubrication so that all sliding surfaces are always dampened with oil.

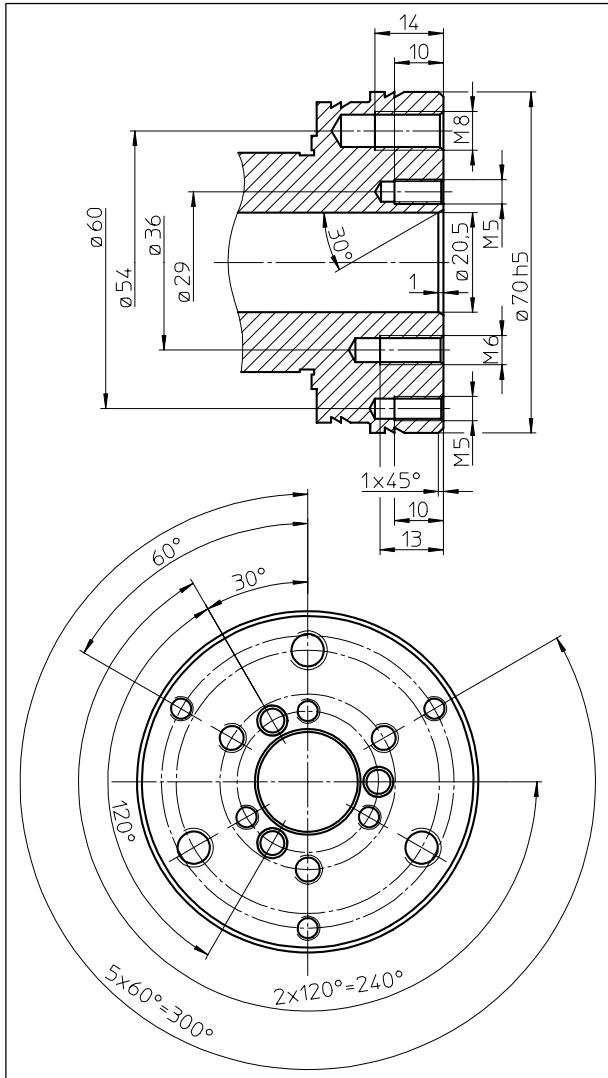
Slide drives

The slides are traversed with step motors via recirculating ball screw spindles. The amply dimensioned spindles, the rigid spindle nuts and the axial bearings without backlash provide high-positioning and working accuracy.

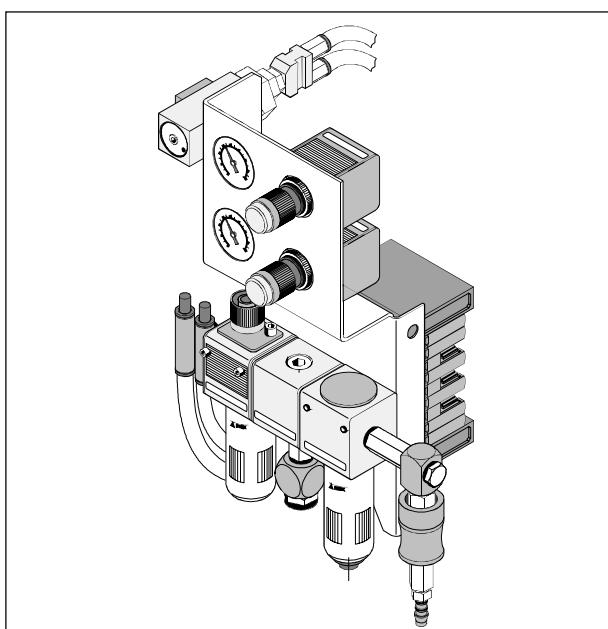
Feed speed..... 0-4000 mm/min
Rapid motion speed 7500 mm/min
Travel path longitudinal slide 300 mm
Travel path cross slide 100 mm
Step resolution 1,25 µm
max. feed force longitudinal slide 2500 N
max. feed force cross slide 2500 N

Central lubrication

Longitudinal and cross slides are supplied with glideway oil via the central lubrication. The pump is automatically switched on after a slide travel path of 16 m.



Fitting dimensions at the spindle nose



Pneumatic maintenance unit

Main spindle

The main spindle is driven by a three-phase A.C. motor via a V-belt.

It is guided in taper roller bearings greased for life and, thus, maintenance-free.

The headstock is formed thermosymmetrically, i.e. in case of heating of the spindle a deviation in alignment is not effected.

The fixation of the clamping devices is carried out in accordance with the kind of clamping device at the thread bores provided for this purpose.

The clamping devices must be provided with an intermediate flange.

Spindle connection manufacturer standard
 Max. chuck size Ø100 mm
 Speed range 150 - 4000 min⁻¹
 Power (100/60% d.c.) 2,2/2,8 kW

Pneumatic maintenance unit (option)

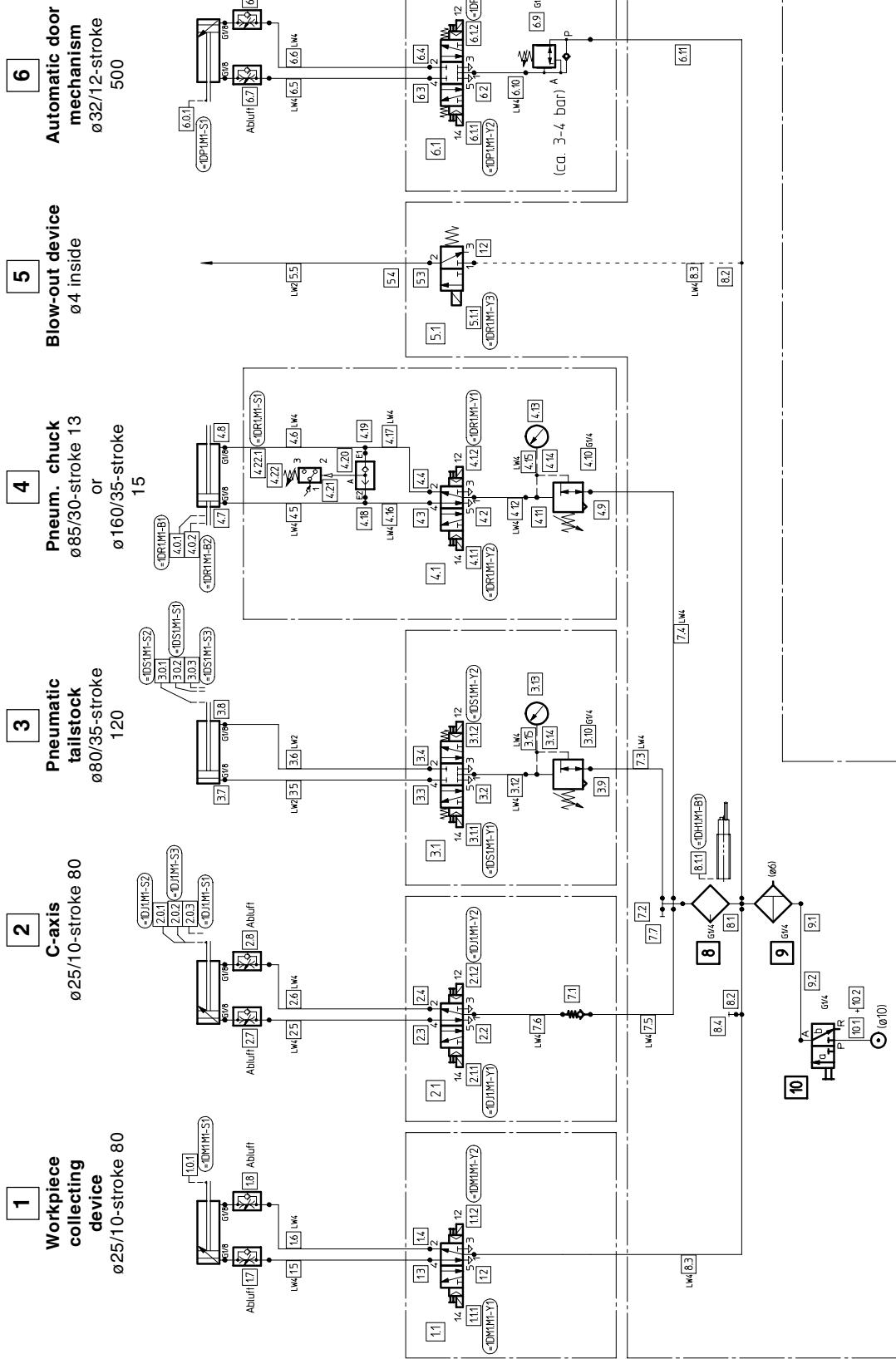
In machines with automatization, the pneumatic maintenance unit (pneumatic clamping device, blow-out device, pneumatic tailstock, automatic door mechanism) is mounted on the rear side of the machine behind the machine back panel.

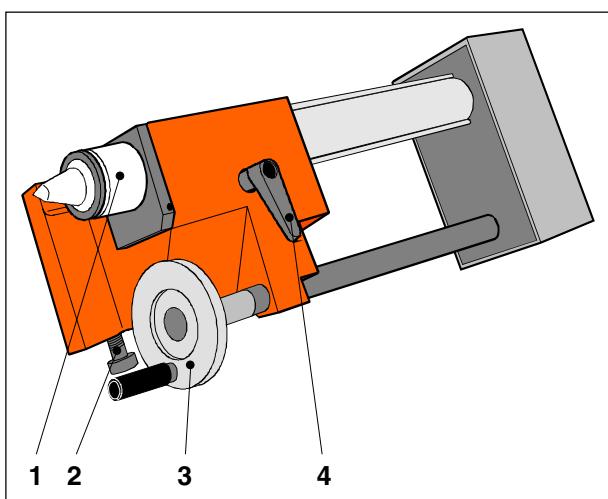
The maintenance unit contains all connections, pressure switches, pressure control units and valves which are necessary for triggering the automatization devices.

Pneumatic scheme and functions see next page.

Pneumatic scheme

only together





Manual tailstock

Manual tailstock

Sleeve diameter Ø35 mm
 maximum sleeve stroke 120 mm
 maximum travelling range 200 mm

The manual tailstock with integrated centre is mounted on the machine bed by means of a dove-tail guide.

Tailstock adjustment

- Shifting the tailstock in the dove-tail guide

Tailstock clamping

- Tightening the locking screw (2) by means of a hexagonal screw driver, key wrench 10

Sleeve adjustment

- Adjust the sleeve (1) by turning the handwheel (3)

Sleeve clamping

- Tightening the clamping lever (4)



Danger:

When countersupporting workpieces the sleeve has always to be clamped.

Automatic door mechanism (option)

Upon order the automatic door mechanism can be mounted as option at the manufacturer.

The chip guard door can be opened and/or closed by the program or by pressing a key via a pneumatic cylinder (1).

Monitoring of the door position is carried out via 3 limit switches.

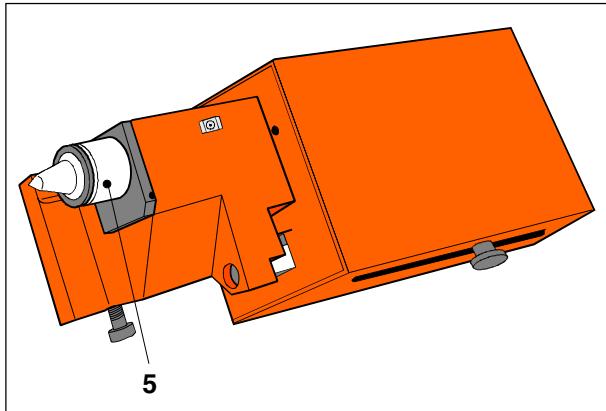
Robotics interface (option)

With the robotics interface in addition to the general triggering of the periphery (such as automatic door mechanism) the machine can also be connected with further machines or devices (e.g. loading and unloading robot).

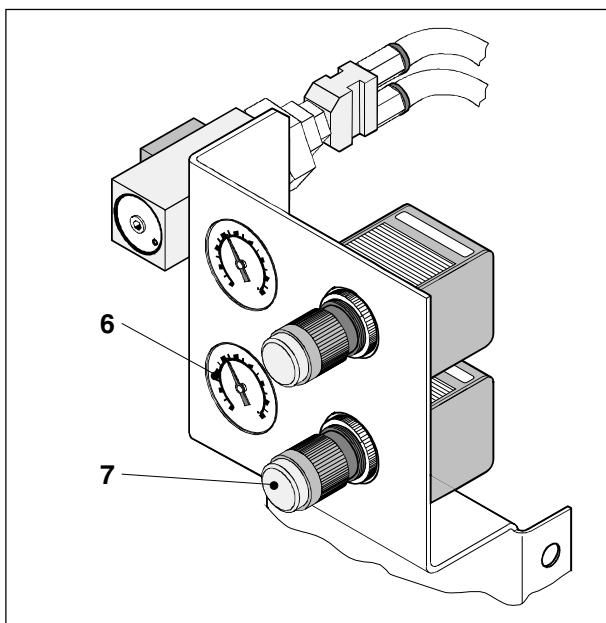
DNC-interface (option)

Via the DNC-interface the machine can be operated via a host. In contrast to the robotics interface, in addition to standard functions, e.g. programs can be transmitted or started from the host.

The DNC-interface is mainly used for the set-up of an FMS.



pneumatic tailstock



Setting the clamping pressure

Pneumatic Tailstock (option)

Upon order the pneumatic tailstock can be mounted at the manufacturer.

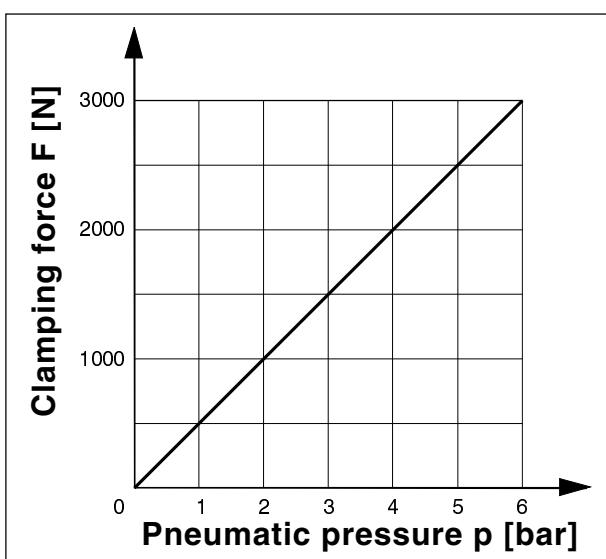
Sleeve diameter Ø35 mm
 maximum sleeve stroke 120 mm
 maximum travelling range 200 mm
 clamping pressure max. 6 bar

The centre is integrated in the sleeve (5). Exact setting of the centre to turning centre is possible due to a built-in eccentric mechanism.

Setting the clamping pressure

The clamping pressure of the tailstock sleeve is set on the rear side of the machine at the pressure control unit (7).

The pressure setting is controlled at the manometer (6).



Clamping force diagram of the tailstock sleeve

Connection air pressure-clamping force

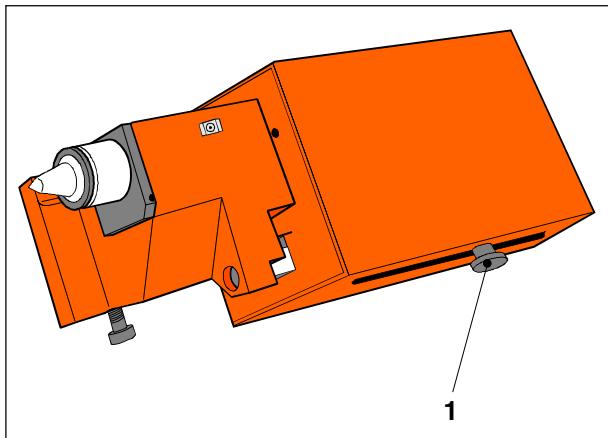
Adjusting the clamping position

Monitoring of the position of the tailstock sleeve is carried out by 3 final position proximity detectors.

Two adjustable proximity detectors control the clamping position while a firmly installed limit switch recognizes the extreme rear final position of the sleeve.

Prerequisites for the adjustment

- The machine is switched on.
- The reference point has been approached.
- The workpiece is clamped in the chuck of the machine.



Adjusting the clamping position

Adjustment procedure

- Traverse tailstock sleeve into extreme rear final position.
During traversing the control displays the message "*Sleeve in intermediate position!*" on the screen.
- Loosen knurled screw (1) and dislocate it extremely to the left in direction workpiece.
Retighten knurled screw (1).
- Traverse tailstock sleeve with closed door into the centre of the workpiece (establish clamping state).
The message "*Sleeve in intermediate position!*" is displayed on the screen.
- Open machine door.
Loosen knurled screw (1) and move it slowly to the right (away from the workpiece) until the message "*Sleeve in intermediate position!*" is replaced by the message "*Machine door open!*".
Clamp knurled screw (1) in this position.

Note:

If the knurled screw (1) is dislocated too fast it might happen that the message "*Sleeve-No part clamped!*" is displayed on the screen.
A correct setting of the proximity detectors is not possible any more.

Traverse the sleeve into the extreme rear position and start again with the adjustment procedure.



- Close the machine door, the message on the screen extinguishes.
At the same time pressure is applied on the pressure valve of the tailstock sleeve, the sleeve is clamped.

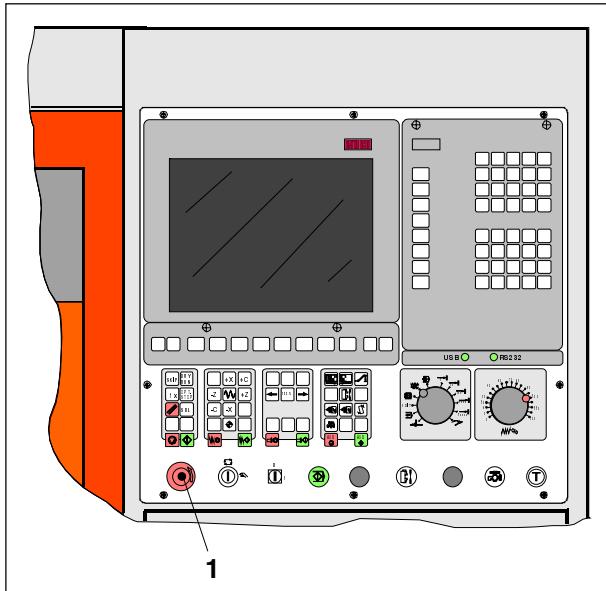
Safety devices

The safety devices are contained in the base machine and facilitate generally risk-free operation of the machine.

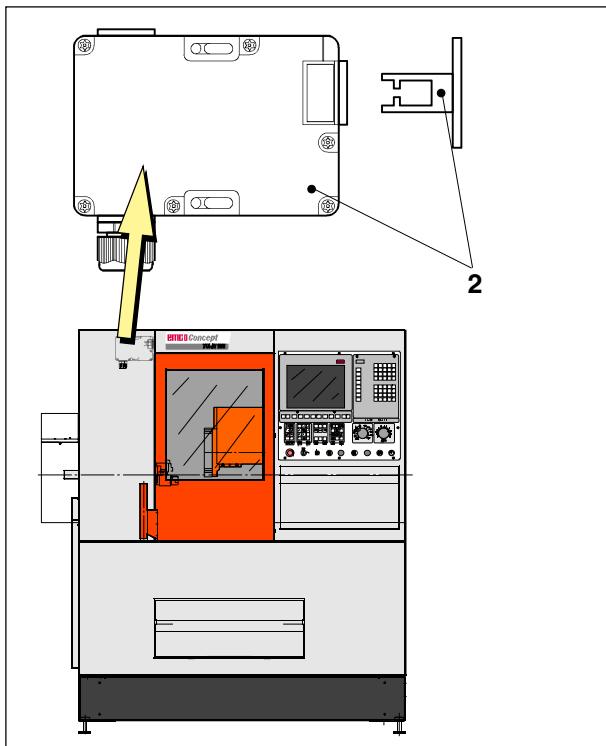


Danger:

The safety devices must never be removed from the machine.
Also mechanic or electric bridgings of the safety devices are prohibited.



EMERGENCY-OFF key at the machine



Door locking device

EMERGENCY-OFF key

In case of any hazard the EMERGENCY-OFF key (1) is to be pressed immediately.

By pressing the key (1) the power supply to the main drive, the feed motors as well as the tool turret is interrupted immediately.

For unlocking the EMERGENCY-OFF key turn knob in clockwise direction.



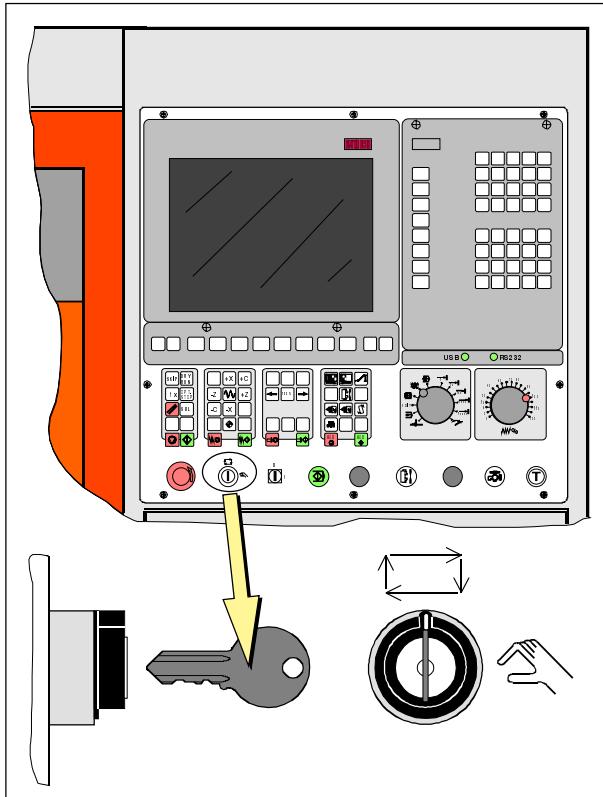
Note:

After pressing the EMERGENCY-OFF KEY the reference point must be reapproached.

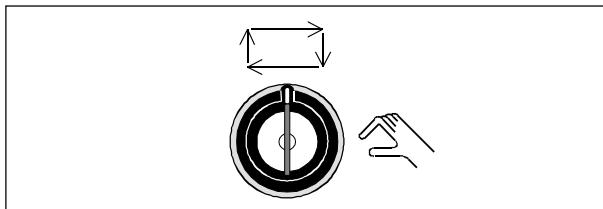
Door locking device

In the machine a door locking device (2) is installed with which the chip guard door can be opened only during standstill of the main drive. A program start with an open door is not possible.

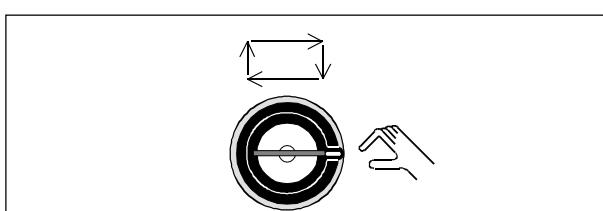
Opening the door by pressing the key "T".



Position of the key switch



Key switch in position "automatic operation"



Key switch in position "setting operation"

Key switch

The key switch can be switched in 2 different positions:

Position "automatic"

The switch position "automatic" is the working position of the machine in which all safety devices are active.

Note:

Manual traversing of the slide is only possible with closed chip guard door as soon as the reference point has been approached, or the key switch is in position "setting operation".



Position "Setting operation"

In this switch position it is possible to traverse the slides manually by opened machine door (Two-hand mode in connection with the consent key - see next page).

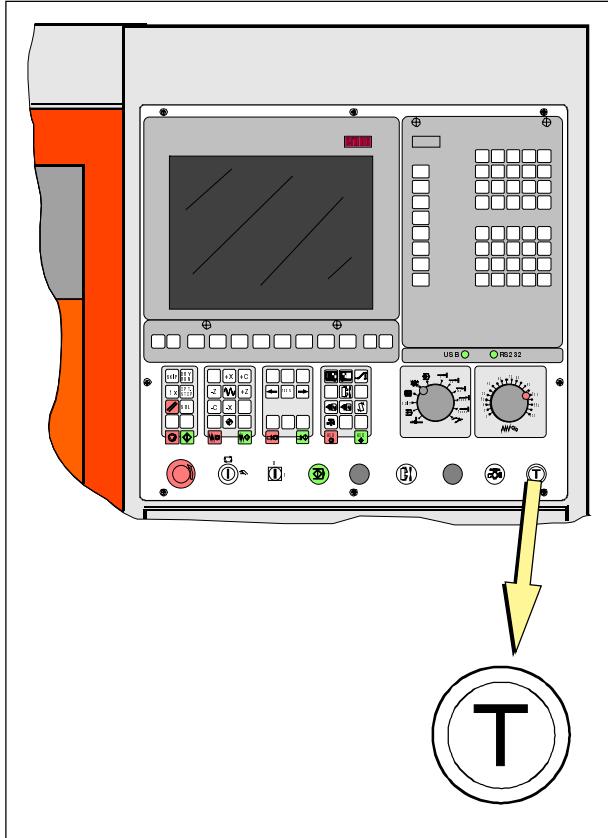


Danger:

- With switch position "setting operation" there is an increased danger of hazards.
- During setting operation keep the chip guard door closed as far as the working procedure permits.
- After termination of the setting work immediately switch the key switch to position "automatic" and take off the key.
- The key may be handed only to those persons who know about the hazards and take adequate precaution measures.

Consent key

The function of the consent key depends on the position of the key switch.



Position of the consent key at the operating panel

Note:

If the consent key is pressed for more than 40 s the function of this key is interrupted, the consent key must be released and pressed again.



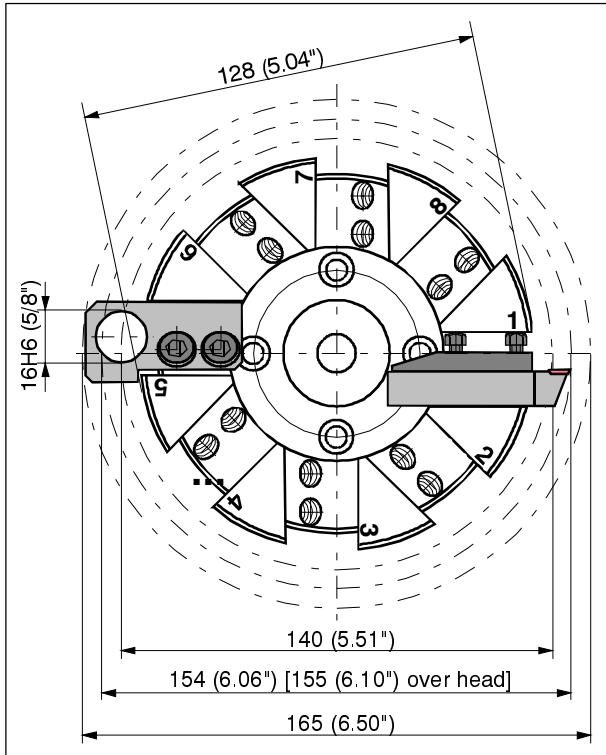
Functions of the consent key

Key switch in "automatic" position

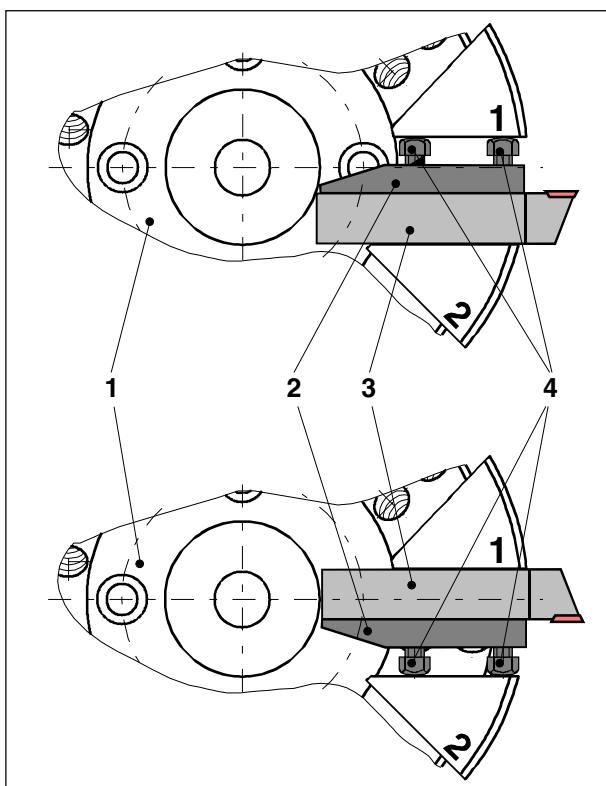
- Releasing the interlocking bolt of the chip guard door with main spindle out of operation.
The machine door is to be opened.
- Traversing of slides in the JOG-manual, with non activated reference point and opened machine door.

Key switch in "setting" position

- Releasing the interlocking bolt of the chip guard door with main spindle out of operation.
The machine door is to be opened.
- Manual traversing of the slide with open chip guard door.
- Swivelling the tool turret with open chip guard door (swivelling by one position respectively)
- Traversing the pneumatic tailstock quill with open machine door.



*Dimensions of the tool turret disk
(dimensions in brackets = inch system)*



Clamping external machining tools

Tool turret 8-fold

The tool turret is used for the support of all external and internal machining tools. It has a direction logic, i.e. the tool turret disk always turns into the same direction during swivelling.

Number of tool supports	8
(external or internal machining tools)	
Shaft height of external tools	12 mm
Shaft width of external tools	12 mm
Cutting circle for external tools	154 mm
Tools clamped over head	155 mm
Bore for internal tools	Ø16H6

Clamping the tool in the tool turret



Danger:

- The tools may be clamped only during machine standstill.
- The tools must be clamped tightly and safely.

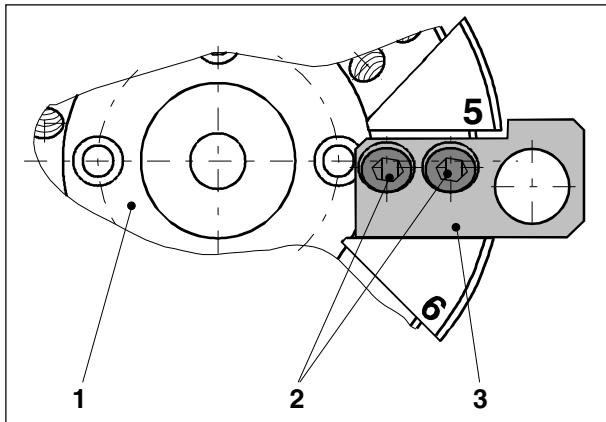
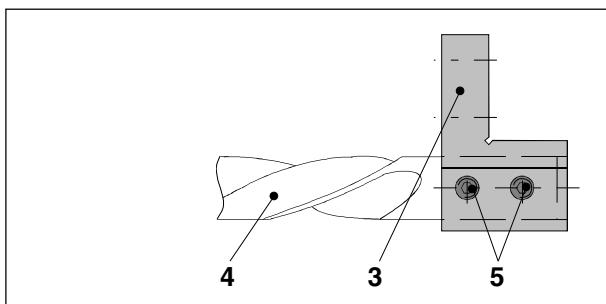
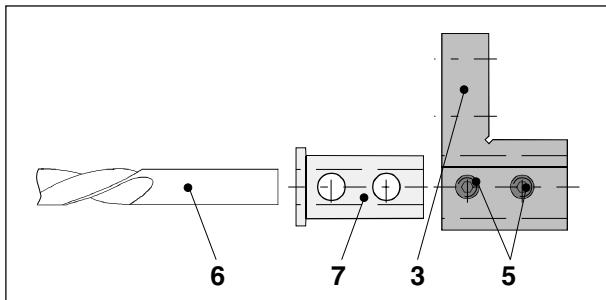
External machining tools

- Insert tool (3) with clamping element (2) until stop into the support groove of the tool turret disk (1).
- Adjust tool to centre height by enclosing shim platelets.
- Clamp tool with both clamping screws (4).



Note:

Mind the modified cutting circle diameter with tools which are clamped over head.

*Clamping the toolholder**Direct clamping in the toolholder**Clamping with reducing bushes*

Internal machining tools

The internal machining tools are clamped into the toolholders provided for this end.

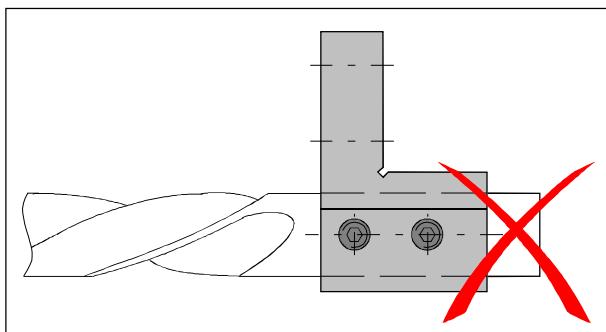
- Insert toolholder (3) until stop into support groove of the tool turret disk (1).
- Fix toolholder (3) with both hexagon socket screws SW5 (2).

- Insert tools with a shaft diameter of 16 mm (4) directly into the support bore at the toolholder (3) and clamp with both set screws M6, SW3 (5).

- Tools with smaller shaft diameter (6) are clamped with adequate reducing bushes (7). Take care that the set screws (5) pass through the bores in the reducing bush (7) so that the tool (6) is clamped directly.

Note:

A set of reducing bushes can be ordered under order no. A7Z 270.

*Wrong clamping of internal tools*

Caution:

At the rear side the tools must not project over the bore, otherwise they would stop the swivel movement of the tool turret.



Tool turret 12-fold

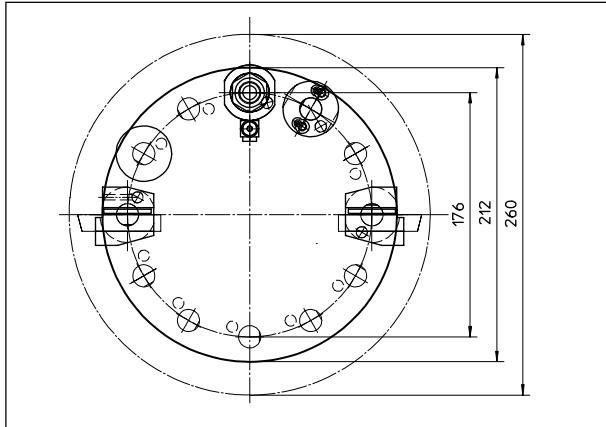
The Emco PC Turn 155 is equipped with a 12-fold tool turret.

Depending on the type of the machine 6 tools can also be driven.

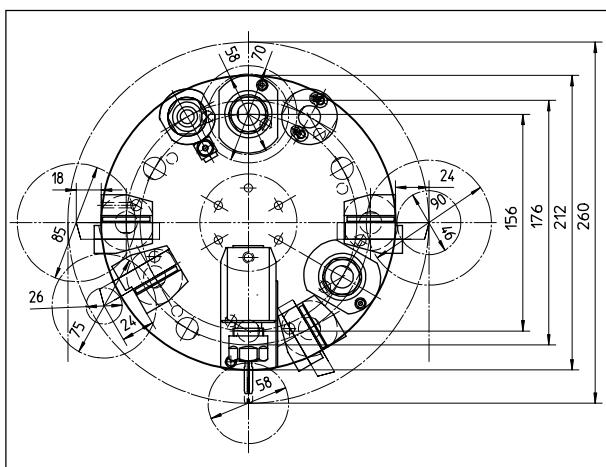
Number of tool supports 12
Tool supports acc. to DIN69880 VDI 16

driven tool stations (optional):

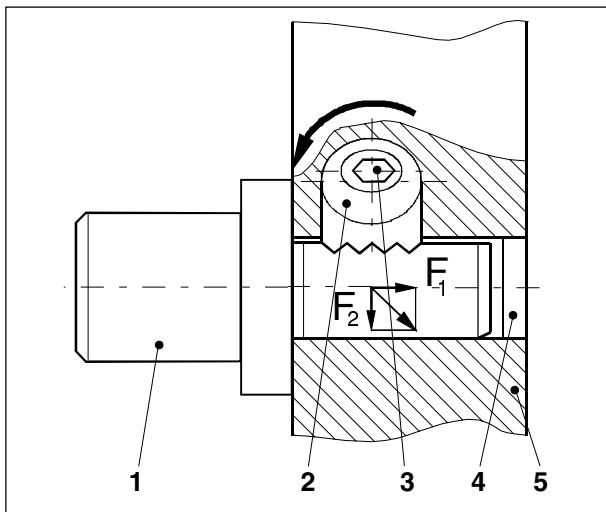
number of driven stations	6
torque constant	4 Nm
speed range	200-6000 rpm
max. output.....	1,2 kW



Tool turret without driven tools



Tool turret with driven tools



Mounting the VDI toolholder

Working area

The working areas you will find in the pictures beside and a few sides before under "Working areas" in this chapter.

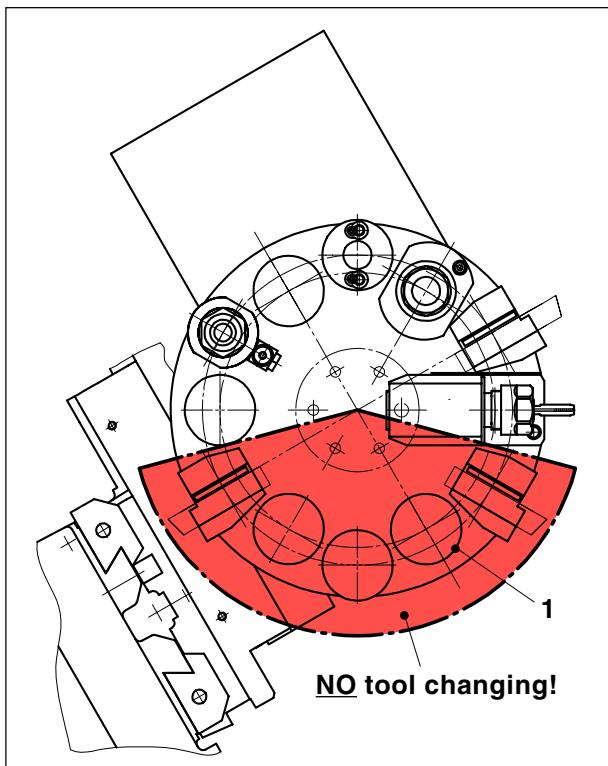
Tooling the tool turret



Danger:

Tooling the tool turret may only be carried out during standstill of the machine.

- Insert toolholder VDI (1) into support (4) of the tool turret disc (5).
- Turn hexagon socket screw (3) in the direction of the arrow and tighten it.
The toothed ring of the eccentric (2) engages in the toothed ring of the toolholder (1), pressing it against the tool turret disc (force F_1) and downward at the same time (force F_2).
- In clamped condition the toolholder lies on the clamping surface of the tool turret disc and is fixed in the centre axis of the VDI mounting bore.

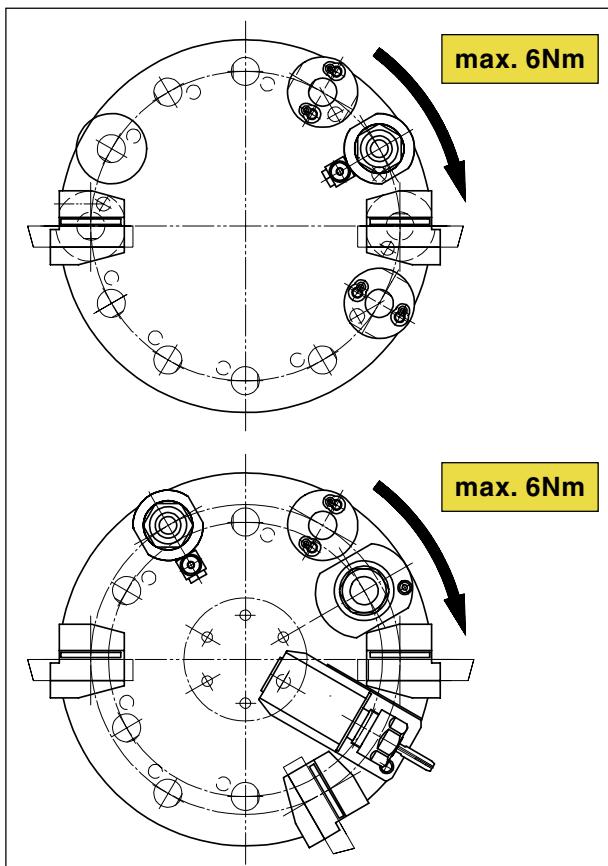


*Area, in which no tool changing is to be allowed
(oil flow-out)*



Attention:

- In view of tool turrets with driven tools, the tools may not be changed in the lower part of the turret (see drawing - marked area), otherwise oil would flow out of the turret.
- Tool supports not used have to be closed with a VDI cover holder with O-ring. Thus, the penetration of coolant and chips and flow-out of oil is avoided.
- Use indexable insert geometries which guarantee short-chip material machining. Long chips might jam tools, tool turrets and clamping devices and also impair cutting results. Furthermore, the machine is cleaned easier from short chips than from long ones.
- Prior to refeeding the bar material move the tool turret near (approx. 2-3 mm) the clamping devices of the main headstock. Only then refeed bar. Then move tool turret together with bar material to the desired length. Otherwise damage or dislocating of the tool turret is possible. Use an absorbing toolholder for the stop (EMCO accessories).



even tooling of the tool turret

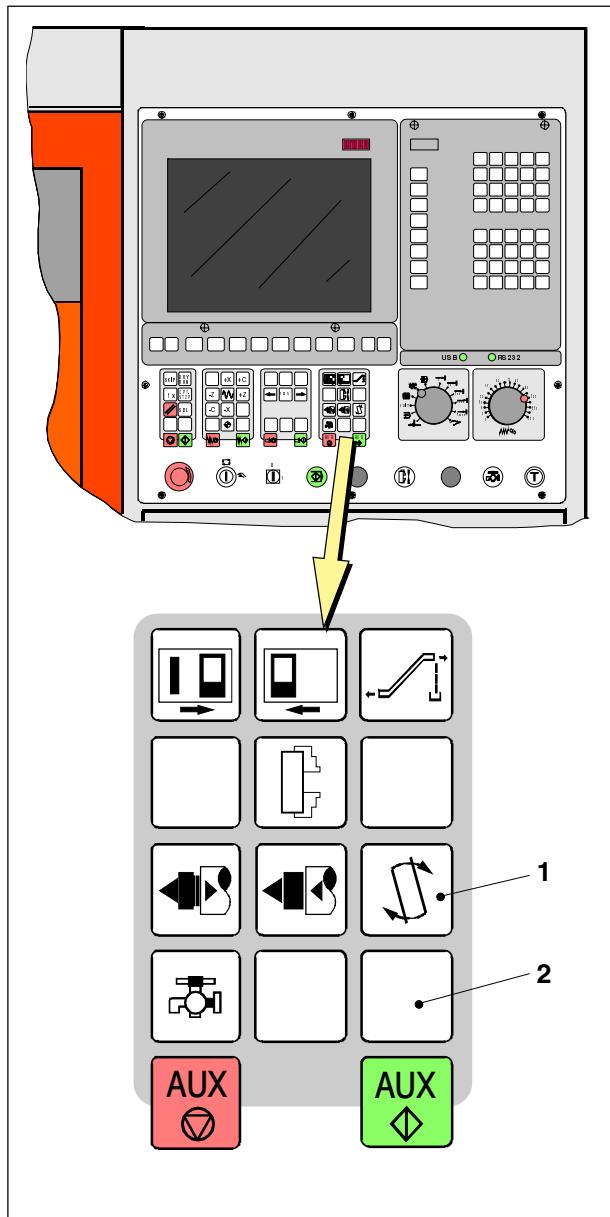
Weight counterbalance

Weight moment max. 6 Nm

Tool tool turret always in such a way that the tool weights are distributed as evenly as possible on the tool turret disc.

The maximum weight moment must on no account be exceeded, otherwise disturbances on the tool turret might occur.

The reason for this can be found in too high loads during the switch-over of the tool turret drive between swivel device and the driven tools.



Releasing the tool Turret

After the stop of a tool change procedure (power failure, EMERGENCY-OFF key, Escape key) the tool turret has to be released to adjust the control to the position of the tool turret.

On the screen the following appears:

Alarm message "7021 Release tool turret"

Possibility 1

- Quit alarm message by pressing the "Reset-key".
- Press tool turret-key (1).
The tool turret swivels for one position, the actual tool position is defined.
- If the alarm message will appear again, the tool turret has to be released with possibility 2.

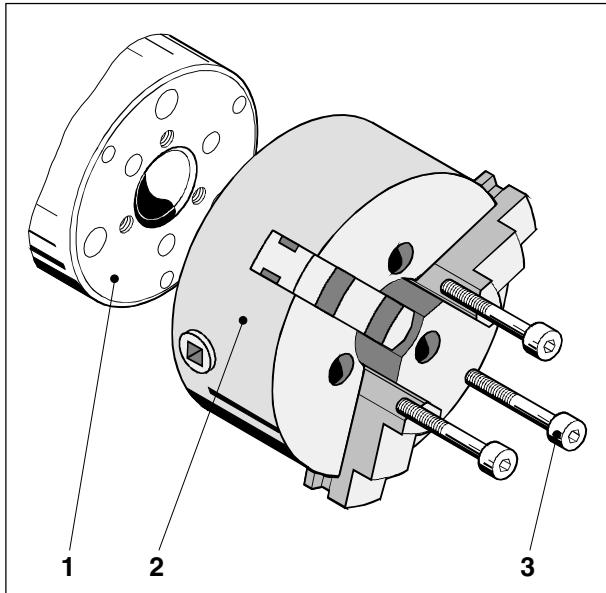
Possibility 2

The tool turret is fitted out with a direction logic, that means, that the swinging movement can be done in both directions.

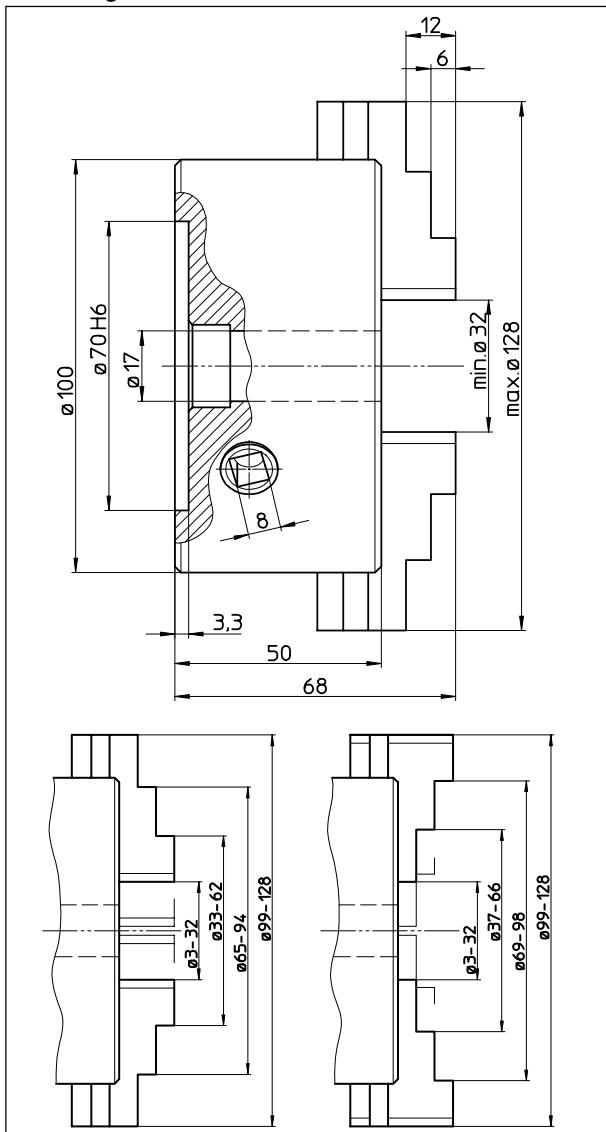
If the tool turret won't be released with possibility 1, the turret has to be swiveled into the inverse direction:

- Quit alarm message by pressing the "Reset-key".
- Hold shift key (2) below the tool turret-key pressed, and press additional the tool turret-key (1).
The tool turret swivels for one position into the inverse direction as in possibility 1.
The actual tool position is defined.

If the tool turret couldn't be released with one of the two possibilities, please contact EMCO Service Department.



Mounting the chuck



Dimensions and clamping range

Three-jaw chuck

Type Röhm ZGH 100/3
Order no. A8Z 060

Speed max. 4000 min⁻¹
Torque for workpieces max. 60 Nm
Clamping force max. 27 kN



Note:

Also mind the instructions enclosed with the chuck.

Mounting the chuck



Danger:

- The chuck may be mounted only during machine standstill.
- For chuck mounting only screws M6x50 according to DIN 912-12.9 may be used. With longer screws the chuck might not fit tightly on the spindle nose, in case of too short screws these might tear out.

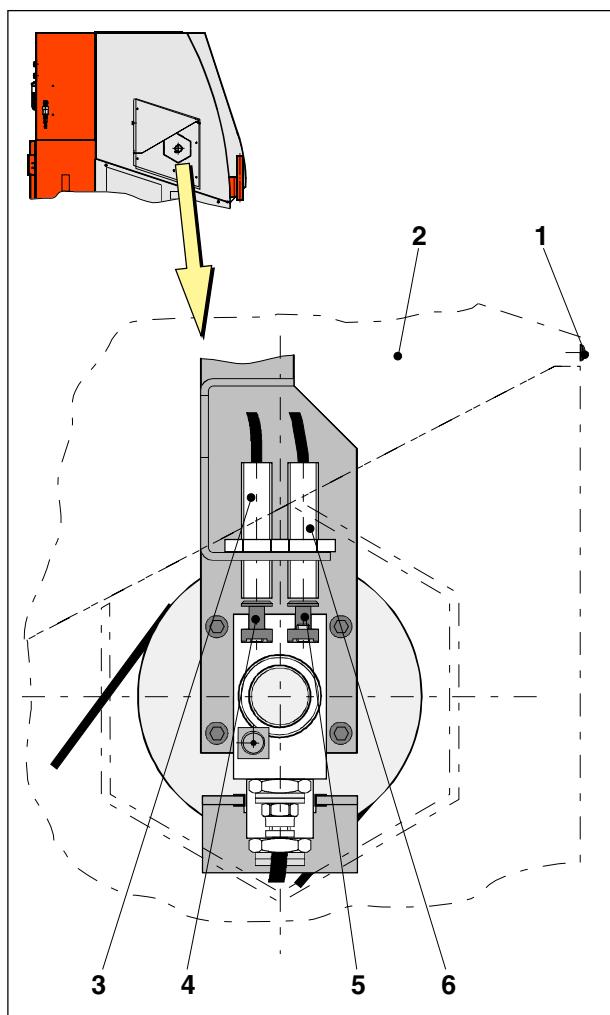
- Spindle nose (1) and centering flange (2) have to be free from dirt.
- Screw the chuck (2) with the three cheese head screws M6x50, SW5 (3) onto the spindle nose and tighten the screws.

Clamping ranges



Danger:

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



Adjusting the final position proximity detectors

Adjustment procedure for collet

- Clamp workpiece in the clamping device.
- Loosen knurled nut (1) and swivel cover (2) downward.
- Loosen indexing bolt (5) by opening the set screw with an Allan key SW2.5 and move it until the LED at the proximity detector (6) lights up.
The message "7051 Collet - No part clamped!" is displayed on the screen of the control.
- Push indexing bolt (5) approx. 1 mm in the direction of the cover (2) and clamp it in this position, the message on the screen is cancelled.
- Open collet.
- Adjust indexing bolt (4) in such a way that the LED at the proximity detector (3) lights up.
The message "7050 Collet open!" is displayed on the screen.
- Swivel cover (2) upward again and clamp it with the knurled nut (1).

Pneumatic clamping device (option)

Upon order the pneumatic chuck is mounted at the manufacturer. It consists of a clamping cylinder without bore, a KFD power chuck and a blow-out device.

Clamping cylinder without bore



Caution:

Adjustment work at the clamping cylinder without bore except for adjusting the final pos. proximity detectors may only be carried out by trained service personnel.

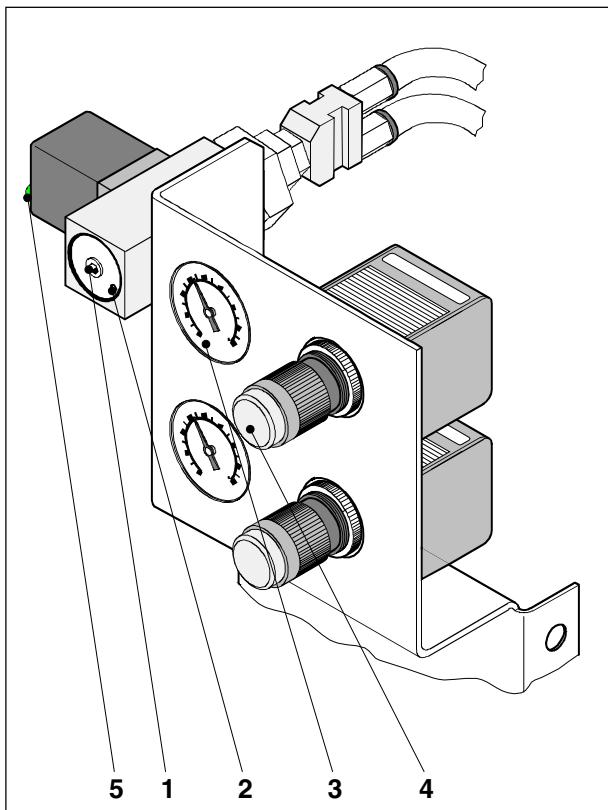
Adjusting the final pos. proximity detectors

To enable the control to monitor the clamping device condition it is necessary to adjust correctly the final pos. proximity detectors in accordance with the clamping device and the workpiece. It depends on the position of the tensioning bar (chuck/collet) which proximity detector is adjusted for which clamping device condition.

Clamping device	Clamping device condition	Position of tensioning bar	respect. proximity detector
chuck	open	front	6
	closed	back	3
collet	open	front	3
	closed	back	6

Adjustment procedure for chuck

- Clamp workpiece in the clamping device.
- Loosen knurled nut (1) and swivel cover (2) downward.
- Loosen indexing bolt (4) by opening the set screw with an Allan key SW2.5 and move it until the LED at the proximity detector (3) lights up.
The message "7049 Chuck-no part clamped!" is displayed on the screen of the control.
- Push indexing bolt (4) approx. 1 mm in the direction of the chuck and clamp it in this position, the message on the screen is cancelled.
- Open chuck.
- Adjust indexing bolt (5) in such a way that the LED at the proximitiy detector (6) lights up.
The message "7048 chuck open!" is displayed on the screen.
- Swivel cover (2) upward again and clamp with the knurled nut (1).



Setting the clamping device pressure

Setting the clamping device pressure

The clamping force of the chuck can be regulated by changing the air pressure.

Additionally a press switch is mounted which controls the pressure set at the manometer.

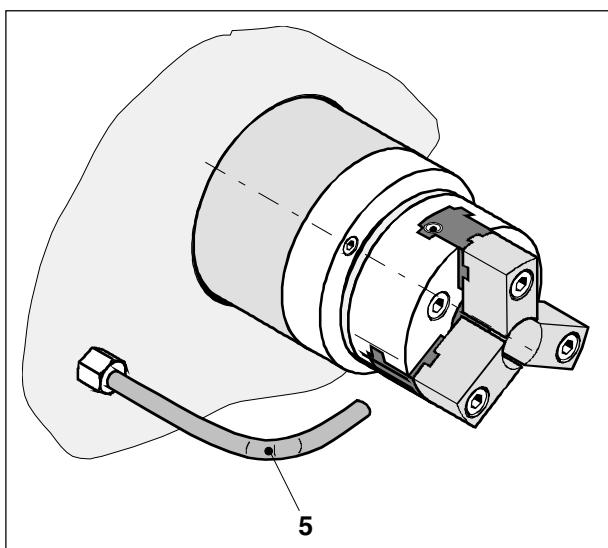
If the set pressure is not achieved an alarm message is displayed on the screen.



Note:

- The setting of the clamping device pressure has to be carried out before adjusting the final position proximity switches.
- The setting has to be carried out after each change of the clamping device pressure.

- Clamp sample workpiece.
- Set clamping device pressure –0.5 bar.
Set a pressure which lies about 0.5 bar below the desired clamping device pressure by means of the turning knob (4).
The set pressure can be read at the manometer (3).
- Loosen fixation screw (2) at the press switch.
- Turn setting screw (1) in clockwise direction, until the control-LED (5) at the press switch is lightening red.
Turn back counter-clockwise the setting screw (1), until the LED (5) is lightening green.
Increase pressure ... turn in clockwise direction
Reduce pressure turn in counter-clockw. dir.
- Tighten fixation screw (2) moderately.
- Set desired clamping device pressure at the turning knob (4) of the pressure control unit.
- By opening and closing the clamping device, the control-LED (5) at the pressure switch changes from green to red, than is has to be lightening green.



Blow-out device with pneumatic chuck

Blow-out device

The blow-out device serves for blowing out the clamping device during tool change.

To enable an efficient blow-out the copper tube (5) can be adequately adjusted by bending it with caution.

Power operated three-jaw chuck KFD 85

Type Röhm KFD 95/3

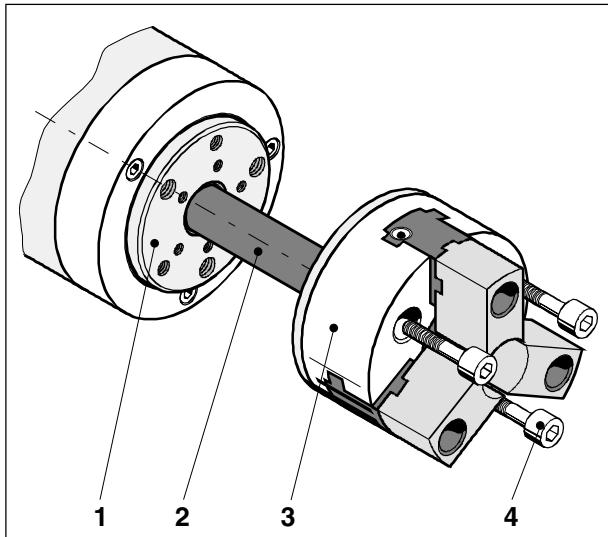
Speed max. 4500 min⁻¹

Actuating force max. 7 kN

Clamping force max. 12 kN

Note:

Also mind the instructions enclosed with the chuck.



Mounting the chuck on the main spindle

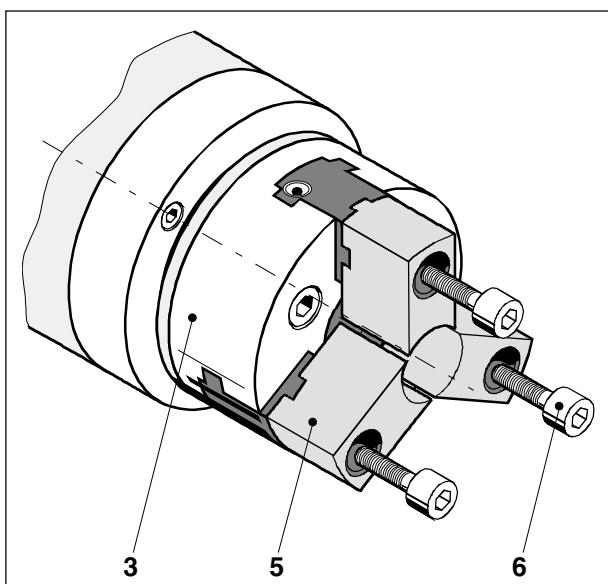
Mounting the chuck



Danger:

For mounting the chuck only screws M8x30 according to DIN 912, 8.8 may be used. With longer screws the chuck might not fit tightly on the spindle nose, in case of too short screws these might tear out.

- Adjust clamping cylinder without bore to opened clamping device condition for chuck.
- Insert tensioning tube (2) into the bore of the main spindle (1) and fasten it with screws in the clamping cylinder without bore.
- Turn chuck (3) until stop into the tensioning tube (2).
The chuck lies tightly on the centering flange of the main spindle (1).
- Turn out chuck again until it can be fastened at the main spindle (1) by means of the cheese head screws M8 x 30, DIN 912 8.8 (4).
- Tighten cheese head screws by means of an Allan key SW6.



Mounting the top jaws on the chuck

Mounting the top jaws

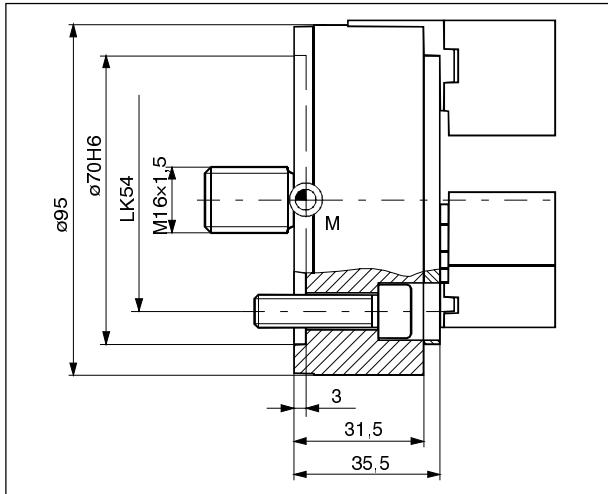
A set of turned out jaws ($\varnothing 30$ mm) and a set of pointed jaws for hardware is supplied with each chuck.

- The 3 top jaws (5) are mounted at the chuck (3) with one cheese head screw M8 x 20 DIN 912, 8.8 (6) each.



Danger:

- The top jaws may only be mounted during machine standstill.
- Prior to a machining process make sure that the top jaws are mounted tightly and safely.
- The top jaws may only be mounted with the screws M8 x 20 DIN 912, 8.8.



Dimensions of the chuck

Dimensions of the chuck Clamping ranges

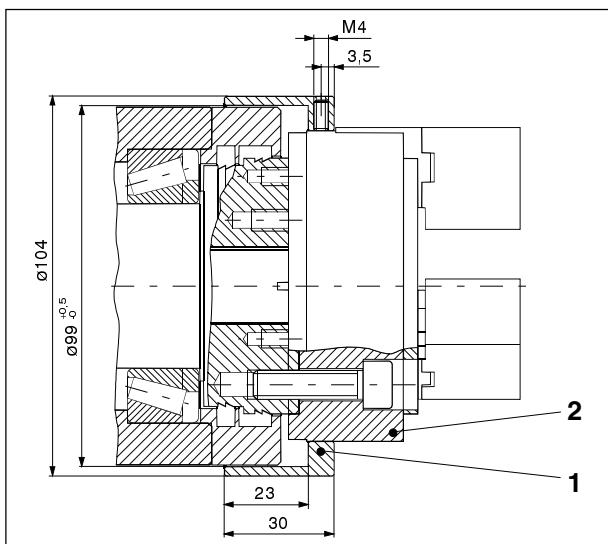
According to the workpiece diameter the top jaws must be adequately turned-out on the machine.

A deviation from the turned-out diameter of +3mm is admissible.



Note:

Number the top jaws so that the same concentricity is received when remounting them.



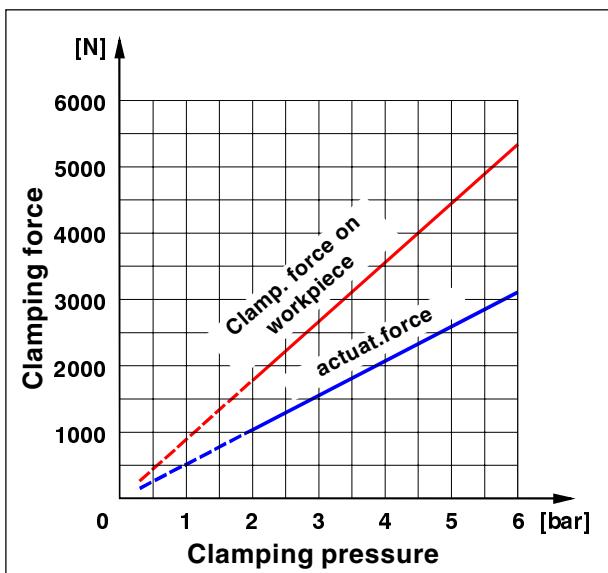
Union sleeve for work with synthetic materials

Working with synthetic materials

Some kinds of synthetic materials such as nylon form ropy threads chips.

These chips can penetrate between chuck and main spindle into the labyrinth of the main spindle bearing and destroy them.

Thus, when machining such synthetic materials you should mount a self-made union sleeve (1) at the chuck (2).



Clamping force of the chuck

Clamping force of the chuck

The clamping force of the chuck depends on the set pressure of the pneumatic valves (see previous pages).

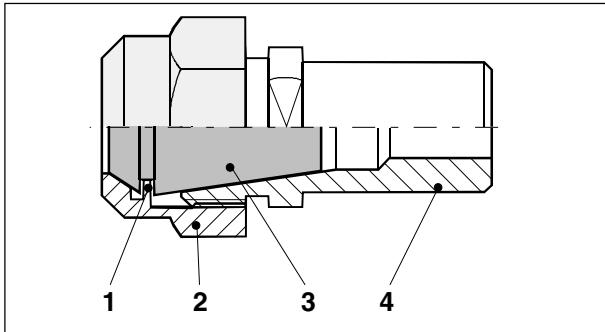
Standard values for the clamping pressure

Minimum pressure 2 bar
Maximum pressure 6 bar

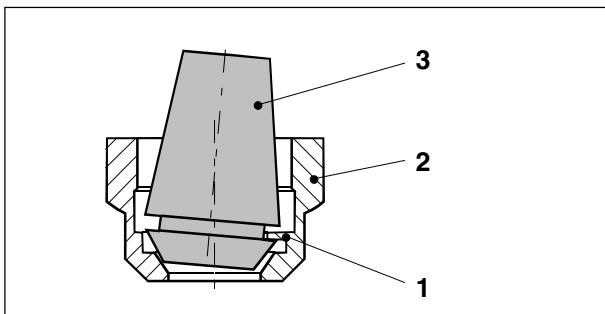
Iron, steel approx. 5.5 bar
Nonferrous metals (Al, Mg) approx. 3-4 bar
soft synthetics, sleeves approx. 2 bar

Toolholder for 8-fold tool turret (accessory)

Collet facility ESX 16



Collet facility ESX 16 with collet



Mounting the collets

Clamping range

Nominal diameter for the collet	Clamping range		Order-No.
	[mm]	[inch]	
1,0	0,5-1,0	1/64-1/32	152 710
1,5	1,0-1,5	3/64	152 715
2,0	1,5-2,0	1/16-5/64	152 720
2,5	2,0-2,5	3/32	152 725
3,0	2,5-3,0	7/64	152 730
4,0	3,0-4,0	1/8-9/64-5/32	152 740
5,0	4,0-5,0	11/64-3/16	152 750
6,0	5,0-6,0	13/64-7/32-15/64	152 760
7,0	6,0-7,0	1/4-17/64	152 770
8,0	7,0-8,0	9/32-19/64-5/16	152 780
9,0	8,0-9,0	21/64-11/32	152 790
10,0	9,0-10,0	23/64-3/8-25/64	152 800
Set of collets ($\varnothing 1,0$ - $\varnothing 10,0$)			152 700

Order-No. A7Z 760
Set of collets (1–10)/Order-No. 152 700

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

Mounting the collets

- Undo clamping nut (2) size 24.
- Insert collet (3) at an angle into the clamping nut so that the eccentric ring (1) engages the groove of the collet.
- Screw clamping nut (2) with collet (3) onto collet holder (4) - do not tighten.
- Insert tool.
- Tighten clamping nut (2).

Dismantling the collet

- Undo clamping nut (2). While the nut is being unscrewed, the collet is pushed off by the eccentric ring (1) in the nut.

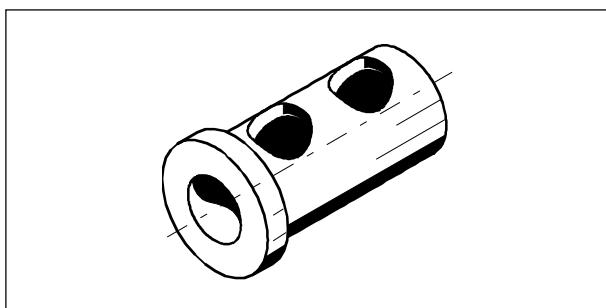
Care



Caution:

Chips and dirt can damage the clamping taper and cone and can make unusable collets and/or collet holder.

Before and after use clean and oil collets and collet holders.



Reducing bushes for internal toolholder

Reducing bushes

Order no. **A7Z 270**

1 set of reducing bushes for the internal toolholders.

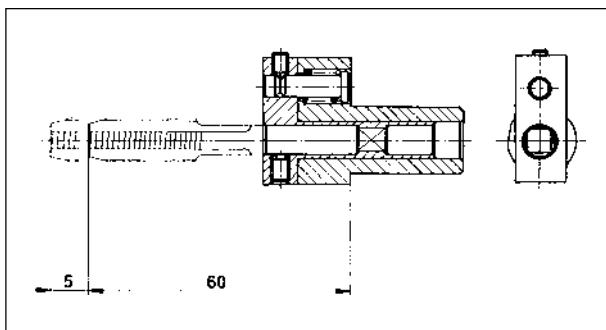
12 pcs. ø2, 3, 4, 5, 6, 7, 8, 9, 3x10, 12 mm



Note:

Internal toolholders are included in the basic equipment of the machine (8 pcs.)

The holders can also be ordered as spare part under order no. **A7R 000 880**.



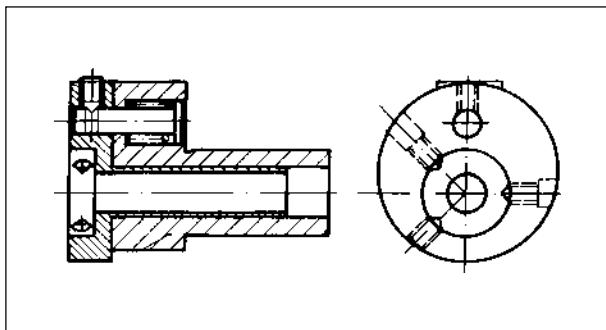
Tap holder with length compensation

Tap holder

Order no. **A7Z 280**

1 set of tap holders with length compensation for taps: **M3, M4, M5, M6, M8, M10**

Including **6 pieces of tap holders** for the twist drills of the respective core drillings.



Die holder

Die holder

Diameter ø16mm for threads M2, M2,5

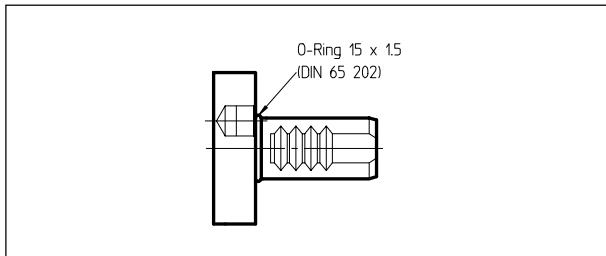
Order no. **A7Z 700**

Diameter ø20 for threads M3-M6

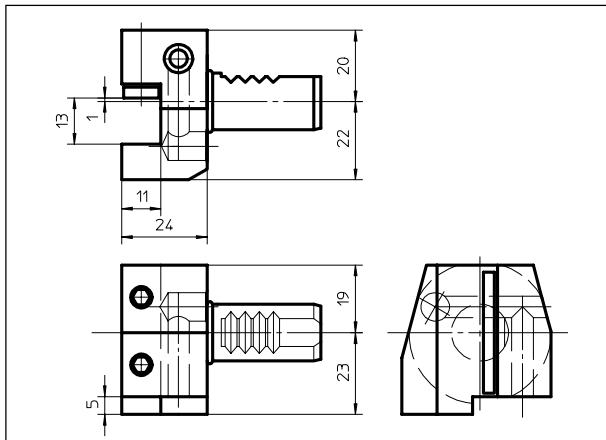
Order no. **A7Z 710**

Toolholders for 12-fold tool turret (accessory)

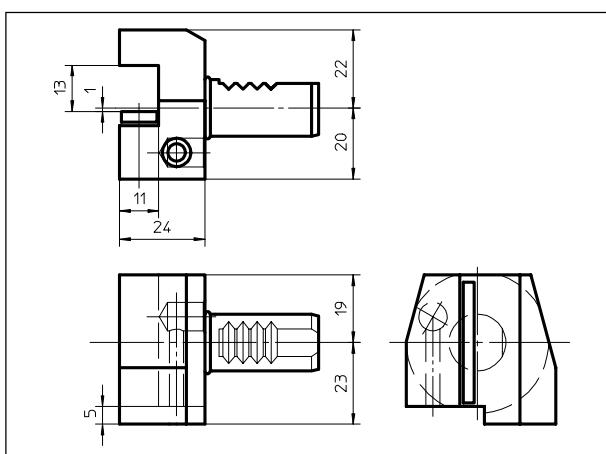
All toolholders are equipped with a VDI-16 support.



Locking bolt



Radial holder M4



Radial holder M3

Locking bolt

Order no. A8Z 590

For locking tool positions which are not used.

Radial toolholder M4

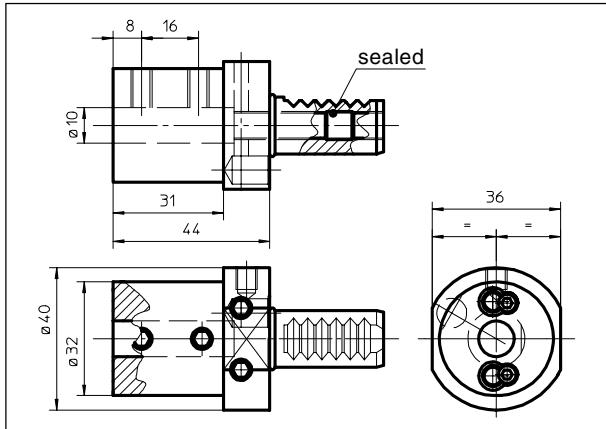
Order no. A8Z 240

For rotary direction M4 of the main spindle
To be used for all external machining tools
Shaft □ 12 mm

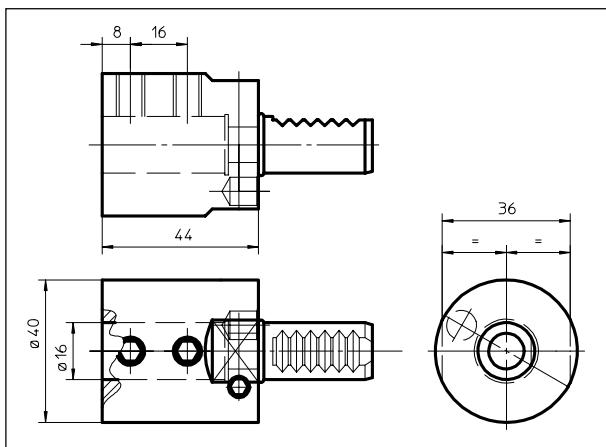
Radial toolholder M3

Order no. A8Z 230

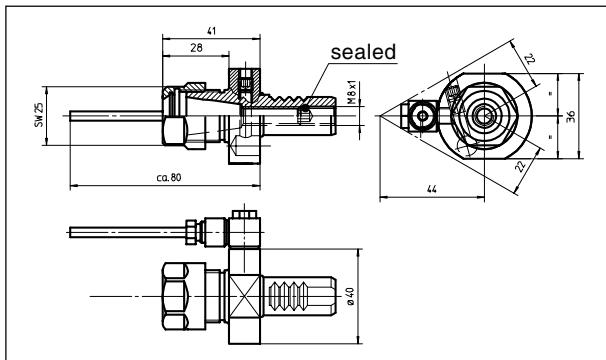
For rotary direction M3 of the main spindle
To be used especially for tap holders for right-hand thread
Shaft □ 12 mm



Drilling bar holders



Drilling toolholder



Collet holder

Drilling bar holder

Usable for all internal machining tools.
With internal coolant supply by means of adjustable ball nozzle.

Support diameter ø10 mm:

Order no. A8Z 310

Support diameter ø16 mm:

Order no. A8Z 320

Drilling toolholder

Bestell-Nr. A8Z 330

Usable for EcoCut-tool (internal turning without predrilling)

With internal coolant supply by means of the tool

Support diameter ø16 mm

Collet holder

Order no. A8Z 350

Usable with ESX16-collets and ET1-16 tapping collets.

Coolant supply via copper tube extension.

Collets ESX16

Nominal diameter fo the collet	Clamping range		Order- No.
	[mm]	[inch]	
1,0	0,5-1,0	1/64-1/32	152 710
1,5	1,0-1,5	3/64	152 715
2,0	1,5-2,0	1/16-5/64	152 720
2,5	2,0-2,5	3/32	152 725
3,0	2,5-3,0	7/64	152 730
4,0	3,0-4,0	1/8-9/64-5/32	152 740
5,0	4,0-5,0	11/64-3/16	152 750
6,0	5,0-6,0	13/64-7/32-15/64	152 760
7,0	6,0-7,0	1/4-17/64	152 770
8,0	7,0-8,0	9/32-19/64-5/16	152 780
9,0	8,0-9,0	21/64-11/32	152 790
10,0	9,0-10,0	23/64-3/8-25/64	152 800
Set of collets (ø1,0 - ø10,0)			152 700

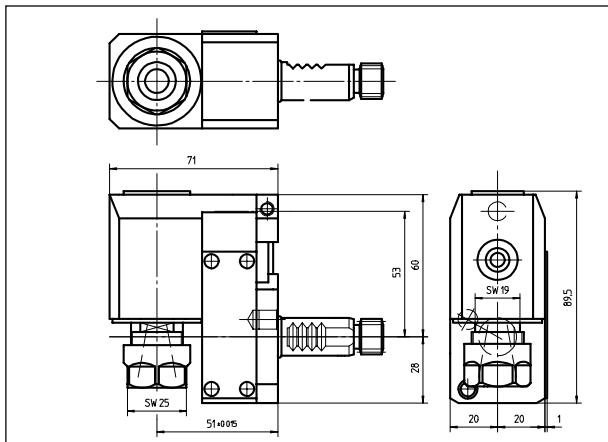
Tap collets ET1-16

With elastic length compensation for the support of taps.

Order no.

Tap collet M2	153 810
Tap collet M3	153 820
Tap collet M4	153 830
Tap collet M5-M8	153 840

Toolholders for driven tools (accessory)



Radial collet holder

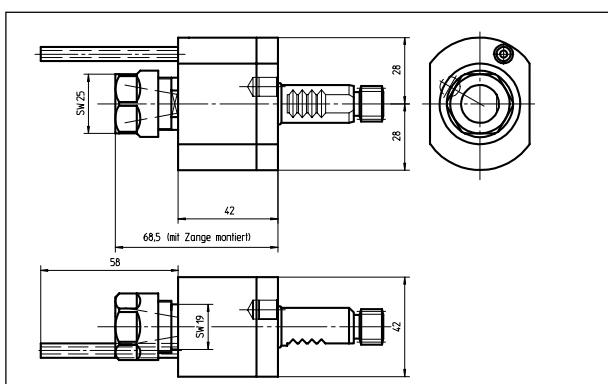
Radial collet

Order no. **A8Z 480**

inset, for milling and drilling in X-direction
With internal coolant supply by means of adjustable ball nozzle.

Usable with:

- Collets ESX16 up to max. ø7
- Tap collets ET1-16 up to max. M6



Axial collet holder

Axial collet

Order no. **A8Z 470**

for milling and drilling in Z-direction
With internal coolant supply by means of adjustable ball nozzle.

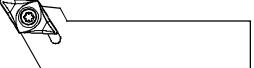
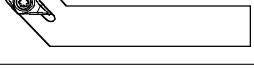
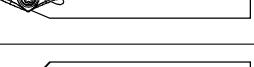
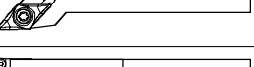
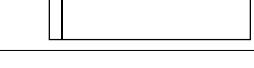
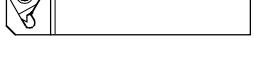
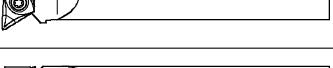
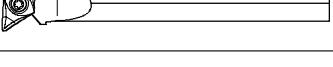
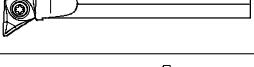
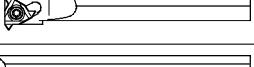
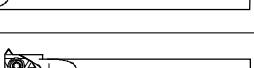
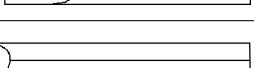
Usable with:

- Collets ESX16 up to max. ø7
- Tap collets ET1-16 up to max. M6

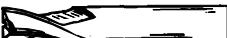
Tools

All listed tools are to be ordered as accessories by EMCO with the specified order-no.

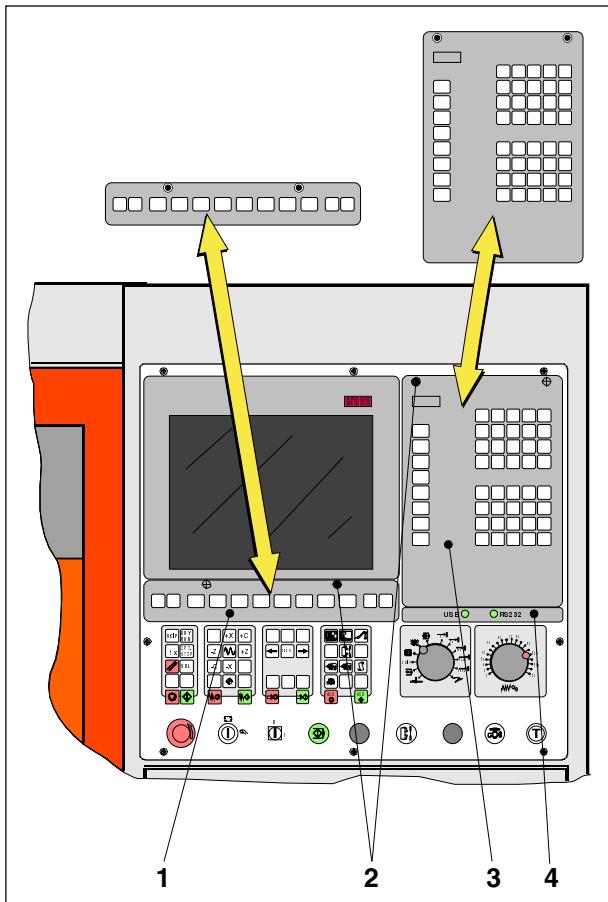
Turning tools

Tool		suitable HM-indexable inserts	
Order-No.	Description	Order-No.	Description
 271 040	Roughing tool-left	 271 045	for steel
		 271 046	for aluminium
 271 050	Side tool-left	 271 055	for steel
		 71 056	for aluminium
 271 060	Turning tool-neutral	 271 055	for steel
		 271 056	for aluminium
 271 070	Side tool-right	 271 055	for steel
		 271 056	for aluminium
 271 080	Cutting-off tool	 271 085	
 271 100	External thread tool	 271 105	for pitches 0,5-1,5mm, 60°
		 271 106	for pitches 1,75-3mm, 60°
 271 110	External thread-tool-right	 271 115	for pitches 0,5-1,5mm, 60°
		 271 116	for pitches 1,75-3mm, 60°
 271 120	Roughing boring bar ø16x100mm	 271 045	for steel
		 271 046	for aluminium
 271 130	Boring bar ø16x100mm	 271 055	for steel
		 271 056	for aluminium
 271 140	Boring bar ø10x60mm	 271 055	for steel
		 271 056	for aluminium
 271 150	EcoCut ø16x31,5mm	 271 155	
 260 627	Internal thread tool - right ø10x60mm	 260 626	for pitches 0,5-1,5mm, 60°
 271 180	Internal thread tool - right ø16x100mm	 271 185	for pitches 1,75-3mm, 60°
 271 170	Internal thread tool - left ø10x60mm	 271 175	for pitches 0,5-1,5mm, 60°
 271 190	Internal thread tool - left ø16x100mm	 271 195	for pitches 1,75-3mm, 60°

Drilling and milling tools

Description	Order no.
	Set of twist drills HSS 25 twist drills ø1-13 mm (in steps of 0.5 mm) 9 twist drills ø2-10 (in steps of 1 mm)
	Set of core hole drills HSS 6 core hole drills ø2.5-8.5 mm
	Twist drills HSS ø12 mm, extra short acc. to DIN 1897 ø16 mm, extra short acc. to DIN 1897
	Centre drill HSS ø6.8 mm A8, DIN333
	Set of taps HSS, DIN 352 6 taps M3-M10
	Taps HSS, DIN 352 M3 (shaft ø3.5 mm) M4 (shaft ø4.5 mm) M5 (shaft ø6 mm) M6 (shaft ø6 mm) M8 (shaft ø6 mm) M10 (shaft ø7 mm)
	End mill cutter HSS, DIN 327-Form B milling cutter ø3 mm (shaft ø6 mm) milling cutter ø4 mm (shaft ø6 mm) milling cutter ø5 mm (shaft ø6 mm) milling cutter ø6 mm (shaft ø6 mm)
	NC start drill HSS shaft ø6 mm, acute angle 120°

Exchange of the control keyboard



Change of the key modules

By exchanging the control keyboard it is possible to operate the machine fast and without larger resetting effort with another control.

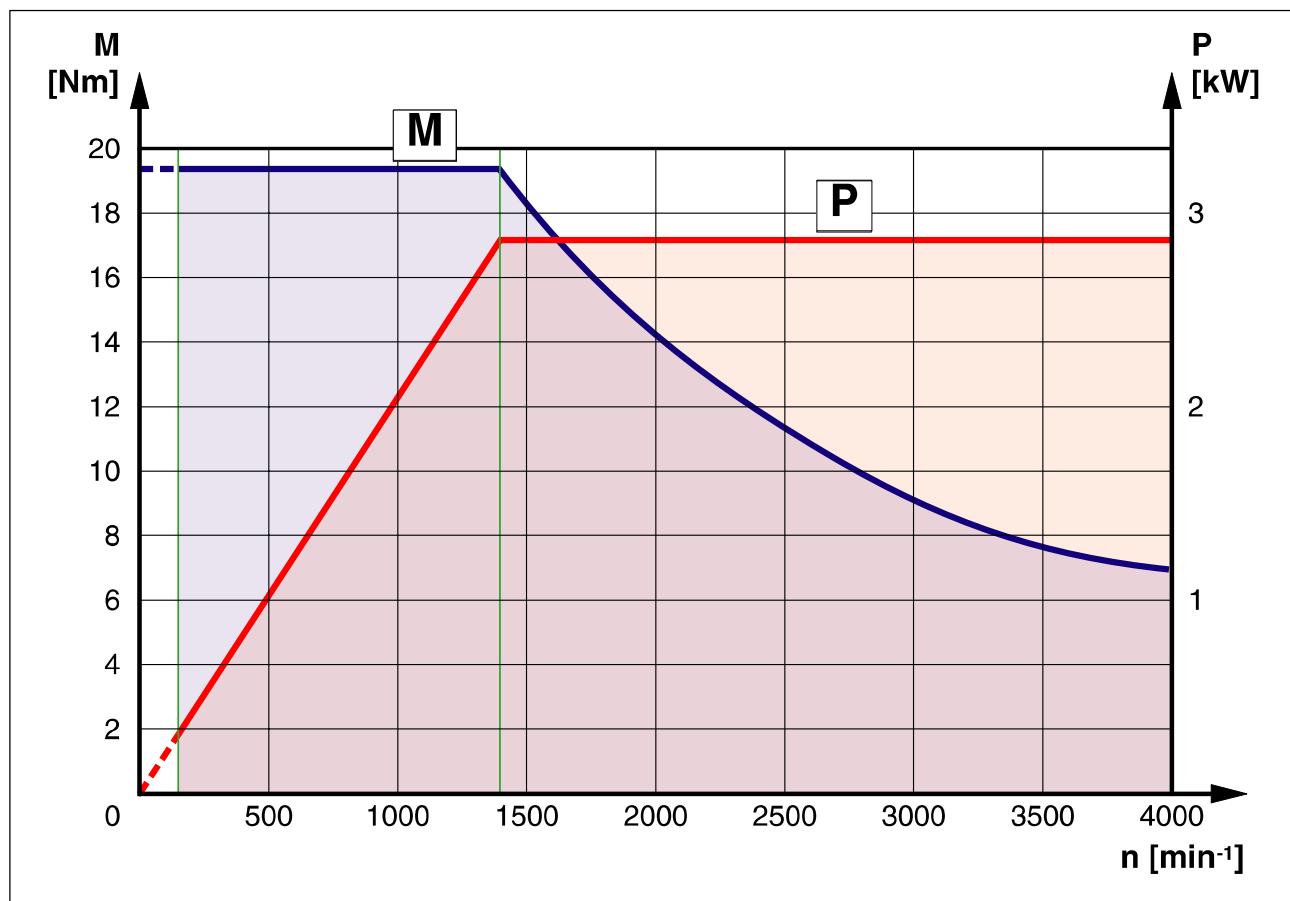
- Untwist knurled screws (2) at the key modules (1 and 3).
- Take off key modules (1 and 3).
- Insert new key modules from above into the recesses at the operating panel (4) and then swivel them to the operating panel.
- Fasten the newly inserted key modules with the 4 knurled screws (2) at the operating panel (4).
- Now install the corresponding software for your new control at your PC (see software description).

Note:

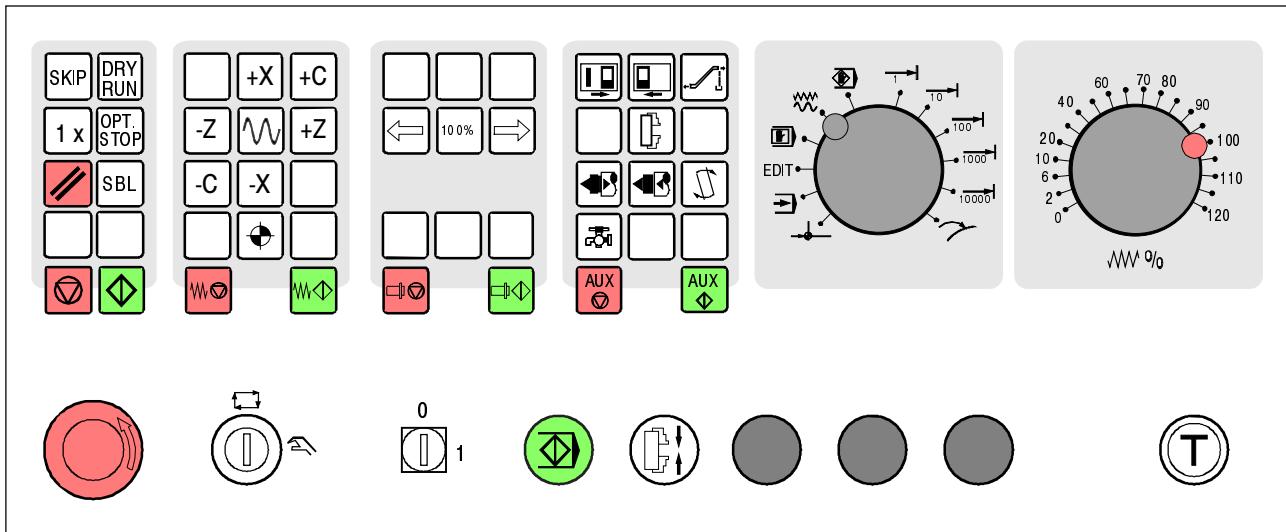
Wrap up well the key modules not needed and keep them in a protected and clean place to avoid damage.



Characteristic lines of the main spindle



C Control Panel EMCO-specific



Key Description

Skip



In skip operation the program blocks that are marked with a slash "/" before the block number, will not be executed in program run (e.g.: /N100).

Dryrun



In dryrun operation the traversing movements will be executed with the feed set in setting data "dryrun-feed".

The dryrun feed works instead of the programmed feed.

Single Piece Mode



With this key you can select single piece mode or continuous operation in connection with an automatic loading device.

Power-on status is single piece operation.



At active function (key was pressed) the program run will be stopped at blocks that contain the command M01.

The screen shows "Halt: M00/M01 active". Continue the program with the key NC Start.

When the function is not active, M01 (in the part program) will be ignored.

Reset Key

Actuating Reset causes:



- Stop of working off the actual part program.
- Alarms and messages are cleared with the exception of Power On or Recall alarms.
- The channel will be set to the reset status, that means:
 - The NC control stays synchronous to the machine.
 - All intermediate and working memory is cleared (the contents of the part program memory stays resident).
 - The control is in basic setting and ready for program run.

NC Stop



After pressing the NC Stop key and takeover of the function by the control, working off of the running part program will be stopped.
You can continue working off by pressing NC Start.

NC Start



After pressing the NC Start key the selected part program will be started with the actual block.

Single Block



This function allows to work off a part program block by block.

The function single block can be activated in AUTOMATIC mode.

Active single block mode causes:

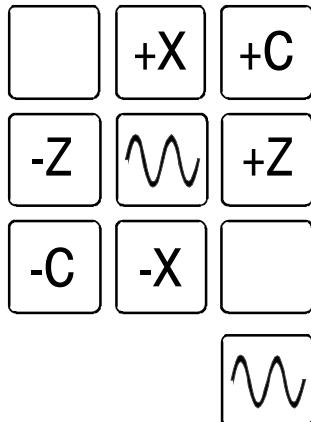
- Display SBL1 at the screen (in the line channel).
- Display of "Hold: Single block mode" in the message line (in interruption status).
- The actual block of the part program will be worked off after pressing NC Start.
- Working off will be stopped after each block.
- The following block will be worked off after pressing NC Start.

Deselect the function by pressing again on the single block key.

Reference Point



Pressing this key causes approaching the reference point in all axes.



Direction Keys

Use this keys to traverse the NC-axes in the JOG mode.

Rapid

If this key is pressed simultaneous to a direction key the responding axis traverses in rapid feed.

Feed Stop



This key stops slide movements in AUTOMATIC mode (not for threads).

Feed Start



This key continues programmed, interrupted slide movements.

When spindle run was interrupted additionally first the spindle run must be continued.

Spindle Stop



This key stops the running of the main spindle and driven tools. Before stopping the spindle you must stop the slides.

Spindle Start



This key continues the programmed run of the main and counter spindle and driven tools.

Programming

See WinNC Software description

Rotation directions

see "System of coordinates" in chapter "B Description".

Spindle Override



The actual spindle speed S is shown at the screen as absolute value and in percent.

Valid for main spindle and driven tools.

Setting range: 50 - 120 % of the programmed spindle speed

Step width: 5 % per key touch

100% spindle speed: 100% key.

Coolant

This key switches the coolant device on or off.

Programming

M9, M2, M30, Reset-Key: Coolant OFF

M8: Coolant device ON

Using the Coolant-Key

- If there is no coolant programmed, coolant device 1 will be switched on:



- **Machine door closed:**

continuous running

- **Machine door open:**

running as long as the key is pressed

- By pressing the key during running program and closed machine door with activated coolant (running coolant pump), the coolant pump will be switched off on respectifly (watching the machining).
- With programmed coolant and open machine door (coolant pump switched off), the programmed coolant pump will be switched on as long as the coolant-key is pressed (adjusting the coolant-nozzles).

Changing tool manually



JOG-mode

The tool turret turns for one position

Slew in the inverse direction (only 12-fold tool turret)

Hold the key below the tool turret key pressed and additional press the tool turret key.
The Turret slews from e.g. position 9 to position 8.



Note:

This function is to be used to release the tool turret after appearing an alarm message (see chapter "B, tool turret 12-fold").



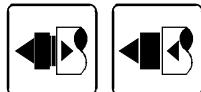
Clamping Device



This key actuates the clamping device.
Switchover chuck/collet see "Machine configuration in the WinNC software description".

Via NC program

M25 Open clamping device
M26 Close clamping device



Tailstock quill forward/backward

With this keys the tailstock will be moved forwards or backwards.



Machine door (option)

With this keys the machine door will be open/closed.

Via NC programm

- Closing the door is not possible via NC program
- The opening happens automatically by programming M00, M01, M30



no function



Auxiliary OFF

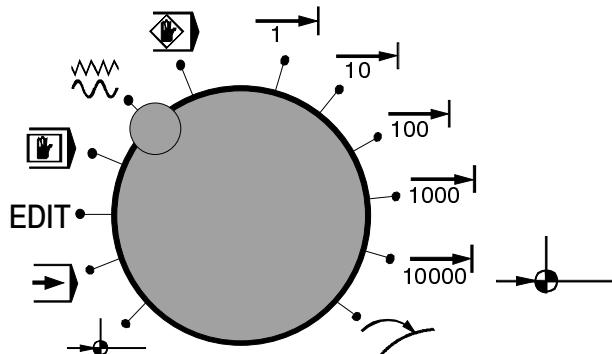
This key switches off the auxiliary drives of the machine. Effective only at spindle and program stop.



Auxiliary ON

This key switches the auxiliary drives of the machine to ready status (hydraulics, feed drives, spindle drives, lubrication, chip conveyor, coolant).

The key must be pressed for approx. 1 second. Short pressing the AUX ON key is a quit function and effects a lubrication impulse.



Mode Selection Switch

Ref

Approaching the reference point (Ref) in JOG mode.

Automatic

Control of the machine by automatic working off of programs.

Edit

With the Sinumerik-control this key is without any function.

MDA - Manual Data Automatic

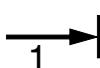
Control of the machine by working off one block or a sentence of blocks. The input of the blocks occurs via operation panel.

Jog - Manual traverse

Conventional traversing of the machine by continuous moving of the axes via direction keys or via incremental moving of the axes via direction keys or via handwheel.

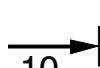


no function



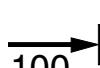
Inc 1 - Incremental Feed

Traverse incremental value with fix step width of 1 increment.



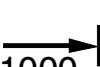
Inc 10 - Incremental Feed

Traverse incremental value with fix step width of 10 increments.



Inc 100 - Incremental Feed

Traverse incremental value with fix step width of 100 increments.



Inc 1000 - Incremental Feed

Traverse incremental value with fix step width of 1000 increments.

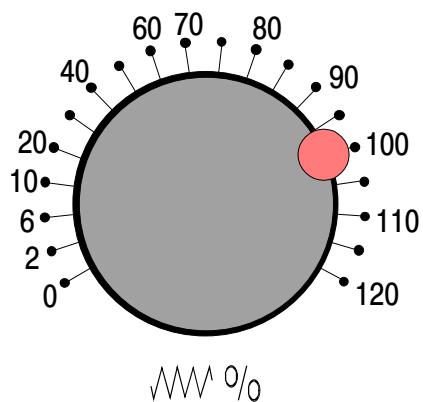


Inc 10000 - Incremental Feed

Traverse incremental value with fix step width of 10000 increments.



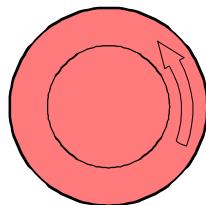
no function



Feed Override Switch

The rotary switch with engaging-positions allows to alter the programmed feed F (meets 100 %). The selected feed value F in % is displayed at the screen.

Setting range:
0 % to 120 % of the programmed feed.
In rapid feed 100 % will not be exceeded.



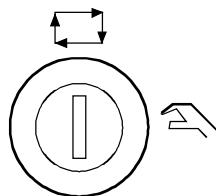
EMERGENCY OFF

Actuate the red button only in emergency situations.

Effects:
Normally all drives are stopped with maximum deceleration by EMERGENCY OFF.

Unlock: Pull out button

To continue press the following keys:
RESET, AUX ON, OPEN and CLOSE door.



Key Switch Special Operation

Functions of the key switch see chapter "B Description" and "Safety Devices".



Danger:

Active special operation increases the danger of accidents.

The key must be used only by authorized persons, who have the knowledge about the dangers and are careful in operation.

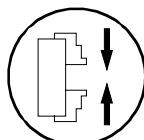
Keep the chip guard door closed also during setup operation.

Take off key always after working in special operation (danger of accidents).

Observe the local safety regulations (e.g.: SUVA, BG, UVV).



Additional NC Start Key



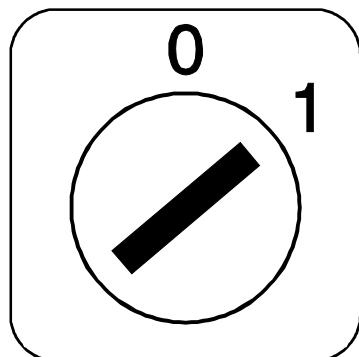
Additional Key Clamping Device

The additional keys have the same function as on the machine control panel.
(Double equipment for better comfort).



Consent Key

- Open the machine door
- Axis movements via direction keys and tool turret movements at open door are allowed by pressing the consent key (precondition: key switch in position setup).

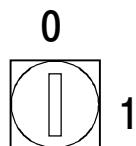


Main Switch

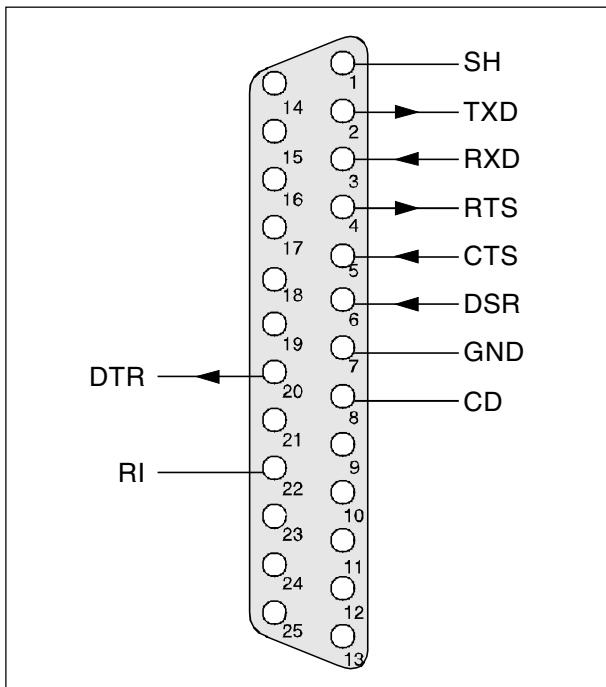
Function:

- 0 - OFF
1 - ON

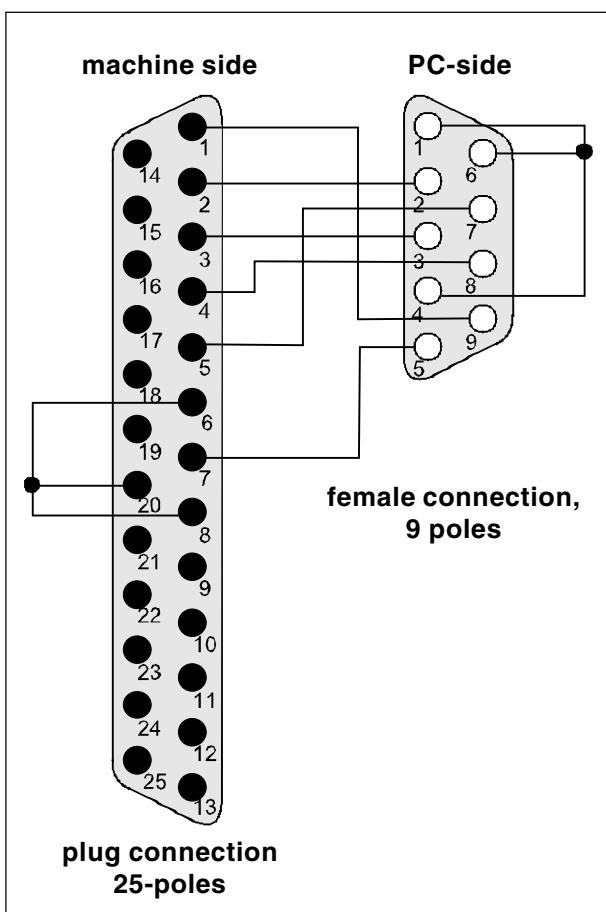
The main switch has no emergency off function, that means the drives run out (unbroken).
The main switch can be locked (unauthorized operation of the machine).



Serial Interface



Serial interface - occupation



Cable connection machine-PC

The 25-pin sub-D-jack ist mounted laterally on the operation panel.

Pin occupation: identical with system Sinumerik 800

Signal names

SH	Schielding
TXD	Transmit data
RXD	Receive data
RTS	Request to send
CTS	Clear to send
DSR	Data send ready
GND	Ground
CD	Carrier identification
DTR	Data terminal ready
RI	Ring indicator

Maximum Cable Length

The maximum cable length depends the bit rate.

Standard Values

9 600 bd	max. 10 m
19 200 bd	max. 7 m
38 400 bd	max. 5 m

Attention:

- Don't overshoot maximum cable length!
- Don't use shield for signal ground GDN!

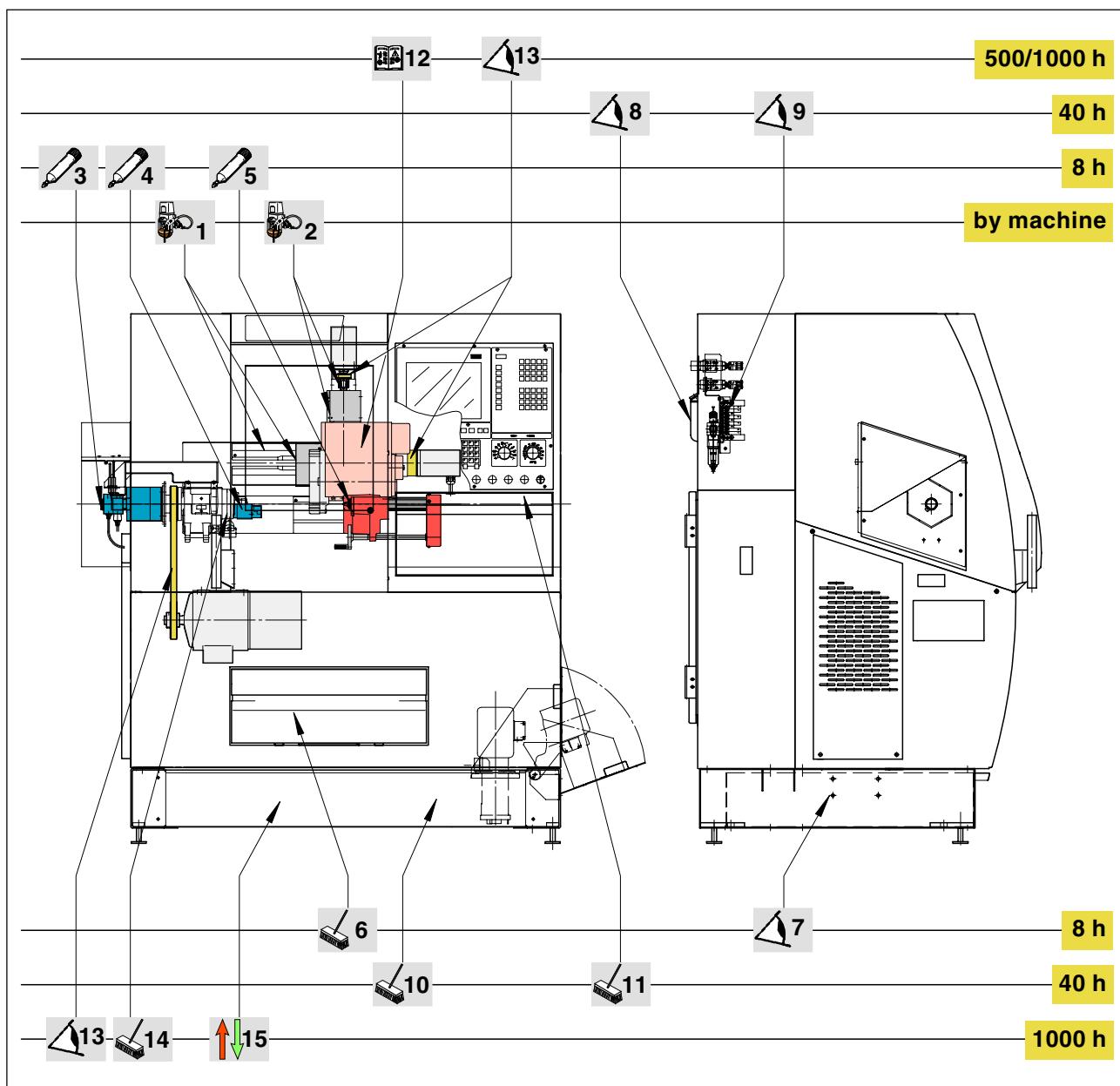


Connection to PC

The plug load you see in the plot beside.

D Maintenance of the Machine

Survey



Danger:

- All maintenance work may only be carried out with the machine switched off.
- Pay attention to the maintenance instructions in the enclosed manuals in chapter "E Additional Instructions"!



central lubrication



manual lubrication (lubricating nipple)



clean, if necessary exchange



check, if necessary supplement



exchange



see additional instructions

No.	Lubricating point	Activity/lubrication	Interval [h]
1	Z slide, guideway and spindle nut	oil central lubrication	adjusted by manufacturer
2	X slide, guideway and spindle nut	oil central lubrication	
3	Clamping cylinder without bore	grease (lubricating nipple)	8
4	Pneumatic power clamping chuck	grease (lubricating nipple)	8
5	Manual tailstock	oil (slideway oil)	8
	Pneumatic tailstock	oil (lubricating nipple)	8
6	Chip drawer	clean	8
7	Coolant level	check	8
8	Central lubrication	check oil level	40
9	Pneumatic maintenance unit	check oil level	40
10	Coolant container	clean	40
11	Filter cartridge for PC cooling device	check / clean / exchange	40
12	Tool turret	see additional instruction	500
13	Belt tension main motor and feed motors	check	1000
14	Labyrinth drainage	clean	1000
15	Coolant	exchange	1000

Filling quantities

Container	Quantity
Central lubrication	0,7 l
Pneumatic oiler	4,5 cl
Coolant tank	140 l

Lubricant recommendations

Application	Denomination acc. to DIN	Recommendation	
Central lubrication Tailstock	slideway oil: CGLP DIN 51502 ISO VG 68	CASTROL KLÜBER MOBIL OMV TRIBOL	Magnaglide D 68 Lamora Super Pollad 68 Vactra 2 Glide 68 1060/68
Clamping cylinder Power chuck	grease: DIN 51804/T1 NLGI 2 DIN 51807-1	EMCO CASTROL KLÜBER MOLUB ALLOY OMV RÖHM TRIBOL	Gleitpaste Grease MS 3 Altemp Q NB 50 Topfit 3284 Signum LM F 80 4020/460-2
Compressed-air oiler	pneumatic oil: DIN 51524 ISO VG32	CASTROL MOBIL	Magnaglide D 32 HLP 32

Chlorin-free Coolants



Hints for cooling lubricant selection:

An incorrectly selected or used cooling lubricant may show decisive effects on the manufacturing process and thus, cause high costs indirectly.

process and thus, cause high costs initially. After the end of service life cooling lubricants represent special waste that need supervision and have to be disposed of adequately. The disposal costs occurring are of decisive influence on the economy of the cooling lubricant use.

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

For complicated machining processes better results can be achieved with non-water soluble cooling lubricants

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

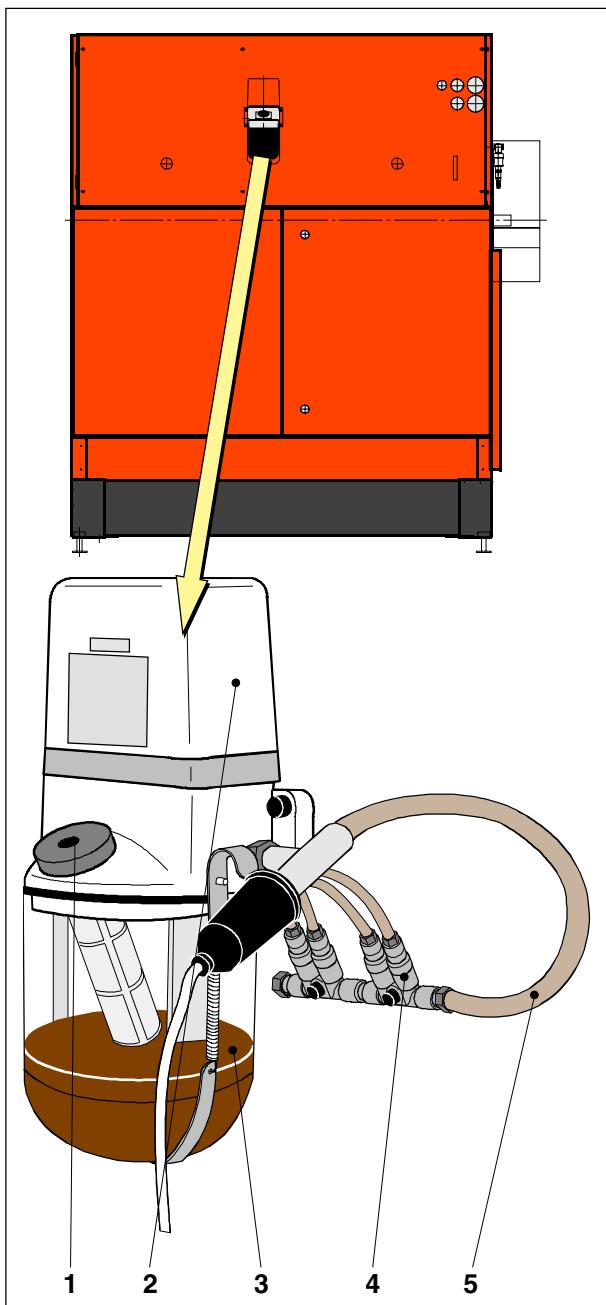
In addition the following items are to be observed:

- Disposal (cleavage-, decomposition property)
 - Content materials (chlorine, nitrite, phenols, etc.)
 - Corrosion protection
 - Viscosity
 - Resistance to aging, serving life
 - Resistance against microorganisms
 - Emulsifying capacity
 - Foaming behaviour
 - Dirt elimination property
 - Wetting capacity
 - Filtering capacity
 - Transparency
 - Compatibility with metals, plastics
 - Residual behaviour
 - Inflammability
 - odour
 - Compatibility with health (formation of mist, skin compatibility, toxicity, carcinogenicity,)

Non-water soluble cooling lubricants are generally without problems

Problems occur with the formation of mist and chip
deoiling.

Central lubrication



Central oil lubrication

Longitudinal and cross slides are supplied with glideway oil via the central oil lubrication.

The distribution elements (4) distribute the glideway oil evenly to the lubricating points.

As soon as the slide has passed a travel path of 16 m the pump (2) is switched on automatically.

The central lubrication can also be activated manually by means of the "AUX" key.

If the "AUX ON" is pressed for a major period the pump is switched on every 6 s (also see initial start-up in chapter "A Installation of the machine").

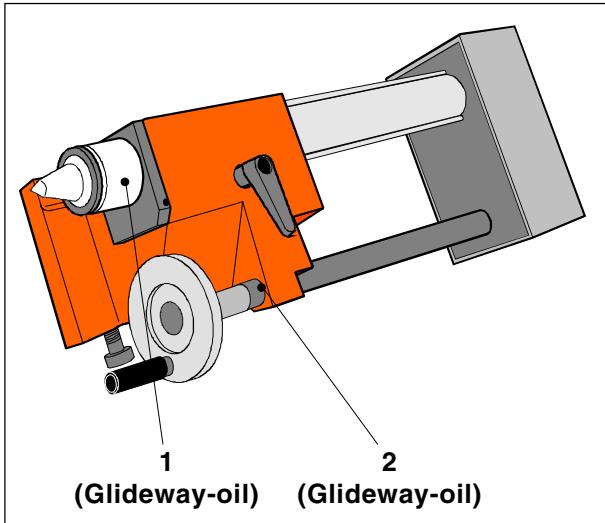
- Check the level of the lubricant tank (3) daily on the rear side of the machine.
Take care that the oil level does not drop below the minimum level.
- For refilling unscrew filling screw (1).
Tank capacity 0.7 l

Deaerating the lubricant lines

If a lubrication is started with too low oil level air enters the lubrication system.

Air inclusions are visible in the lubricant lines behind the distribution elements (4).

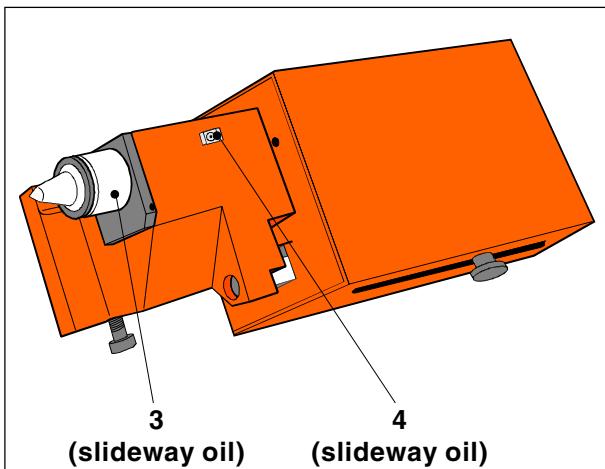
- Unscrew lubricant line (5) in front of the distribution elements.
- Carry out lubrication with "AUX" key until only oil is pressed out of the line (5).
- Retighten lubrication line (5).



Maintenance of the tailstock

Hand tailstock

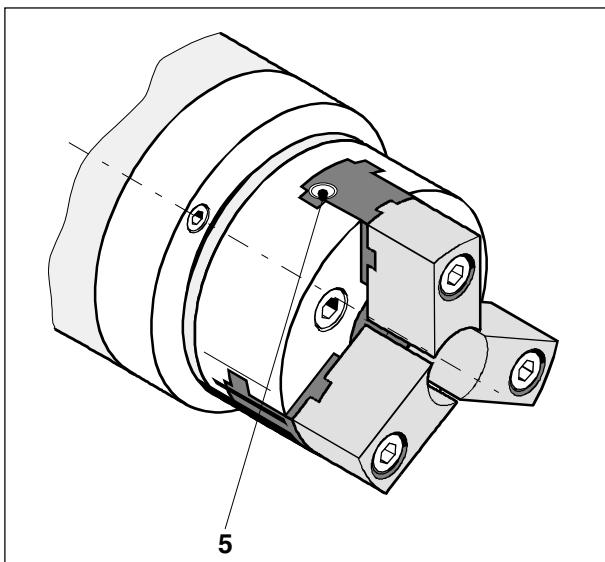
Oil tailstock sleeve (1), as well as bearing (2) of the tailstock handwheel slightly with glideway oil every 8 hours (daily).



Maintenance of the pneumatic tailstock

Pneumatic tailstock

Oil the tailstock every 8 hours (daily) at the tailstock sleeve (3) and with the supplied oil press at the lubrication nipple (4).



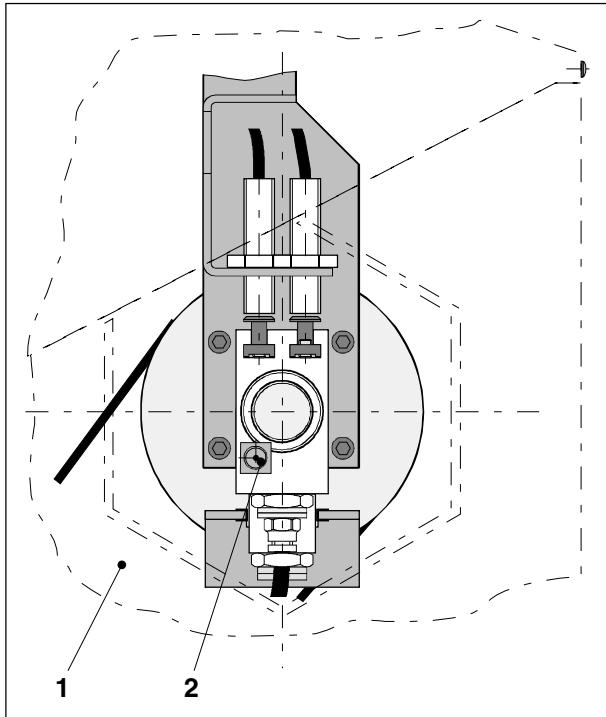
Lubrication nipple at the power chuck

Pneumatic clamping device

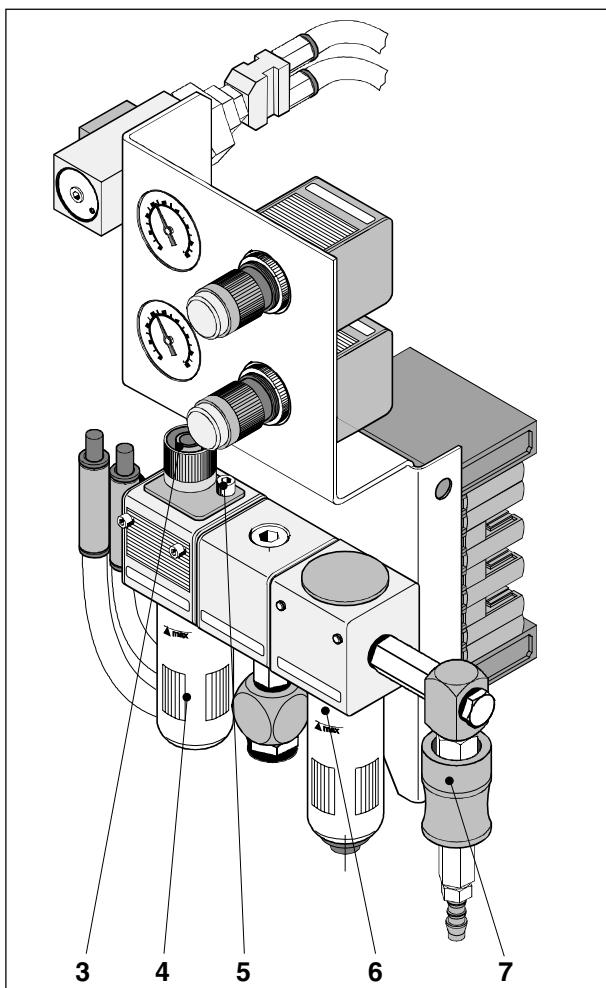
KFD power chuck

Clean the chuck daily from chips and other kinds of dirt to guarantee smooth running and thus safe clamping.

The guides of the top jaws have to be lubricated daily (every 8 hours) with grease at the 3 lubrication nipples (5).



Lubrication nipple at the clamping cylinder



Refilling the pneumatic oil

Clamping cylinder without bore

The bearing at the clamping cylinder without bore has to be lubricated every 8 hours (daily) with grease at the lubrication nipple (2).

The lubrication nipple is accessible by means of the supplied grease gun laterally at the machine through the bore on the cover (1).

Pneumatic unit (option)

The oil level of the compressed-air oiler has to be controlled daily at the tank (4) of the maintenance unit.

If necessary an adequate oil has to be refilled (see lubricant recommendations).

- Screw off filling screw (5) and fill in oil up to the "max" mark at the tank (4).
- The control knob (3) serves for setting the mixture ratio air/oil.
It is preset by the manufacturer and should not be changed.

Oil quality for compressed-air oiler

Pneumatic oil DIN 51 524 ISO VG 32

e.g. CASTROL Magnaglide D 32
MOBIL HLP 32

Water separator

To keep the compressed air as free as possible from water a water separator is installed in the maintenance unit.

The separator tank (6) is automatically emptied after each closing and subsequent opening of the air supply at the manual slide (7).

Coolant device

Cooling lubricant level

Check interval 8 h
 Exchange of the coolant 1000 h

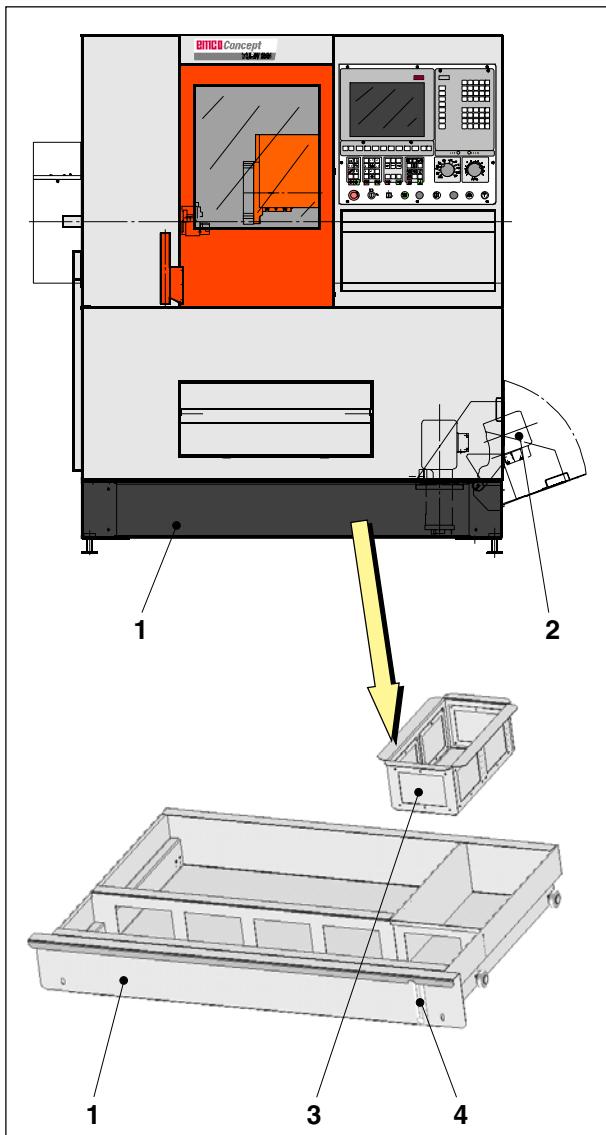
The cooling lubricant level is checked at the front side of the machine on the display (4) of the cooling lubricant tank(1).

When refilling the cooling lubricant observe the composition and the miscibility of the existing liquid (also see cooling lubricant recommendations).



Attention:

- For a regular function of the coolant pump the coolant level must be at least 45 mm.
- In general only use chlorine-free coolants. The chlorine part in the coolant is responsible for the rust on bright parts.



Cleaning the coolant tank

Cleaning the coolant tank

Cleaning interval 40 h

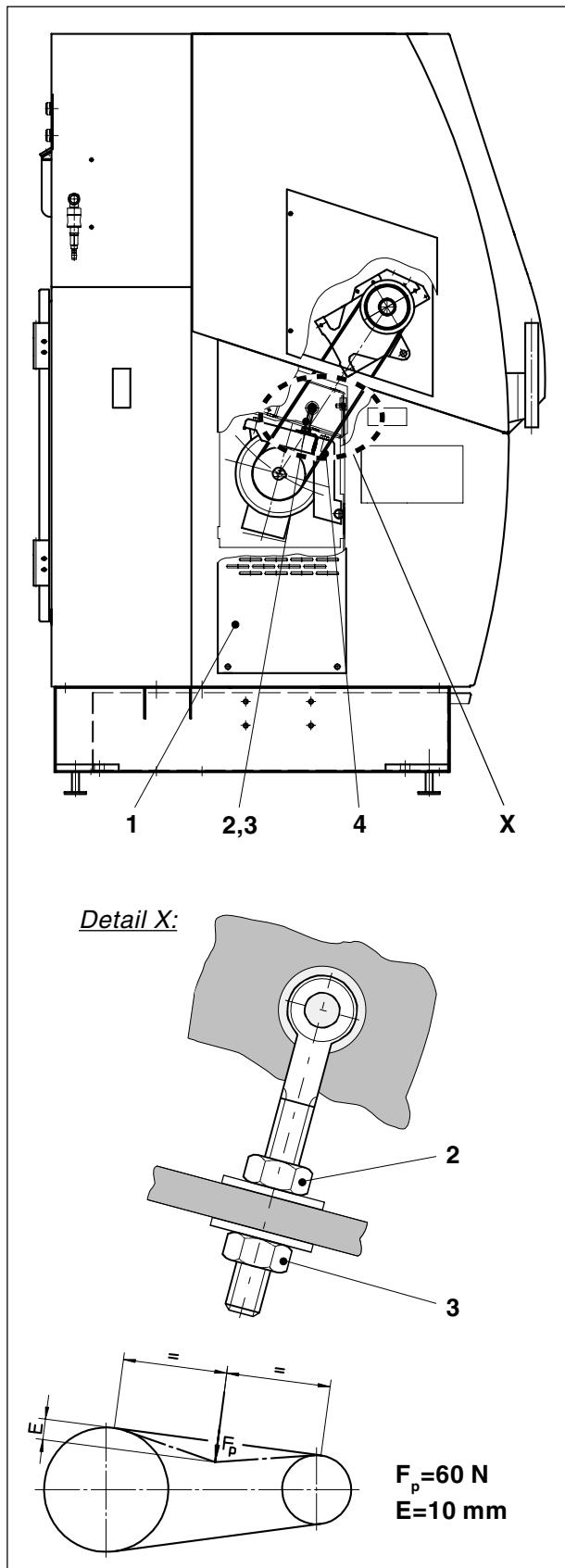
- Swivel out coolant pump (2).
- Draw out coolant tank forward.
- Take sieve inset (3) out of the coolant tank and clean it thoroughly.
- Remove dirt from coolant tank.
- Check return flow lines for cleanliness and rinse them if necessary.
- Insert sieve inset (3) again into the coolant tank (1).
- Insert coolant tank (1) and swivel pump (2) in.



Notes:

- Dispose cooling lubricants acc. to environmental requirements (special waste!).
- Do not use fluorine chlorinated hydrocarbons (e.g. trichloroethylene, trichloroethane etc.) for cleaning the tank!
- During cleaning mind complete elimination without residues of deposits! Remaining contaminations are sites of growth for bacteria which attack the newly filled emulsion and reduce its service life.
- Dirty cleaning rags (cleaning paper) have to disposed of as special waste.

Main drive belt



Exchange and tension of the drive belt

The main driving belt should be checked for state and tension at least every half year.

In case of signs of wear the belt should be exchanged immediately.

Belt Poly V-belt 1285 PJ8
Order no. ZRM 801 285

Exchange of the main drive belt



Danger:

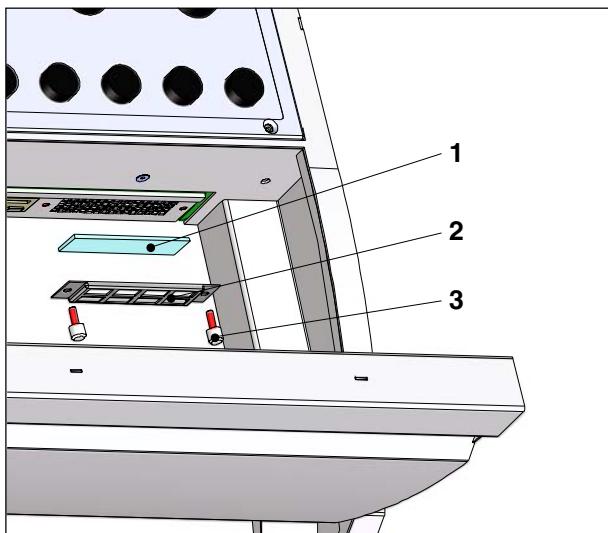
The main drive belt may only be exchanged during standstill of the machine.
(Take out mains plug!)

- Take off cover (1)
- Loosen counter nut SW17 (3).
- Loosen adjusting nut SW17 (2) until the drive belt can be taken off.
- Replace drive belt (4) by a new belt.
- Tighten drive belt by means of the adjusting nut (2).
The tension is to be adjusted so that the belt between the two pulleys can be pressed down approx. 12 mm with a control force of 60 N ($\approx 6 \text{ kg}$).
- Secure belt position by tightening the counter nut (3).
- Mount cover (1).

Note:

Control the belt tension with a new drive belt after the first 10 operation hours (run-in phase).





Filtermatte für PC-Kühlung

Filter cartridge for PC cooling device

The PC, which is built-in in the machine, is fitted out with fan for cooling the PC elements and processors.

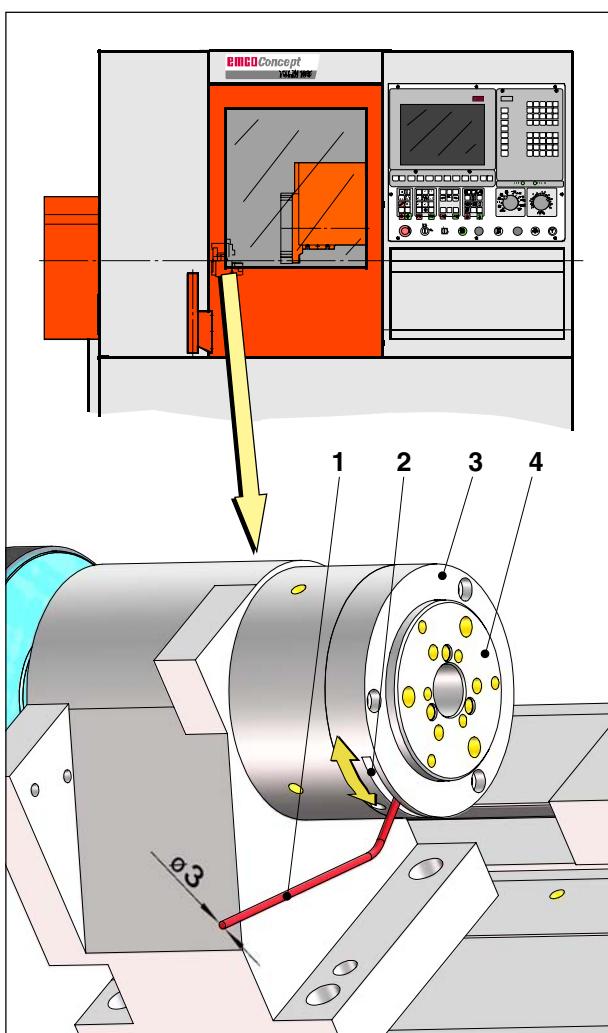
A filter cartridge is built-in as dust guard. Check the filter cartridge scheduled, clean or exchange it (5 pcs. of cartridges are delivered with the machine).

- Open PC load.
- Dismount guard rail (2) with the two knurled screws (3) and exchange filter cartridge (1).
- Mount guard rail (2).



Caution:

For protection of the PC, the machine may not be operated without mounted filter cartridge!



Labyrinth drainage at the headstock

Labyrinth drainage

If used, the coolant enters between main spindle (4) and bearing cover (3) in the headstock.

The coolant penetrated can flow off via the drainage slot (2) at the bearing cover.

The coolant (especially old coolant) causes deposits, which can obstruct the drainage slot. Then the coolant cannot drain off, penetrates the spindle bearing and destroys it.

Remedy:

- Clean drainage slot (2) every 1000 operating hours with a wire (1).
- Never direct the coolant jet directly against the main spindle.
- Don't use too old coolant (see maintenance notes for the coolant attachment).

E Additional Instructions

Sauter

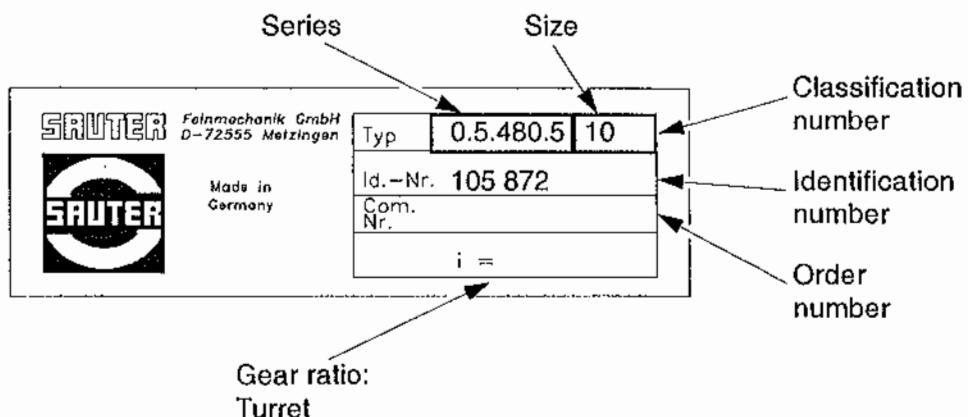
Tool Turret without driven tools

Tool Turret with driven tools

**Operating Instructions
for
Disk-Type Tool Turret
with Electric Drive**

0.5.480.510 - 105 872

Type plate on turret housing



Interpretation of symbols	4
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Appendix

Diagram of functions:
Disk-type tool turret 0.5.480 SK - 919 e

Diagram of functions:
Disk-type tool turret 0.5.480 SK - 920 e

Wiring diagram: Disk-type tool turret EPB - 1128 e

Survey: Disk-type tool turret 0.5.480

Interpretation of symbols

Warning notes



WARNING¹⁾

This warning designates a potentially hazardous situation which may lead to serious injuries, or even death.



WARNING¹⁾

Risk of electric shock due to high voltages!



CAUTION¹⁾

This caution designates a potentially hazardous situation in which the product or property in its environment could be damaged.



IMPORTANT

For application notes and other useful information.



Clearing

Clear machine before carrying out any further work!

1) Classification of signal words acc. to ANSI Z535.4

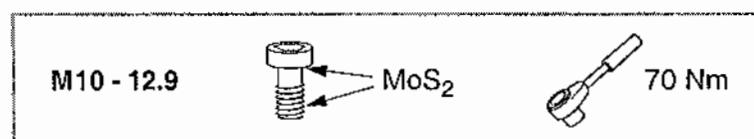
Symbols for action instructions

- Designates an action instruction
- ➡ Designates the result of an action
- Designates a cross-reference

Tools required: here, hexagonal pin wrench complete with T grip



Use M10 bolts, quality 12.9; use MoS₂ to lubricate the points marked, tightening torque 70 Nm.



Abbreviations

max.	maximum
perm.	permissible
Fig.	figure
if nec.	if necessary
approx.	approximately
acc.	according (to)

1 Safety notes

The turret corresponds to the state of the art and the recognized technical safety rules. Nevertheless hazards and risks can occur.

1.1 Use within specifications

Operate turret only in perfect condition and in compliance with the Operating Instructions.

Install and operate turret only in machines complying with the relevant regulations for workspace protection.

1.2 Required skills

Only trained and competent personnel may work on the turret; this personnel must have been instructed in accordance with the Operating Instructions and directly on the turret.



WARNING

Risk of personal injury or machine damage.

All work on the electrical system is to be carried out by a competent electrical engineer¹⁾ only! Observe service and maintenance intervals for electrical lines at all times!

1.3 Notes on product-specific risks

Setting tasks require a 24V DC power supply.



Clearing required prior to any work:

- Switch the machine off.
- Push the motor protection switch for the turret into the OFF position.

1) According to DIN 31000: A competent **specialist person** is, whoever "... - due to his specialist training, knowledge and experience as well as knowledge of the relevant regulations - is in a position to evaluate the tasks assigned to him and able to recognize any potential dangers."

**WARNING**

In the event of a fault or a collision, unexpected rotation of the tool disk is possible.
Injury hazard.

**CAUTION**

Do not attempt any further switching operations, if the turret is damaged, as otherwise considerable consequential damage may be caused.
Call SAUTER Service.



For manual operation, turn the motor shaft with the help of a hexagonal pin wrench, complete with T-grip.

WARNING

A reversal of the moment of the motor results in the acceleration of the motor shaft. The hexagonal pin wrench may thus be unexpectedly accelerated.
Therefore, in order to avoid the ejection of the and resulting injuries, firmly grip the hexagonal pin wrench.

1.4**Disposal**

Comply with all national and regional disposal regulations and laws.

1.5 **Liability and warranty**

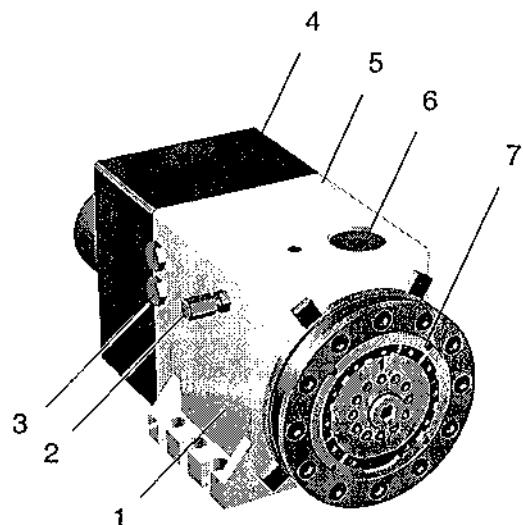
The information contained in these Operating Instructions is in conformity with the knowledge at the point of printing.
Subject to modifications which occur within the framework of continuous further development.

All liability and warranty shall be excluded if

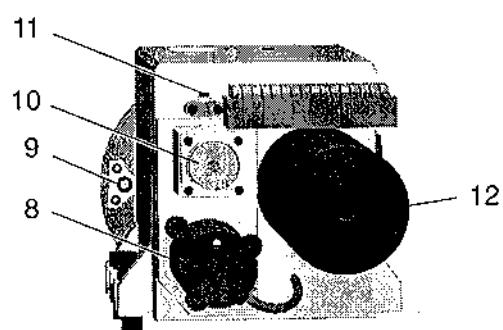
- the notes and instructions contained in these Operating Instructions are not complied with,
- the product is not used as directed,
→ *Use within specifications, page 6*
- the turret including accessories is incorrectly operated,
- the turret including accessories is incompetently repaired and maintained,
- conversions and functional changes are implemented without approval by the manufacturer,
- no suitable tool disks and tool holders are used,
- no original replacement parts are used.

2 Product description

2.1 Designation of parts



- 1 Turret housing
- 2 Cooling lubricant connection
- 3 Electrical connection
- 4 Covering hood for electric components
- 5 Bedding plate
- 6 Aperture for oil check of turret gearbox chamber
- 7 Locating disk



- 8 Angular encoder
- 9 Cooling lubricant valve
- 10 Solenoid
- 11 Proximity switch S7
"Check pre-indexation"
- 12 Turret motor

2.2 Technical data

Series 0.5.480.5.. Size 10

Number of indexing positions		8 or 12 or 16	
Perm. tangential torque (turret locked) at calculated safety	Nm	200	1.3
Perm. mass moment of inertia of tool disk, tool holders, and tools	kgm^2	0.25 ¹⁾	
Perm. imbalance (load moment) caused by tool holders and tools	Nm	6	
Indexing times ^{1) 2)} Theoretical cycle time (unlock/turn/lock) at rotating angle α [degrees]	s	$i \times \frac{41 + \alpha}{n} \times 0.17 + 0.1$	
Gear ratio	i	see turret type plate	
Motor speed	n rpm	see motor rating plate	
Perm. indexing frequency	min^{-1}	6.6 ¹⁾	
Operating voltage/mains frequency		see motor rating plate	
Degree of protection		IP 65	
Turret mass (without tool disk)	kg	approx. 14	
Maximum mass of the tool disk inclusive of tool holders and tools	kg	20	
Maximum mass of the tool holders and tools fitted ³⁾	kg	10	
Perm. ambient temperature range	$^{\circ}\text{C}$ $^{\circ}\text{F}$	$+10 \dots +40$ $+50 \dots +104$	

For footnotes and continuation of table see next page

Operating pressure for cooling lubricant ⁴⁾ :		
Cooling lubricant valve – standard version		
constant supply	bar	7
externally switched supply	bar	14
Medium pressure valve (option)	bar	25

- 1) Depending on the gear ratio and the mains frequency
- 2) Indexing times for 0.5.481.5.. on request
- 3) For standard tool disks
- 4) In order to achieve an extended service life of the cooling lubricant valve, it is advisable to filter the cooling lubricant by $\leq 100 \mu\text{m}$. Post-connected loads (spindle units with internal cooling lubricant guide a.o.) may require a higher degree of filter fineness. Note and comply with the manufacturer's instructions!

3 Manual mode

In manual mode, the mechanical functions of the disk-type tool turret will be checked:

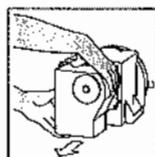
- following initial assembly to the machine
- during troubleshooting
- after a renewed setup following fault conditions



Clearing required prior to any work:

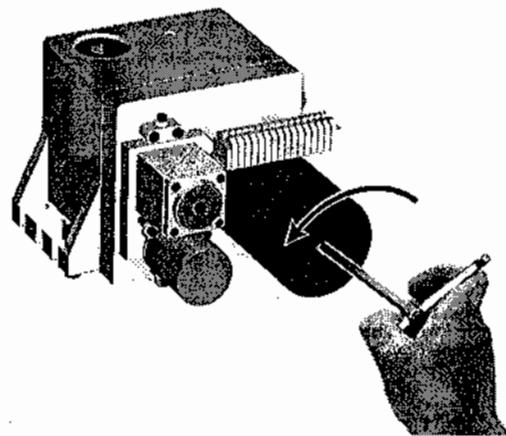
- Switch the machine off.
- Push the motor protection switch for the turret into the OFF position.

1. Undo fixing screws of covering hood, withdraw covering hood to rear.
If necessary, use push-off screw.



2. Remove screw plug on motor housing.

Unlock turret



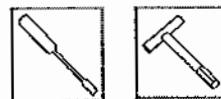
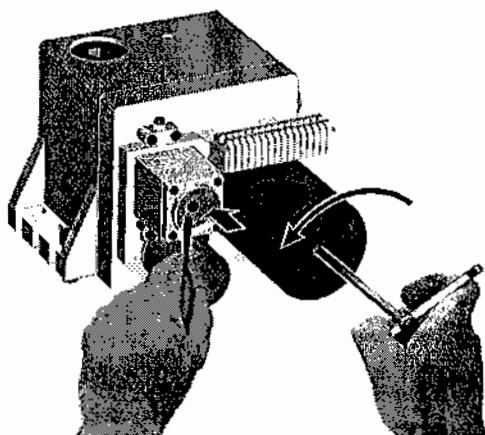
3. Use a hexagonal pin wrench, complete with T-grip, to rotate the motor shaft.
⇒ If the disk-type tool turret is locked, the locating disk (or tool disk) does not co-rotate; the centre position of the lock can be felt.

**WARNING**

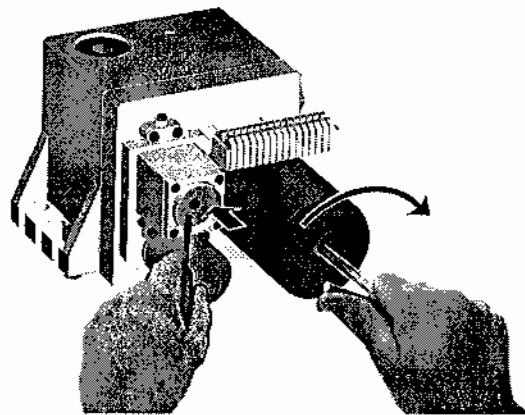
A reversal of the moment of the motor results in the acceleration of the motor shaft. The hexagonal pin wrench may thus be unexpectedly accelerated.

Therefore, in order to avoid the ejection of the and resulting injuries, firmly grip the hexagonal pin wrench.

4. Keep the same direction of rotation, continue to rotate.
⇒ The disk-type tool turret unlocks; a reversal of the moment on the motor shaft can be felt.

Rotate tool disk

5. Keep direction of rotation, continue to rotate disk until locating disk (or tool disk) starts to turn as well.
6. Keep direction of rotation, continue to rotate disk until locating disk (or tool disk) has reached the position required, then press in the keeper by means of a screwdriver.
⇒ The preindexing bolt engages into a hole.
⇒ The tool disk cannot be rotated any further.

Lock turret

7. Reverse direction of rotation on the motor shaft whilst simultaneously pressing in keeper.
⇒ The disk-type tool turret locks.
The lock resistance can be felt when rotation is continued.
The locking process ends, if the centre position of the lock can be felt.

On completion of setup or maintenance work:

8. Screw in plug and fit covering hood.
Note position of cables in order to avoid any pinching of the same.

Lock turret in position 1



IMPORTANT

For some setup and maintenance work the disk-type tool turret has to be locked in position 1.

Precondition

- Numeral 1 of the locating disk has reached its 12 o' clock position relative to the turret base area.
or
- Position 1 of the tool disk is in working position.

1. Use a hexagonal pin wrench, complete with T-grip, and rotate the motor shaft until position 1 has been reached.
2. Press in the keeper by means of a screwdriver and rotate the motor shaft until the disk-type tool turret locks (see above).

4 Maintenance

Turret maintenance comprises the following tasks:

- Cleaning,
- Checking,
- Setting and
- Repair.

4.1 Safety notes

→ *Safety notes, page 6*

4.2 Service intervals

Plan your tasks carefully in order to provide for troublefree operation and reduce necessary downtimes to a minimum.

The service life of the turret is approx. 2–3 million switchings.
This value applies to crash-free operation in compliance with the specified operating conditions and the permissible loads.

→ *Technical data, page 10*

After 4,000 hours of operation

Check cooling lubricant valve for wear and leakage. Replace any defective parts. → <i>Page 24</i>	User
Check oil of the turret gearbox chamber; if necessary, replenish oil. → <i>Page 18</i>	User

After 2½ years

Check all electrical lines and connections for mechanical damage as well as embrittlement. Replace any defective parts.	User Specialist electrical engineer ¹⁾
--	--

- 1) According to DIN 31000: A competent **specialist person** is, whoever "... - due to his specialist training, knowledge and experience as well as knowledge of the relevant regulations - is in a position to evaluate the tasks assigned to him and able to recognize any potential dangers."

After 8,000 hours of operation

Change the oil of the turret gearbox chamber.
→ Page 18

User

After approx. 2–3 million switchings

The service life of the turret may possibly be reached, depending on the operating conditions involved.

A general overhaul is recommended for further trouble-free operation.

SAUTER Service

4.3 Maintenance work

Turret gearbox chamber

The turret gearbox chamber has to be serviced after 4,000 operating hours.



Clearing required prior to any work:

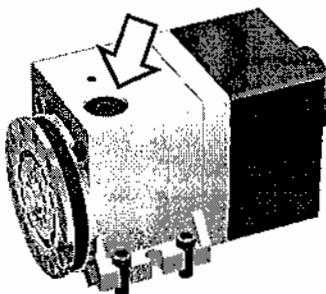
- Switch the machine off.
- Push the motor protection switch for the turret into the OFF position.



IMPORTANT

Improperly disposed used oil is a danger for our environment.
Therefore pay attention to the legal regulations for the waste disposal of used oil!

For draining or replenishing oil following aperture is provided:



Checking the oil

- Unscrew screw plug.
- Turn the tool disk and observe the rotating parts in the gearbox chamber.



IMPORTANT

Rotating parts in the gearbox chamber have to be covered with oil.

- If necessary, replenish oil.

Assess oil condition

Condition	Cause	Action
Oil black or brown, without metallic abrasion	Natural consumption	—
Oil black or brown, with metallic abrasion	Internal parts of turret are damaged	
Oil white, mixed with cooling lubricant	Turret sealings are damaged	Request SAUTER Service!
None oil left	Turret sealings are damaged	

Changing the oil


IMPORTANT

The gear oil can be drawn off, if a suitable plant is available.

Otherwise the working steps 1–6 have to be carried out.

1. If necessary, remove tool disk.
2. Screw in ring bolt on the turret housing up to the contact surface.
Observe load capacity of the ring bolt!
3. Use lifting gear to secure turret on the ring bolt, observe maximum hoisting angle of 45° on the ring bolt!



4. Unscrew the screws on the turret foot.
5. Unscrew screw plug.
6. Drain waste oil.

Fill oil

 100 cm ³
lubricating oil C acc. to ISO 6743/6
viscosity ISO VG 46 acc. to DIN 51562

- Screw in screw plug.
- Fit and align turret.
- Fit and align tool disk.
→ Page 23

4.4 Repairs after fault conditions



Clearing required prior to any work:

- Switch the machine off.
- Push the motor protection switch for the turret into the OFF position.

Fault	Cause	Remedy	Who carries out this task?
Turret			
Incorrect center height, tool disk offset relative to locating disk	Collision when turret is locked	Turn back tool disk in the annular groove and align	User → Page 23
Tool disk does not rotate	Gearwheels are defective	SAUTER Service	
Turret is difficult to operate (Thermo protection device has responded)	Insufficient oil in the gearbox chamber Contactor is defective	Check oil Check motor drive	User → Page 18
Turret no longer locks or the pre-indexing bolt gets caught	Collision during pivoting	SAUTER Service	
Tool disk does not stop in the selected position	Angular encoder is not correctly adjusted or defective	Check angular encoder, set or replace if necessary	User → Page 26, page 28
	Proximity switch S7 does not switch	Check proximity switch S7, set or replace if necessary	User → Page 30
Tool disk stops in between two positions	Chips between tool disk and turret	Remove tool disk, remove chips	User

Fault	Cause	Remedy	Who carries out this task?
Leakage oil escapes	Defective seals	SAUTER Service	
Cooling lubricant is not being transferred	Cooling lubricant valve is defective	Replace cooling lubricant valve	User → Page 24
	Cooling lubricant valve/line is blocked	Blow cooling lubricant valve/line clear	User → Page 24
Cooling lubricant escapes between tool disk and turret	Cooling lubricant valve is defective	Replace cooling lubricant valve	User → Page 24
Tangential play of tool disk when turret is locked	Collision while turret is locked	SAUTER Service	
	Wear due to lack of oil	SAUTER Service	



SAUTER Feinmechanik GmbH

Postfach 1551
D-72545 Metzingen
Germany



++49 (0) 7123-926-0



++49 (0) 7123-926-193



Service@sauter-gmbh.com

4.5 Aligning the tool disk

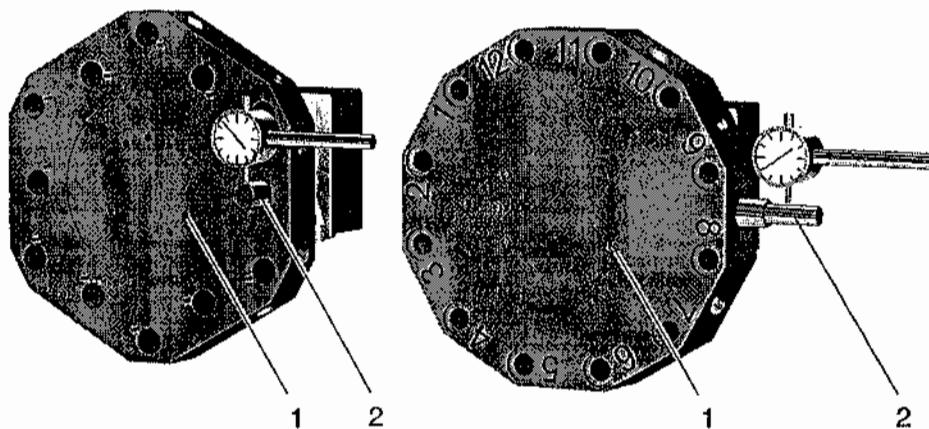
Preparation



Clearing required prior to any work:

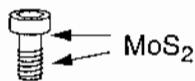
- Switch the machine off.
- Push the motor protection switch for the turret into the OFF position.
- Lock turret.
→ *Manual mode, page 12*

Aligning



- If necessary, undo screws (1).
- Align the locating hole to center height of the machine; use a plug gauge (2) if required.
- Tighten screws (1).

M 6 - 12.9



16 Nm

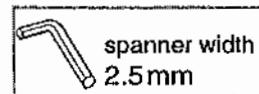
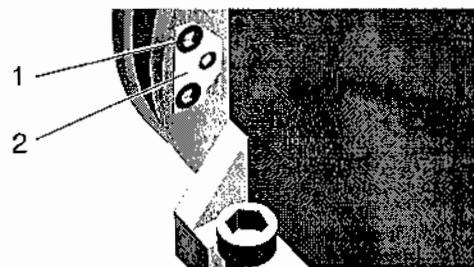
4.6 Replacing the cooling lubricant valve¹⁾

The cooling lubricant valve is a wearing part and has to be serviced after 4,000 hours of operation.

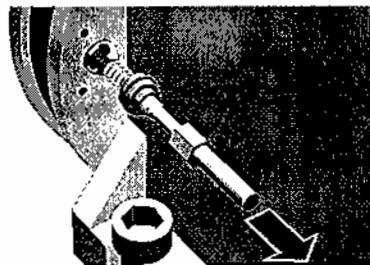


Clearing required prior to any work:

- Switch the machine off.
- Push the motor protection switch for the turret into the OFF position.

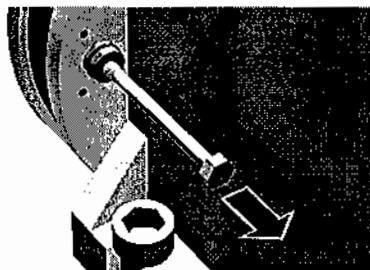


- Unscrew the screws (1) and remove the part (2).

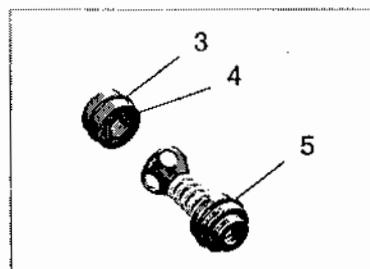


- Use an extractor to pull out the spring element.

1) Customized versions may also differ from the present version.



➤ Disassemble the valve bush.



- Replace O-ring seals (3,5), valve bush (4) or entire cooling lubricant valve.
→ Page 37
- Insert the valve bush, and ensure it snaps into place.
- Insert the spring element, and ensure it snaps into place.
- Use the screws (1) to fasten the part (2).

4.7 Adjusting the angular encoder



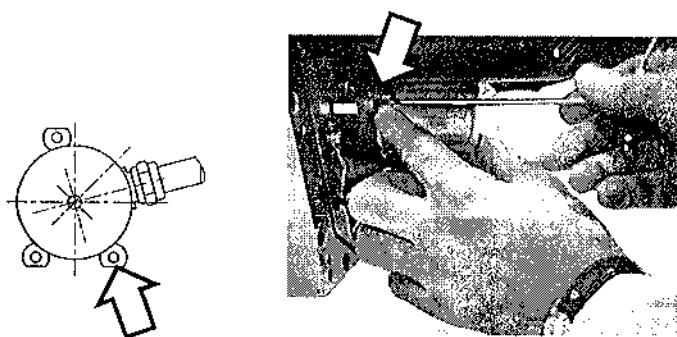
IMPORTANT

Setting tasks require a 24V DC power supply.

Preparation

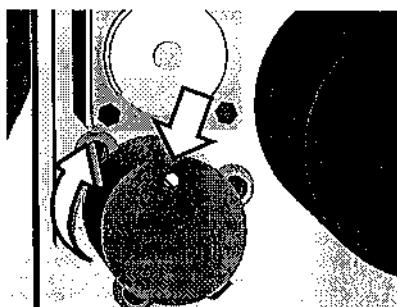
- Lock disk-type tool turret in position 1.

→ *Manual mode, page 12*



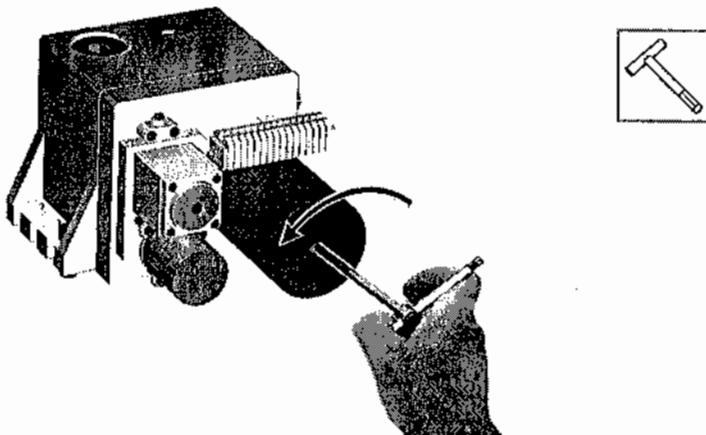
- Undo claws by means of a hexagonal pin wrench.

Adjusting



- Rotate angular encoder out of position until illuminated diode lights up.
- Clamp in angular encoder by means of the claws.

Checking the setup for symmetry



1. Use hexagonal pin wrench with T-grip for rotating the motor shaft.
2. Rotate motor shaft until illuminated diode on the angular encoder or the indication "Position 1" on the machine are extinguished.
3. Note the T-grip position.



WARNING

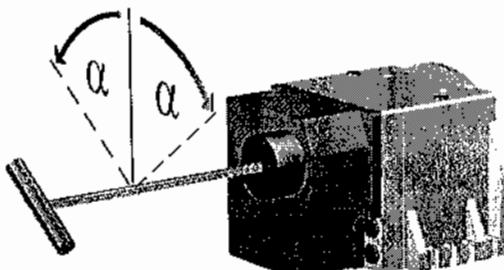
A reversal of the moment of the motor results in the acceleration of the motor shaft. The hexagonal pin wrench may thus be unexpectedly accelerated.

Therefore, in order to avoid the ejection of the and resulting injuries, firmly grip the hexagonal pin wrench.

4. Carefully continue to rotate until a moment reversal can be felt on the motor shaft.
5. Note the T-grip position.

The distance between the two grip positions characterizes the angle range.

6. Repeat steps 1 to 5 with reverse direction of rotation. The angle α must be the same for both directions of rotation!



By turning the angular encoder out of position, any dissymmetry can be removed.

4.8 Replacing the angular encoder

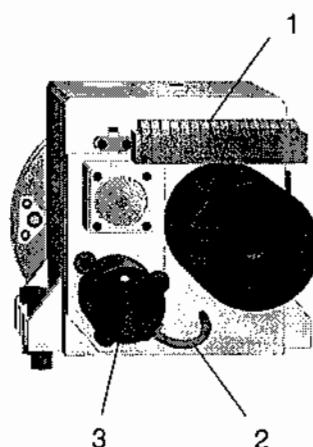


IMPORTANT

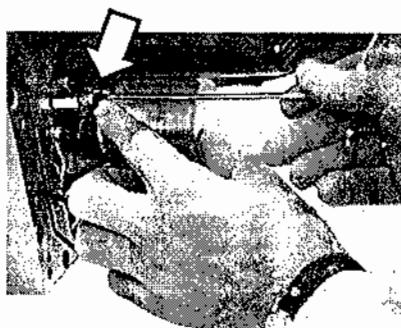
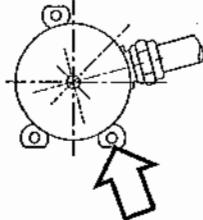
Setting tasks require a 24V DC power supply.

Preparation

- Lock disk-type tool turret in position 1.
→ *Manual mode, page 12*



- Note the position of the cable outlet (2) on the angular encoder (3), remove attachment.
- Undo cables on terminal strip (1) (note where they are connected).



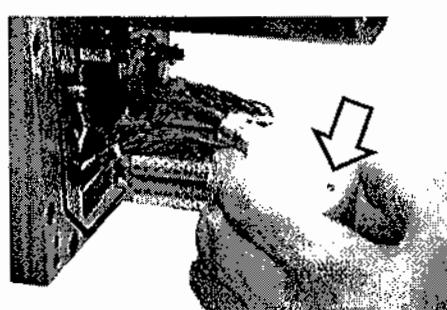
- Undo claws by means of a hexagonal pin wrench.

Replacing

- Carefully withdraw angular encoder.
On the shaft of the angular encoder, a gearwheel is located which is fixed in position by means of a setscrew.
- Undo setscrew and remove gearwheel.



- Connect new angular encoder electrically.
 - *Wiring diagram: Disk-type tool turret EPB - 1128 e
in the Appendix to these Operating Instructions*
- Fit gearwheel.



- Rotate shaft of the angular encoder until the illumination of the LED on the angular encoder indicates the "Position 1" setting.
This indication must remain whilst the following steps are carried out.

**IMPORTANT**

The LED is used only to indicate position 1 during the adjustment work. It is no position indicator during operation.



- Ensure that the cable outlet is in its correct position.
- Insert the angular encoder, note the position of the claws.
- If necessary, check the adjustment of the angular encoder.
 - *Page 27*
- Use claws to secure the angular encoder.
- Fit covering hood. Note position of cables in order to avoid any pinching of the same.

4.9 Proximity switch S7

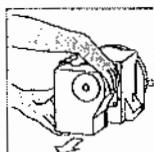
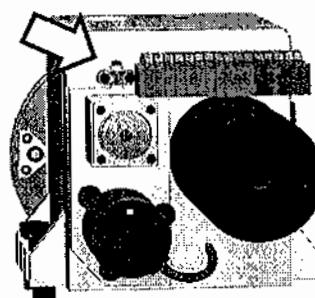
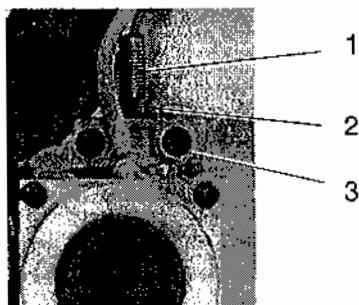
**IMPORTANT**

Setting tasks require a 24V DC power supply.

**Clearing required prior to any work:**

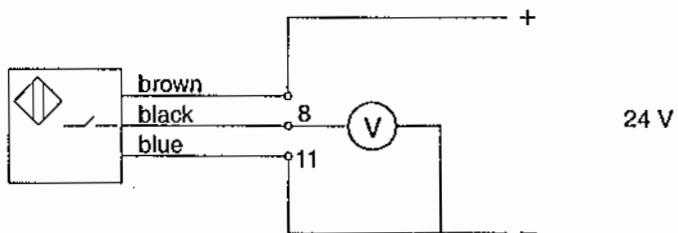
- Switch the machine off.
- Push the motor protection switch for the turret into the OFF position.

- Undo fixing screws of covering hood, withdraw covering hood to rear. If necessary, use push-off screw.

**Replacing**

- Undo clip (3) and withdraw proximity switch (1) from eccentric bush (2).

Checking

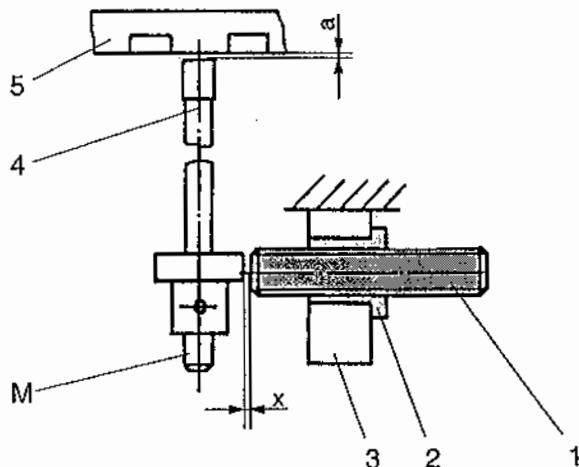


H-Signal \geq 90% of rated voltage

- Apply a voltage of 24 V DC to the proximity switch (1).
- The proximity switch is energized when the LED lights up.
- Insert tested/new proximity switch (1).

Adjusting

- Unlock disk-type tool turret.
- *Manual mode, page 12*
- Move disk-type tool turret into a location between two positions.
 If the keeper (M) is operated, the preindexing bolt (4) can be pressed in partially only.



- Set switching distance $x = 0.3 - 0.5$ mm.
- Determine dimension a.
 a = stroke of the preindexing bolt (4) up to the damping ring (5) when the solenoid is operated manually
 (corresponds to the press-in depth of the keeper (M)).

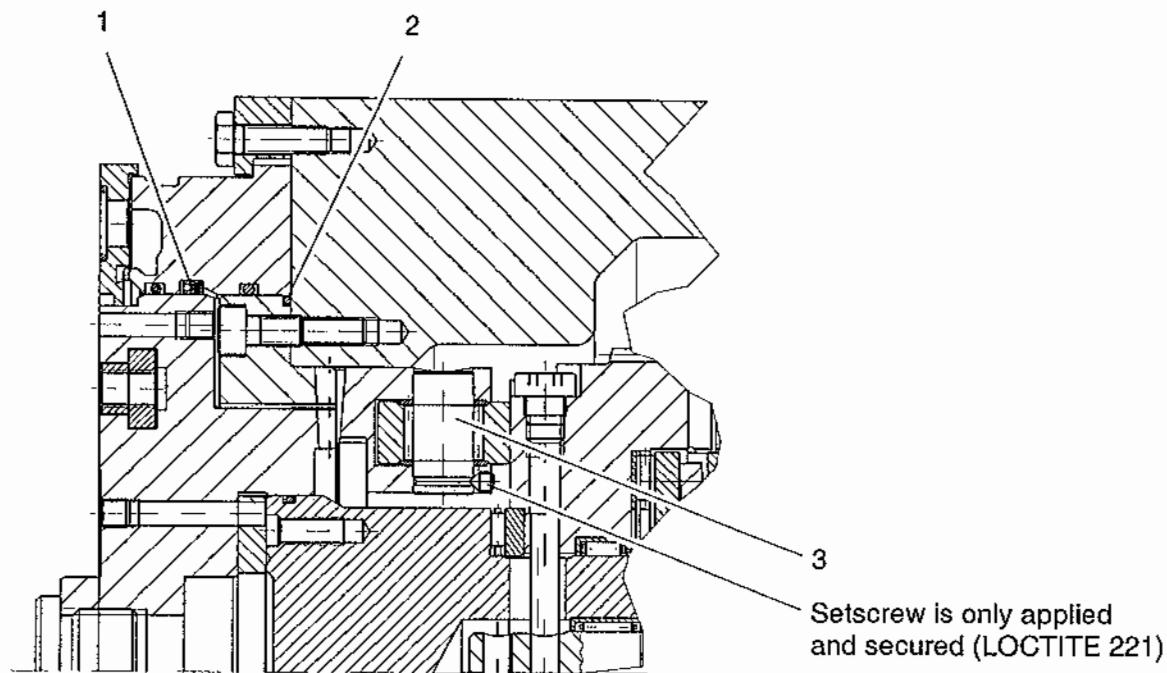
- Adjust proximity switch (1) on eccentric bush (2) such that its signal begins to drop after $a + 2^{+0.5}$ mm immersion depth of the preindexing bolt.
Any greater immersion depth may cause the motor to be blocked.
- Tighten clip (3).
- Fit covering hood. Note position of cables in order to avoid any pinching of the same.

Function test

- Switch on turret.
- Check switching process repeatedly.

5 Replacement parts

5.1 Indexing unit

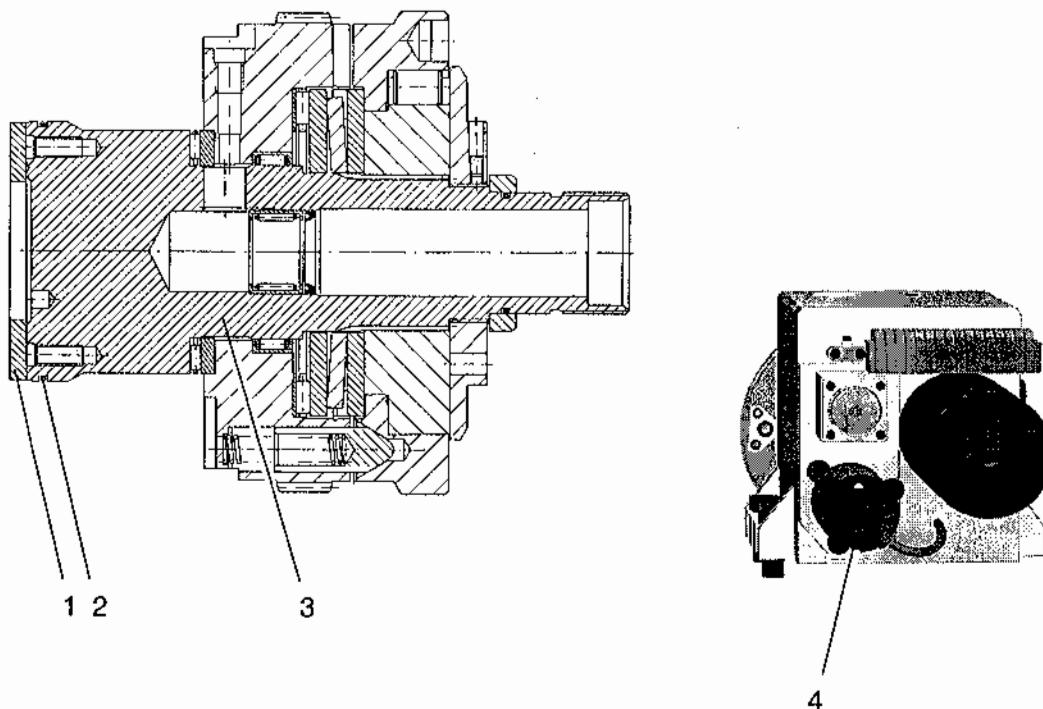


IMPORTANT

Only use the order form if you wish to order any replacement parts!

No.	Ident No.	Designation	Qty.
1	066 299	FU groove ring	1
2	085 074	O-ring seal	1
3	106 469	Replacements parts group, indexing	3
IMPORTANT		Request assembly guideline MR 02.025!	

5.2 Clamping and angular encoder

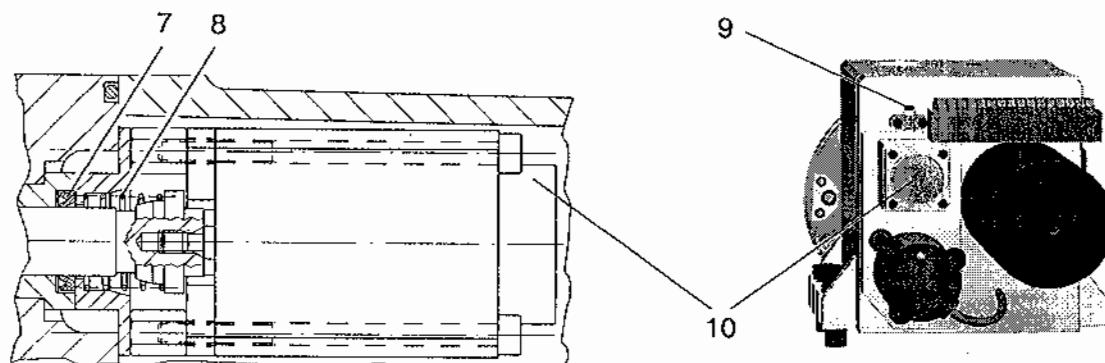
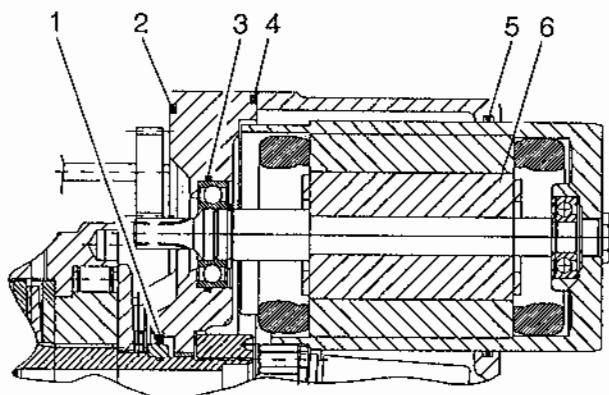


IMPORTANT

Only use the order form if you wish to order any replacement parts!

No.	Ident No.	Designation	Qty.
1	066 252	Disk (for tuning)	1
2	060 302	O-ring seal	1
3		Replacement parts group, clamping	1
	IMPORTANT	Request assembly guideline MR 02.025!	
4	105 500	Angular encoder	1

5.3 Gear, drive, pre-indexation

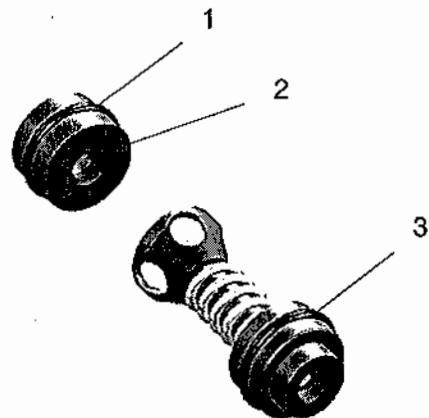


IMPORTANT

Only use the order form if you wish to order any replacement parts!

No.	Ident No.	Designation	Qty.
1	068 206	Sealing ring	1
2	058 665	O-ring seal	1
3	001 020	O-ring seal	1
4	063 827	O-ring seal	1
5	060 303	O-ring seal	1

No.	Ident No.	Designation	Qty.
6		Fitted motor (will be supplied complete with housing and bearing) Data according to the motor's nameplate: 	1
7	039 473	Sealing ring	1
8	065 754	Helical compression spring	1
9	069 669	Proximity switch	1
10	066 293	Solenoid	1

5.4 Cooling lubricant valve¹⁾**IMPORTANT**

Only use the order form if you wish to order any replacement parts!

No.	Ident No.	Designation	Qty.
1	060 667	O-ring seal	1
2	066 095	Bush	1
3	060 667	O-ring seal	1

1) Customized versions may also differ from the present version.



++49 (0) 7123-926-193



++49 (0) 7123-926-0



service@sauter-gmbh.com



Service
SAUTER Feinmechanik GmbH
Postfach 1551
D-72545 Metzingen
Germany

Company:

Street:

Postal Code
City:

Name:

Tel.:

Fax:

Assembly	Ident No.	Designation	Qty.



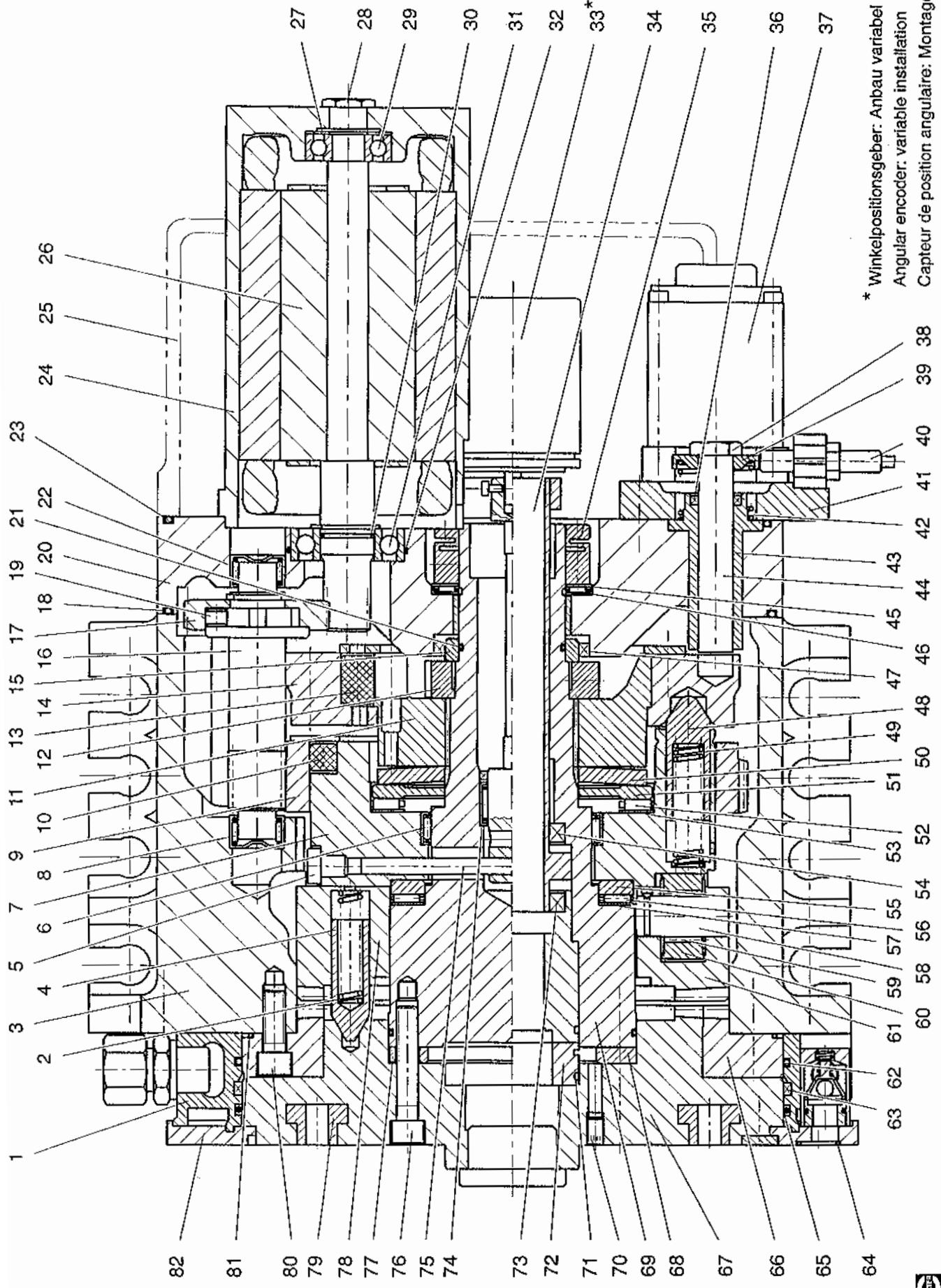
Read off the following data from the type plate and always complete.

Typ

Ident-Nr.

Com. Nr.

We will be pleased to answer your enquiries and receive your feedback information.



* Winkelpositionsggeber: Anbau variabel
Angular encoder: variable installation
Capteur de position angulaire: Montage variable

0.5. 480

SHUTTER

Table 1

Table 2

Angular encoder position																
Funktion	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Strobe	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1.Bit	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
2.Bit	0	1	0	0	1	1	0	0	0	0	0	0	0	1	1	0
3.Bit	0	0	1	0	1	1	1	0	0	0	0	0	1	1	1	0
4.Bit	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
• 5.Bit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Parity-Check	1	1	0	1	0	1	0	1	0	0	1	0	1	0	1	0

	Min.	Max.
VZ1 (ms)	30	
VZ2 (ms)	60	
VZ3 (ms)	40	

Edition: 01.06.12
SCHÜTTER Feinmechanik GmbH
D-72555 Metzingen
Germany
gep.:
getr.:
Wo

1 diagram | 0.5.4...5.. | 8/10 Positionen

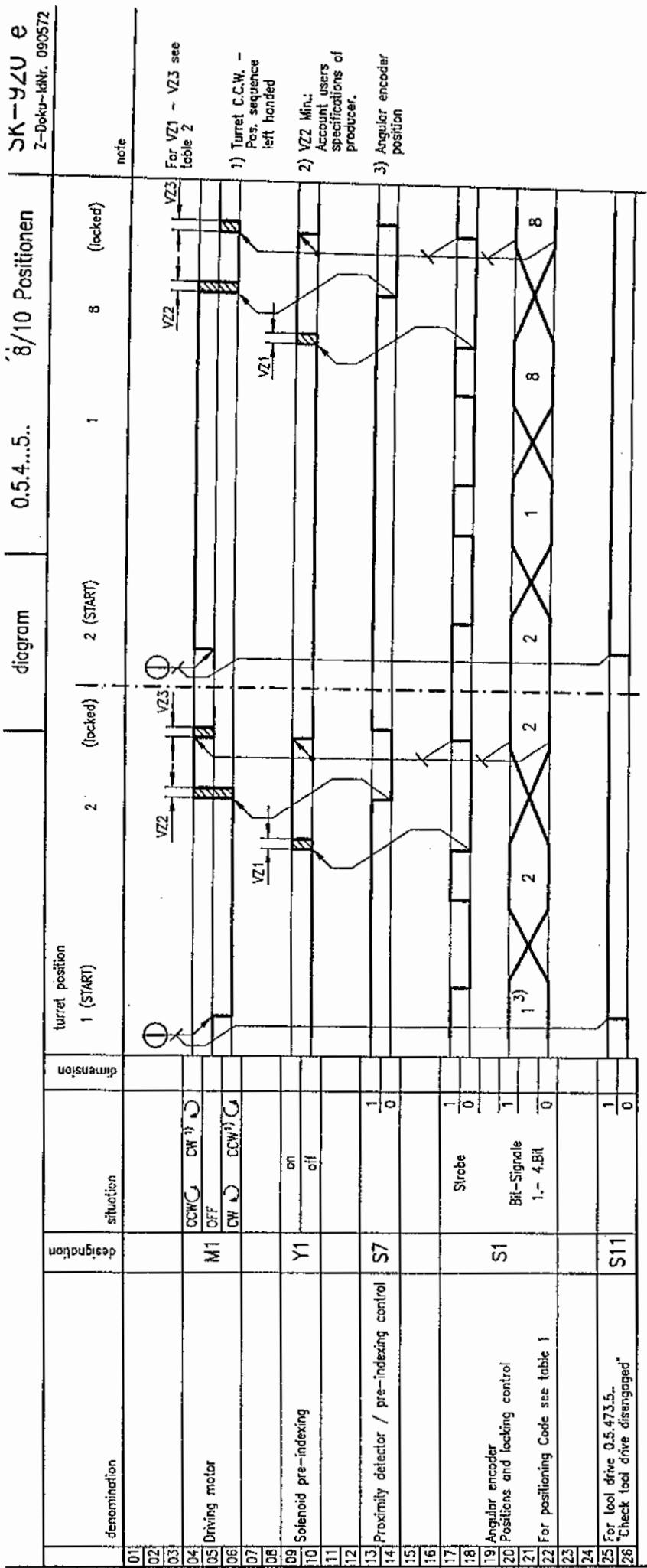


Table 1

Funktion	Angular encoder position										Mn.	Mx.
	1	2	3	4	5	6	7	8	9	10	VZ1 (ms)	VZ2 (ms)
Strobe	1	1	1	1	1	1	1	1	1	1	30	60
1.Btl	1	0	1	0	1	0	1	0	1	0	2	40
2.Btl	0	1	1	0	0	1	1	0	0	1		
3.Btl	0	0	0	1	1	1	0	0	0	0		
4.Btl	0	0	0	0	0	0	0	1	1	1		
Parity-Check	1	1	0	1	0	0	1	1	0	0		
	0	0	1	1	0	0	0	0	1	1		
	0	1	0	0	1	1	0	0	0	1		
	1	0	1	1	0	0	1	1	0	0		

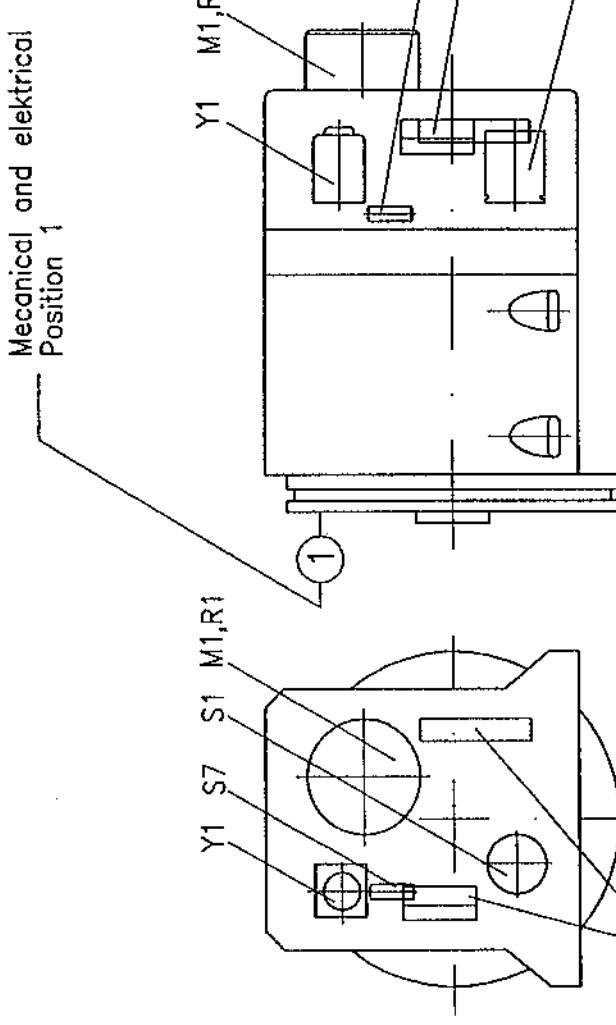
Table 2

Edition:	01.08.12 N	STUTTER Förmtechnik GmbH	Datum:	17.03.89	gepr.:
		D-7255 Metzingen	SHUTTER	SHUTTER	Germany

design- no- tion	Element/Function	Line	P E X S2	cable ④ 1x0,34 mm ²	Type	Supplier
S1	Angular encoder	Brown (+) blue (-)	12	brown		
	1.Bit	white	11	blue		
	2.Bit	yellow	2	white		
	3.Bit	green	3	yellow		
	4.Bit	black	4	green		
	5.Bit	grey	5	black	R3321RC.02/24	Hohner
	Strobe block	6	6	grey		
	Parity pink	7	7	block		
	screen transparent	8	8	pink		
	transp.	9	9	transp.		
S7	Proximity-Detector central pre-indexing	brown (+) blue (-)	12	brown	BES 516-324-E4-C-01	Balluff
R1	① Temperature limiter Bimetal cutoff	Blue	8	red		
M1	3-Phase A.C. Motor (release-indexing- locking)	blue	4	4	C1B-130B-300/300 1,6A 24VDC 1,6A 230V	SAUTER
Y1	Ground	U1	5	5		
	Solenoid pre-indexing	V1 V2 V3 V4 V5 V6 V7 V8 V9 V10 V11 V12 V13 V14 V15 V16 V17 V18 V19 V20	6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	yellow-green		
				6	24V DC; 2,0A	Schultz
				7	40%ED; 2,0A	

Mechanical and electrical

Position 1



- ① In normal state the temperatur limiter contacts are closed.
- ③ Diode 1N4006 (mounted to terminals).
- ④ depending on the turret's outfit.
- ⑤ for 16/24 positions only.

② Motor M1 (6 wires) Connection to terminals	increasing positions sequence CCW	Technical Data of:	S1	S7
low voltage O1 U1 M20-CQ1 W1 V1 D1 O2 U2 M20-CQ2 W2 V2 D2 O3 U3 M20-CQ3 W3 V3 D3	U1 W1 V1 D1 U2 W2 V2 D2 U3 W3 V3 D3	Operating voltage: Max. residual ripple: Max. load current: Nom. sensing distance: Temperature range: Function: Type:	15-30 V DC 10% 40mA - mm 0° bis +60°C pnp logic	10-24V DC 10% 200mA 1mm -20° bis +65°C n.o. (make) function pnp logic

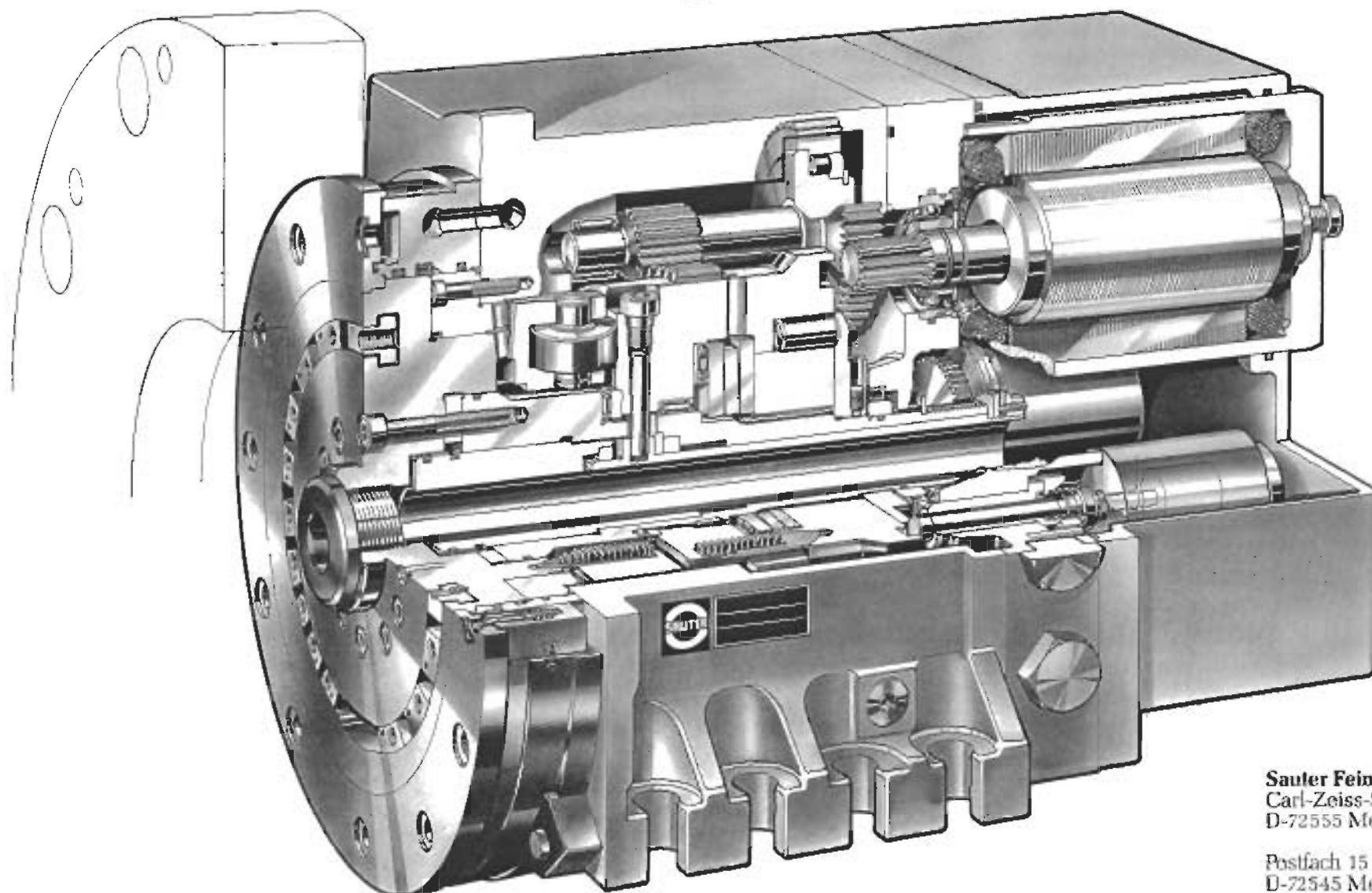
② Immomechanik GmbH D-7255 Metzingen Germany	gez.: SHUTTER	gez.: SHUTTER
Edition 10.04.04 A1	Datum: 00.03.03	gez.: AI

SAUTER werkzeug-
Scheibenrevolver

**SAUTER DISK-Type
Tool Turret**

**Tourelle Revolver
DISQUE SAUTER**

0.5.480.5..



Sauter Feinmechanik GmbH
Carl-Zeiss-Str. 7
D-72555 Metzingen

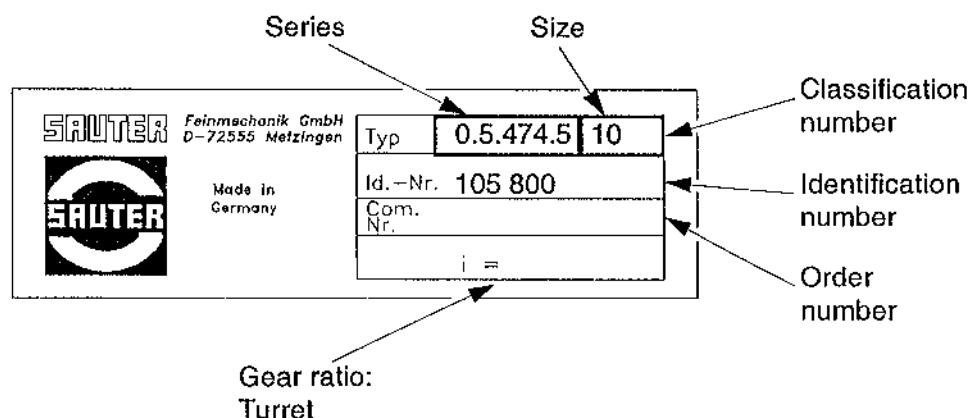
Postfach 1551
D-72545 Metzingen/Germany

Telefon (07123) 926-0
Telefax (07123) 926-190

**Operating Instructions
for
Disk-Type Tool Turret
with Tool Drive**

0.5.474.510 - 105 800

Type plate on turret housing



Interpretation of symbols	4
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1.2 Required skills	6
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Appendix

Diagram of functions:
Disk-type tool turret 0.5.480 SK - 919 e

Diagram of functions:
Disk-type tool turret 0.5.480 SK - 920 e

Wiring diagram: Disk-type tool turret EPB - 1128 e

Survey: Disk-type tool turret 0.5.480

Interpretation of symbols

Warning notes



WARNING¹⁾

This warning designates a potentially hazardous situation which may lead to serious injuries, or even death.



WARNING¹⁾

Risk of electric shock due to high voltages!



CAUTION¹⁾

This caution designates a potentially hazardous situation in which the product or property in its environment could be damaged.



IMPORTANT

For application notes and other useful information.



Clearing

Clear machine before carrying out any further work!

1) Classification of signal words acc. to ANSI Z535.4

Symbols for action instructions

- Designates an action instruction
- ⇒ Designates the result of an action
- Designates a cross-reference

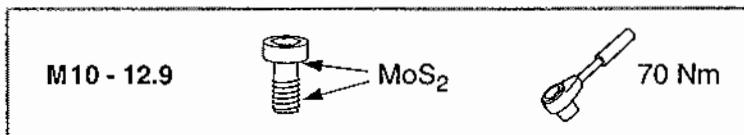
➤ Use lifting gear!



Tools required: here, hexagonal pin wrench complete with T grip



Use M10 bolts, quality 12.9; use MoS₂ to lubricate the points marked, tightening torque 70 Nm.



Abbreviations

max.	maximum
perm.	permissible
Fig.	figure
if nec.	if necessary
approx.	approximately
acc.	according (to)

1 Safety notes

The turret corresponds to the state of the art and the recognized technical safety rules. Nevertheless hazards and risks can occur.

1.1 Use within specifications

Operate turret only in perfect condition and in compliance with the Operating Instructions.
Install and operate turret only in machines complying with the relevant regulations for workspace protection.

1.2 Required skills

Only trained and competent personnel may work on the turret; this personnel must have been instructed in accordance with the Operating Instructions and directly on the turret.



WARNING

Risk of personal injury or machine damage.
All work on the electrical system is to be carried out by a competent electrical engineer¹⁾ only! Observe service and maintenance intervals for electrical lines at all times!

1.3 Notes on product-specific risks

Setting tasks require a 24V DC power supply.



Clearing required prior to any work:

- Switch the machine off.
- Push the motor protection switch for the turret into the OFF position.

1) According to DIN 31000: A competent **specialist person** is, whoever "... - due to his specialist training, knowledge and experience as well as knowledge of the relevant regulations - is in a position to evaluate the tasks assigned to him and able to recognize any potential dangers."

**WARNING**

In the event of a fault or a collision, unexpected rotation of the tool disk is possible.
Injury hazard.

**CAUTION**

Functional faults may be caused by an ingress of chips and contamination. Close open tool locations and cooling lubricant bores by means of suitable closing plugs.

**CAUTION**

Do not attempt any further switching operations, if the turret is damaged, as otherwise considerable consequential damage may be caused.
Call SAUTER Service.



For manual operation, turn the motor shaft with the help of a hexagonal pin wrench, complete with T-grip.

WARNING

A reversal of the moment of the motor results in the acceleration of the motor shaft. The hexagonal pin wrench may thus be unexpectedly accelerated.
Therefore, in order to avoid the ejection of the and resulting injuries, firmly grip the hexagonal pin wrench.

1.4**Disposal**

Comply with all national and regional disposal regulations and laws.

1.5 Liability and warranty

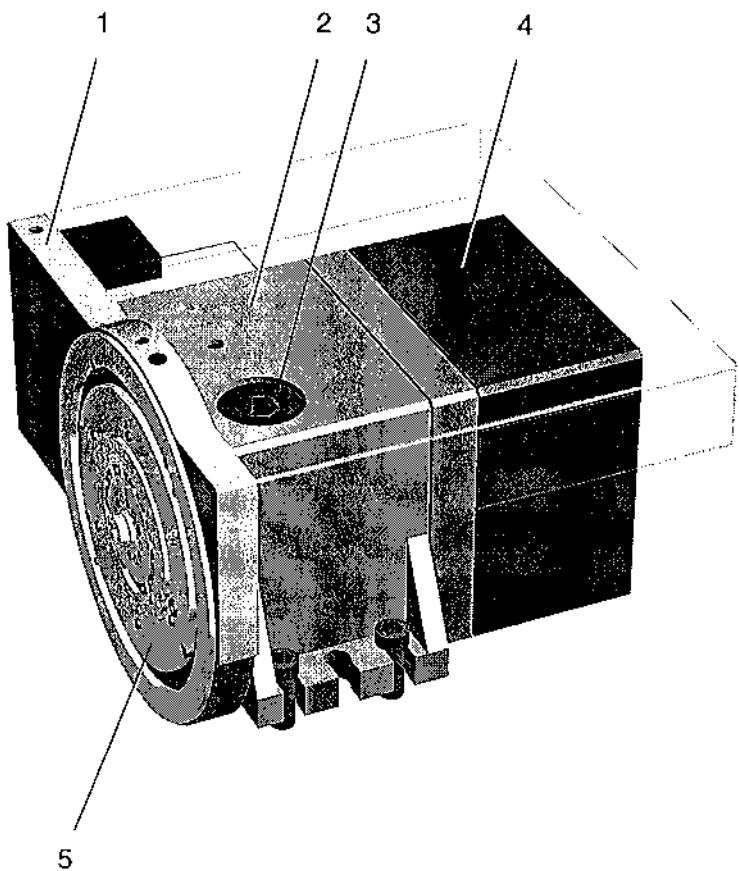
The information contained in these Operating Instructions is in conformity with the knowledge at the point of printing.
Subject to modifications which occur within the framework of continuous further development.

All liability and warranty shall be excluded if

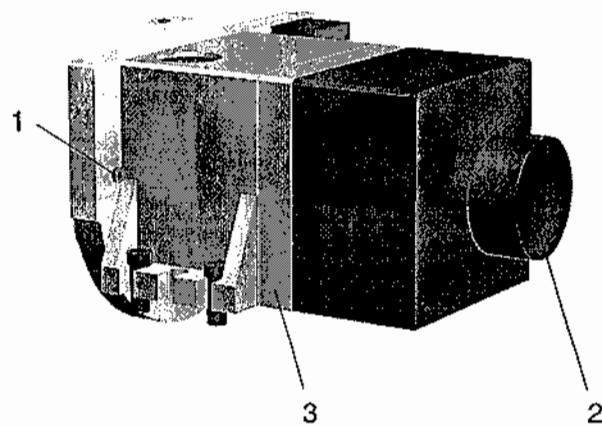
- the notes and instructions contained in these Operating Instructions are not complied with,
- the product is not used as directed,
→ *Use within specifications, page 6*
- the turret including accessories is incorrectly operated,
- the turret including accessories is incompetently repaired and maintained,
- conversions and functional changes are implemented without approval by the manufacturer,
- no suitable spindle units are used as stipulated in SAUTER Product Information PI 14/14.2, for example,
- no suitable tool disks and tool holders are used,
- no original replacement parts are used.

2 Product description

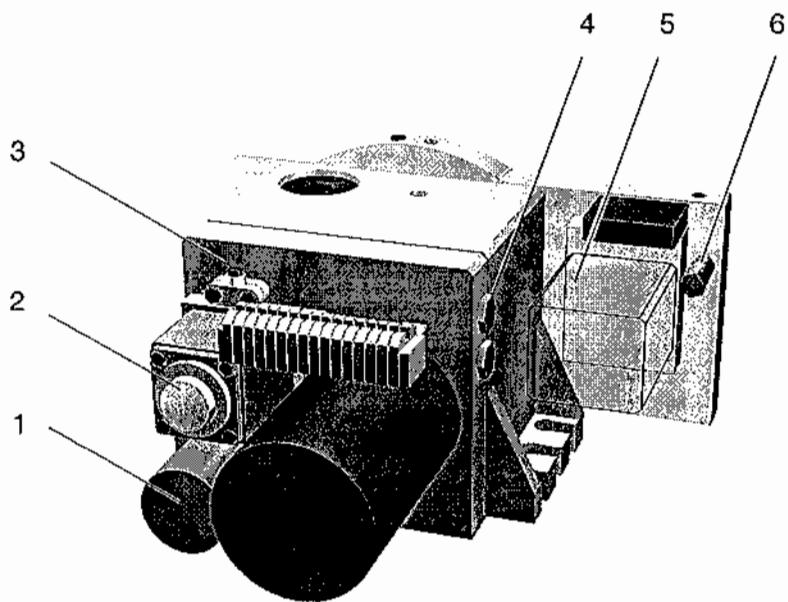
2.1 Designation of parts



- 1 Gear housing
- 2 Turret housing
- 3 Aperture for oil check of turret gearbox chamber
- 4 Covering hood for electric components
- 5 Locating disk



- 1 Cooling lubricant valve
- 2 Turret motor
- 3 Bedding plate: turret



- 1 Angular encoder
- 2 Solenoid
- 3 Proximity switch S7 "Check pre-indexation"
- 4 Electrical connection: turret
- 5 Tool drive motor ¹⁾
- 6 Cooling lubricant connection

1) not included in scope of delivery

2.2 Technical data

Series 0.5.474.5.. Size 10

with tool drive

Disk-type tool turret		
Number of indexing positions		8 or 12 or 16
Perm. tangential torque ¹⁾ (turret locked) at calculated safety	Nm	200 1.3
Perm. mass moment of inertia of tool disk, tool holders, and tools	kgm^2	0.25 ²⁾
Perm. imbalance (load moment) caused by tool holders and tools	Nm	6
Indexing times ²⁾ Theoretical cycle time (unlock/turn/lock) at rotating angle α [degrees]	s	$i \times \frac{41 + \alpha}{n} \times 0.17 + 0.1$
Gear ratio	i	see turret type plate
Motor speed	n rpm	see motor rating plate
Perm. indexing frequency	min^{-1}	6.6 ²⁾
Operating voltage/mains frequency		see motor rating plate
Degree of protection		IP 65
Turret mass (without tool disk)	kg	approx. 14
Perm. ambient temperature range	$^{\circ}\text{C}$ $^{\circ}\text{F}$	+10 ... +40 +50 ... +104

For footnotes and continuation of table see next page

Operating pressure for cooling lubricant ³⁾ :		
Cooling lubricant valve – standard version		
constant supply	bar	7
externally switched supply	bar	14
Medium pressure valve (option)	bar	25

- 1) The adm. loads refer to processing without load shocks. Whenever processing is subject to intermittent cuts, shocks or impacts, a significant reduction in the values needs to be taken into account.
- 2) Depending on the gear ratio and the mains frequency
- 3) In order to achieve an extended service life of the cooling lubricant valve, it is advisable to filter the cooling lubricant by $\leq 100 \mu\text{m}$. Post-connected loads (spindle units with internal cooling lubricant guide a.o.) may require a higher degree of filter fineness. Note and comply with the manufacturer's instructions!

Tool drive			
Mass	kg	approx. 10	
Gear ratio	i	1.0	
Maximum speed	n_{\max} rpm	6,000	
Maximum torque ¹⁾ for duty cycle 100% (S1)	T_{\max} Nm	6	
Suitable for spindle units with shank diameter gearwheel	d mm z m	16 13 1	

- 1) The permissible loads refer to processing without load shocks. Whenever processing is subject to intermittent cuts, shocks or impacts, a significant reduction in the values needs to be taken into account.

3 Manual mode

In manual mode, the mechanical functions of the disk-type tool turret will be checked:

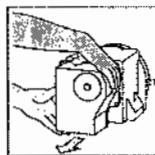
- following initial assembly to the machine
- during troubleshooting
- after a renewed setup following fault conditions



Clearing required prior to any work:

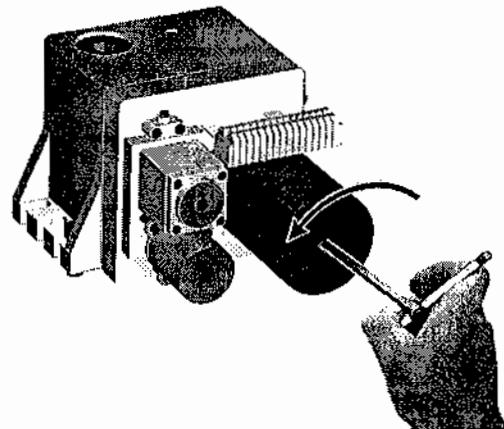
- Switch the machine off.
- Push the motor protection switch for the turret into the OFF position.

1. Undo fixing screws of covering hood, withdraw covering hood to rear.
If necessary, use push-off screw.



2. Remove screw plug on motor housing.

Unlock turret



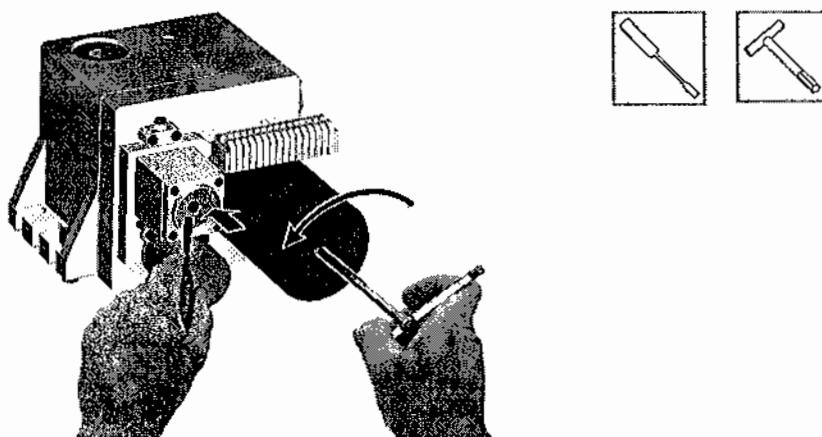
3. Use a hexagonal pin wrench, complete with T-grip, to rotate the motor shaft.
⇒ If the disk-type tool turret is locked, the locating disk (or tool disk) does not co-rotate; the centre position of the lock can be felt.

**WARNING**

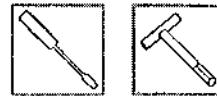
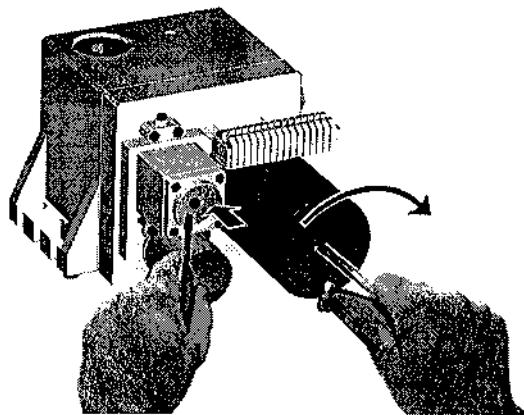
A reversal of the moment of the motor results in the acceleration of the motor shaft. The hexagonal pin wrench may thus be unexpectedly accelerated.

Therefore, in order to avoid the ejection of the and resulting injuries, firmly grip the hexagonal pin wrench.

4. Keep the same direction of rotation, continue to rotate.
⇒ The disk-type tool turret unlocks; a reversal of the moment on the motor shaft can be felt.

Rotate tool disk

5. Keep direction of rotation, continue to rotate disk until locating disk (or tool disk) starts to turn as well.
6. Keep direction of rotation, continue to rotate disk until locating disk (or tool disk) has reached the position required, then press in the keeper by means of a screwdriver.
⇒ The preindexing bolt engages into a hole.
⇒ The tool disk cannot be rotated any further.

Lock turret

7. Reverse direction of rotation on the motor shaft whilst simultaneously pressing in keeper.
⇒ The disk-type tool turret locks.
The lock resistance can be felt when rotation is continued.
The locking process ends, if the centre position of the lock can be felt.

On completion of setup or maintenance work:

8. Screw in plug and fit covering hood.
Note position of cables in order to avoid any pinching of the same.

Lock turret in position 1



IMPORTANT

For some setup and maintenance work the disk-type tool turret has to be locked in position 1.

Precondition

- Numeral 1 of the locating disk has reached its 12 o' clock position relative to the turret base area.
or
- Position 1 of the tool disk is in working position.

1. Use a hexagonal pin wrench, complete with T-grip, and rotate the motor shaft until position 1 has been reached.
2. Press in the keeper by means of a screwdriver and rotate the motor shaft until the disk-type tool turret locks (see above).

4 Maintenance

Turret maintenance comprises the following tasks:

- Cleaning,
- Checking,
- Setting and
- Repair.

4.1 Safety notes

→ *Safety notes, page 6*

4.2 Service intervals

Plan your tasks carefully in order to provide for troublefree operation and reduce necessary downtimes to a minimum.

The service life of the turret is approx. 2–3 million switchings.
This value applies to crash-free operation in compliance with the specified operating conditions and the permissible loads.

→ *Technical data, page 11*

The service life of the tool drive unit is approx. 8,000 hours of operation. This value applies to crash-free operation in compliance with the specified operating conditions and the permissible loads.

Weekly	
Clean turret.	User

After 500 hours of operation	
Check oil of tool drive unit; if necessary, replenish oil. → <i>Page 19</i>	User

After 4,000 hours of operation	
Check cooling lubricant valve for wear and leakage. Replace any defective parts. → <i>Page 27</i>	User
Check oil of the turret gearbox chamber; if necessary, replenish oil. → <i>Page 21</i>	User

After 2½ years

Check all electrical lines and connections for mechanical damage as well as brittleness.
Replace any defective parts.

User
Specialist electrical engineer¹⁾

- 1) According to DIN 31000: A competent specialist person is, whoever "... - due to his specialist training, knowledge and experience as well as knowledge of the relevant regulations - is in a position to evaluate the tasks assigned to him and able to recognize any potential dangers."

After 8,000 hours of operation

Change the oil of the turret gearbox chamber.
→ Page 21

User

The service life of the tool drive unit may possibly be reached, depending on the operating conditions involved.
A general overhaul is recommended for further trouble-free operation.

SAUTER Service

After approx. 2–3 million switchings

The service life of the turret may possibly be reached, depending on the operating conditions involved.
A general overhaul is recommended for further trouble-free operation.

SAUTER Service

Tool drive unit

Maintenance work must be performed on the tool drive unit after 500 hours of operation.



Clearing required prior to any work:

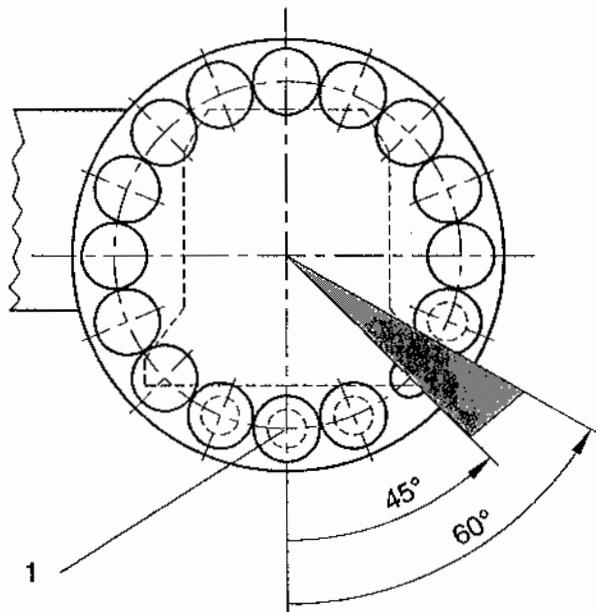
- Switch the machine off.
- Push the motor protection switch for the turret into the OFF position.



IMPORTANT

Improperly disposed used oil is a danger for our environment. Therefore pay attention to the legal regulations for the waste disposal of used oil!

Check oil level



1. Select tool location for driven tools:

The tool location for the oil-level check must remain within the marked area. The angle area is to be measured from tool location (1) in bottom position.

2. Remove spindle unit or closing plug.

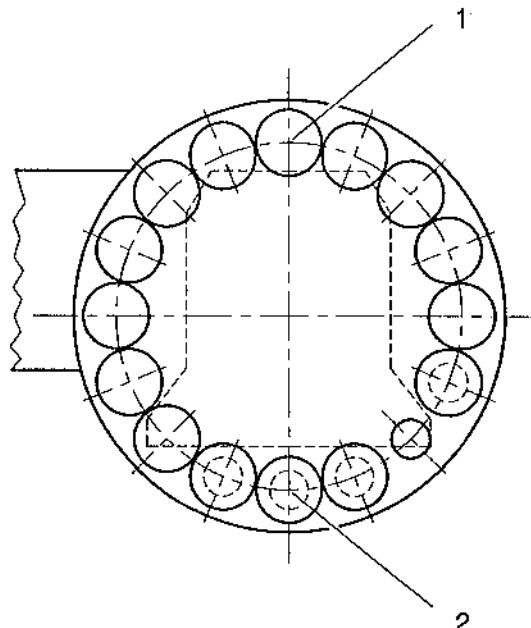


IMPORTANT

The tool drive unit is sufficiently lubricated, when oil flows out of the tool location.

3. If necessary, replenish oil.
 → *Page 20*
4. Reinstall spindle unit or closing plug.

Changing the oil



1. Remove closing plug (2) from tool location in bottom position.
2. Drain used oil.
3. Reinstall closing plug (2).
4. Remove closing plug (1) from tool location in top position.
5. Fill up with oil:

 100 cm ³				
lubricating oil	C	acc. to ISO 6743/6		
viscosity	ISO VG 46	acc. to DIN 51562		

6. Reinstall closing plug (1).



CAUTION

Functional faults may be caused by an ingress of chips and contamination. Close open tool locations and cooling lubricant bores by means of suitable closing plugs.

4.3 Maintenance work

Turret gearbox chamber

The turret gearbox chamber has to be serviced after 4,000 operating hours.



Clearing required prior to any work:

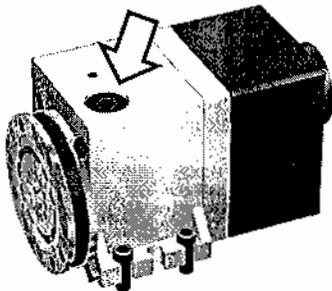
- Switch the machine off.
- Push the motor protection switch for the turret into the OFF position.



IMPORTANT

Improperly disposed used oil is a danger for our environment. Therefore pay attention to the legal regulations for the waste disposal of used oil!

For draining or replenishing oil following aperture is provided:



Checking the oil

- Unscrew screw plug.
- Turn the tool disk and observe the rotating parts in the gearbox chamber.



IMPORTANT

Rotating parts in the gearbox chamber have to be covered with oil.

- If necessary, replenish oil.

Assess oil condition

Condition	Cause	Action
Oil black or brown, without metallic abrasion	Natural consumption	–
Oil black or brown, with metallic abrasion	Internal parts of turret are damaged	
Oil white, mixed with cooling lubricant	Turret sealings are damaged	Request SAUTER Service!
None oil left	Turret sealings are damaged	

Changing the oil


IMPORTANT

The gear oil can be drawn off, if a suitable plant is available.

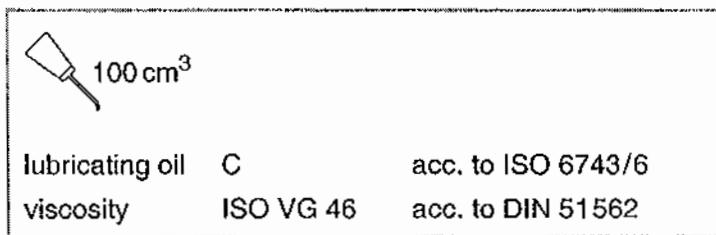
Otherwise the working steps 1–7 have to be carried out.

1. If necessary, remove tool disk.
2. If necessary, remove tool drive unit.
3. Screw in ring bolt on the turret housing up to the contact surface.
Observe load capacity of the ring bolt!
4. Use lifting gear to secure turret on the ring bolt, observe maximum hoisting angle of 45° on the ring bolt!



5. Unscrew the screws on the turret foot.
6. Unscrew screw plug.
7. Drain used oil.

Fill oil



- Screw in screw plug.
- Fit and align turret.
- Fit tool drive unit.
- Fit and align tool disk.
→ *Page 26*

4.4 Repairs after fault conditions



Clearing required prior to any work:

- Switch the machine off.
- Push the motor protection switch for the turret into the OFF position.

Fault	Cause	Remedy	Who carries out this task?
Turret			
Incorrect center height, tool disk offset relative to locating disk	Collision when turret is locked	Turn back tool disk in the annular groove and align	User → Page 26
Tool disk does not rotate	Gearwheels are defective	SAUTER Service	
Turret is difficult to operate (Thermo protection device has responded)	Insufficient oil in the gearbox chamber	Check oil	User → Page 21
	Contactor is defective	Check motor drive	User
Turret no longer locks or the pre-indexing bolt gets caught	Collision during pivoting	SAUTER Service	
Tool disk does not stop in the selected position	Angular encoder is not correctly adjusted or defective	Check angular encoder, set or replace if necessary	User → Page 28, page 30
	Proximity switch S7 does not switch	Check proximity switch S7, set or replace if necessary	User → Page 32
Tool disk stops in between two positions	Chips between tool disk and turret	Remove tool disk, remove chips	User
Leakage oil escapes	Defective seals	SAUTER Service	

Fault	Cause	Remedy	Who carries out this task?
Cooling lubricant is not being transferred	Cooling lubricant valve is defective	Replace cooling lubricant valve	User → Page 27
	Cooling lubricant valve/line is blocked	Blow cooling lubricant valve/line clear	User → Page 27
Cooling lubricant escapes between tool disk and turret	Cooling lubricant valve is defective	Replace cooling lubricant valve	User → Page 27
Tangential play of tool disk when turret is locked	Collision while turret is locked	SAUTER Service	
	Wear due to lack of oil	SAUTER Service	
Tool drive			
Tool is not driven	Gearwheels are defective	SAUTER Service	
	Tool drive motor is defective	Replace tool drive motor	User



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4.5 Aligning the tool disk

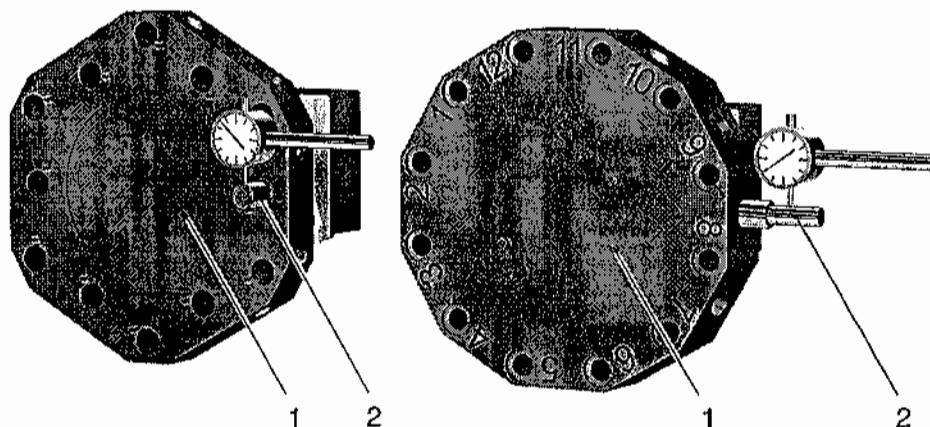
Preparation



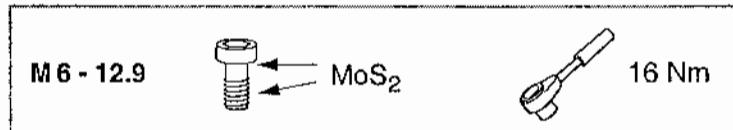
Clearing required prior to any work:

- Switch the machine off.
- Push the motor protection switch for the turret into the OFF position.
- Lock turret.
→ *Manual mode, page 13*

Aligning



- If necessary, undo screws (1).
- Align the locating hole to center height of the machine; use a plug gauge (2) if required.
- Tighten screws (1).



4.6 Replacing the cooling lubricant valve¹⁾

The cooling lubricant valve is a wearing part and has to be serviced after 4,000 hours of operation.



Clearing required prior to any work:

- Switch the machine off.
- Push the motor protection switch for the turret into the OFF position.

Who carries out this task?

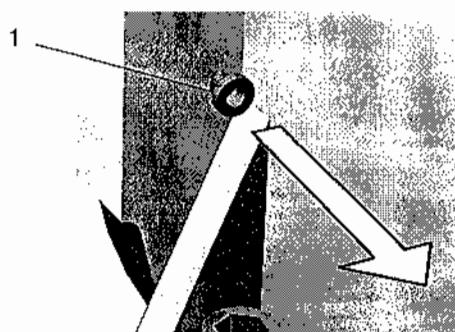
User

Checking

Check whether cooling lubricant emerges between tool disk and turret.

- If necessary, replace defective parts or the entire cooling lubricant valve.

Replacing



- Unscrew screw (1).



- Take out spring.

- Dismantle valve bush.



- Replace defective parts,

→ Page 39

- Insert the valve bush, and ensure it snaps into place.

- Insert spring.

- Screw in screw (1).

1) Customized versions may also differ from the present version.

4.7 Adjusting the angular encoder



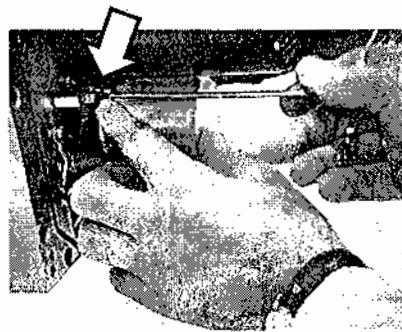
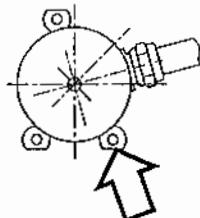
IMPORTANT

Setting tasks require a 24V DC power supply.

Preparation

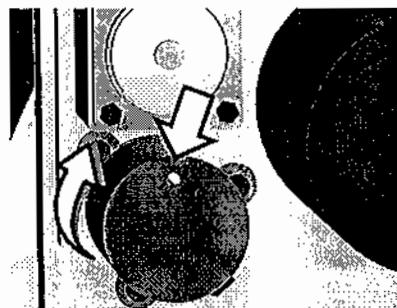
- Lock disk-type tool turret in position 1.

→ *Manual mode, page 13*



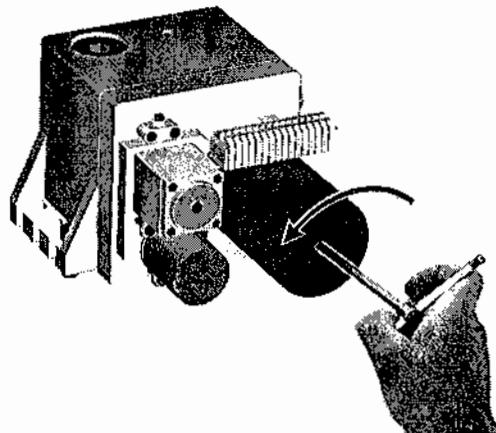
- Undo claws by means of a hexagonal pin wrench.

Adjusting



- Rotate angular encoder out of position until illuminated diode lights up.
- Clamp in angular encoder by means of the claws.

Checking the setup for symmetry



1. Use hexagonal pin wrench with T-grip for rotating the motor shaft.
2. Rotate motor shaft until illuminated diode on the angular encoder or the indication "Position 1" on the machine are extinguished.
3. Note the T-grip position.

**WARNING**

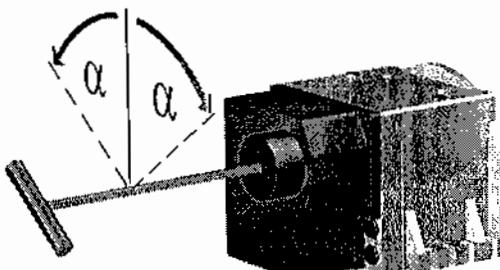
A reversal of the moment of the motor results in the acceleration of the motor shaft. The hexagonal pin wrench may thus be unexpectedly accelerated.

Therefore, in order to avoid the ejection of the and resulting injuries, firmly grip the hexagonal pin wrench.

4. Carefully continue to rotate until a moment reversal can be felt on the motor shaft.
5. Note the T-grip position.

The distance between the two grip positions characterizes the angle range.

6. Repeat steps 1 to 5 with reverse direction of rotation. The angle α must be the same for both directions of rotation!



By turning the angular encoder out of position, any dissymmetry can be removed.

4.8 Replacing the angular encoder

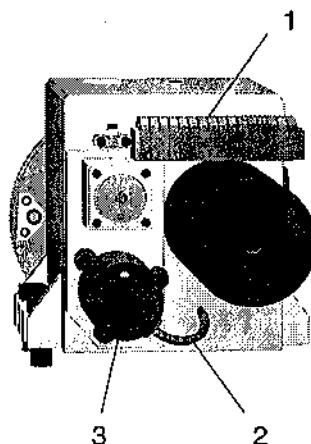


IMPORTANT

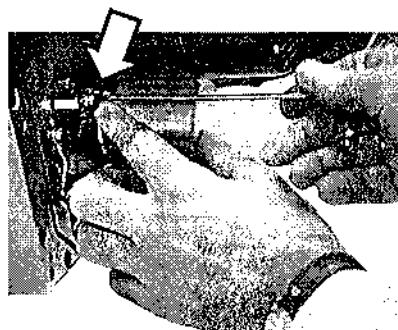
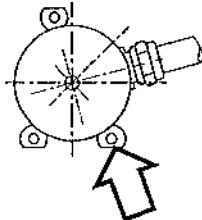
Setting tasks require a 24V DC power supply.

Preparation

- Lock disk-type tool turret in position 1.
→ *Manual mode, page 13*



- Note the position of the cable outlet (2) on the angular encoder (3), remove attachment.
- Undo cables on terminal strip (1) (note where they are connected).



- Undo claws by means of a hexagonal pin wrench.

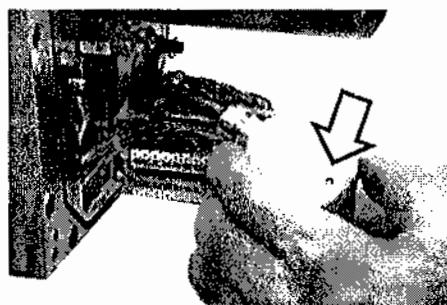
Replacing

- Carefully withdraw angular encoder.

On the shaft of the angular encoder, a gearwheel is located which is fixed in position by means of a setscrew.

- Undo setscrew and remove gearwheel.

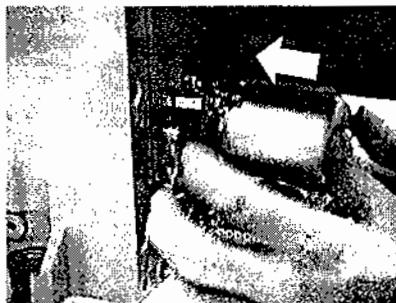
- Connect new angular encoder electrically.
 - *Wiring diagram: Disk-type tool turret EPB - 1128 e in the appendix to these Operating Instructions*
- Fit gearwheel.



- Rotate shaft of the angular encoder until the illumination of the LED on the angular encoder indicates the "Position 1" setting. This indication must remain whilst the following steps are carried out.

IMPORTANT

The LED is used only to indicate position 1 during the adjustment work. It is no position indicator during operation.



- Ensure that the cable outlet is in its correct position.
- Insert the angular encoder, note the position of the claws.
- If necessary, check the adjustment of the angular encoder.
 - Page 28
- Use claws to secure the angular encoder.
- Fit covering hood. Note position of cables in order to avoid any pinching of the same.

4.9 Proximity switch S7



IMPORTANT

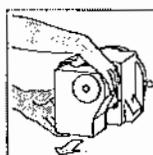
Setting tasks require a 24V DC power supply.



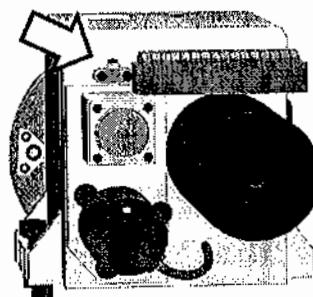
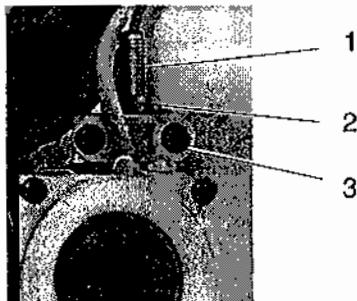
Clearing required prior to any work:

- Switch the machine off.
- Push the motor protection switch for the turret into the OFF position.

- Undo fixing screws of covering hood, withdraw covering hood to rear. If necessary, use push-off screw.

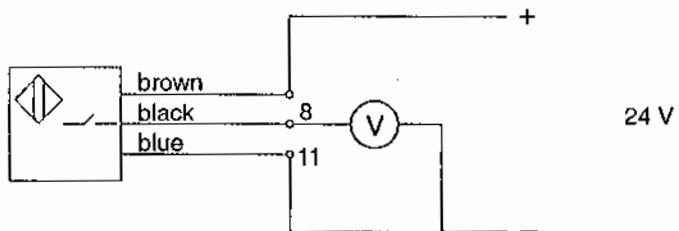


Replacing



- Undo clip (3) and withdraw proximity switch (1) from eccentric bush (2).

Checking

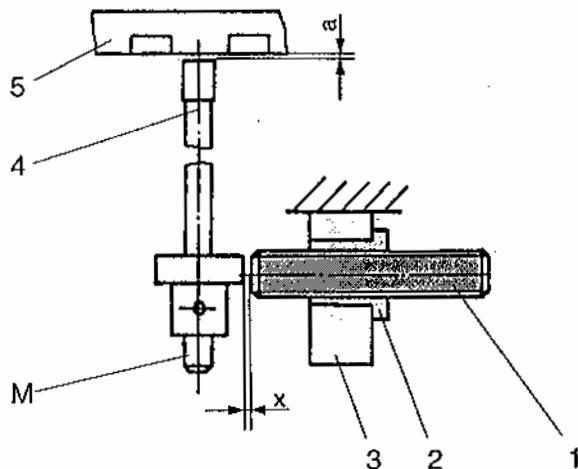


H-Signal \geq 90% of rated voltage

- Apply a voltage of 24 V DC to the proximity switch (1).
The proximity switch is energized when the LED lights up.
- Insert tested/new proximity switch (1).

Adjusting

- Unlock disk-type tool turret.
→ *Manual mode, page 13*
- Move disk-type tool turret into a location between two positions.
If the keeper (M) is operated, the preindexing bolt (4) can be pressed in partially only.



- Set switching distance $x = 0.3 - 0.5$ mm.
- Determine dimension a.
 $a = \text{stroke of the preindexing bolt (4) up to the damping ring (5) when the solenoid is operated manually}$
(corresponds to the press-in depth of the keeper (M)).

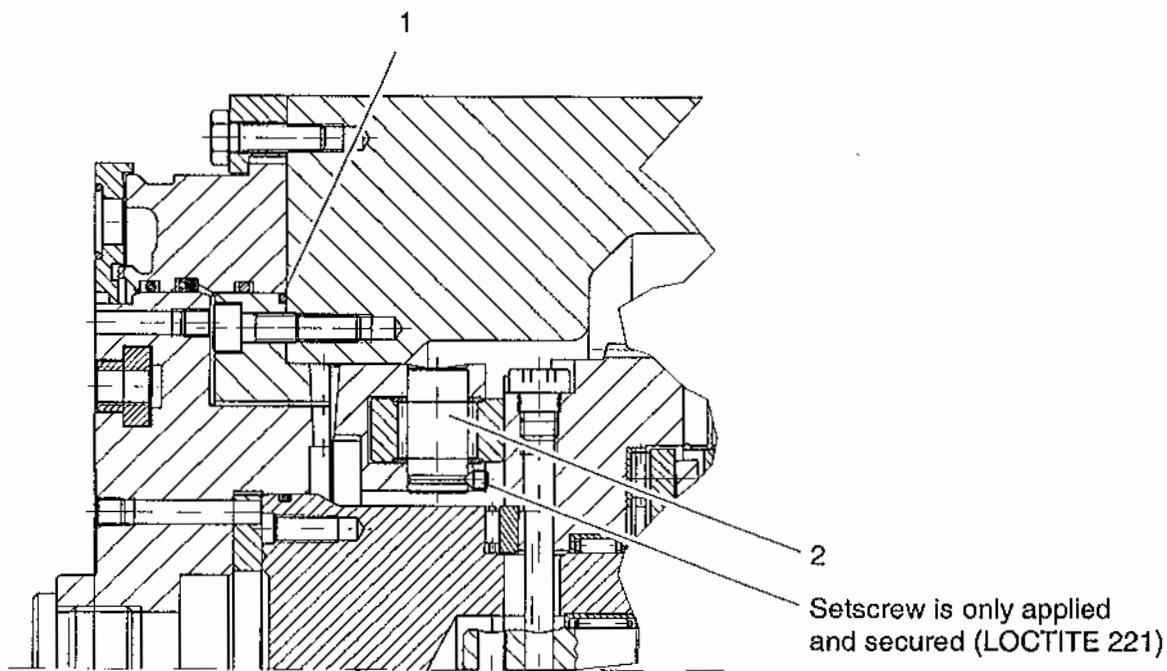
- Adjust proximity switch (1) on eccentric bush (2) such that its signal begins to drop after a + 2^{+0,5} mm immersion depth of the preindexing bolt.
Any greater immersion depth may cause the motor to be blocked.
- Tighten clip (3).
- Fit covering hood. Note position of cables in order to avoid any pinching of the same.

Function test

- Switch on turret.
- Check switching process repeatedly.

5 Replacement parts

5.1 Indexing unit



IMPORTANT

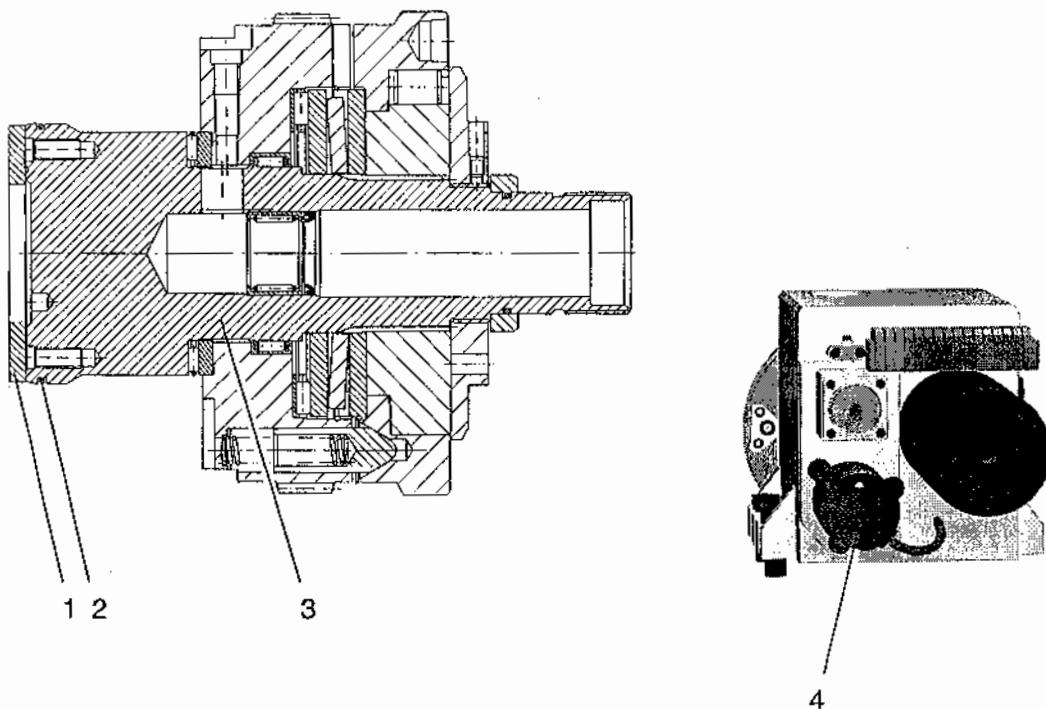
Only use the order form if you wish to order any replacement parts!

No.	Ident No.	Designation	Qty.
1	085 074	O-ring seal	1
2	106 469	Replacements parts group, indexing	3

IMPORTANT

Request assembly guideline MR 02.025!

5.2 Clamping and angular encoder

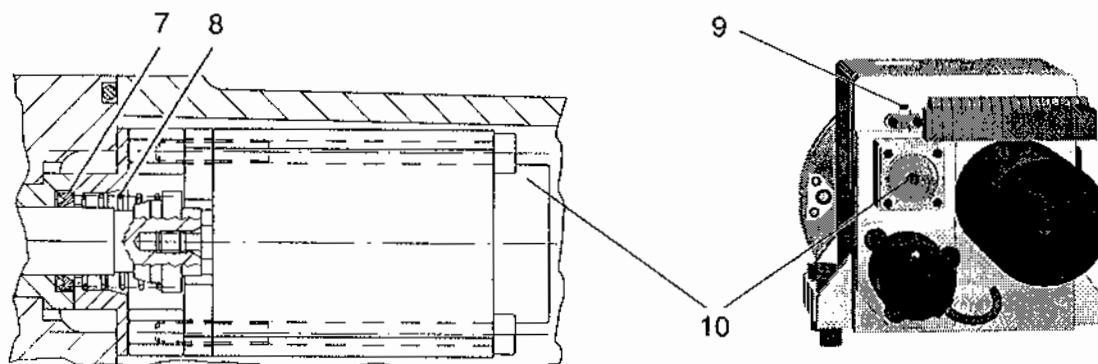
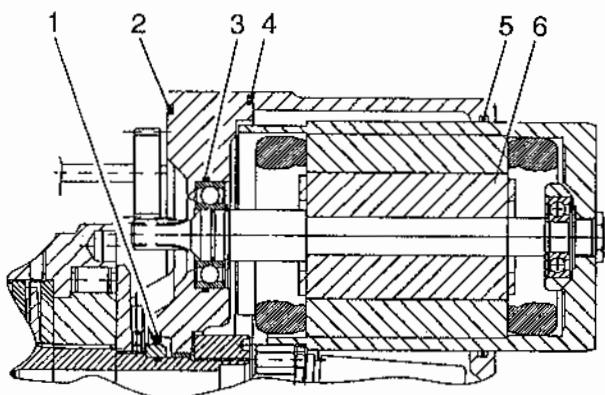


IMPORTANT

Only use the order form if you wish to order any replacement parts!

No.	Ident No.	Designation	Qty.
1	066 252	Disk (for tuning)	1
2	060 302	O-ring seal	1
3		Replacement parts group, clamping	1
	IMPORTANT	Request assembly guideline MR 02.025!	
4	105 500	Angular encoder	1

5.3 Gear, drive, pre-indexation



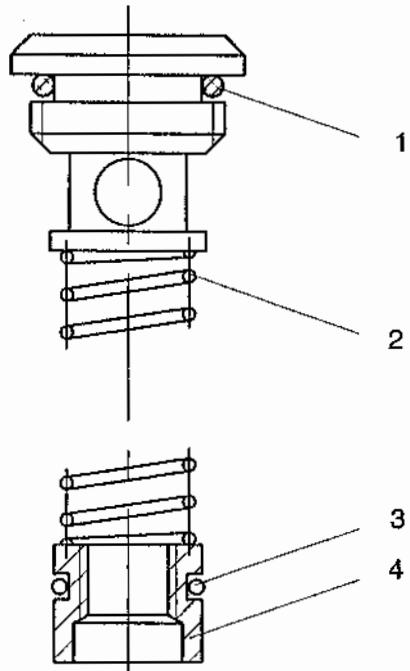
IMPORTANT

Only use the order form if you wish to order any replacement parts!

No.	Ident No.	Designation	Qty.
1	068 206	Sealing ring	1
2	058 665	O-ring seal	1
3	001 020	O-ring seal	1
4	063 827	O-ring seal	1
5	060 303	O-ring seal	1

No.	Ident No.	Designation	Qty.
6		Fitted motor (will be supplied complete with housing and bearing) Data according to the motor's nameplate: 	1
7	039 473	Sealing ring	1
8	065 754	Helical compression spring	1
9	069 669	Proximity switch	1
10	066 293	Solenoid	1

5.4 Tool drive: Cooling lubricant valve¹⁾



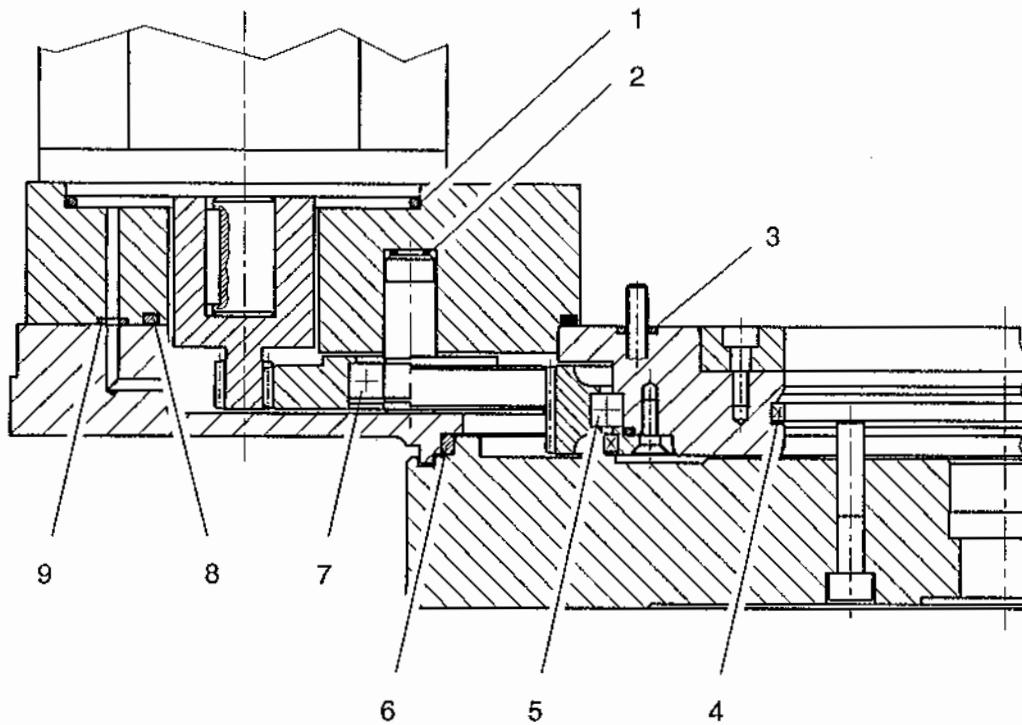
IMPORTANT

Only use the order form if you wish to order any replacement parts!

No.	Ident No.	Designation	Qty.
1	060 667	O-ring seal	1
2	031 115	Helical compression spring	1
3	060 668	O-ring seal	1
4	066 819	Bush	1

1) Customized versions may also differ from the present version.

5.5 Tool drive



IMPORTANT

Only use the order form if you wish to order any replacement parts!

No.	Ident No.	Designation	Qty.
1	066 853	O-ring seal	1
2	000 968	O-ring seal	1
3	061 134	O-ring seal	1
4	066 299	FU groove ring	1
5	076 681	Ball bearing	1
6	044 204	FU groove ring	1
7	026 649	Ball bearing	1
8	060 303	O-ring seal	1
9	000 968	O-ring seal	1



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service@sauter-gmbh.com



Service
SAUTER Feinmechanik GmbH
Postfach 1551
D-72545 Metzingen
Germany

Company:

Street:

Postal Code
City:

Name:

Tel.:

Fax:

Assembly	Ident No.	Designation	Qty.



Read off the following data from the type plate and always complete.

Typ	
Ident-Nr.	
Com. Nr.	

We will be pleased to answer your enquiries and receive your feedback information.

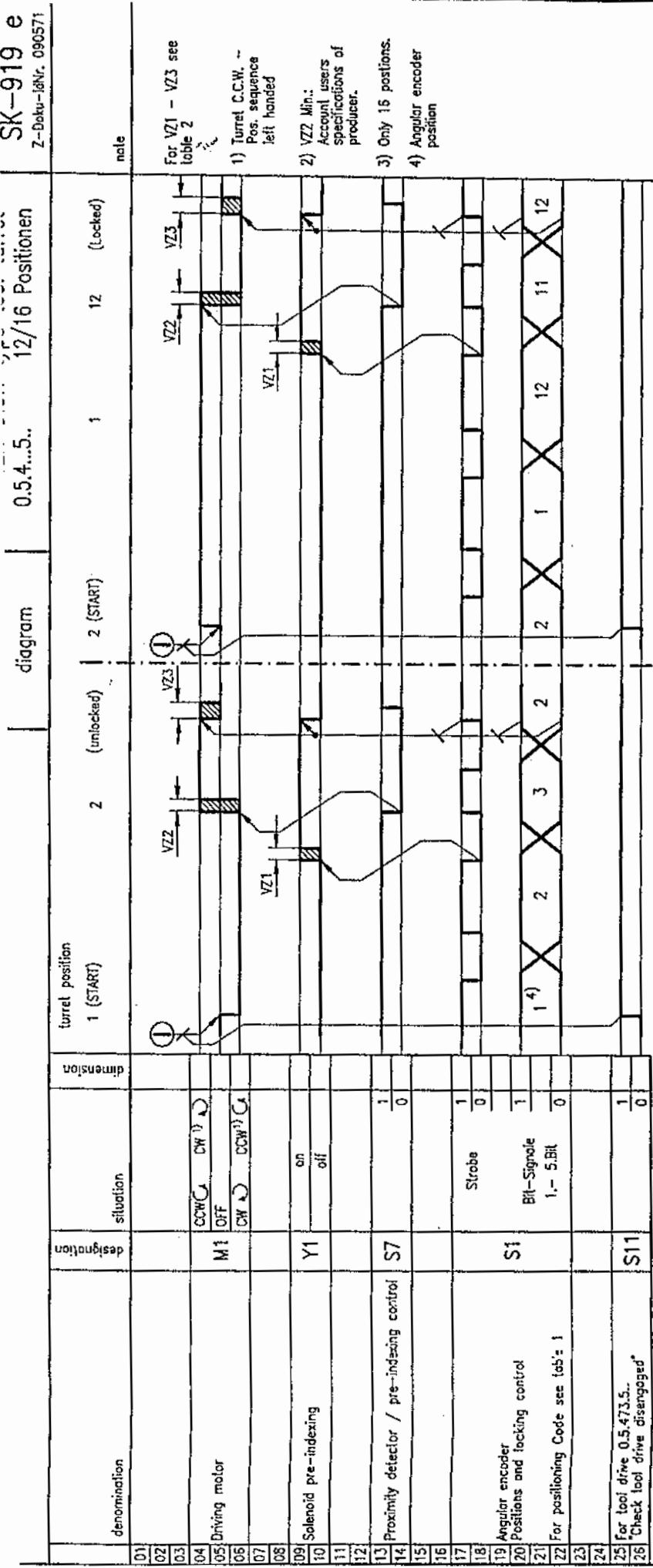


Table 1

Funktion	Angular encoder position															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Strobe	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1.BR	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0
2.BR	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0
3.BR	0	0	0	1	1	1	1	0	0	0	0	1	1	1	0	0
4.BR	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0
5.BR	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
Sanity Check	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Legend for connections:

- > C
- > C
- > C
- > C

Table 2

	Min.	Max.
Admissible delay time	VZ1 (ms) VZ2 (ms) VZ3 (ms)	20 60 40

SAUTER Feinmechanik GmbH
D-7255 Metzingen
Germany

Edition: 00.07.25 N

Datum: 17.03.89

Sez.: 9971

SAUTER

denomination	situation	turret position	diagram	0.54...5..	8/10 Positionen
01					
02					
03					
04	Driving motor	CCW C CW 1) ↘ OFF			
05		CW ↗ CCW 1) C			
06					
07					
08					
09	Solenoid pre-indexing	Y1 on off			
10					
11					
12					
13	Proximity detector / pre-indexing control	S7 1 0			
14					
15					
16					
17		Strobe 1 0			
18					
19	Angular encoder	S1 Bit-Signale 1.- 4.Bit			
20	Positions and locking control	1 0			
21	For positioning Code see table 1				
22					
23					
24					
25	For tool drive 0.54/3.5..	S11 1 0			
26	*Check tool drive disengaged*				

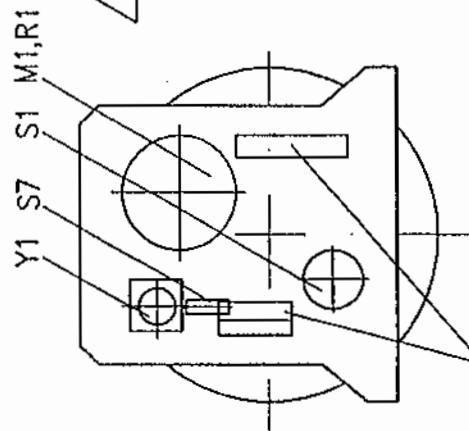
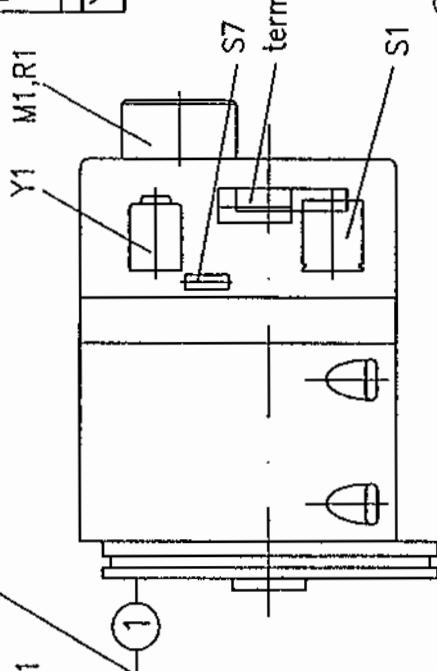
- 1) Turret C.C.W. -
Pos. sequence
left handed
- 2) VZ2 Min.:
Account users
specifications of
producer.
- 3) Angular encoder
position

- 1) VZ1 - VZ3 see
table 2

Table 1

Funktion	Angular encoder position								Mn.	Max.
	1	2	3	4	5	6	7	8		
Strobe	1	1	1	1	1	1	1	1	30	30
1.Bit	1	0	1	0	1	0	1	0	60	60
2.Bit	0	1	1	0	0	1	1	0	40	40
3.Bit	0	0	0	1	1	1	0	0		
4.Bit	0	0	0	0	0	0	1	1		
Parity-Check	1	1	0	1	0	0	1	1		
	0	0	0	0	0	0	0	1		
	0	0	0	0	0	0	1	0		
	0	0	0	0	0	1	0	0		
	0	0	0	0	1	0	0	0		
	0	0	1	0	0	0	0	1		
	0	1	0	0	0	0	1	0		
	1	0	0	0	0	1	0	0		
	0	0	0	1	0	0	0	1		
	0	0	1	0	0	0	0	1		
	0	1	0	0	0	0	1	0		
	1	0	0	0	0	1	0	0		
	0	0	0	1	0	0	0	1		
	0	0	1	0	0	0	0	1		
	0	1	0	0	0	0	1	0		
	1	0	0	0	0	1	0	0		
	0	0	0	1	0	0	0	1		
	0	0	1	0	0	0	0	1		
	0	1	0	0	0	0	1	0		
	1	0	0	0	0	1	0	0		
	0	0	0	1	0	0	0	1		
	0	0	1	0	0	0	0	1		
	0	1	0	0	0	0	1	0		
	1	0	0	0	0	1	0	0		
	0	0	0	1	0	0	0	1		
	0	0	1	0	0	0	0	1		
	0	1	0	0	0	0	0	1		
	1	0	0	0	0	1	0	0		
	0	0	0	1	0	0	0	1		
	0	0	1	0	0	0	0	1		
	0	1	0	0	0	0	0	1		
	1	0	0	0	0	1	0	0		
	0	0	0	1	0	0	0	1		
	0	0	1	0	0	0	0	1		
	0	1	0	0	0	0	0	1		
	1	0	0	0	0	1	0	0		
	0	0	0	1	0	0	0	1		
	0	0	1	0	0	0	0	1		
	0	1	0	0	0	0	0	1		
	1	0	0	0	0	1	0	0		
	0	0	0	1	0	0	0	1		
	0	0	1	0	0	0	0	1		
	0	1	0	0	0	0	0	1		
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	1	0	0	0	0	1	0	0		
	0	0	0	1	0	0	0	1		

designing-	Element/Function	Line	\overline{E}	\overline{X}	cable 14x0,14 mm ²	cable 12x0,75 mm ²	Type	Supply
S1	Angular encoder	brown (+) blue (-)	12	11	brown blue			
	⑤	1.Bit white 2.Bit yellow 3.Bit green 4.Bit blue 5.Bit grey	1	2	white yellow green			
	Stroke block	4	5	6	grey black			
	Parity pink	7			black pink			
	screen transparent	13			transp.P.			
S7	Proximity-Detector control pre-indexing	brown (+) blue (-)	12	11			BES S15-324-E4-C-01	Belluffi
		block	8	9	red			
R1 ①	Temperature limiter Bimetal cutoff	blue	14			4	CIB-130B-300/300 1,6A 24VDC/1,6A 250V	
M1	3-Phase A.C. Motor release-indexing-locking	blue	15			5		
Y1	Solenoid pre-indexing	Ground	V1	V1		1		
		brown (+) blue (-)	16	17		2		
			1			3		
						8		
						9		
						10		
						yellow-green		
						6	24V DC; 2,0A	Schultz
						7	40%ED;	

Mechanical and electrical
Position 1

- ① In normal state the temperatur limiter contacts are closed.
- ③ Diode 1N4006 (mounted to terminals).
- ④ depending on the turret's outfit.
- ⑤ for 16/24 positions only.

②	Motor M1 (6 wires) Connection to terminals	increasing positions sequence cw	Technical Data of:	S1	S7
low voltage	high voltage	U1 W1 U2 W2 U3 W3 U4 W4 U5 W5 U6 W6	Operating voltage: Max. residual ripple: Max. load current: Nom. sensing distance: Temperature range: Function: Type:	15-30 V DC 10% 40mA 1mm 0° bis +60°C -20° bis +65°C n.o. (make) function pnp logic	10-24V DC 10% 200mA 1mm 0° bis +60°C -20° bis +65°C n.o. (make) function pnp logic

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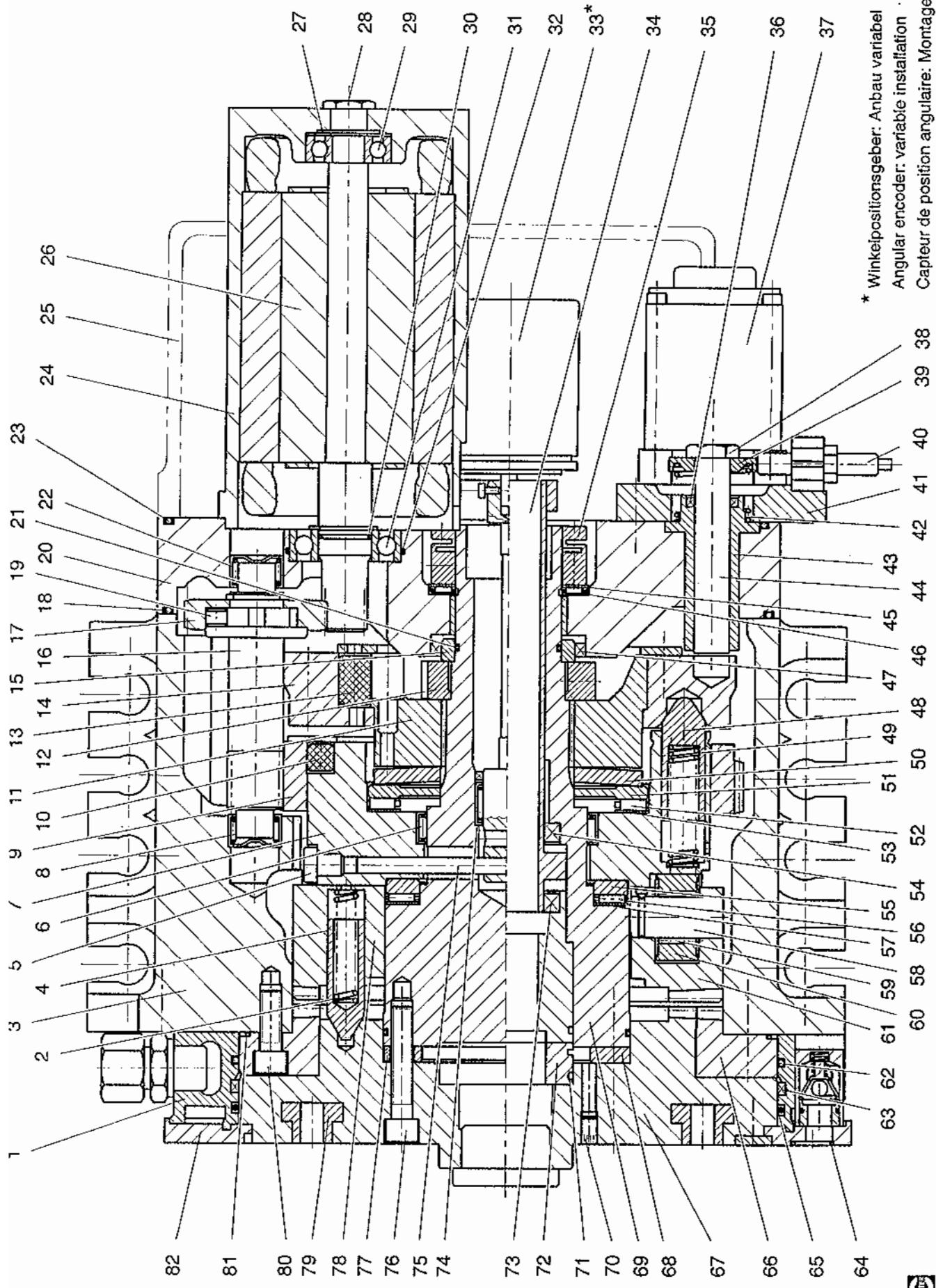
Edision
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STRUTTER 00.03.03

gesp:
STRUTTER 00.03.03

0.5. 480

* Winkelepositionsgeber: Anbau variabel
Angular encoder: variable installation
Capteur de position angulaire: Montage variable



FRÄUTER