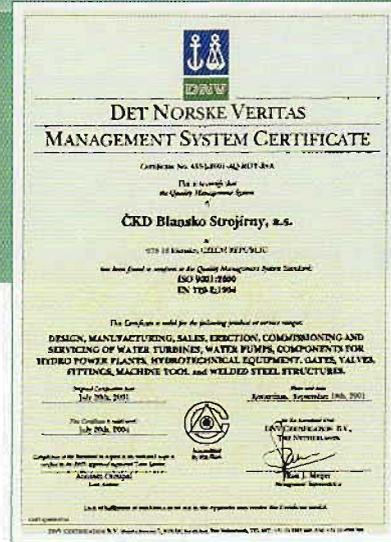
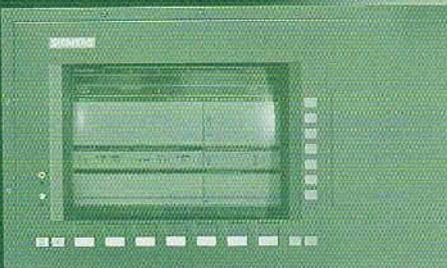


HEAVY DUTY VERTICAL LATHES

SKJ
SKD



CKD[®]
BLANSKO



MANUFACTURING PROGRAMME

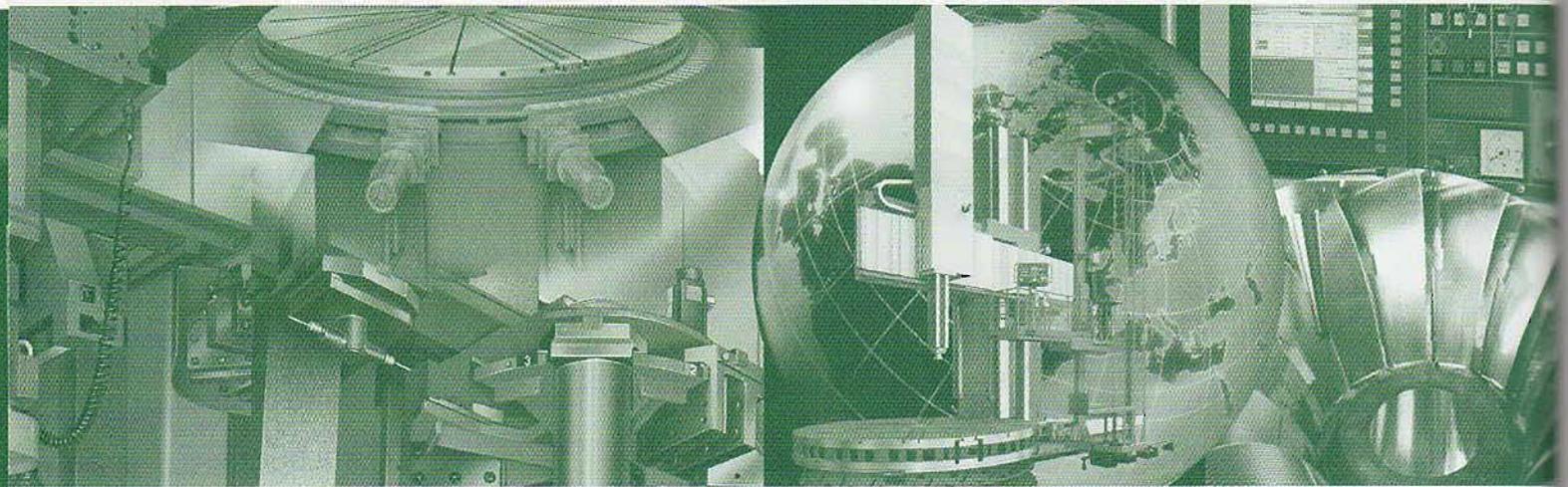
- SKJ 32-63 D
- SKD 32/35 D
- SKD 40/47 D
- SKJ 50-100 D
- SKD 50/53 D
- SKD 63/65 D
- SKJ 80-160 D



The **ČKD Blansko Strojírny, a. s.** company ranks among the engineering companies with a rich historical tradition. The beginnings of the engineering production in the place of present company go back to 1689. Present name of ČKD company dates from 1927. Besides water turbines, the main long-term assortment of the ČKD Blansko Strojírny company, a. s. includes especially heavy duty vertical lathes. They are exploited by the company itself for the produc-

tion of rotation parts of water turbines which considerably contributes to operation trials of their technological parameters and possibilities, their reliability and to the collection of experience and knowledge serving for their future development. Since April 1994, the ČKD Blansko Strojírny, a. s. company holds the quality certificate ISO 9001 : 2000.





The production programme of heavy duty vertical lathes of the ČKD Blansko Strojirny, a. s. company includes:

- single-column type SKJ designed for the machining of parts within the maximum diameter range 3,200 - 16,000 mm, within the maximum height range 2,500 - 6,300 (6,500) mm and within the maximum weight range 50 - 320 (450) t
- double-column type SKD designed for the machining of parts within the maximum diameter range 3,500 - 7,000 mm, within the maximum height range 2,500 - 4,500 mm and within the maximum weight range 50 - 100 (250) t

Field of application

- Depending on their equipment, single-column and double-column types of vertical lathes permit:
- in the turning mode
 - turning the frontal, cylindrical, conical and general rotation inner and outer surfaces
 - turning the inner and outer threads

- on the cylindrical and conical surfaces, with constant and variable lead
- frontal and peripheral grinding of frontal and cylindrical, inner and outer surfaces (machines equipped with grinding attachment) in the milling mode
- milling the surfaces and co-axial slots with the head feed (axis X or Z) or with the rotation feed of the table (axis C)
- milling the eccentric slots and general forms with the interpolation of axes X, Z and C
- drilling and boring openings in the axis and outside the axis of the table with the usage of a precise positioning
- thread cutting in the axis and outside the axis of the table
- milling, boring and cutting the threads under various angles towards

the axis of the table (machines equipped with angular milling head)

Thanks to the possible attachments, the machines may be considered as multi-professional machining centres.



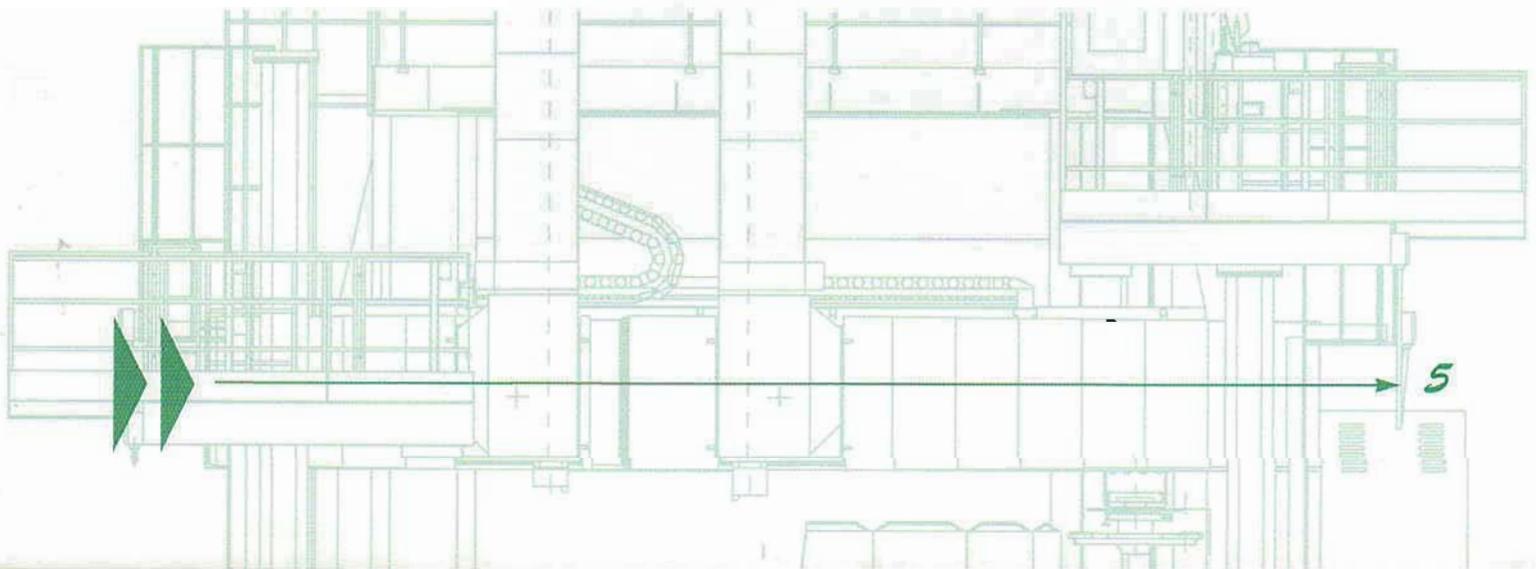
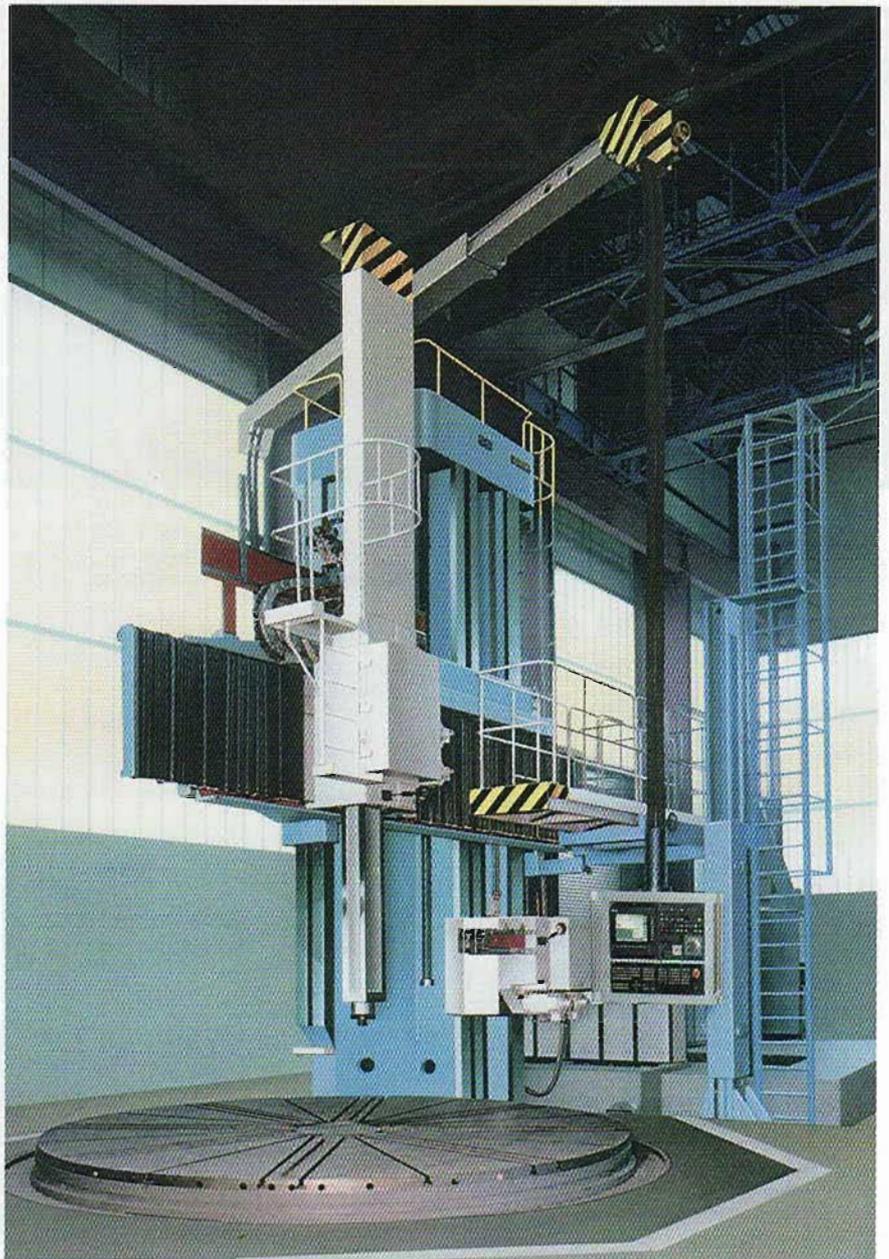
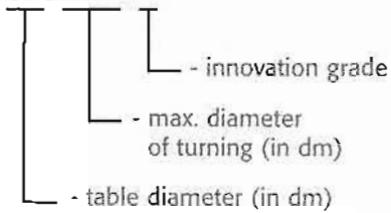
Single-column types

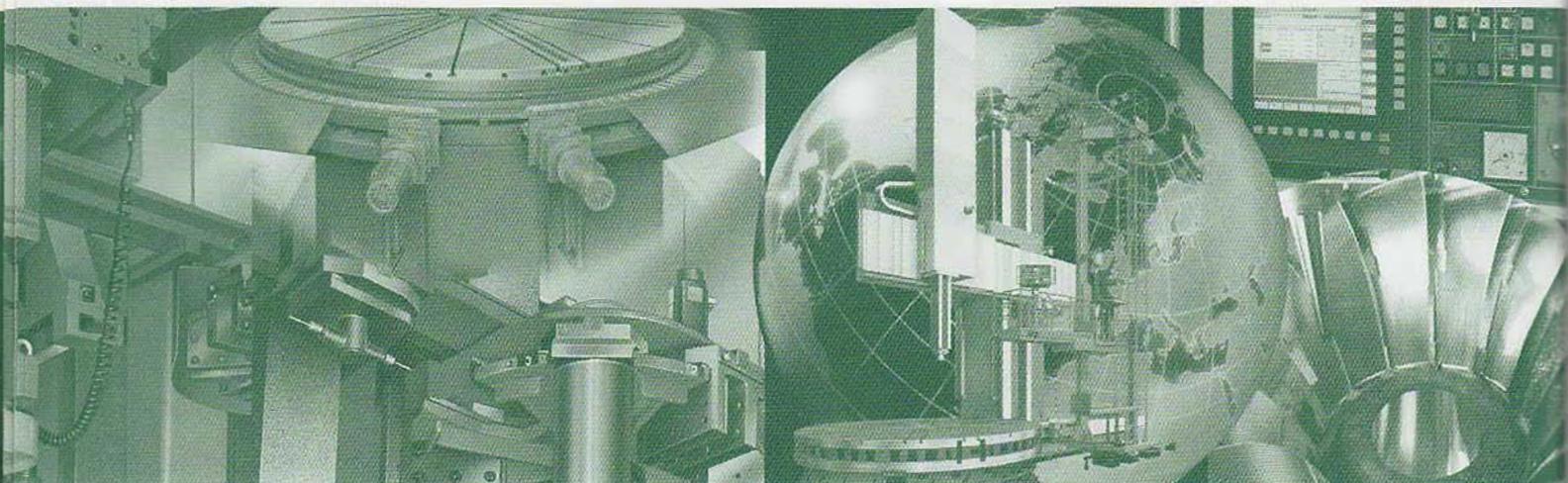
designed with movable column and cross rail, rail head and side head (optional extras). They permit to turn pieces within large scope of diameters with the most advantageous position of column permitting to exploit the side head better. These types are convenient especially for turning the annular pieces with large outside diameter that do not require machining of the centre.

Marking of the machines:

single-column vertical boring
and turning mill

SKJ XX-XXX X





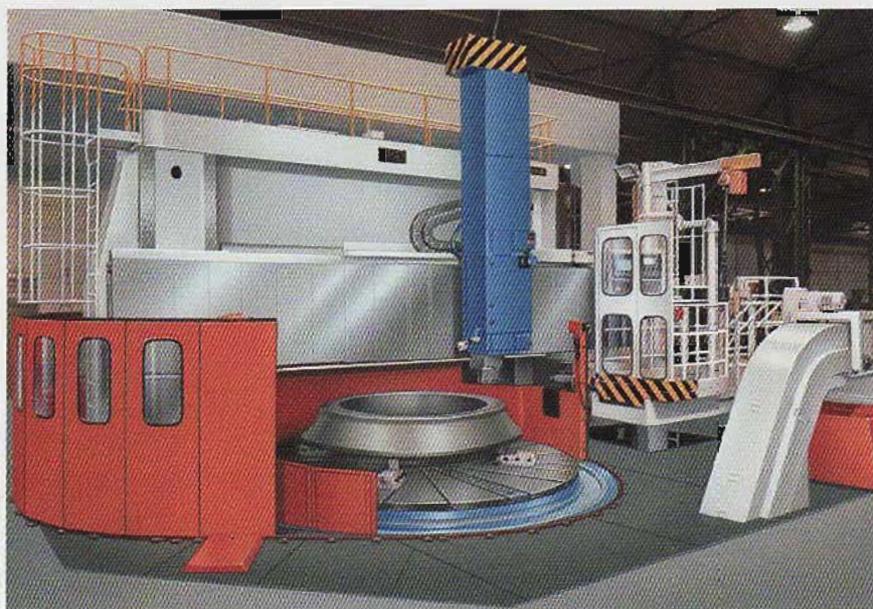
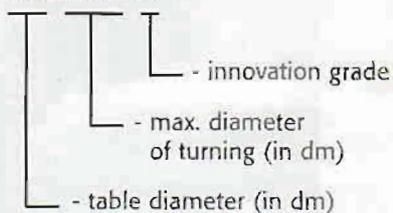
Double-column types

designed with movable cross rail, right head and left head (optional extras). Closed portal frame of the double-column vertical boring and turning mill is highly rigid which permits to achieve high output and precision machining.

Marking of the machines:

single-column vertical boring and turning mill

SKD XX/XX X



Application features

Single-column and double-column types of vertical lathes consist of modular basic parts and devices, permitting to create, beside standard machines, also special types of machines depending on specific requirements of the customers. The design solution of machines guarantees:

- achievement of stated technological parameters in all operational modes
- stability of geometric and working precision
- rich technological and automation possibilities

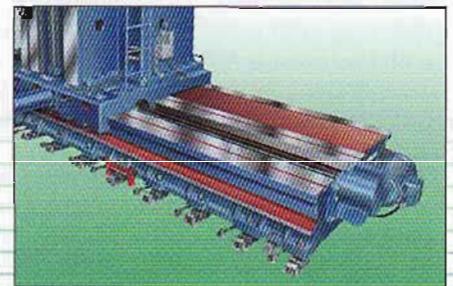
The main construction units and devices of standard types have the following design features:

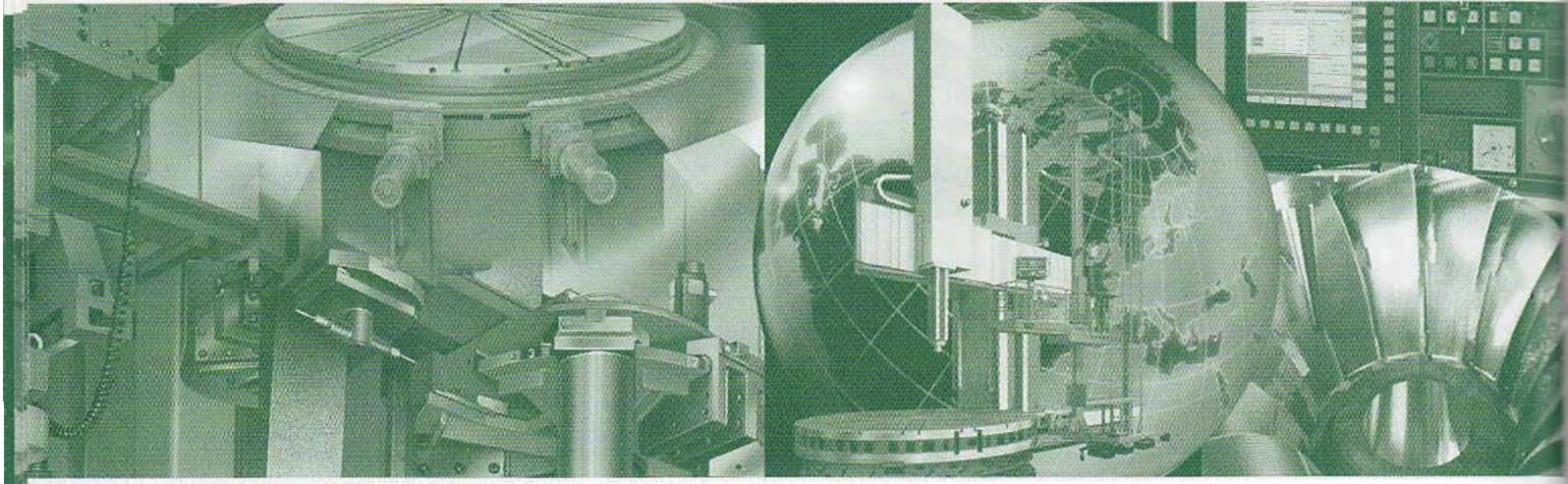
Frame

- in single-column types, it consists of horizontally movable column and vertically movable cross rail with supporting arm
- in double-column types, it has the form of a portal consisting of right and left columns with fixed top connection by spacing bridge and height-adjustable cross rail on the slide ways of columns
- the main parts of frames are of rigid cast iron
- height adjustment of the cross rail by means of movement screws with check of nut wear
- cross rail is equipped with positioning device for defined steps indexing of the cross rail
- set position fixation of the cross rail

by means of hydraulically controlled clamping

- compensation of deflection and twist of the cross rail by profiling of slideways and by digital deflection compensation
- lining of slide ways on the cross rail by hardened steel strips
- independently of the table, the frame is anchored by foundation bolts to the base through levelling wedge-shaped blocks
- by the change of height of the frame towards the table in the machine base, the machine may be adapted to the required height of work-piece





Heads

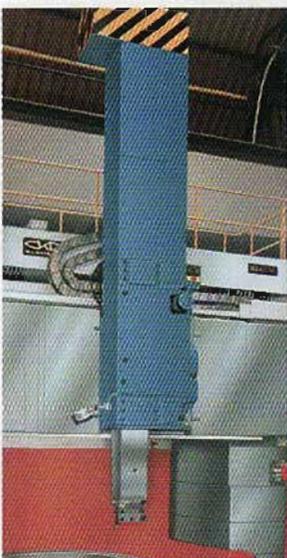
- consist of two parts – slide and head box (grey cast iron castings)
- hardened steel ram
- slide way with pressure lubrication and slide way of ram with low passive resistance
- independent feed mechanisms with AC servomotors, epicyclic gears and ball screws with pre-loaded nuts for the ram and head feed
- direct feed measurement with linear scales
- motor-controlled swivelling of head box with the ram
- central lubrication
- hydraulically counterbalanced ram

Main drive

- double-step gearbox
- spur helical gears
- vertical flanged AC spindle motor

Table base

- main parts, table, bed and pinion box are from cast iron or from cast steel and forged pieces
- axial arrangement of the table is hydrostatic with constant quantity of oil in each pocket
- pre-loading of axial arrangement by means of an anti-friction bearing placed at the centre of the table
- slide way on the table lined with a sliding plastic material
- radial arrangement by means of a double-row roller bearing with backlash elimination
- anchored to the base independently of the frame through levelling wedge-shaped blocks by means of foundation bolts



Operator's platform

- located on the right side of the machine, independently movable in the vertical and horizontal directions
- in the front part of the platform, there is a swivelling main control panel (may be located on the operator's platform or on the floor next to the machine)
- covering of the operator's place and security locks on the entrance door comply with the requirements of the regulation EU 98/37/EC

Control and electrical equipment

- standard type for the voltage 3x400 V and frequency 50 Hz, possible adaptation to other voltages and frequencies
- CNC system (standard SINUMERIK 840 D, DE) with colour display, equipped with a software for management of required number of axes and spindles, hard disc, disc unit, compensation of backlash, measurement and deflection, control of con-

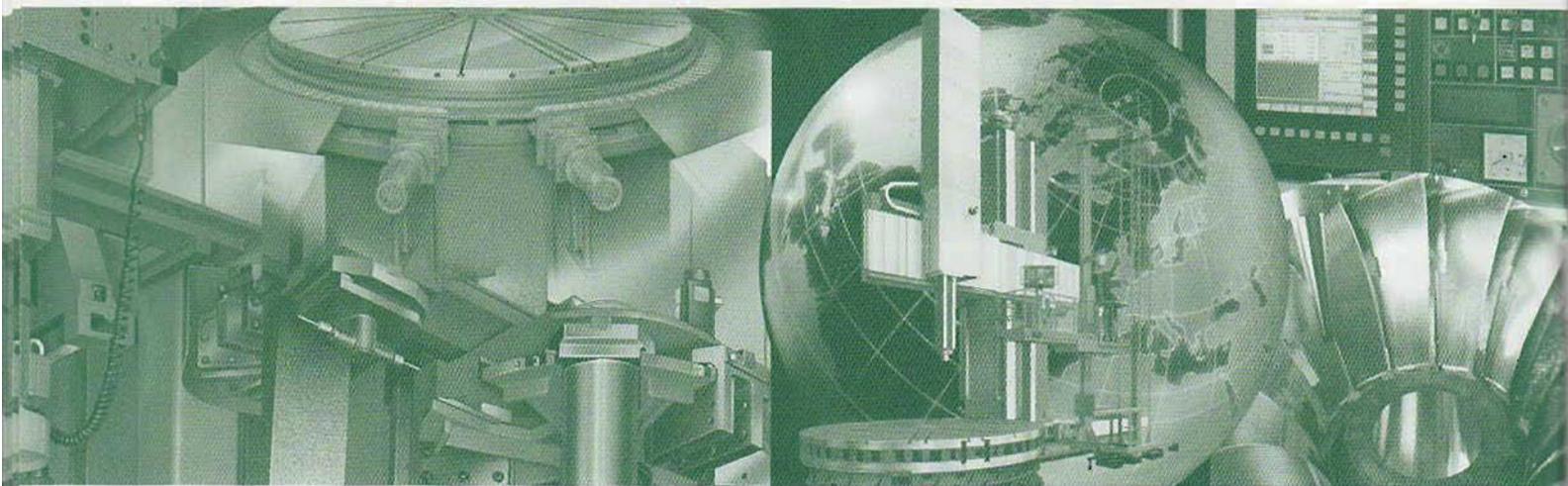
stant cutting speed and necessary options

- AC motor for the driving the table as a main spindle
- AC servo-drives for linear axes X, Z, X2, Z2
- electric cabinets with security and control devices, transistor converters, CNC control unit and PLC modules, air-conditioned
- central control panel with display and control elements for the control of CNC and the machine
- handheld control panel for the setting of the machine in the manual mode, connected by cable to the central panel
- electrical equipment complies the standard EN 60 204-1
- the machine equipment comply with the requirements of the regulation 73/23/EEC for the low-voltage devices and with the regulation 89/336/EEC about electromagnetic compatibility

Hydraulic devices

- hydraulic set for the hydrostatic axial arrangement of the table with delivery of constant quantity of oil into the individual pockets, possible oil cooling (upon special request)
- pressure hydraulic set with a closed circuit for the control of auxiliary functions of the machine
- lubricating hydraulic set for the centralised lubrication of slide ways
- set for the lubricating screws of cross rail lifting
- hydraulic set for the circulating lubrication of the main drive
- all the sets are equipped with diagnostic elements, service and error statuses are indicated on the display of CNC control system in the form of alarm end messages





Optional extras

- complementation, of the machine by devices increasing the application possibilities and automation of the machine
- application of components of the extras requires some modifications of the machine

The equipment includes:

Boring and milling attachment, axis C

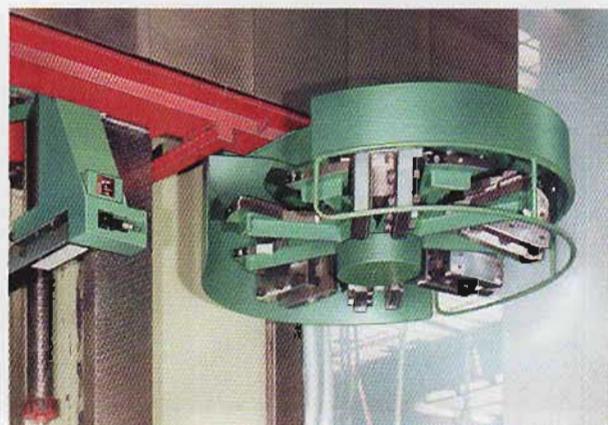
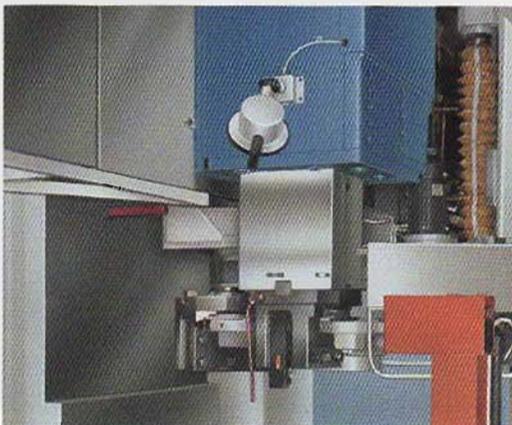
- two-step epicyclic gearbox with AC motor of the milling spindle, placed at the upper end of the ram
- straight milling head with spindle in the ram axis, fixed on the front of the lower end of the ram instead of the tool holder, spindle taper ISO 50,

possible equipment with shank quick-clamp

- connection between the gearbox and the milling head by means of a rigid shaft placed inside the ram
- for the C-axis drive, extension of the table drive by a feed servo-drive consisting of AC servo-motor and epicyclic gearbox between the main drive and the pinion box
- elimination of backlash in the gears by means of two hydraulically pre-loaded pinions
- direct measurement of the table position by means of a precision rotary encoder placed at the centre of the table
- hydraulic-mechanical clamping device locking the table during the milling of slots and drilling

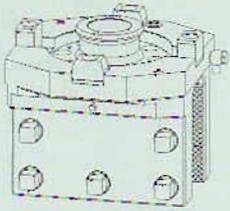
Automatic tool holder and head changer

- automatic fixation of holders by means of a fixing collet and Belleville spring mounted in the lower part of the ram
- 8 or 6-position disc circular magazine with a separate drive by stepping motor placed at the end of the cross rail
- double-disc magazine for different types of tool holders and tools
- set of tool holders according to the requirement which may contain turning holders of various types and rotary tool holders

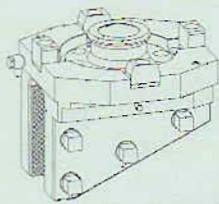


TURNING TOOL HOLDERS

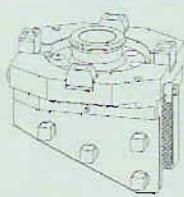
B3.1



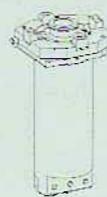
B3.2



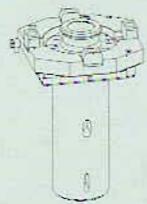
B3.3



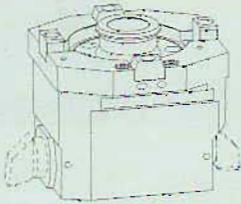
B3.4



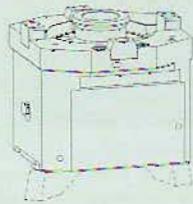
B3.5



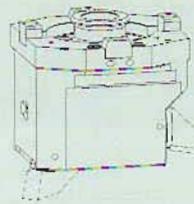
B3.6



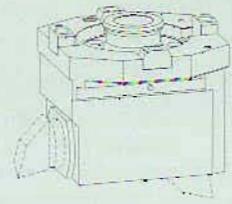
B3.7



B3.8



B3.9



B3.1 Standard tool holder

B3.2 Slant turning tool holder for outer turning

B3.3 Slant turning tool holder for inner turning

B3.4 Extended turning tool holder

B3.5 Extended turning tool holder with clamping taper MORSE 5 or 6

B3.6 With two horizontal fixtures CAPTO (C6)

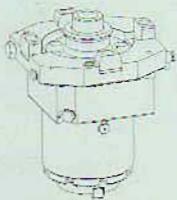
B3.7 With two vertical fixtures CAPTO (C6 or C8)

B3.8 With one vertical and one horizontal fixtures CAPTO (C6 or C8)

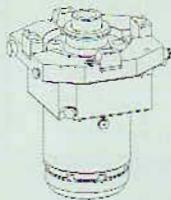
B3.9 With one vertical and one horizontal fixtures CAPTO (C6 or C8)

ROTARY TOOL HOLDERS

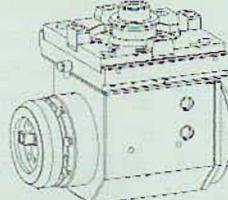
B4.1



B4.2



C2



C3



B4.1 Straight milling head

B4.2 Straight milling head with tool quick-clamp

C2 Angle milling head 90°

C3 Universal milling head

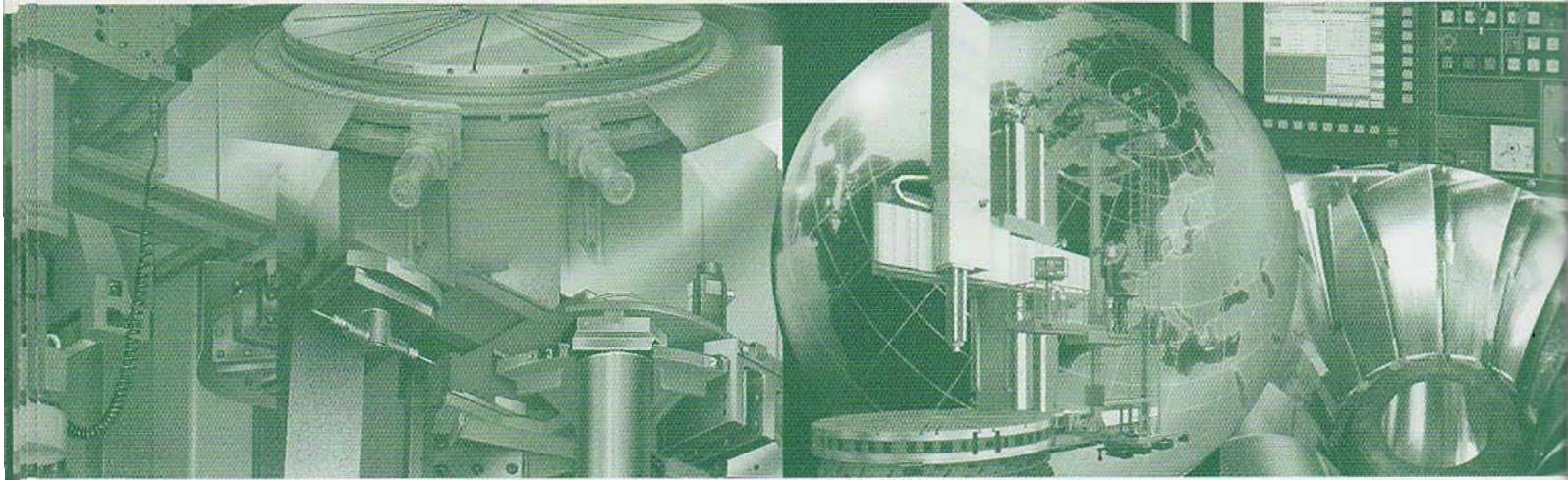
GRINDING ATTACHMENT

C6



C6 Grinding attachment - grinder and extension





Chip conveyers

- 2-segment chain conveyers around the table
- chute for chips
- chip container or a direct discharging conveyer for the transport of chips beyond the machine (upon special request)

Liquid coolant attachment

- tank with standard filtration and pumping set, possible manual setting of the coolant quantity
- income of coolant to the tool holders on the heads
- collecting troughs around the table and collection of the liquid to the tank
- in case of higher requirements on the filtration, the device may be completed with a band filter, hydrocyclone filter or under-pressure filter (all of these upon a special request)

Tool measurement

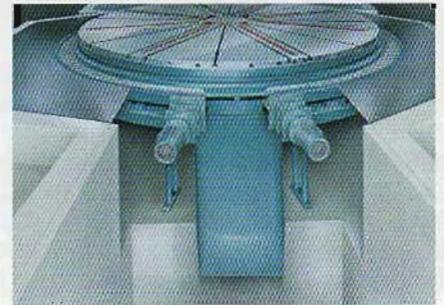
- permits measurement of the length and the wear of the tool by probe RENISHAW RP2, placed on the motor-controlled arm. The device is placed under the cross rail on the right side of the machine.

Workpiece measurement

- permits measurement of the workpiece by help of two contact probes RENISHAW LP2H, placed in special tool holder
- the holder is placed in the tool magazine and fixed in the ram in automatic cycle

Protective covers around the table

- consist of covers with usual height of 2.2 m, preventing entrance into the machining area during machining
- front covers with windows from polycarbonate
- front part of covers can be shifted aside and is equipped with an electric lock and security limit switch
- the device complies with the requirement of the regulation 98/37/EC about the machine equipment



Standard equipment

Equipment and material necessary for the setting of the machine and for the common operation, service, adjustment and maintenance of the basic type, as:

- levelling blocks and anchoring bolts
- clamping jaws
- extension arms (only with single-column types)
- tools for setting and maintenance
- accompanying documentation

Optional accessories

Equipment permitting to extend the working possibilities of the machine without demanding modifications.

They include:

Grinding attachment

- rotor of in-built double speed asynchronous motor directly on the milling spindle
- possible fixation in the vertical or horizontal position
- power supply by a cable from the head box

Angular milling head

- spindle taper ISO 50
- the spindle may be equipped with a tool quick-clamp

Universal milling head

- continuous manual turning towards the ram axis within 190° with the possibility of precise setting by 1°
- spindle taper ISO 50
- the spindle may be equipped with a tool quick-clamp

High-speed head

- permitting to increase the speed of the milling spindle in the ratio 1:4

Attachment for fixing the workpieces with larger diameter

- consists of fixing arms in a star position connected mutually and with the table
- it is mounted on the table, permitting to fix and machine the workpieces with larger diameter using the maximum load on the table

Extension of CNC system

- according to the specifications of the CNC system producer

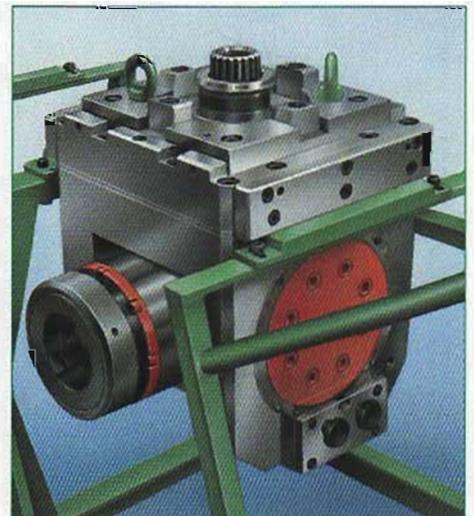
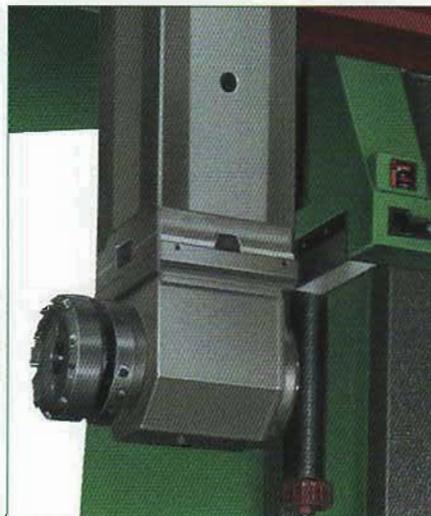
Set of spare parts for five-year service

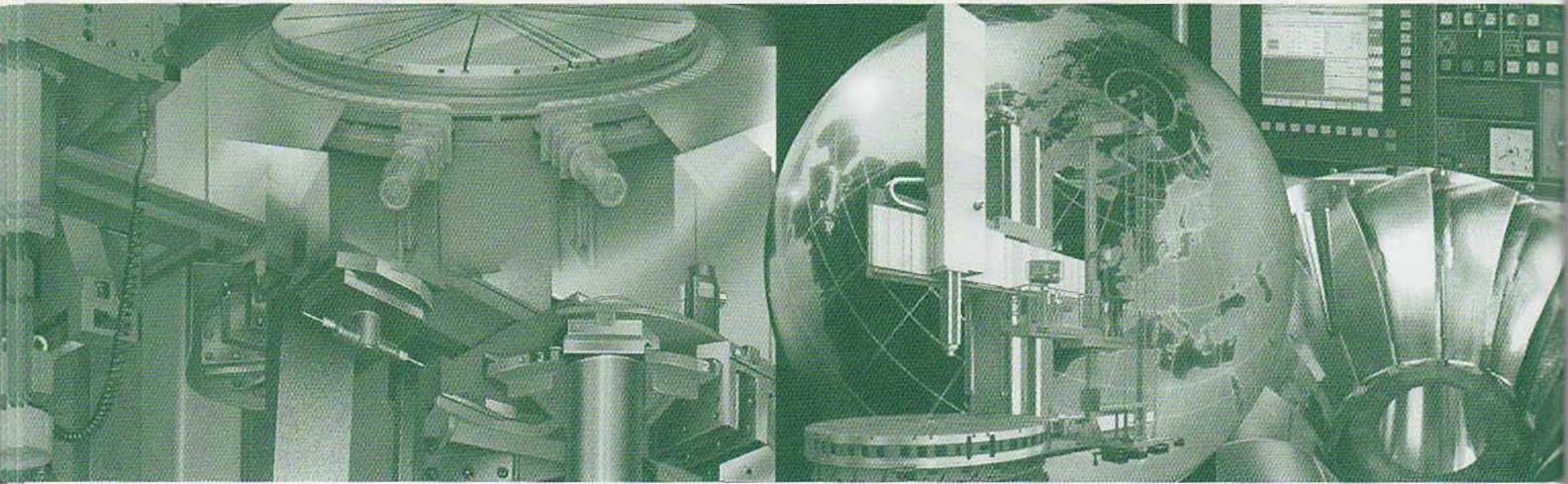
- contains parts that could wear for mechanical, hydraulic and electric parts of the machine for the five-year service

Delivery

Single-column and double-column types are usually delivered in standard version with standard equipment. Based on the order of optional version with optional extras, the individual type versions may be delivered:

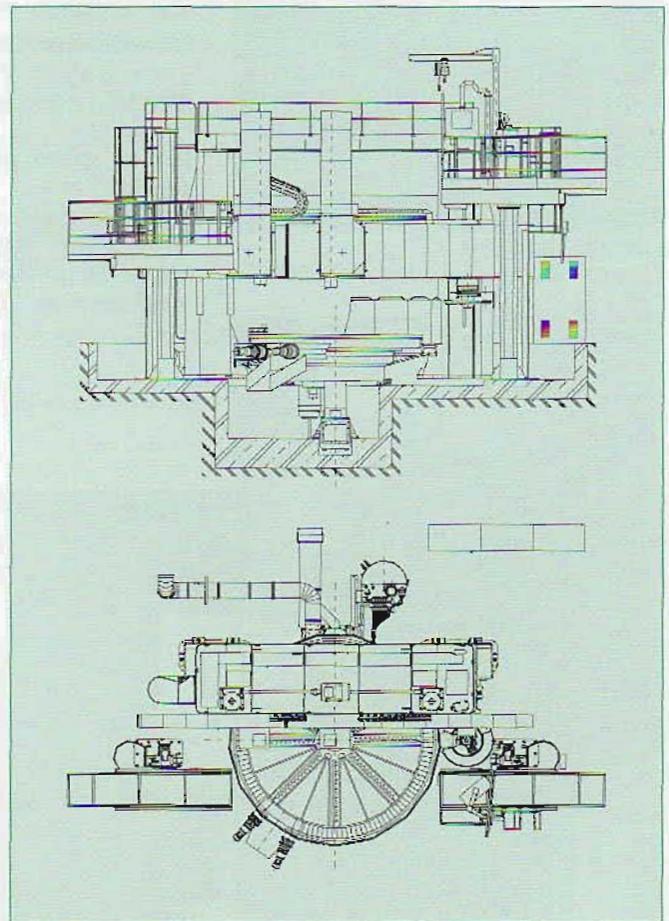
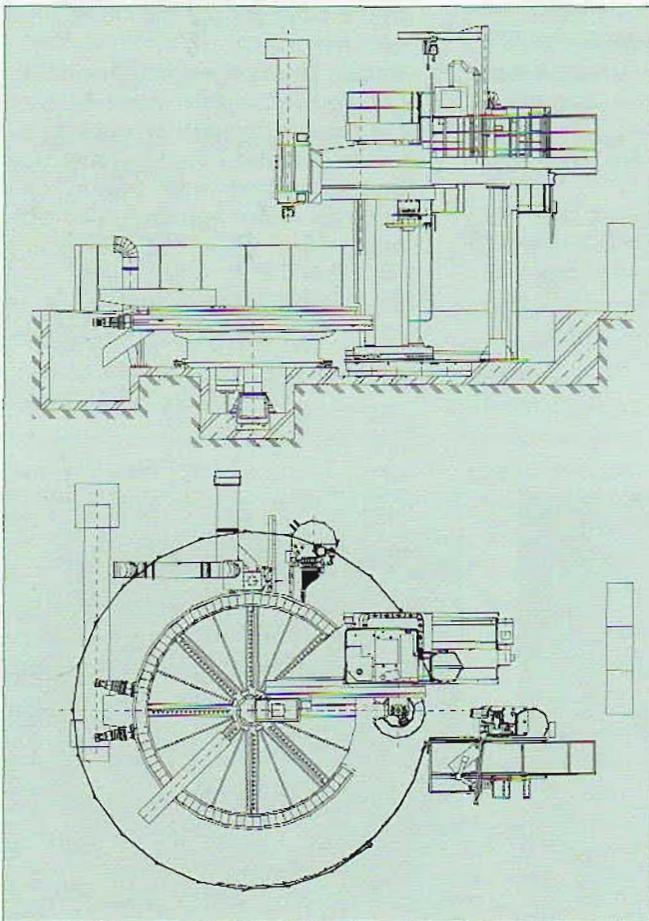
- with higher parameters of the maximum turning diameter and height, table speed and load
- with increased geometrical precision compared to standard version
- with another CNC system
- with electrical devices for another voltage and frequency and for various climatic areas
- in various colour versions
- with ordered attachments and equipment for extended application possibilities and automation according to the specification mentioned in the offer for the individual type versions
- single-column types may be delivered with tangential movement of the column, this version with accessories (angular head) permits tangential milling and boring and other extended application possibilities





Single-column vertical lathe with travelling column

Double-column vertical lathe



TECHNICAL DATA OF VERTICAL TURNING MILLS - BASIC DESIGN

Type of machine		SKJ 32/63 D	SKD 32/35 D	SKD 40/47 D	SKJ 50-100 D	SKD 50/53 D	SKD 63/65 D	SKJ 80-160 D
Machining capacity								
Max. turning diameter	mm	3200-6300	3500	4700	5000-10000	5300	6500	8000-16000
Max. turning diameter to the center of table	mm	4000	-	-	6300	-	-	8000
Max. height of turning over table	mm	2500	2500	2500	4000	4000	4000	6300
Table								
Table diameter	mm	3200	3200	4000	4770	4770	6300	6300 8000
Maximum load	kg	50 000	50 000	60 000	100 000	100 000	100 000	320 000
Maximum torque	kNm	136	136	153	272	272	272	680
Main drive motor output	kW	100	100	100	100	100	100	150
Table speed	1. range	min ⁻¹	0.8 - 26	0.8 - 26	0.8 - 23	0.4 - 13	0.4 - 13	0.22 - 6
	2. range	min ⁻¹	3.3 - 100	3.3 - 100	2.8 - 80	1.6 - 50	1.4 - 40	0.73 - 20
Heads								
R.H. rail head - horizontal travel	mm	2200	2100	2550	3375	2895	3525	4800
L.H. rail head - horizontal travel	mm	--	1590	2040	--	2385	3035	--
Side head - vertical travel	mm	1900 (1400*)	--	--	2600 (2100*)	--	--	4950
Ram travel	mm	1600 (2000)	1600 (2000)	1600 (2000)	2000 (2500)	2000 (2500)	2000 (2500)	3200
Feeds	mm.min ⁻¹	0.1 - 8000	0.1 - 8000	0.1 - 8000	0.1 - 8000	0.1 - 8000	0.1 - 8000	0.1 - 8000
Rapid traverse	mm.min ⁻¹	8000	8000	8000	8000	8000	8000	8000
Cross section of ram	mm x mm	280x280	280x280	280x280	280x280 (320x320)	280x280 (320x320)	280x280 (320x320)	400x400
Max. cross section of tool	mm x mm	50x50	50x50	50x50	50x50	50x50	50x50	63x63
Max. cutting force	kN	80	80	80	80 (100)	80 (100)	80 (100)	125
Cross rail								
Vertical travel	mm	1900	2100	2100	3350	3600	3600	4250
Traverse speed	mm.min ⁻¹	500	500	500	500	500	500	280
Column								
Horizontal travel	mm	1550	-	-	2245	-	-	4175
Traverse speed	mm.min ⁻¹	500	-	-	500	-	-	280
Machine dimensions								
Length	mm	11 500	10 000	11 000	16 000	13 000	15 500	22 000
Width	mm	8 600	8 200	8 600	10 600	11 500	12 000	18 500
Height	- total	mm	9 800	9 500	9 500	11 600	11 100	16 200
	- over floor	mm	7 500	7 200	7 200	9 300	8 800	12 900
Machine weight								
Basic version	kg	60 500	65 000	73 000	121 000	106 000	118 000	321 000

* valid for machine with toolholder magazine