Compact vertical machining centres with movable table
with 3 or 5 continuous axes

COMPACT

FFG

SIGMA

An advantageous price/performance ratio.

- The new vertical machining centers COMPACT, in configuration with 3 or 5 continuous axes, aim at reaching the most demanding application markets in terms of reliability and accuracy, to machine complex medium-little sized workpieces, at extremely competitive investment and operating costs, in precision mechanics, automotive, medical, aeronautics and moulds and dies fields.
- The entirely cast iron structure enhance the rigidity features of the machine in case of extreme exploitation of motorspindle power and torque.
- For COMPACT 5A, the two rotating axes (B and C) are driven by high performance powerful torque motors, entirely developed and manufactured in SIGMA, ensuring an excellent dynamics in the continuous 5-axes machining.
- COMPACT line is equipped with last generation Fanuc, Heidenhain and Siemens CNCs boosting its accuracy and productivity qualities. Such an availability allows to meet the requirements of those customers, who already use programming systems in a specific field.
- The high ergonomics operator panel is positioned on a sliding front structure.
- New COMPACT machining centres are supplied with new guards conceived according to most innovative industrial design criteria that sum up ergonomics, easy access to the work area, wide visibility during machining, comfort during workpiece loading/unloading operations, optimal fumes and swarf containment, easy use and maintenance.
- The electronic device Sigma Tool Check (Sigma patent), located near the tools loading/unloading position, is dedicated to all operations related to “direct call” of tools, single tool management (assignment or modification of a tool code, display and modification of tool compensation data) and tool magazine instruction, for direct interface with the CNC, without stopping the working cycle.

COMPACTNESS, STABILITY, HIGH PERFORMANCES IN ONE SOLUTION

ACCURACY
• Optical scales on all linear axes
• Z-axis counterbalance
• Differential temperature control of spindle and tilting head by a conditioning circuit

POWER
• The available torque, power and speed of Sigma motorspindles assure the best continuous machining conditions

SPEED
• Axes feedrate up to 40 m/min
• Axes acceleration up to 3,5 m/s^2

VERSATILITY
• Cast iron machine structure for maximum rigidity in case of extreme exploitation of motorspindle power and torque
• Y axis stroke of 570 mm for 5-axes version and 620 mm for 3-axes version
• Table loading capacity up to 1000 Kg for 5-axes version and 1200 Kg for 3-axes version

• The cast iron bed of COMPACT machining centres is designed to assure stability and stiffness. The configuration with moving worktable on X-axis allows to enhance the accuracy values and final quality of the machined workpieces.

• For COMPACT line in particular, the sliding of X-axis on two planes at different height assures an important section/inertial moment, so that machine dynamic performances are further increased.

• The structure dimensioning has requested an intensive software application of finite elements method (FEM), reaching an ideal mix of rigidity, accuracy, speed and resistance over time, for both the structures and the dynamic partes (as the screws which move the axes). The results are a speed up to 40 m/min and an acceleration of 3,5 m/s^2.

• All movements take place on linear guideways with roller recirculation sliding blocks.

• Machine accuracy is assured by pressurized optical scales on X, Y and Z axes.

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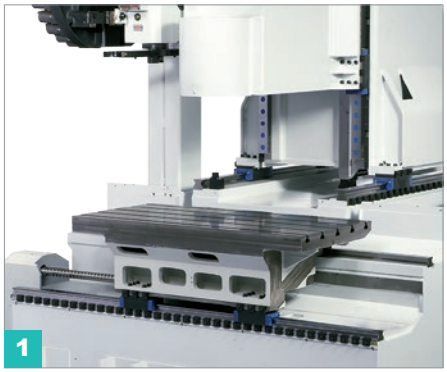
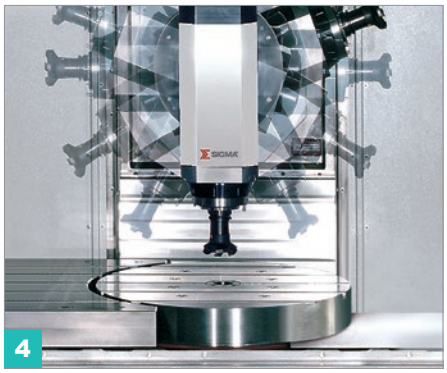


MOVING TABLE
The configuration with moving worktable on X-axis allows to enhance the accuracy values and final quality of the machined workpieces.

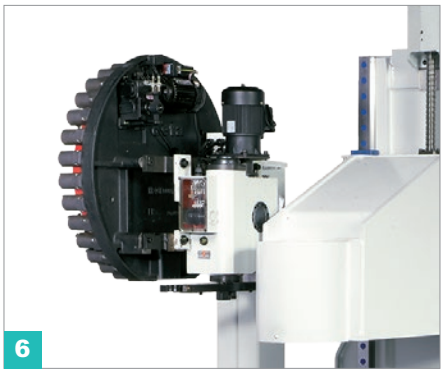
STRUCTURE
The structural concept allows to enhance the rigidity features of the machine in case of extreme exploitation of motorspindle power and torque.

MOTORSPINDLE
Motorspindles entirely developed and manufactured in SIGMA as a guarantee of reliability and long life, with features of high performances in terms of power (33 kW), torque (235 Nm) and rotation speed (up to 18,000 rpm).



TILTING MILLING HEAD*
Tilting milling heads (B-axis) for simultaneous 4-5 axes machining are developed and manufactured in SIGMA, driven by high performance powerful torque motors to ensure high precision, dynamics, rotation speed and torque.
*For COMPACT 5A only

ROTARY TABLE*
Rotary tables (C-axis), embedded in the moving work table, for continuous 5- axis machining with a diameter of 550 mm, are driven by high performance powerful torque motors to ensure high precision, dynamics, rotation speed and torque.
*For COMPACT 5A only



TOOL MAGAZINE
Tool magazines are structurally disconnected from the machine axes movements. This allows for easy inspection and direct replacement of the tools on the tool chain, in total safety, without stopping the working cycle.

SIGMA TOOL CHECK
Electronic device dedicated to all operations related to “direct call” of tools, single tool management (assignment or modification of a tool code, display and modification of tool compensation data) and tool magazine instruction, for direct interface with the CNC, without stopping the working cycle.

DYNAMIC ADJUSTMENT
The dynamic adjustment during milling allows to optimize the dynamic behavior of the machine in the various working conditions through 5 sophisticated customized CNC functions: standard machining, powerful roughing, accurate finishing, high precision, working speed of the machined workpiece.

USER PANEL
The user panel, with a high ergonomic content, developed according to innovative industrial design, is positioned on a sliding front structure.

SIGMA vertical machining centres and flexible milling cells incorporate excellence in performance deriving from the "**SIGMA DNA**", a mix of concepts, experiences and exclusive innovations gained and consolidated by SIGMA through its decades of history, which are applied across activities related to product development of all machine models.

MACHINE GUARDING
Machine guarding is designed according to the most innovative industrial design criteria, by integrating the ergonomic functions such as:
easy access to the working area, wide visibility of the operating area, easy loading/unloading of workpieces, containment of fumes and cutting waste, easy maintenance.

AUTOMATION
Process automation is assured by the modular systems for pallet workpiece management that can be easily integrated with machines in stand-alone configurations or in cells or with flexible manufacturing islands.

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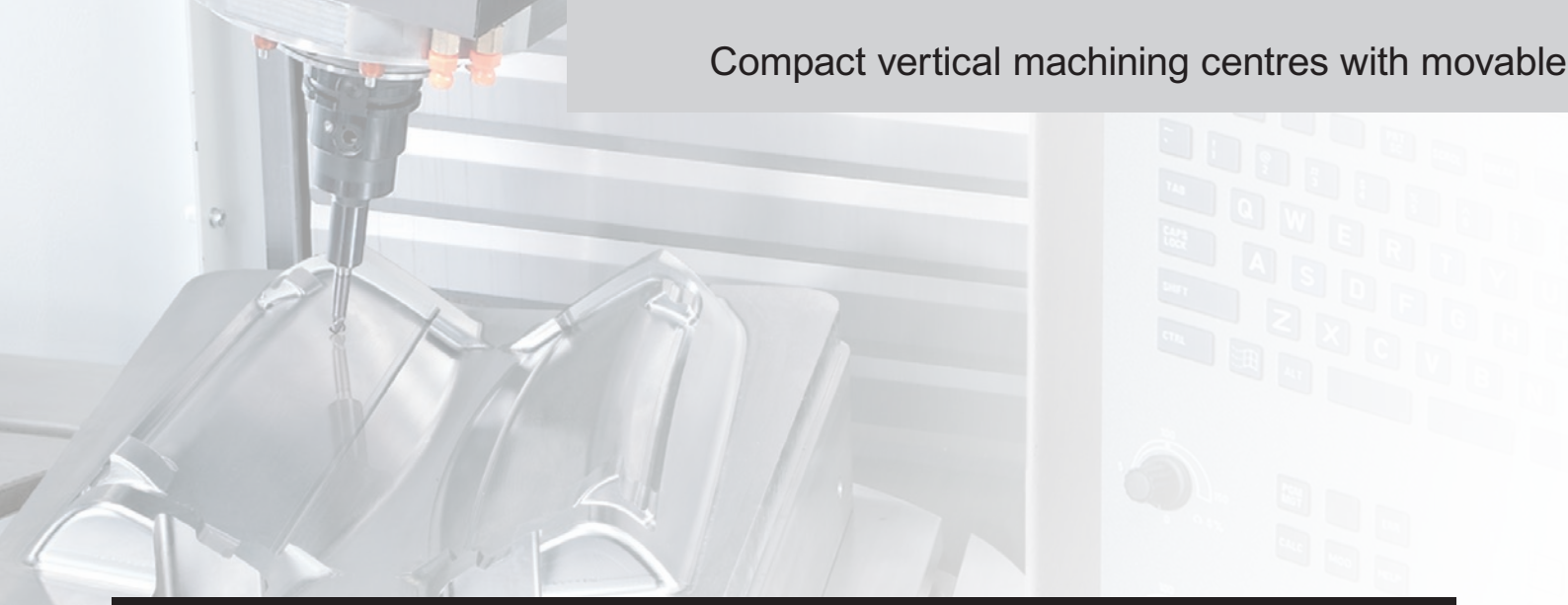
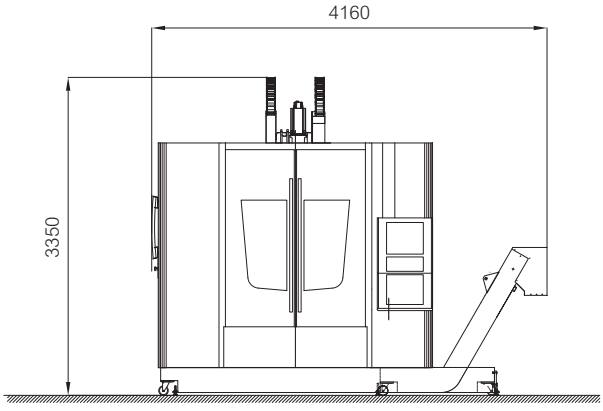
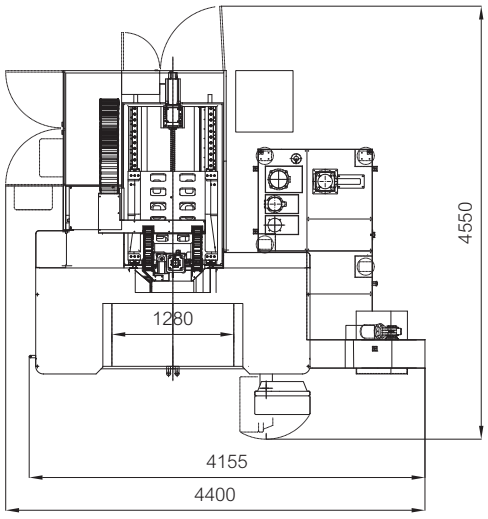


Application markets

The new vertical machining centers COMPACT, in configuration with 3 or 5 continuous axes, aim at reaching the most demanding application markets in terms of reliability and accuracy, to machine complex medium-little sized workpieces, at extremely competitive investment and operating costs, in precision mechanics, automotive, medical, aeronautics and molds and dies fields.

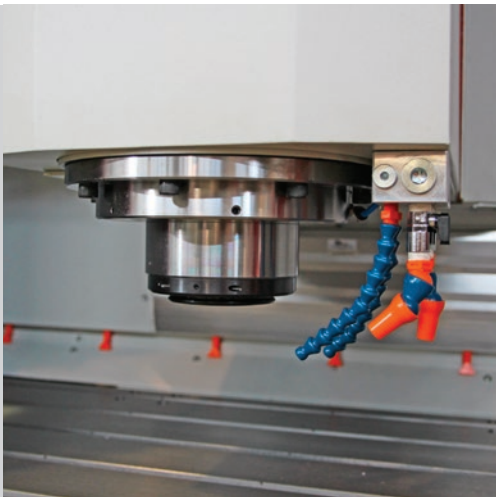
Machine overall dimensions COMPACT 3A-L



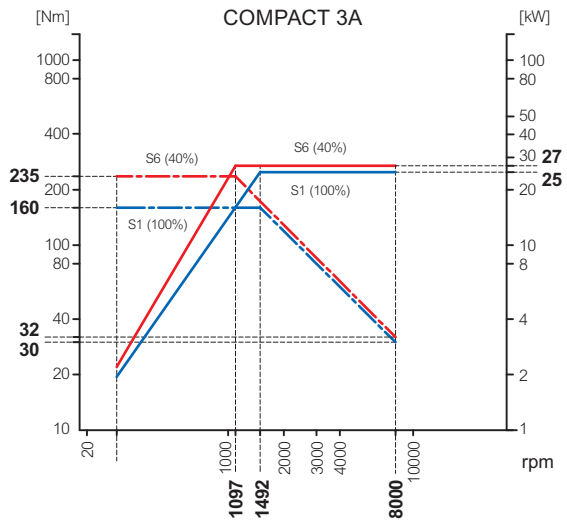


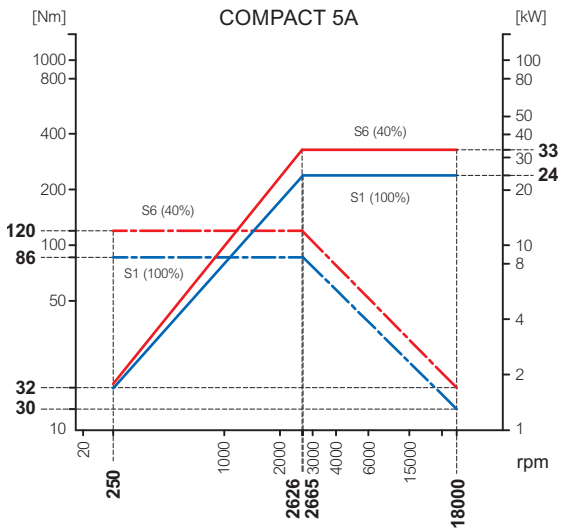
Motorspindles

In 3-axes version, the standard motorspindle is driven by a brushless motor ensuring 27 kW power, 235 Nm torque and 15.000 rpm.
Same 27 kW power, but SK40 taper, 10.000 rpm and 130 Nm are features of another available standard motorspindle. Upon request can be available an optional motorspindle with same 27 kW power, but SK50 taper, 8.000 rpm and 235 Nm.
In 5-axes version, the standard motorspindle is driven by a brushless motor ensuring 33 kW power, 180 Nm torque and 12.000 rpm.
Upon request can be available an optional motorspindle with same 33 kW power, but HSK-A-63 taper, 18.000 rpm and 120 Nm.



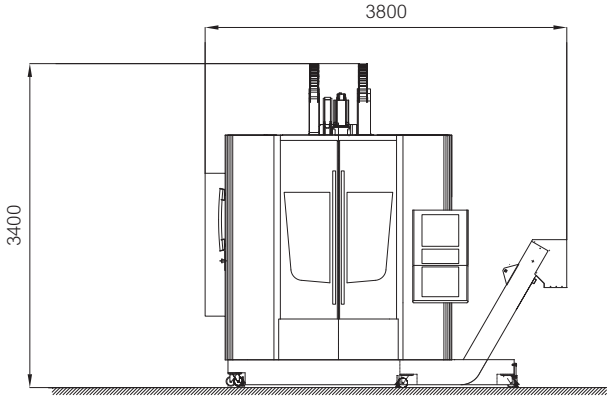
Power/torque diagram

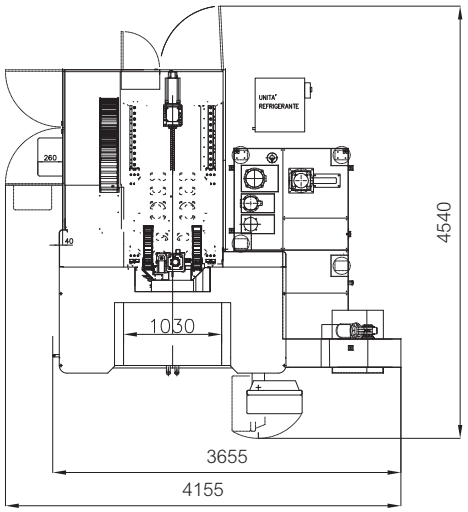




Machine overall dimensions

COMPACT 3A-M / 5A





Compact vertical machining centres with movable table with 3 or 5 continuous axes

TECHNICAL DATA

WORKING AREA		COMPACT 3A-M	COMPACT 3A-L	COMPACT 5A
X - Y - Z Axes Traverse	mm *inch*	1.000 - 620 - 600 *39 - 24 - 24*	1.250 - 620 - 600 *49 - 24 - 24*	1.150 - 570 - 800 *45 - 22 - 31*
X - Y - Z Axes Feedrate	m/min *ipm*	40 *1575*	40 *1575*	40 *1575*
X - Y - Z Axes Acceleration	m/s^2 *ft/s^2*	3,5 *12*	3,5 *12*	3,5 *12*
Spindle nose - table surface distance	mm *inch*	150 - 750 *6 - 30*	150 - 750 *6 - 30*	150 - 625 *6 - 25*
Horizontal spindle - table surface distance	mm *inch*	-	-	160 - 960 *6 - 38*
Linear axes slideways X - Y - Z axes	type	with recirculation roller sliding blocks size 45 mm (X) 55 mm (Y-Z)		with recirc. roller sliding blocks: size 45-2+2 pads (X) size 55-2+2 pads (Y-Z)
Axes motion system diam x pitch	type	ISO 3 ground ball screws 40x20		
TABLE				
Table surface	mm *inch*	600 x 1.200 *24 x 47*	600 x 1.450 *24 x 57*	-
Max. load on fixed worktable	kg *lb*	1.000 *2205*	1.200 *2646*	-
REMOVABLE WORKTABLE (Option)				
Table surface	mm *inch*	-	-	550 x 550 *22 x 22*
Max. load on worktable	kg *lb*	-	-	1.000 *39*
TILTING HEAD (B AXIS)				
Motor	type	-	-	torque
Traverse	degrees	-	-	± 110
ROTARY TABLE (C AXIS)				
Motor	type	-	-	torque
Traverse	degrees	-	-	360
Diameter - Max. load	mm-kg inch-*lb*	-	-	550-500 *22-670*
LINEAR AXES ACCURACY				
Measuring system X - Y - Z axes	type	codified incremental pressurized optical scales		
Positioning uncertainty P (VDI/DGQ 3441)	µm	6		
ROTARY AXES ACCURACY (B-C)				
Positioning	arcsec	-	-	5”
Repeatability	arcsec	-	-	4”
OTHER DATA				
Weight	kg *lb*	8.000 17637 approx.	9.000 *19842* approx.	9.000 *19842* approx.
Overall dimensions: width x depth x height	m *ft*	4,2 x 4,5 x 3,4 *13,8 x 14,8 x 11,2*	4,4 x 4,5 x 3,4 *14,4 x 14,8 x 11,2*	4,2 x 4,5 x 3,4 *13,8 x 14,8 x 11,2*

SPINDLE						
Spindle speed	rpm	8.000	10.000	15.000	12.000*	18.000
Motor	type	motorspindle	electrospindle	motorspindle	synchronous motorspindle	
Tool holder taper	type	SK50	SK40* BT40 HSK-A-63	SK40* BT40 HSK-A-63	SK40* BT40 HSK-A-63	HSK-A-63
Max. available power S1/S6	kW *hp*	25/27 *34/36*	26/29 *35/39*	25/27 *34/36*	27/33 *36/44*	24/33 *32/44*
Max. available torque S1/S6	Nm *lb*ft*	160/235 *118/173*	100/130 *74/96*	160/235 *118/173*	130/180 *96/133*	86/120 *63/89*
Conditioning	type	chiller with different temperature control				

TOOL MAGAZINE			
Tool magazine capacity (type)	Nr	30* (drum type magazine) 40 (chain type magazine)	40 (chain type magazine)
Max. tool diameter / lenght	mm *inch*	76 / 127 *3 / 5* (with free side pockets) / 300 *12*	
Chip-to-chip change time	s	4,5 approx.	
Tool selection / tool changer	type	random / double gripper arm	
Tool magazine control	type	electronic control panel «Sigma Tool Check»	

* standard

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