TOS KUŘIM
ALTA GROUP

TECHNICAL SPECIFICATION

Bed type milling machine

FS(Q) 100/125

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Article

1. GENERAL CHARACTERISTICS OF THE MILLING MACHINE

Milling machine is designed for machining of complex shape workpieces by both, classical milling and high speed machining technology.

Machine base is formed by the fixed bed with table travelling in longitudinal direction. Column is firmly connected to the machine bed. Along its vertical guideways travels knee. In the knee transverse direction travels headstock with spindle head.

Machine versatility, mainly with respect to use of the spindle heads allows maximal utilization of the machine to the technological requirements. There is an optimal way to choose exact spindle head for required machining operation and use the maximal level of cutting conditions and machine workspace. High performance and torque of spindle heads with mechanical drive find its use during rough milling operations.

Machine is designed for working conditions and parameters according to combination of three environmental classes conditions IE 33 as per valid Czech standards CSN EN 60721-3-2, but the air temperature must be kept within range of +15°C to +35°C while air pressure must be higher than 90kPa.

Following conditions must be kept to achieve optimal working accuracy of the machine:

- Surrounding area temperature in between +17°C to +25°C
- Surrounding area temperature change during 24 hrs. must not exceed 4°C
- Temperature change gradient of surrounding temperature must not exceed 0, 5°C/1hr

2. MACHINE DESCRIPTION

2.1. Machine bed

The machine bed is made of welded frame filled with special mixture based on concrete. The upper part of the bed is equipped section moulding of linear guideways on which travels the table.

2.2. Table

The table is a rigid casting. On its bottom part its equipped with the blocks of linear guideways to allow travel on the machine bed. Table working area is equipped with T-slots for clamping and positioning of the workpiece. Travel is through the ball screw.

2.3. Column

Column base is formed by rigid ribbed weldment, partially filled with special mixture on concrete base. On its side the column is equipped with section moulding of linear guideways for headstock travel.

2.4. Knee

Knee is a ribbed weldment equipped with blocks of linear guideways for its travel in vertical direction on the column and transverse travel of the headstock.

2.5. Headstock

The main part of the headstock is iron casting of square section equipped with section moulding of linear guideways on its bottom and side parts allowing transverse travel of the headstock. The front part of the headstock is equipped with positioning and clamping mechanism for the spindle heads. Headstock have continuously numerically controlled drive to rotate the spindle heads in its axis with indexing mechanism in division of 1°. The drive of rotation is by an independent servodrive, via closed chain of gearwheels with mechanical adjustment of play in gearing.
Spindle drive is by servodrive, via belt transmission and three stage gearbox with automatic gearing of each speed drives the output shaft to connect the drive of the spindle head. Three stage gearbox allows optimal use of motor output in whole range.

2.6. Linear axis drives

Travel in the longitudinal direction is provided by individual servodrive which directly drive the ball screw with preloaded nut. Travel in the transverse travel is by individual servodrive driving the ball screw through belt transmission with spur belt.
Travel in vertical direction is by two servodrives driven by ballscrews via spur belt. Vertical ballscrews are equipped with electromagnet brake, which in case of belt breakdown blocks the movement in the axis.

2.7. Measuring device

Linear coordinates measuring /X, Y and Z axes/ is provided by absolute scales with measuring unit of 0,001mm. Rotary axis measuring is by incremental rotary encoder, programming unit is 0,001°.

2.8. Lubrication

Lubrication of linear axis /X, Y, Z/ and ball screws, including its seating is by permanent grease filling, which can be replenished according to lubrication plan. Gearbox of headstock has oil filling, bearings and gearwheels are lubricated by oil mist. Lubrication of between gears of spindle heads drive is by grease lubrication unit. Each lubrication spot is equipped with dispensers. Quantity of grease is adjustable by lubrication unit switching rate.

2.9. Machine auxiliary functions

The auxiliary functions /i.e. gearing in the gearbox, tool release, operating ATC) are operated hydraulically. Pressurized oil is supplied by the hydraulic unit.

2.10. Cooling system

The cooling system with chiller provides thermal stabilization of three stage gearbox of main drive and cooling of spindle drive chain of spindle heads. Thermal stabilization of gearbox is by lubrication oil chilled in exchanger outside of the gearbox. Cooling of the spindle heads is by direct flow of coolant.

2.11. Tool cooling

Machine is in standard execution supplied with low pressure cooling. Coolant is supplied into the flange of spindle head equipped with adjustable nozzles and adjustable joint hoses.
Machine can be equipped with high pressure internal tool cooling (tool shank ISO50, DIN 69 871 - 1 form. B. For this option machine is equipped with high pressure coolant intake into the headstock and spindle heads

2.12. Guideways covering

The covering of guideways in the longitudinal direction is by the telescopic covers. All guideways are equipped with wipers.

2.13. Machine control and operation

Machine is operated from the movable panel located on front part of machine bed. Manual control of the machine (feeds movement) can be done from the table surface of machine by using the hand wheel (HT2).

2.14. Workspace safety

For safety reasons the machine is provided with fencing with three doors. The doors are equipped with mechanical lock and safety switch. Fencing is provided in RAL 9011 colour. Operator is protected against the flying chips and coolant by front movable cover.

2.15. Electrical equipment

The electrical equipment of the machine is located in separate cabinet next to the machine and is in accordance with CSN EN 60204-1 standards.

2.16. Control system

The machine is equipped with a CNC control system, its control part is located in the control panel. Operation of all basic functions of the machine is in the automatic mode by control system, when in manual mode, these basic functions can be executed by buttons on the control panel.
Machine is in standard execution supplied with SIEMENS Sinamic S120 drives and with SIEMENS Sinumerik 840D control system. It is a modular 32-bit microprocessor CNC continuously control system, its configuration can be modified to machine execution and as well as customer requirements with regards to functions, programming and control.

2.17. Machine colour

Machine is painted in combination of colours RAL7035, RAL7021 and RAL3020.

2.18. Machine documentation

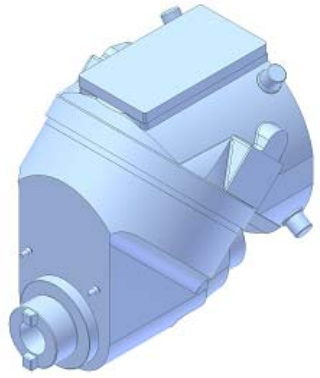
2 pcs Machine manual in English
1 pc Sub-deliveries technical documentation
1 pc Machine manual on flash disc
1 pc PLC data record (in written form/available on flash disc)

3. MILLING MACHINE ACCESSORIES:

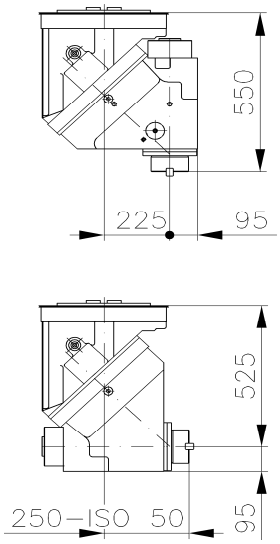
3.1. Universal indexing head VO

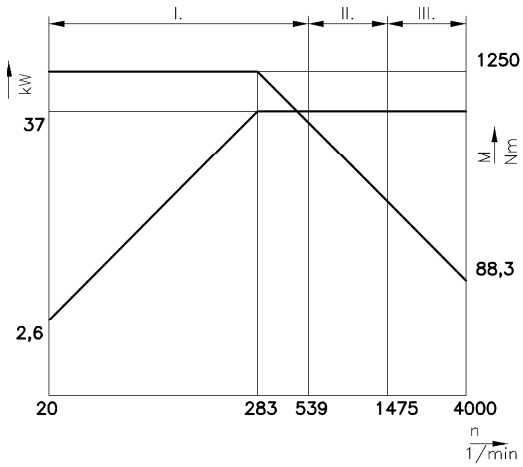
Single-spindle head with the spindle adjustable automatically in either vertical or horizontal position – continuously revolving around the headstock axis "C" within the range of ±180°, with possibility of mechanical indexing by 1°. The drive mechanism for spindle head turning around the headstock axis C with indexing is a part of the headstock. The spindle head is also revolving around the axis inclined in the angle of 45° with respect to the headstock axis, which allows automatic spindle resetting in both vertical or horizontal position and any intermediate position by 2.5°. Positioning in this axis is derived from the spindle control servo drive; the spindle part of the head is locked in gear rims in the position. The spindle drive is derived from the drive shaft of the headstock through two pairs of bevel gears. The spindle is provided with an automatic tool clamping system by means of Belleville springs with clamping force multiplier, releasing is carried out with a hydraulic cylinder. Spindle bearings are lubricated with lifelong plastic lubricant. The spindle is equipped with ISO50 taper.

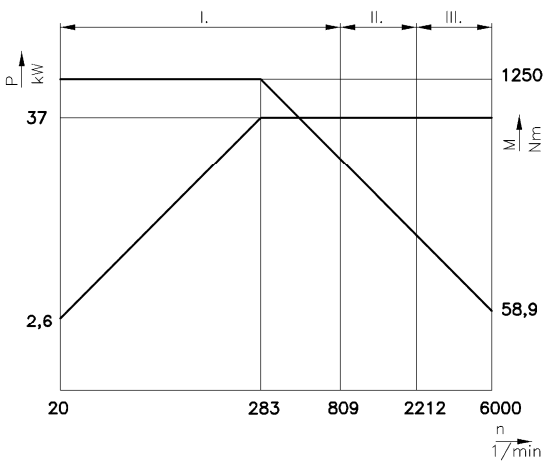
Technical parameters



Spindle taper	ISO 50
Spindle speed – continuously	20 – 4 000 20 – 6 000 rpm
Total motor output on main spindle	37 kW
Max. spindle torque	1 250 Nm
Speed of spindle turning around cross axis C	1 - 1 800 °/min
Max. torque of head swivelling around cross axis C	2 500 Nm
Double-sided precision of A position adjustment around cross axis C (according to CSN ISO 230-2)	16"
J Single-sided repeatability of R position adjustment around cross axis C (according to CSN ISO 230-2)	8"

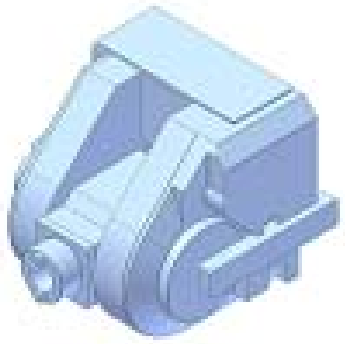


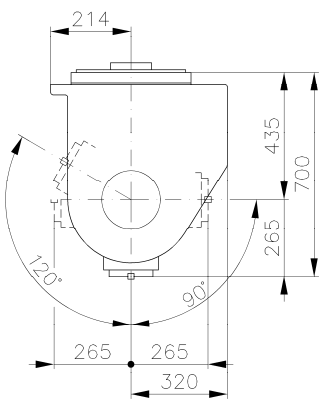


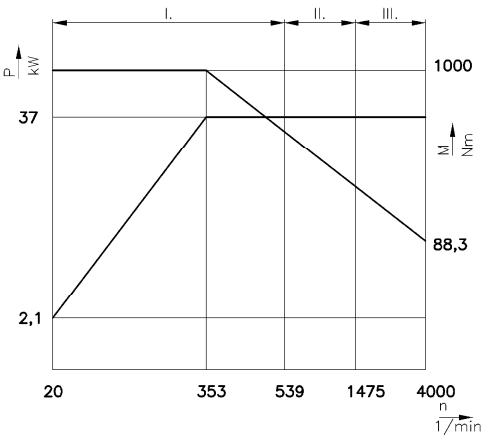


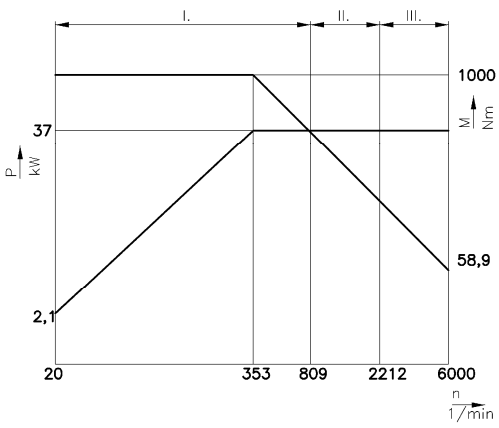
3.2. Spindle head VK

Single spindle head - continuous revolving in two axis. The head is continuously revolving around the cross axis/headstock axis C within the range of ±180°, with possibility of mechanical indexing by 1° and around to its perpendicular axis B within the range from +120° to -90°, with the possibility of hydraulic-mechanical clamping in the adjusted position with the help of hydraulic controlled friction brake. The mechanism of the rotation around the axis C with the indexing is part of the headstock. The rotation mechanism in the second rotation axis B is the part of spindle head and is from servomotor through gear, which consist from closed chain of gear wheels with mechanical backlash elimination in gears. The spindle drive is derived from the drive shaft of the headstock through three pairs of bevel gears. The spindle is equipped with automatic clamping of tools by means of Belleville springs with the multiplier of the clamping force, the release is ensured by the hydraulic cylinder. The bearings of the spindle are lubricated by a lifelong grease. The spindle taper is ISO 50.

Technical parameters		
	Spindle taper	ISO 50
	Spindle speed – continuously	20 – 4000, 20 – 6000 rpm
	Total motor output on main spindle	37 kW
	Max. spindle torque	1 000 Nm
	Speed of spindle turning around cross C / axis B perpendicular to cross axis	1 - 1 800 / 1 -5 400 °/min
	Max. torque of head swivelling around cross axis C / axis B perpendicular to cross axis	2 500 / 2 400 Nm
	Double-sided precision of A position adjustment around cross axis C / axis B perpendicular to cross axis (according to CSN ISO 230-2)	16/16"
	Single-sided repeatability of R position adjustment around cross axis C / axis B perpendicular to cross axis (according to CSN ISO 230-2)	8/8"





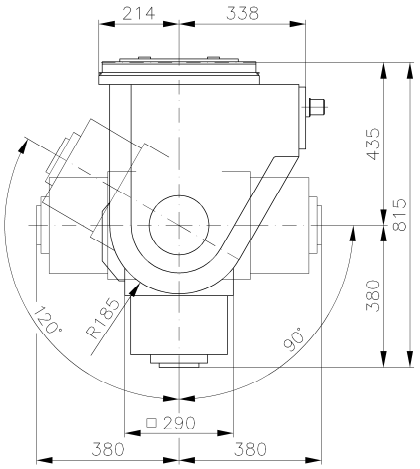


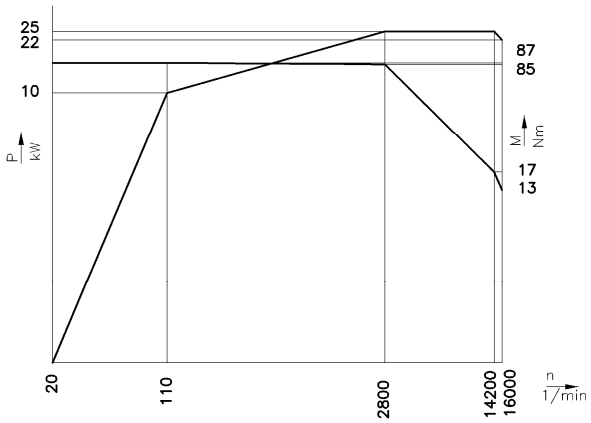
3.3. Spindle head VKE

Single electro spindle head - continuous revolving in two axis.

Around the headstock axis C within the range of ±180°, with possibility of mechanical indexing by 1° and around to its perpendicular axis B within the range from +120° to -90°, with the possibility of hydraulic-mechanical clamping in the adjusted position with the help of hydraulic controlled friction brake. The mechanism of the rotation around the headstock axis with the indexing is part of the headstock. The rotation mechanism in the second rotation axis is part of the spindle head and is from servomotor through gear, which consist from closed chain of gear wheels with mechanical backlash elimination in gears. The spindle drive is formed by electro spindle impeller and equipped with HSK-A63 taper according to DIN 69063-1 with axial inflow of coolant.

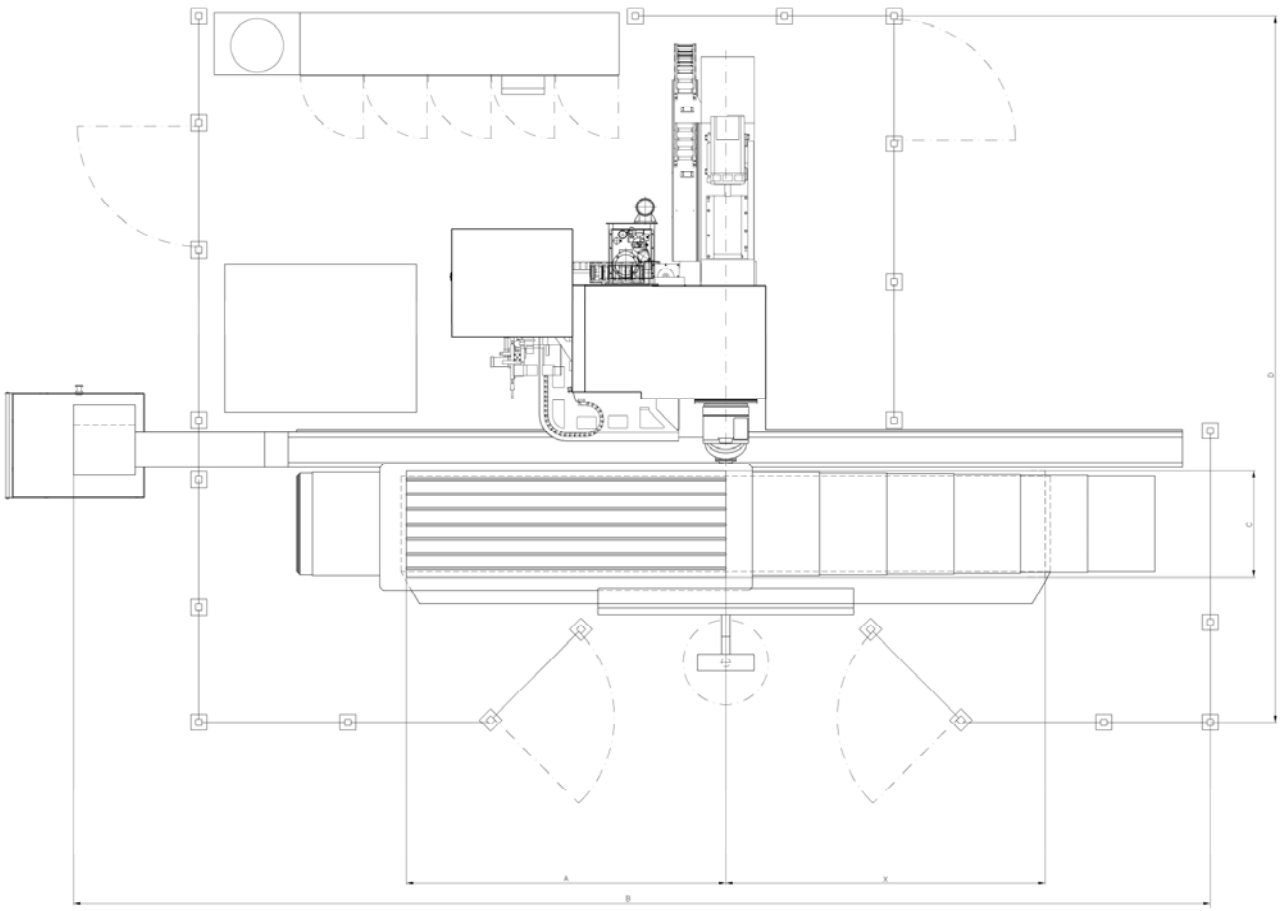
Technical parameters		
	Spindle taper	HSK - A63
	Spindle speed – continuously	110 - 16 000 rpm
	Total motor output on main spindle	25 kW
	Max. spindle torque	87 Nm
	Speed of spindle turning around cross C / axis B perpendicular to cross axis	1 - 1 800 / 1 - 5 400 °/min
	Max. torque of head swivelling around cross axis C / axis B perpendicular to cross axis	2 500 / 1 800 Nm
	Double-sided precision of A position adjustment around cross axis C / axis B perpendicular to cross axis (according to CSN ISO 230-2)	16/16”
	Single-sided repeatability of R position adjustment around cross axis C / axis B perpendicular to cross axis (according to CSN ISO 230-2)	8/8”

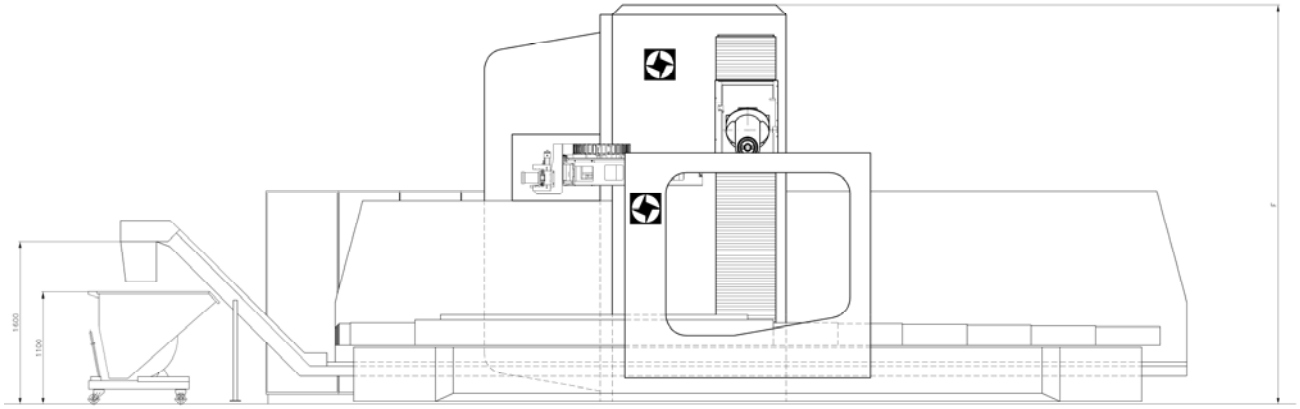




4. MACHINE DIMENSIONS

DIMENSIONS TABLE	
Axis X	2000; 3000; 4000; 5000
Table length A	2000; 3000; 4000; 5000
Total length B	8700; 10700; 12700; 14700
Axis Y	1250; 1500
Table width C	1000; 1250
Machine width E	5700; 6000
Total width D	6800; 7000
Total width I	6500; 7000
Axis Z	1500; 2000
Total height F	3900; 4400



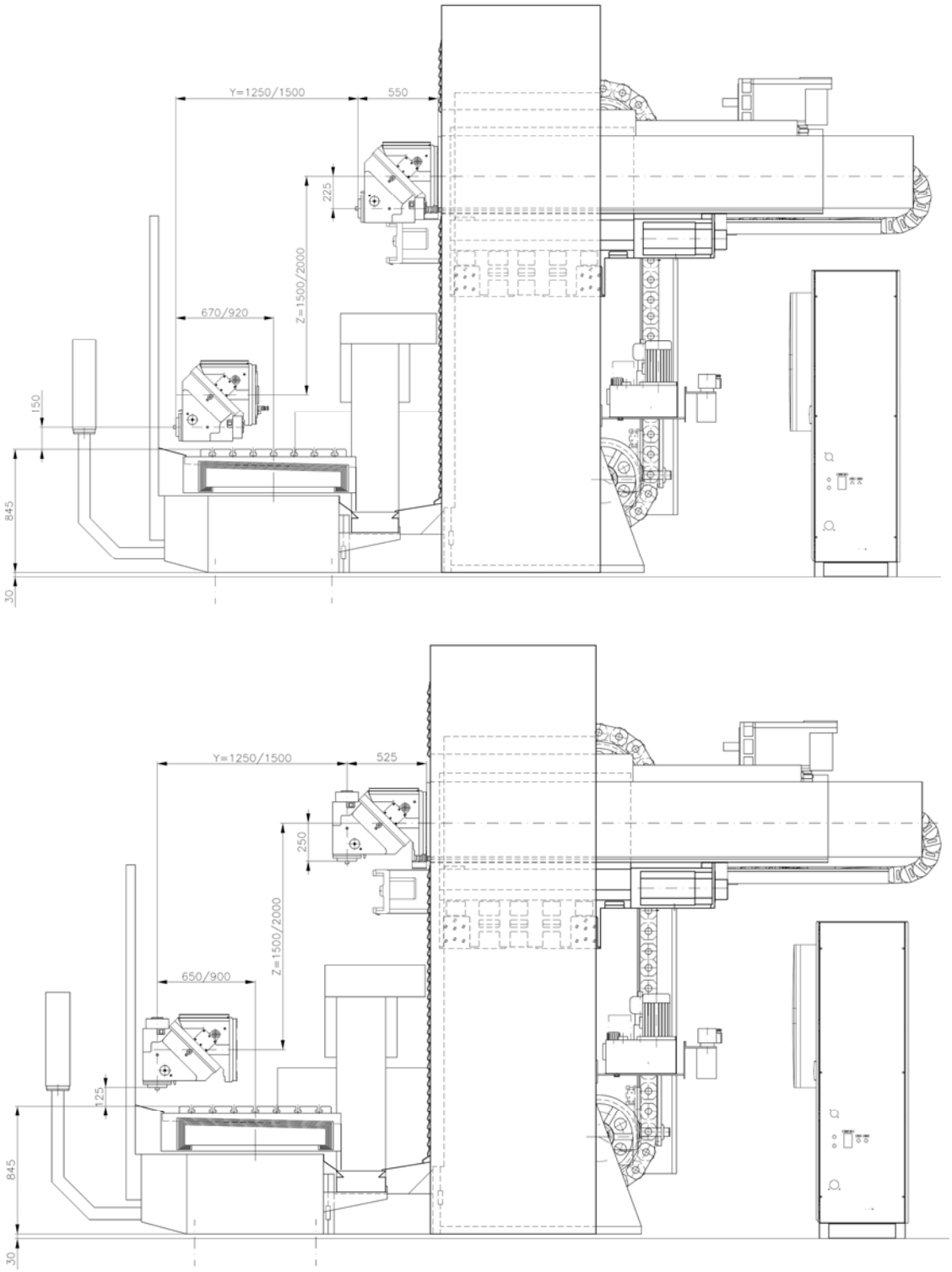


5. TECHNICAL SPECIFICATION FS

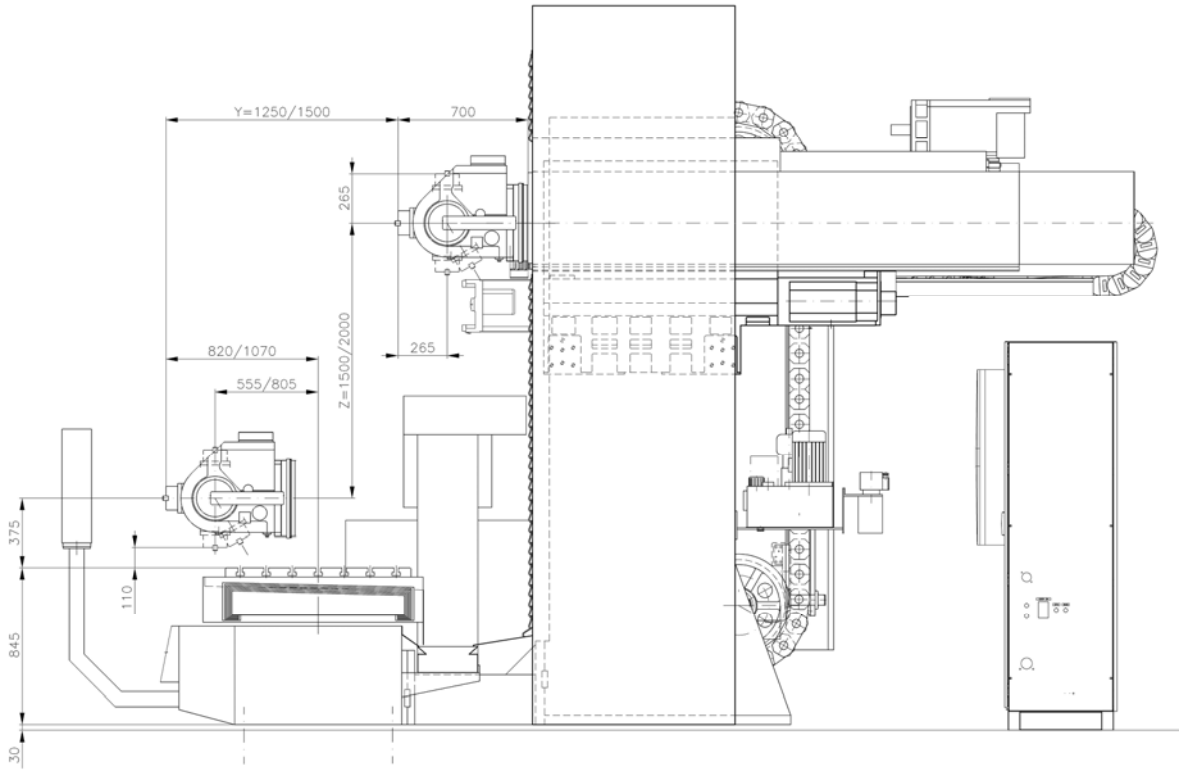
Machine		FS(Q) 100/125
Machine parameters	units	
Guide ways		Rolling type
Clamping taper / clamping		ISO 50 / DIN
Main motor power /output	kW	30/37
Maximal torque / maximal revolutions	Nm / rpm	According the load diagrams of milling heads
Exchangeable milling heads		VK; VKE; VO
Cross ram movement Y	mm	1250; 1500
Vertical movement Z	mm	1500; 2000
Table movement X	mm	2000; 3000; 4000; 5000
Rapid feed range X, Y, Z	m/min	30, 30, 30
Table length	mm	2000; 3000; 4000; 5000
Max. axis forces X, Y, Z	N	20000
Table width	mm	1000; 1250
Maximal table load	t/m-2	1,5/2,5/4
Tools magazine		Chain type 40 (60) tools
Low pressure cooling (unit values)		2bar/30 l.min/1000 l
Optional high pressure cooling (unit values)		20bar/30 l.min/180 l

6. MILLING HEAD WORKING TRAVERSES

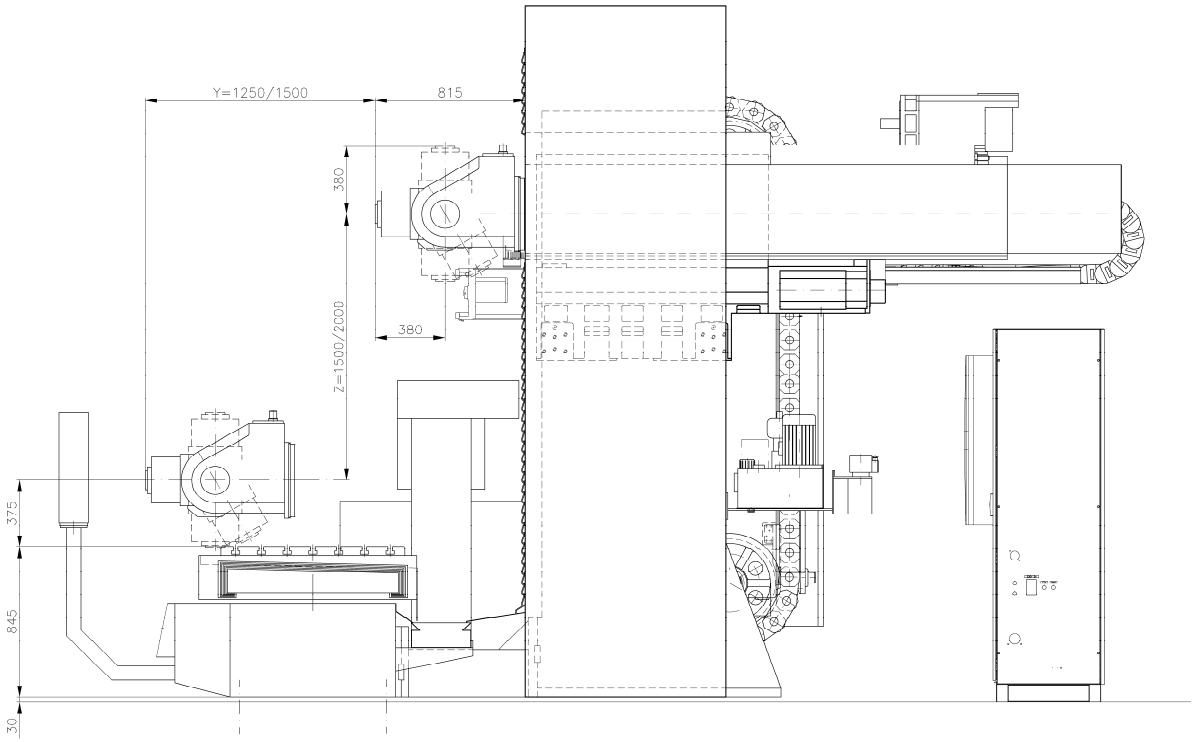
6.1. Miling head VO



6.2. Milling head VK



6.3. Milling head VKE



7. OPTIONAL ACCESSORIES:

- Chip conveyor
- Tool magazine for 40/60 tools
- Low pressure + High pressure cooling LP 5bar/60 lmin/1500 l, HP 20bar/30 lmin/180 l
- Semi cabin
- Cabin covering
- Workpiece probe
- Tool probe
- HT8 hand wheel