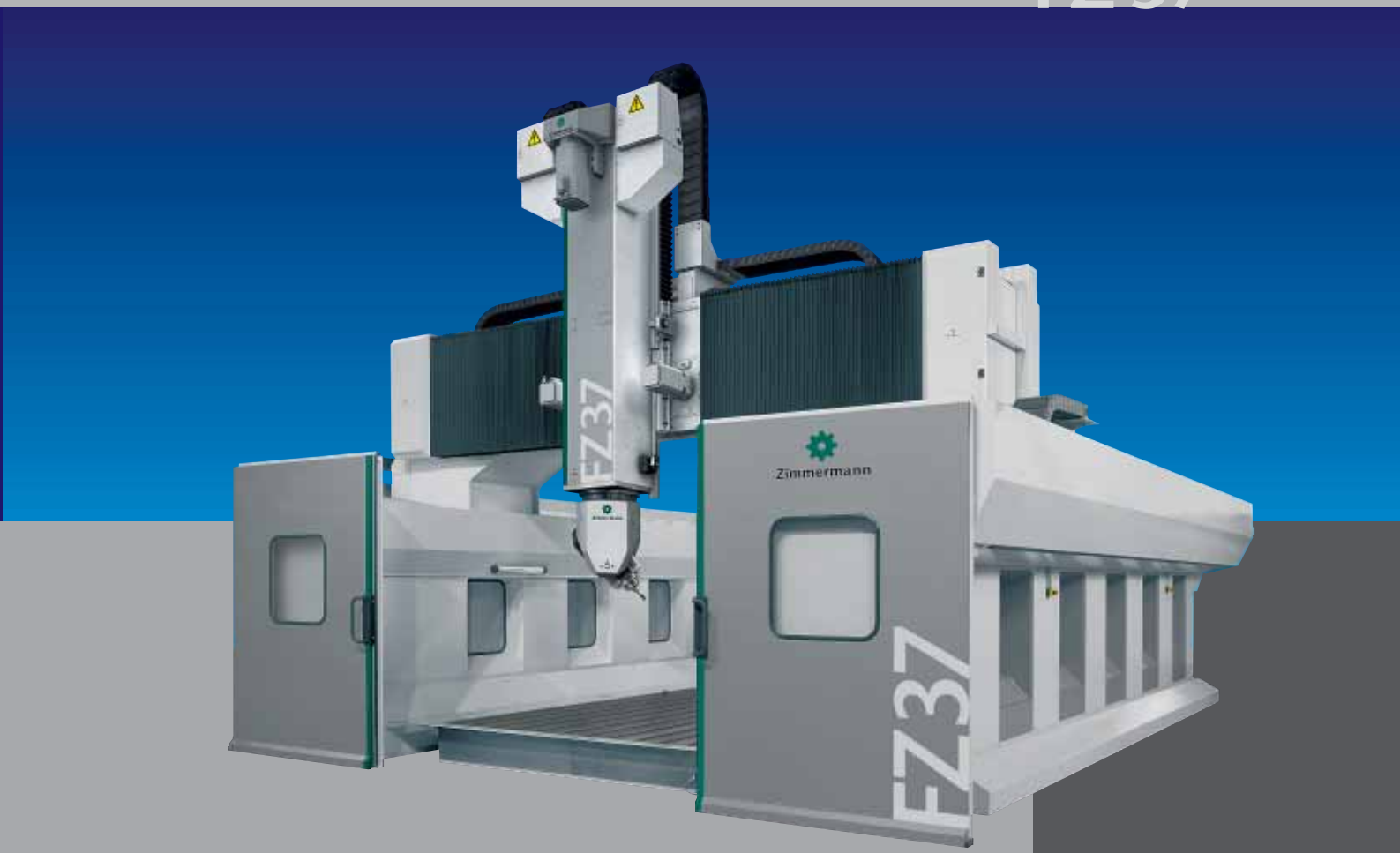
Zimmermann

CNC Portal Milling Machine

FZ 37



CNC High Performance
Milling Technology

FZ 37
High End HSC Portal Milling Machine with Overhead Gantry

The portal milling machine FZ 37 with overhead gantry technology and upper moving portal now in the third generation is based on a modular machine concept which makes possible a wide range of variants with different drive technologies and auxiliary equipment. With the machine table anchored firmly to the foundations, the machine dynamics are independent of the weight of the workpiece.

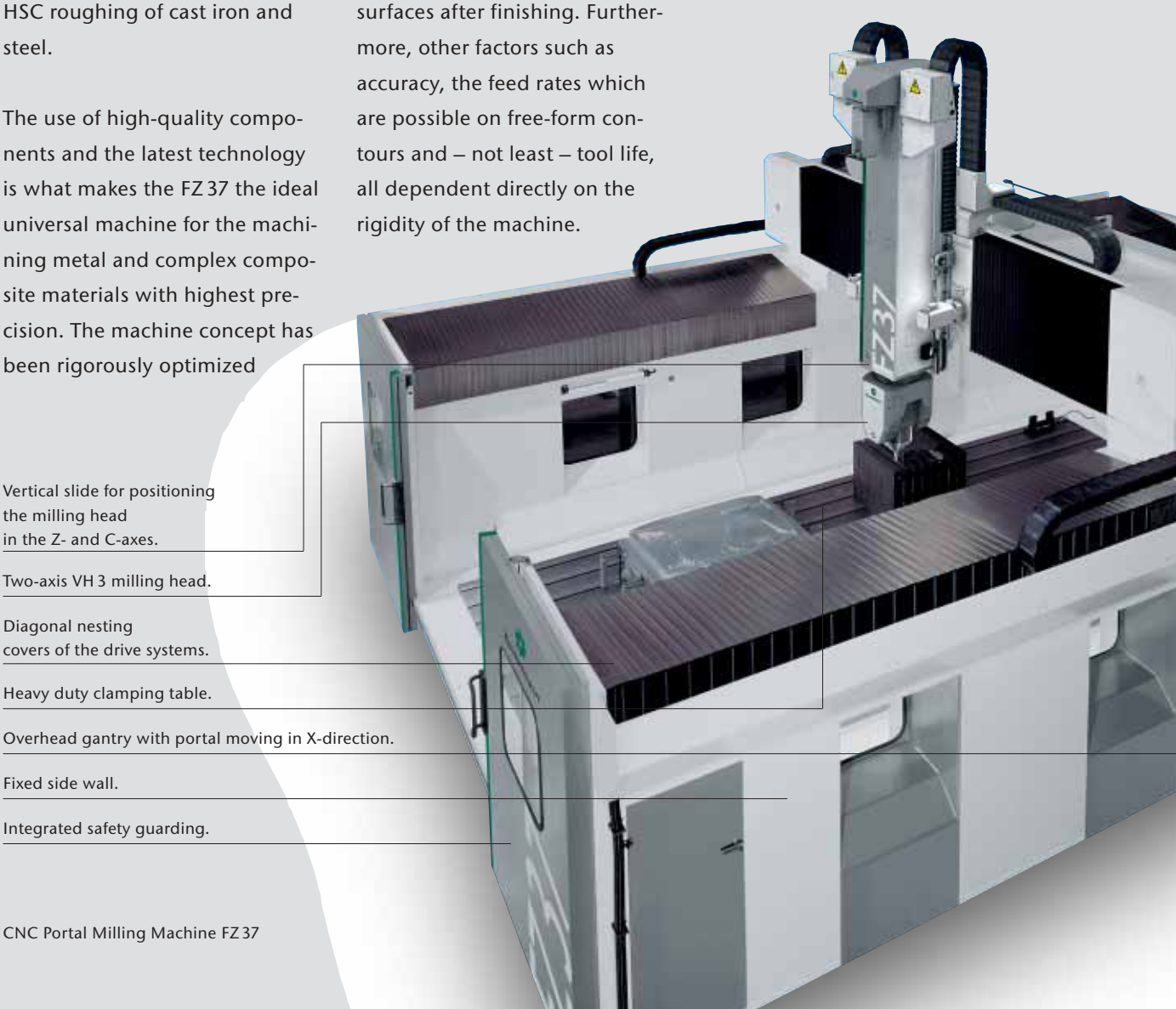
The FZ 37 is designed for the highly dynamic machining of all machinable materials right up to HSC roughing of cast iron and steel.

The use of high-quality components and the latest technology is what makes the FZ 37 the ideal universal machine for the machining metal and complex composite materials with highest precision. The machine concept has been rigorously optimized for maximum rigidity and dynamic performance using the latest FEM analysis techniques.

The uncompromising design of the FZ 37 portal milling machine represents the state-of-the-art of current technology, while still being offered at a very affordable price.

Prerequisite for modern mould and die making as well for the aircraft industry is an extremely stiff machine structure capable of producing very high-quality surfaces after finishing. Furthermore, other factors such as accuracy, the feed rates which are possible on free-form contours and – not least – tool life, all dependent directly on the rigidity of the machine.

The FZ 37 satisfies these high quality demands among other things by means of duplex guideways in the X-axis. This design ensures that the gantry motion is exceptionally straight. Thus the linear axes X, Y and Z are exactly perpendicular to each other over the whole range of travel. Particularly on machines with long axial travel, it is important to have excellent mechanical accuracy on which electronic compensation techniques can be based. In the FZ 37 this is achieved by tighter component and assembly tolerances.



Latest generation rack and pinion drives are used to achieve optimal dynamics, representing a quantum leap in this tried and proven technology. By using specially developed, rotationally stiff gears for the mechanical drive system, the highest dynamic positioning accuracy can be achieved together with high efficiency and smooth running of the motors.
The FZ 37 can be used for wet or dry machining. The return flow of the coolant is ensured by an intelligent overlapping design of the protective sheet-metal covers.
The side walls, which can be provided with windows for optimal viewing, are part of the housing of the machine. For loading, sliding doors – or alternatively folding doors – are provided at face side. The rear opening is taken up either by a totally enclosed toolchanger or another sliding door.

VH 3 – the all-rounder

This all-round head can optimally accomplish all milling task applications of the FZ 37 – powerfully and efficiently.

Universal use
The extremely robust VH 3 can be used in all heavy-duty Zimmermann machines. The VH 3 has been especially designed for modern 5-axes simultaneous machining. High torques about the A and C-axes ensure reliable, accurate motion control. Rapid drives and very efficient high-power spindles facilitate high performance cutting with HSC strategies. Precision worm drives ensure accuracy and damping.

Unlimited power
In the rotary axes torques up to 1 000 Nm are available and the milling spindle has a power rating of 60 kW and 95 Nm. This is more than enough for all machining tasks.

A new design
The VH 3 has been completely revised.

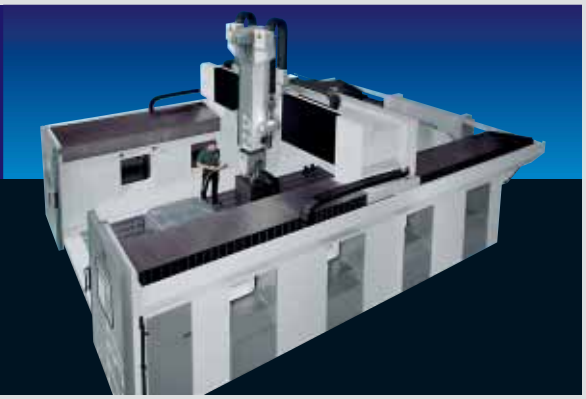
- Low interference contour for better access.
- Water-cooled worm gear for higher precision and elimination of thermal influences.
- Higher swivel speeds for shorter overall machining times.
- Clamping of rotary axes for greater rigidity during roughing.
- Robust, reliable grease replenishment system to ensure long life and profitability.

Areas of application
Ideal when a wide range of machining applications needs to be satisfied with a single head. Today rapidly changing tasks and machining conditions are typical and hard to plan for in advance: from high-precision machining of composites, via volume machining of aluminium to HSC milling strategies for steel and cast iron.

FZ 37
Technical Specification

Design

The portal design with fixed machine bed and a gantry travelling in the X-direction offers significant advantages for tool,



▲ Pick-up tool changer.

mould and die making as well as for the aircraft industry. The cast-iron machine bed is permanently anchored to the foundation, so that the workpiece does not have to be moved. In this way, machining operations are always independant of the weight of the workpiece. As the table is disconnected from the side walls, many alternative clamping strategies and designs of the working area or the clamping concept for the parts are possible. The moving mass is made up of the structurally stiff gantry, the transverse and Z-slides, and the milling head. Constant moving masses ensure highly consistent dynamic behaviour – a prerequisite for optimum surface finish and workpiece accuracy.

This combination of high stability and stiffness, constant moving masses, and highly dynamic drives make this machine ideally suited to the machining of several types of materials, for example aluminium, kirksite and fibre-reinforced composite materials as well as HSC roughing of steel and cast iron.

Simultaneous operation

The FZ 37 is designed as a simultaneous 5-axes machine.

Machine frame and guiding

The machine bed is made of cast iron; the side walls, gantry and Z-slide are of welded steel construction. The side walls are filled with a fibre-reinforced concrete composite material for excellent vibration damping and thermal stability. The guide, drive and measuring systems for the Y- and Z-axes are protected from contamination by dust-proof bellows. The X-axis is fitted as standard with nesting aluminium lamella bellows.

Axis drives

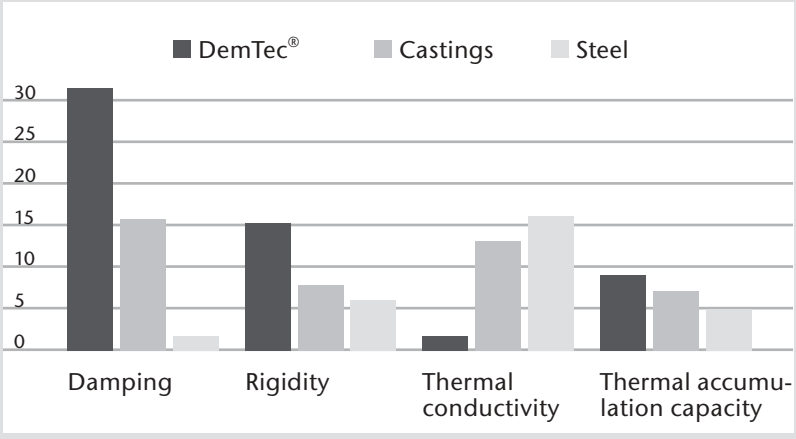
Power transmission is carried out by means of a rack and pinion drive with preloaded duplex motors in the X and Y-axes and an individual motor in the Z-axis. The control-system gantry function ensures that the two X-axis drives are synchronized.

- Linear guides:

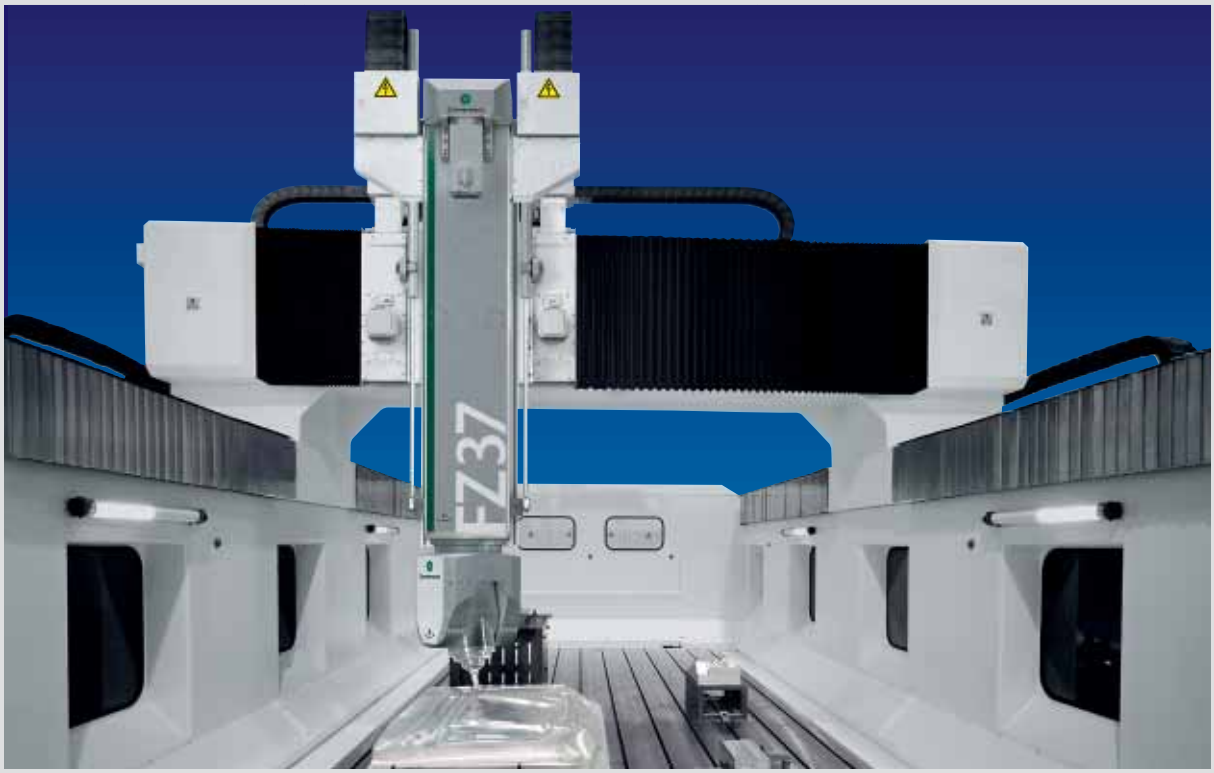
Pre-loaded, circulating-roller linear bearings: size 55 on the X-axis, and size 45 on the Y- and Z-axes. Up to 8 bearing carriages per axis.

- Rack and pinion:

Rack and pinion, quality level 5 with two electronically preloaded motors per drive unit (X-, Y-axis) for backlash-free motion and one drive unit in the Z-axis.



▲ Comparison of different structural materials for the side walls based on the most important functional criteria.



▲ Working area FZ 37.

Measuring systems

The three linear axes, X, Y and Z, are equipped with direct length measuring systems with Heidenhain glass-scales (rulers for axes with over 3 m travel). The measuring systems are protected from dirt by a compressed air barrier.

Milling spindle

Zimmermann milling heads are equipped with powerful milling spindles manufactured by Weiss, or alternatively Fischer, in power ranges that have, in part, been developed exclusively for Zimmermann. A number of different spindles (for roughing, finishing and universal spindles) are available for almost all milling heads. Our spindles are all equipped with a unique monitoring system, with vibration sensors and bearing and motor temperature monitoring. The milling spindles specified by Zimmermann are fine tuned to suit the particular combination of milling machine, milling head and milling spindle. Optional equipment is also available for external coolant supply or through-tool cooling, minimum quantity lubrication – also external or through the tool – and air cooling.

Control systems

It is possible to combine different makes and types of control systems with the FZ 37. Modern control systems include functions such as “look ahead”, jerk limitation, spline interpolation and 5-axis machining. Systems for measuring and digitalizing are available as options.

▲ The 2-axis VH 3 milling head.

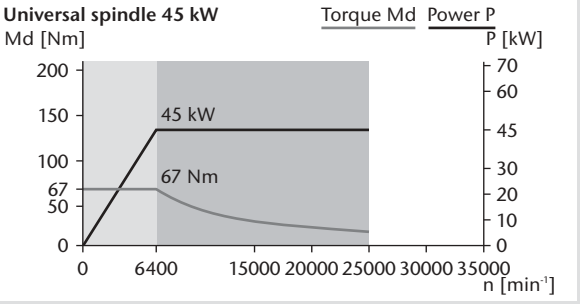
▲ Milling aluminium.

FZ 37
Technical Data

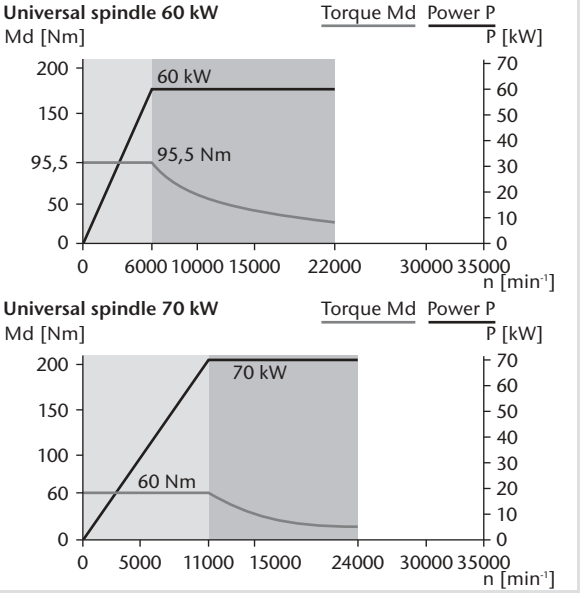
Machine	FZ 37			
Working areas				
X-axis	3 000 – 40 000 mm[1]			
Y-axis	2 000 – 5 000 mm[1]			
Z-axis	1 000 – 2 500 mm[1]			
Worktable size				
Length	3 000 – 40 000 mm			
Width	2 000 – 5 000 mm			
Height	350 mm			
Max. worktable load	max. 30 000 kg/m²			
T-slots (longitudinal)	18 ^{H12} (optional 18 ^{H8})			
Distance T-slots	250 mm			
Feed drives				
Feed axes X, Y and Z	up to 50 000 mm/min.			
Acceleration of linear axes	up to 4 m/s²			
Accuracy[2]				
Positioning accuracy X-axis	0,030 mm			
Positioning accuracy Y-, Z-axes	0,020 mm			
Repeatability X-axis	0,015 mm			
Repeatability Y-, Z-axes	0,010 mm			
Milling head	**VH 3**	**VH 3**	**VH 2**	**VH 5**
Swivel ranges				
A-axis	± 110°	± 110°	± 110°	± 110°
C-axis (Z=1250 mm / Z=1500 mm)	± 300° / ± 360°	± 300° / ± 360°	± 300° / ± 360°	± 275° / ± 360°
Performance				
Torque A-axis / C-axis	1 000 Nm	1 000 Nm	800 Nm	650 / 700 Nm
Acceleration A-, C-axes	300°/s²	300°/s²	300°/s²	800°/s²
Feed rate A-, C-axes	90°/s max.	90°/s max.	90°/s max.	360°/s
Accuracy[2]				
Positioning accuracy A-, C-axes	15" = 0,0041°	15" = 0,0041°	15" = 0,0041°	16" = 0,0044°
Repeatability A-, C-axes	10" = 0,0027°	10" = 0,0027°	10" = 0,0027°	12" = 0,0033°
Axes clamping				
Clamping A-axis	hydraulic	hydraulic	hydraulic	hydraulic
Clamping C-axis	spring clamp	spring clamp	spring clamp	hydraulic
Holding torque A-, C-axes	2 000 Nm	2 000 Nm	1 600 Nm	2 000 Nm
Milling spindle				
Power S1 max. (100 % ED)	60 kW	70 kW	45 kW	52 kW
Torque S1 max. (100 % ED)	95 Nm	60 Nm	67 Nm	45 Nm
Max. torque Permanent greasing	22 000 min^{-1}	–	25 000 min^{-1}	24 000 min^{-1}
Oil-air lubrication	–	24 000 min^{-1}	30 000 min^{-1}	–
Constant power range from	6 000 min^{-1}	11 000 min^{-1}	6 400 min^{-1}	[3] 11 000 min^{-1}
Tool holder	HSK 63 A	HSK 63 A	HSK 63 A	HSK 63 A
Swivel axis – spindle nose	300 mm	300 mm	340 mm	250 mm
Tool clamping	Spring clamp	Spring clamp	Spring clamp	Spring clamp
Tool unclamping	hydraulic	hydraulic	hydraulic	hydraulic
Lubrication	Perm. grease lubrication + autom. grease replenishment system	Oil-air lubrication	Perm. grease lubrication + autom. grease replenishment system (opt. oil-air lubrication)	Permanent grease lubrication

[1] Other dimension on request
[2] According to VDI / DGQ 3441
[3] Up to 20 000 min^{-1}
We reserve the right to make technical changes.

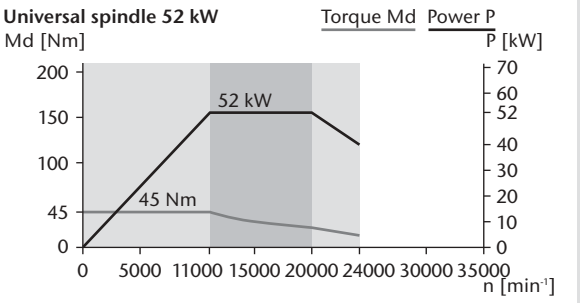
VH 2 Milling spindle performance diagram



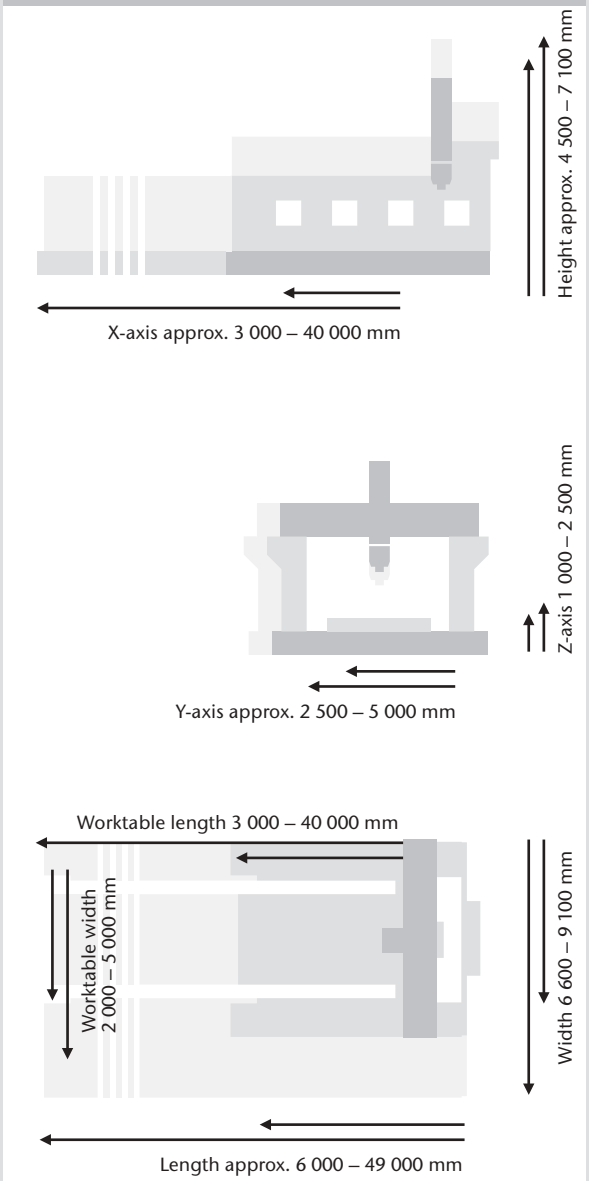
VH 3 Milling spindle performance diagram



VH 5 Milling spindle performance diagram



Dimensions



All dimensions shown are examples for the FZ 37 in minimum or maximum design configurations. Special sizes deviating from this are also possible.

Options	FZ 37
Air-conditioned control cabinet	■
Safety guarding	■
Simultaneous A-axis	■
Simultaneous C-axis	■
Clamping A-/C-axis	■
Coolant system	▪
Tool changer 15- to 200-times	▪
Minimal quantity lubrication	▪

Options	FZ 37
Measuring touch probe (wireless, cable)	▪
Tool measuring (laser, tactile)	▪
Special painting	▪
Chip conveyor	▪
Extraction systems	▪
Partitioned working area	▪
Special voltage	▪

■ Standard ▪ Option

Zimmermann

High Performance
Milling Technology

Zimmermann is synonymous with CNC portal milling machines on a big scale. Specialisation and our high rate of innovation has put our technology out in front worldwide.

A uniquely wide and finely tuned programme, including a large number of different machines and milling heads, enables you to choose the perfect machine for every application, thus offering you the ideal solution with regard to quality and cost-effectiveness.

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