

OKK

5-axis Control Machining Center

SAX SERIES

Effective for Highly-efficient Intensive machining of Dies and Parts that are more Complex or more Detailed and Complicated

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Intensive machining enables shorter lead times.

No accumulation of errors through multiple setup operations improves machining accuracy.

Tilting a workpiece or a tool requires less extension of a tool.
Also, it allows the use of optimum rpm/ cutting speed for the tip of the tool.

In the 3-axis machining for prototype or die fabrication, long extension of a tool has been needed. However, the 5-axis machining requires reduced extension of a tool and can improve accuracy and quality of machining. Also, it greatly reduces the time required for machining and enables highly efficient machining.



3-axis machining

Highly efficient 5-axis machining requiring less extension of a tool

Intensive machining can reduce costs for preparing fixtures.

This enables the machining of complex shapes such as impellers.

5AX

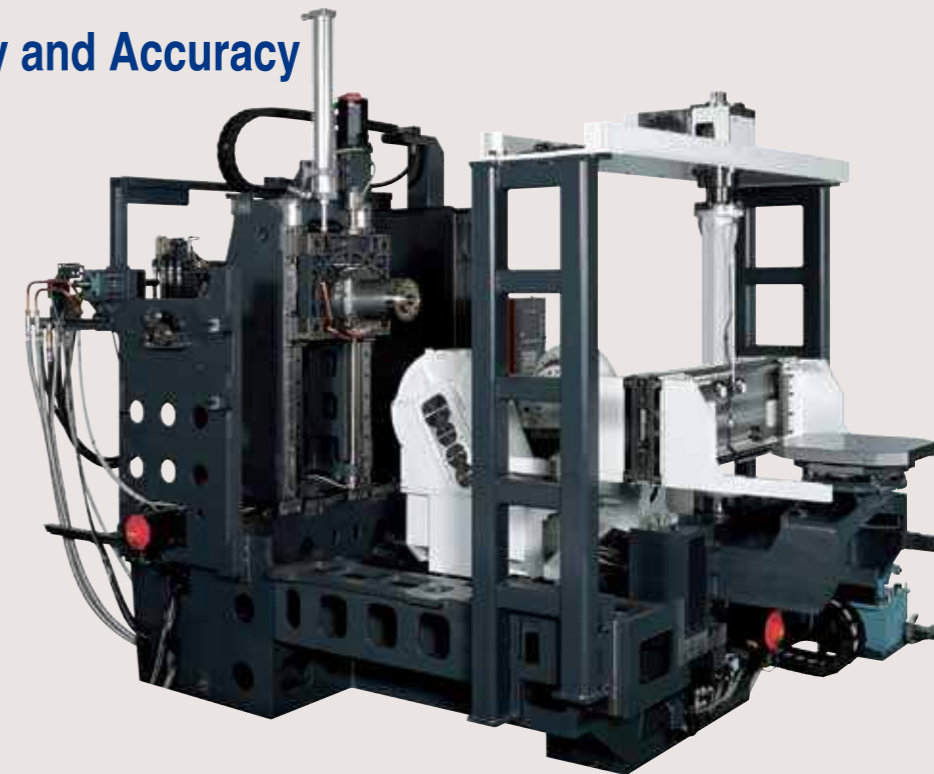
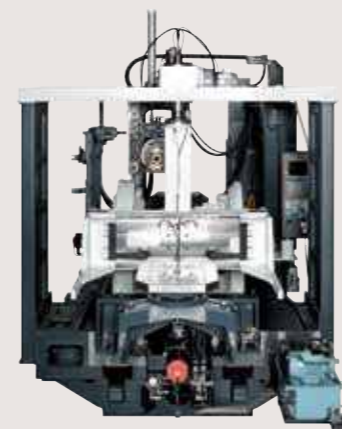
Exceptionally Efficient Machining of Complex Parts for Aircraft and Automotive Industries

OKK integrated the developed 5-axis vertical machining centers technologies and the HM-series highly rigid horizontal machining centers.



- Machining from roughing through finishing are combined and completed in a single chucking.
- Maximum machining size (diameter × height) : $\phi 750 \times 700$ mm ($\phi 29.53" \times 27.56"$)
- The large trunion table produces highly rigid and accurate machining.

Exceptional Rigidity and Accuracy



New Innovative Trunion Table Mechanism

The solid dual-disc clamping method of the Trunion table ensures the braking retaining force of 10000 N·m (7376 ft·lbs) for the A axis and 6800 N·m (5015 ft·lbs) for the B axis. The double (hydraulic and mechanical) clamping method applied to the pallet clamping ensures the clamping force of 96000 N (21600 lbf) and provides safety at the time of the power failure. The standard rotary scale feedback encoder on the A and B axes of the Trunion table maximizes the indexing accuracy. Drive of the Trunion table was changed to the new rolling type from the conventional slide type. The non-backlash mechanism was applied to the tilting axis to improve the indexing accuracy.

High-powered Head interlock with Machine's High Rigidity

High-power machining is enabled with the high-torque BT50 MS spindle.



Spindle taper	No.50
Spindle motor	30 / 25 kW (40 / 34 HP)
Maximum torque	420N·m (310 ft·lbs) OP : 623N·m (443 ft·lbs)
Spindle diameter	$\phi 100$ mm ($\phi 3.94"$)

Chip Processing Measures

The scattered chips on the splash guard are prevented from accumulating by the use of the shower nozzles on the ceiling (ceiling shower: option, std US) and removed through the coil-type chip conveyors on the right and left sides. The steeply inclined wall structure of the splash guards, i.e. large inclination angle of the telescopic cover and the top faces of the machine, deter chips from accumulating.



Ceiling shower (option, std US)



Lift-up type chip conveyor (option)



Coil type chip conveyor

Positioning Accuracy (without linear scale) mm (inch)

Positioning Accuracy (X, Y, Z)	±0.0025 (±0.00008")/full length
Repeatability (X, Y, Z)	±0.0015 (±0.00004")/full length

Positioning Accuracy (with linear scale) mm (inch)

Positioning Accuracy (X, Y, Z)	±0.0020 (±0.00004")/full length
Repeatability (X, Y, Z)	±0.0010 (±0.00002")/full length

Positioning Accuracy (with encoder) mm (inch)

Positioning Accuracy	A axis: ±5 sec C axis: ±2.5sec
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Cutting Accuracy mm (inch)

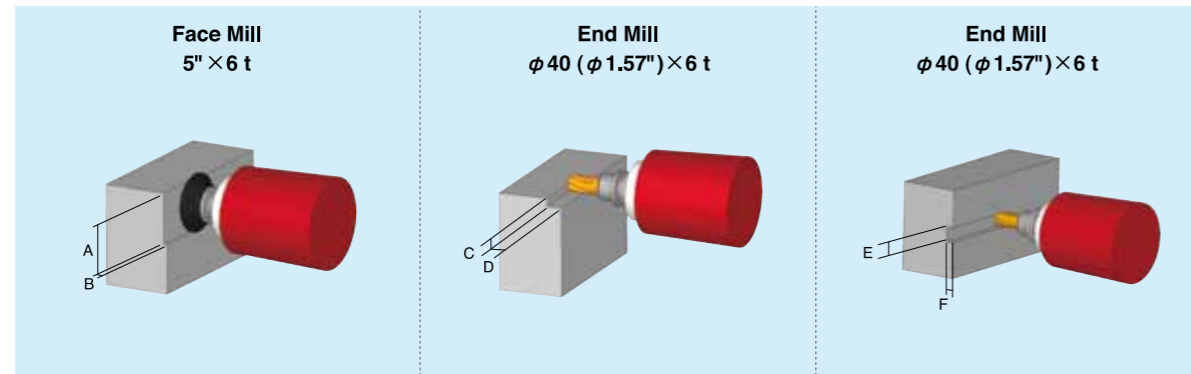
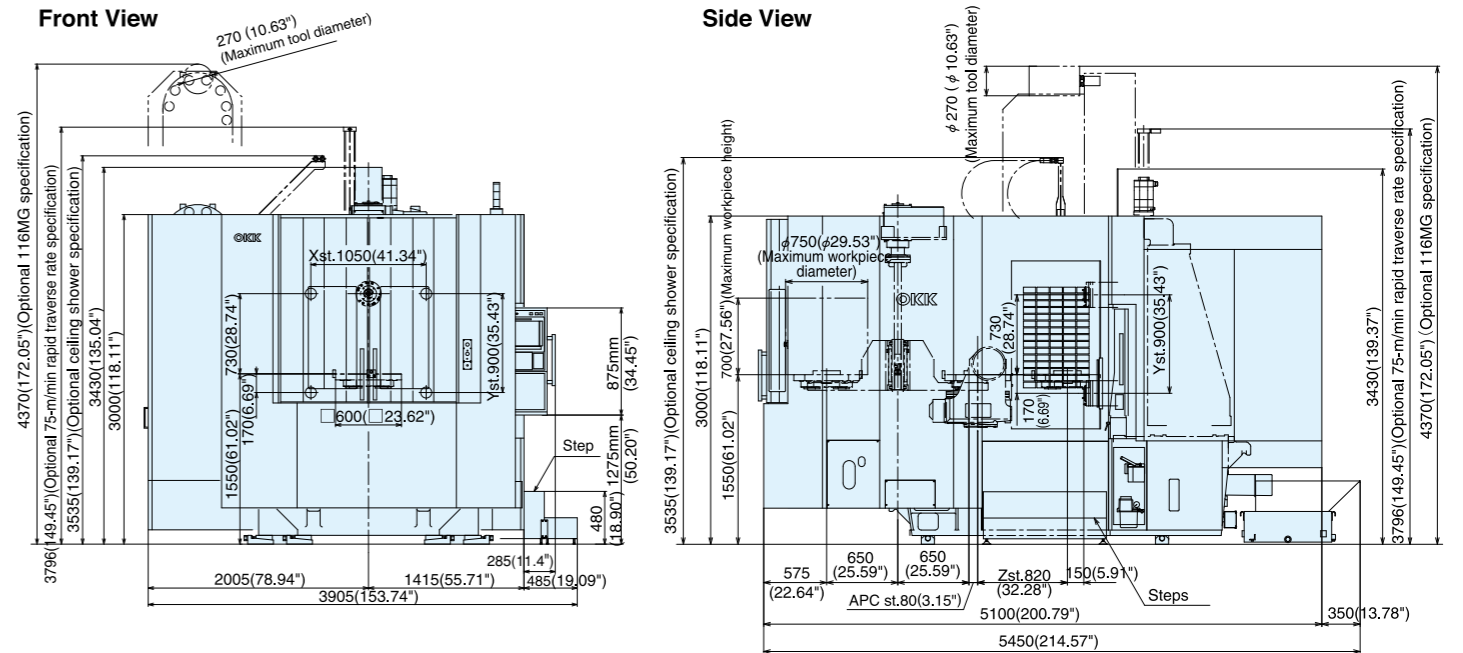
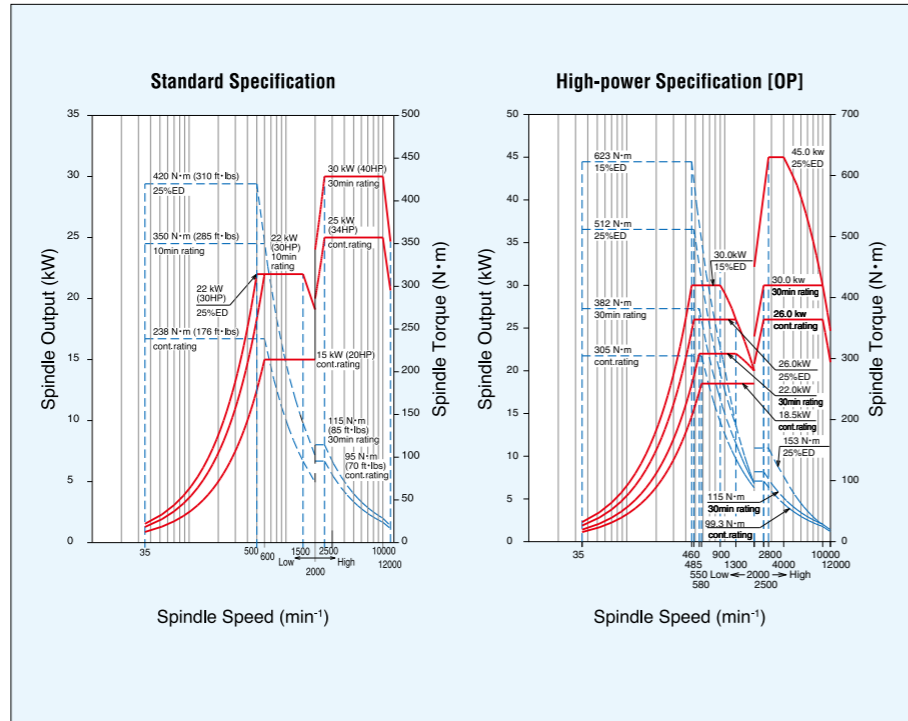
Item	OKK tolerance	Result
Axis direction	0.015 (0.00059")	0.003 (0.00012")
Diagonal direction	0.015 (0.00059")	0.005 (0.00020")
Deviation of hole dia	0.010 (0.00039")	0.005 (0.00020")

Circular Cutting Accuracy mm (inch)

Item	OKK tolerance	Result
Circularity	0.005 (0.00020")	0.004 (0.00016")

Remarks

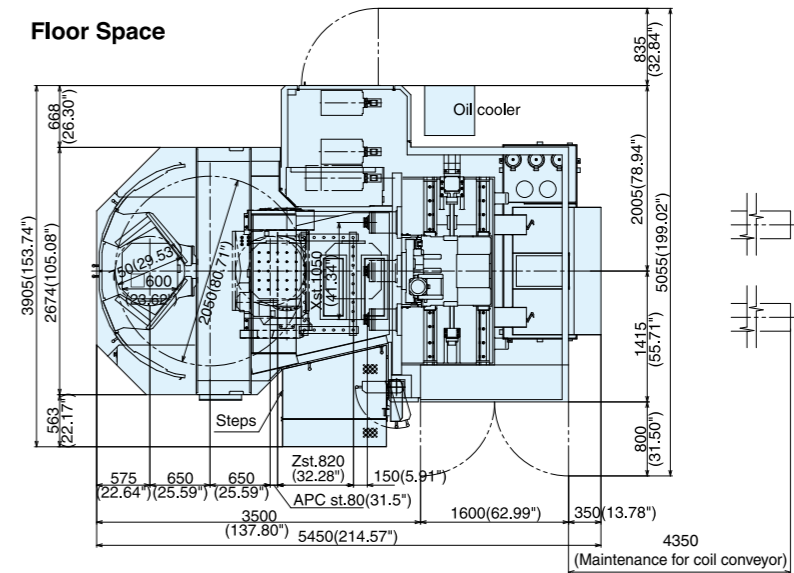
- *1: The above sample data shows a short-time machining example and the results of continuous machining may differ from them.
- *2: The above sample data shows the accuracy under OKK's in-house cutting test conditions. The results may vary with the conditions of the cutting tools and fixtures.
- *3: The accuracy shown above are values obtained based on OKK's inspection standards under the conditions that the machine is installed according to OKK's foundation drawing and the ambient temperature remains constant.



Spindle speed	300min ⁻¹	200min ⁻¹	200min ⁻¹
Cutting speed	120m/min (4724ipm)	25m/min (984ipm)	25m/min (984ipm)
Cut width	(A) 100mm (3.94")	(C) 20mm (0.79")	(E) 40mm (1.57")
Cut depth	(B) 6mm (0.24")	(D) 50mm (1.97")	(F) 20mm (0.79")
Feed rate	780mm/min (31ipm)	240mm/min (9ipm)	280mm/min (11ipm)
Feed per tooth	0.433mm/tooth (0.01705inch/tooth)	0.200mm/tooth (0.00787inch/tooth)	0.233mm/tooth (0.00917inch/tooth)
Cutting amount	468cm ³ /min (28.5cu-inch/min)	240cm ³ /min (14.6cu-inch/min)	224cm ³ /min (13.7cu-inch/min)
Spindle motor load	102%	80%	97%

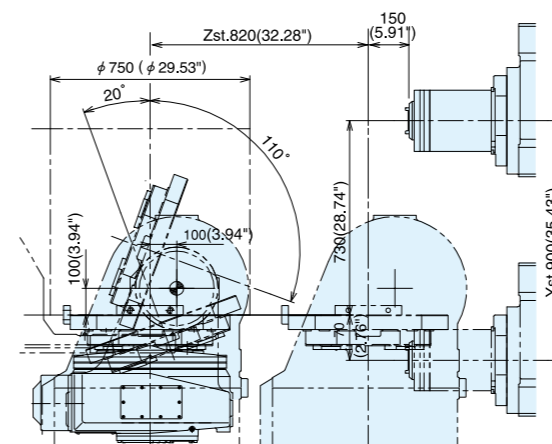
Note 1: The above machining data are obtained at the position of 0-degree table tilting angle.
 Note 2: The above machining data show a sample actual machining and are for reference only.

Floor Space

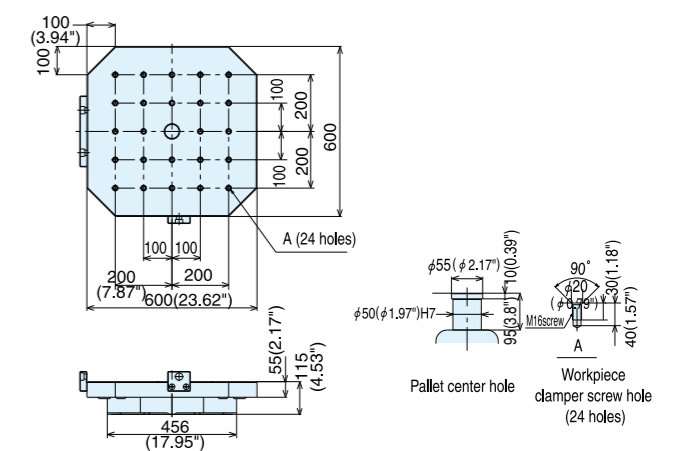


Strokes

(The drawing shows incorrect spindle center to pallet face minimum shows 70mm (2.76"))



Table



Specifications

HM-X6000

Item	Unit	Specification
Travel	Travel on X axis (Column: right / left)	mm 1050(41.34")
	Travel on Y axis (Spindle head: up / down)	mm 900(35.43")
	Travel on Z axis (Pallet: back / forth)	mm 820(32.28")
	Travel on A axis (Table tilting)	deg 20 to -110
	Travel on B axis (Table turning)	deg 360
Table	Distance from table top surface to spindle center	mm -170 to 730(-6.69" to 28.74")
	Distance from table center to spindle nose	mm 150 to 970(5.91" to 38.19")
	Table (Pallet) work surface area	mm <input type="checkbox"/> 600(<input type="checkbox"/> 23.62")
	Max. workpiece weight loadable on table (A axis=0 deg)	kg 650(1433lbs)(Uniformly distributed load)
	Max. workpiece moment	N·m 392(289ft. lbs)
	Work surface configuration (nominal screw-hole size x number of holes)	M16 x 24 holes
	Minimum index angle of table (pallet)	deg 0.001
	Table (Pallet) index time for 90 degrees	sec A axis: 1.7 B axis: 0.6
	Pallet exchange time (New JIS evaluation time)	sec 18
	Spindle	Spindle speed
Spindle speed control		Stepless control
Spindle nose (Nominal number)		7/24 taper, No. 50
Feed rate	Spindle bearing bore diameter	mm ϕ 100(ϕ 3.94")
	Rapid traverse rate	XYZ: m/min XYZ:54(2126ipm) AB: min ⁻¹ A:10 B:33.3
	Cutting feed rate	XYZ: mm/min 1 to 40000(0.04 to 1575ipm) ^{*1} AB: min ⁻¹ A:5 B:5
	Type of tool shank (Nominal number)	JIS B 6339 BT50
Automatic tool changer (ATC)	Type of pull stud (Nominal number)	OKK only 90°
	Number of stored tools	tools 40 ^{*2}
	Maximum tool diameter (With tools in adjacent pots)	mm ϕ 115(ϕ 4.53")
	Maximum tool diameter (With no tools in adjacent pots)	mm ϕ 270(ϕ 10.63")
	Maximum tool length (from the gauge line)	mm 500(19.69")
	Maximum tool weight	kg 25(55lbs)
	Tool selection method	Address fixed random method
	Tool exchange time (tool-to-tool)	sec 2.0
	Tool exchange time (cut-to-cut)	sec 4.2
	Motor	For spindle (30-min rating / continuous rating)
For feed axes		XYZ: kW FANUC XYZ:5.5(7HP) AB: kW FANUC A:5.5(7HP) B:4.5(6HP)
Power supply		kVA FANUC:67
Required power source	Supply voltage and supply frequency	V x Hz AC200±10% x 50/60±1 AC220±10% x 60±1 ^{*3}
	Compressed air supply pressure	Mpa 0.4 to 0.6(58 to 87psi) ^{*4}
	Air supply flow rate	L/min(ANR) 500(132gpm) ^{*5}
Capacity of tank	For coolant	L 400(106gal)
	For spindle head cooling	L 70(185gal)
	For hydraulic unit	L 20(5gal)
Dimensions of Machine	Height of Machine (from floor level)	mm 3430(135.04")
	Floor space required for operation (width x depth)	mm 3905(153.74") x 5450(214.57")
	Floor space including maintenance area (width x depth)	mm 5100(200.79") x 6300(248.03")
	Weight of Machine	kg 20000(44100lbs)
	Controller	F31i-B5
Operating environment temperature	°C 5 to 40	

*1: Under the HQ or hyper HQ control
 *2: Number of stored tools refers a total number of tools including the one installed on the spindle i.e. subtract one from the above for the actual number of tools stored in the tool magazine.
 *3: When the supply voltage is 220 VAC, the supply frequency of 60 Hz only is applicable.
 *4: Purity of the supplied air should be equivalent to Class 3.5.4 specified in ISO 8573-1 / JIS B8392-1 or higher.
 *5: The flow rate for the standard specification machines is specified in the above.
 When optional specification such as an air blow is added, add the corresponding air supply according to the operating frequency.

Standard Accessories

HM-X6000

Item	Q'ty
Lighting unit with one fluorescent lamp	1 set
Two-lamp-type signal lamp	1 set
Coolant unit with separate-type coolant tank	1 set
Ceiling cover / APC safety guard	1 set
Door interlock control	1 set
Slideway protection covers for X, Y and Z axes	1 set
Spindle air purge	1 set
Spindle head and ball screw cooling oil temperature controller	1 set
Hydraulic unit	1 set
Coil-type chip conveyor	2 sets
Edge locator	1 set
Automatic pallet changer (2APC)	1 set
Oil-air unit	1 set
Steps (before the operation panel)	1 set
Leveling blocks	1 set
Parts for machine transportation (excluding the hoisting jigs)	1 set
Automatic power-off system	1 set
Rotary encoder (A axis / B axis)	1 set
Electrical spare parts (fuses)	1 set
Instruction manual	1 set
Electrical instruction manual (including Hardware diagrams)	1 set

Optional Accessories

HM-X6000

Item	Specification
<input type="checkbox"/> 75-m/min rapid traverse rate	<input type="checkbox"/> 8000 min ⁻¹ (22/18.5 kW(30/25HP))
<input type="checkbox"/> Spindle motor	<input type="checkbox"/> 12000 min ⁻¹ high-power specification (40/25 kW(54/30HP))
<input type="checkbox"/> Compatibility with Dual contact tool	
<input type="checkbox"/> Pull stud	<input type="checkbox"/> MAS I <input type="checkbox"/> MAS II <input type="checkbox"/> 60 <input type="checkbox"/> 80 <input type="checkbox"/> 116 <input type="checkbox"/> 120 <input type="checkbox"/> 160 <input type="checkbox"/> 176 <input type="checkbox"/> 236
<input type="checkbox"/> Tool magazine	
<input type="checkbox"/> Additional pallet	
<input type="checkbox"/> Automatic door for the APC safety guard	
<input type="checkbox"/> Lift-up type chip conveyor	<input type="checkbox"/> Fixed type(for Lift-up type chip conveyor) <input type="checkbox"/> Swing type(for Lift-up type chip conveyor)
<input type="checkbox"/> Chip bucket	
<input type="checkbox"/> Ceiling shower	
<input type="checkbox"/> Workpiece flushing gun	
<input type="checkbox"/> Oil skimmer	
<input type="checkbox"/> Air blow nozzle	
<input type="checkbox"/> Oil-mist / air blow nozzle	
<input type="checkbox"/> Mist collector	
<input type="checkbox"/> Compatibility with through-spindle including high-pressure unit	<input type="checkbox"/> 2MPa(290psi) <input type="checkbox"/> 7MPa(1015psi)
<input type="checkbox"/> Thickener bag filter (Spare parts for high-pressure unit)	
<input type="checkbox"/> Minute amounts of cutting oil supply unit (Maker: BLUEBE)	
<input type="checkbox"/> Cutting oil (compatible with BLUEBE unit)	
<input type="checkbox"/> Linear scale	<input type="checkbox"/> For X and Y axes <input type="checkbox"/> For X, Y and Z axes
<input type="checkbox"/> Coolant cooler	
<input type="checkbox"/> Signal lamp	<input type="checkbox"/> Two-lamp type with buzzer <input type="checkbox"/> Three-lamp type with buzzer <input type="checkbox"/> Two-lamp type flasher <input type="checkbox"/> Three-lamp type flasher <input type="checkbox"/> 4 sets <input type="checkbox"/> 8 sets
<input type="checkbox"/> Additional M code	
<input type="checkbox"/> Standard tool set	
<input type="checkbox"/> Special machine painting color	
<input type="checkbox"/> Foundation bolts for bond anchoring	
<input type="checkbox"/> Bond for foundation work	
<input type="checkbox"/> Automatic magazine lubrication	
<input type="checkbox"/> Automatic greasing of guides and ball screws	<input type="checkbox"/> T0 (Manual measurement) <input type="checkbox"/> T1-A (Workpiece measurement) <input type="checkbox"/> T1-B (Workpiece measurement, Tool length measurement, Tool break detection) <input type="checkbox"/> T1-C (Tool length measurement, Tool break detection) <input type="checkbox"/> T0 software
<input type="checkbox"/> Touch sensor system	
<input type="checkbox"/> Integrating timer (Max 9999 hours)	
<input type="checkbox"/> Workpiece counter (5-digit display)	
<input type="checkbox"/> Calendar timer	
<input type="checkbox"/> OKK manual guide i (Animation of milling cycle for F31i)	
<input type="checkbox"/> Tool Magazine operation panel	

Debut of Highly Rigid 5-axis Controlled Machining Center!

Designed for machining hard-to-cut materials such as stainless steel and titanium alloy.

Complete roughing to finishing operations in a single chucking. Responds to all users' needs and achieves highly efficient and accurate machining through intensive machining even when machining aircraft parts, die components and so on.



Titanium Material Sample Workpiece

Material: Titanium
 Coolant: Water-soluble coolant
 Tooling: $\phi 10 \sim 50\text{mm}$ ($\phi 0.39 \sim 1.97''$) end mill
 Cutting condition: S380 ~ S6000
 F120 ~ F2000
 Cutting time: 3 hours 20 minutes



- The tilt and rotary structure built in the table delivers the multiple surface machining and the simultaneous 5-axis controlled machining capability.
- The No.50 taper spindle can cover the machining of heavy-duty cutting at low speed through high-speed cutting.
- Drastically improved access to and operation of workpieces.
- Vastly improved performance in removal of chips from around the table.

※ The machines in the photographs of this brochure may include optional accessories.



Highly Rigid Main Body Structure

In order to ensure high rigidity and to improve the dampening performance for vibrations generated while machining, the bed and column structure are constructed of triangular ribs arranged to optimize the casting strength through FEM models.

High-speed and Highly Rigid Spindle

The No. 50, 7/24 taper spindle nose is used in combination with the 100mm(3.94") inner diameter, four-row combination angular bearing. The spindle rotating range is 35~12000min⁻¹. Roughing and heavy-duty cutting of hard-to process materials are enabled due to the built-in motor that can output a maximum 623 N·m (460ft·lbs) (15% ED).



Feed Guide Face

Use of the highly rigid, large-size linear roller guide improves vibration dampening of the feed system.



Table

To deliver driving torque, the drive sections of the tilt and rotary axes adopt the mechanism of 1/180 (A axis), 1/120 (C axis) reduction ratio worm gears. 3870 N·m (2902 ft·lbs) clamping torque in the rotary axis assures rigidity in indexing and machining of multiple surfaces. With the brake mechanism on both sides, 5340 N·m (4005 ft·lbs) brake torque is achieved on the tilt axis.



APC (Automatic Pallet Changer) is included in the Standard Specification!

Arranging the APC in the rear of the machine not only ensures operability and accessibility of operators but improves visibility of workpiece machining area. At the same time it achieves a compact floor space design (saves about 20% of space compared with our conventional machines).



In addition to the APC included in the standard specification, the conveyor installed inside the machine processes chips completely and thus saves manpower and supports unmanned operation.

Accuracy

Positioning Accuracy (without linear scale)

	mm (inch)
Positioning Accuracy (X, Y, Z)	±0.0020 (±0.00008") /full stroke
Repeatability (X, Y, Z)	±0.0010 (±0.00004") /full stroke

(OKK tolerance)

Positioning Accuracy (with linear scale)

	mm (inch)
Positioning Accuracy (X, Y, Z)	±0.0010 (±0.00004") /full stroke
Repeatability (X, Y, Z)	±0.0005 (±0.00002") /full stroke

(OKK tolerance)

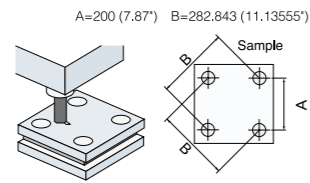
Positioning Accuracy (with encoder)

Positioning Accuracy	A axis: ±5 sec	C axis: ±3 sec
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(OKK tolerance)

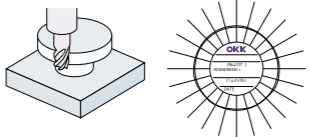
Cutting Accuracy

Item	OKK tolerance	Result
Axis direction	0.015 (0.00059")	0.003 (0.00012")
Diagonal direction	0.015 (0.00059")	0.005 (0.00020")
Deviation of hole dia	0.010 (0.00039")	0.005 (0.00020")



Circular Cutting Accuracy

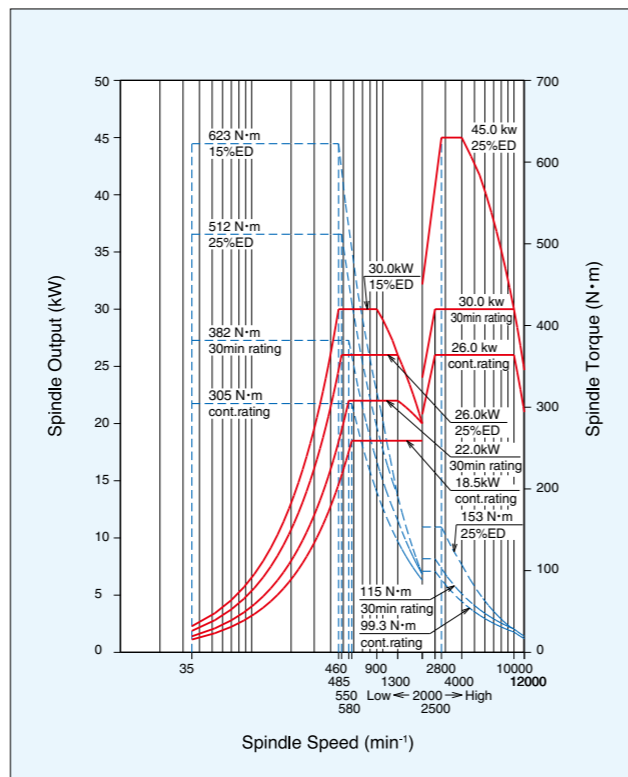
Item	OKK tolerance	Result
Circularity	0.005 (0.00020")	0.0041 (0.00016")



Remarks

- *1: The above sample data shows a short-time machining example and the results of continuous machining may differ from them.
- *2: The above sample data shows the accuracy under OKK's in-house cutting test conditions. The results may vary with the conditions of the cutting tools and fixtures.
- *3: The accuracy shown above are values obtained based on OKK's inspection standards under the conditions that the machine is installed according to OKK's foundation drawing and the ambient temperature remains constant.

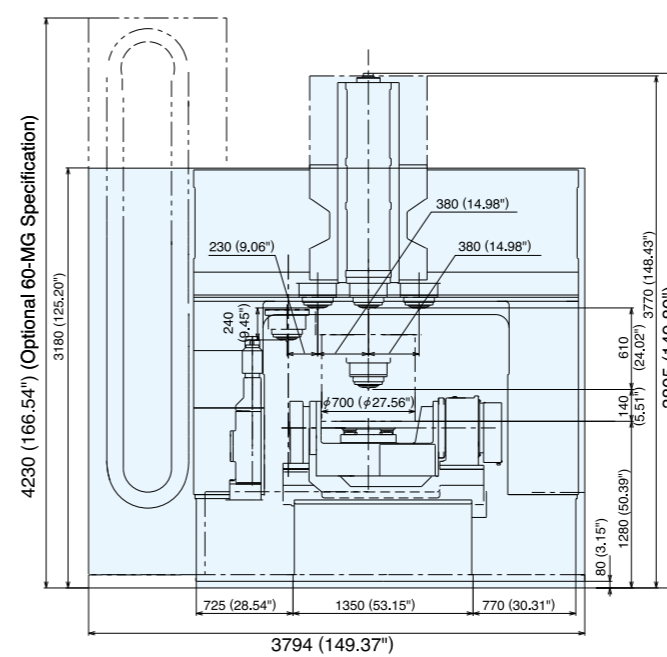
Spindle Output and Torque Diagram for Standard Specification (FANUC)



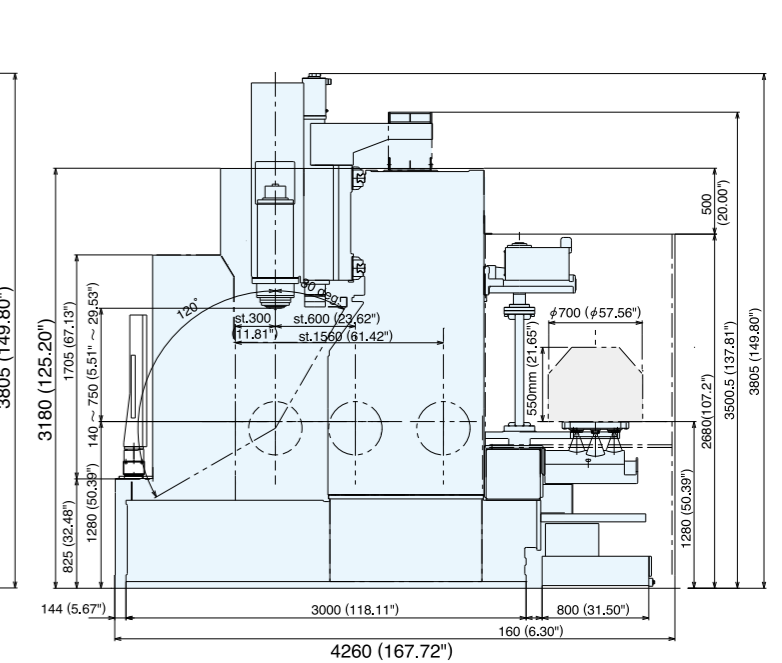
Main Dimensions of the Machine

VG5000

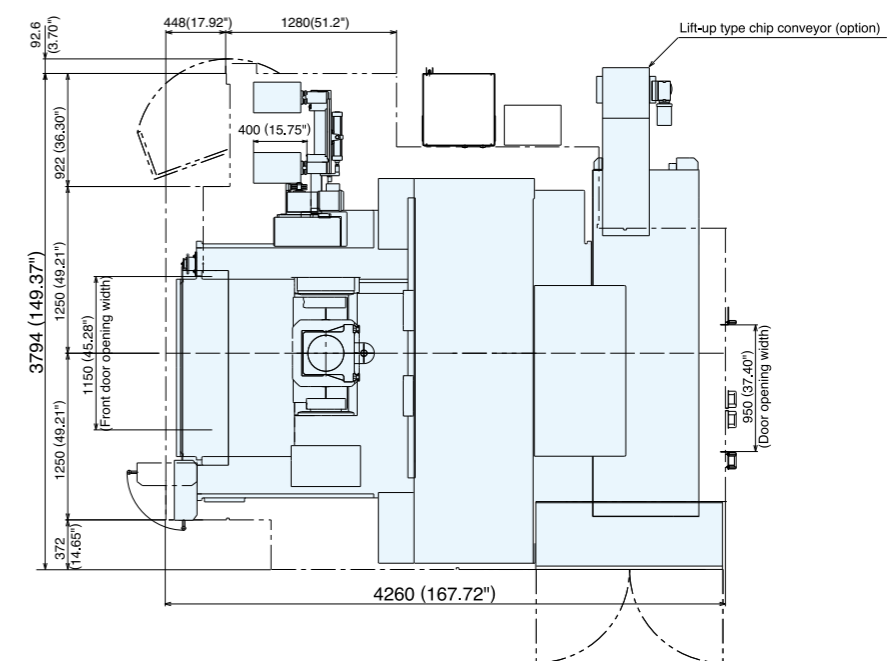
Front View



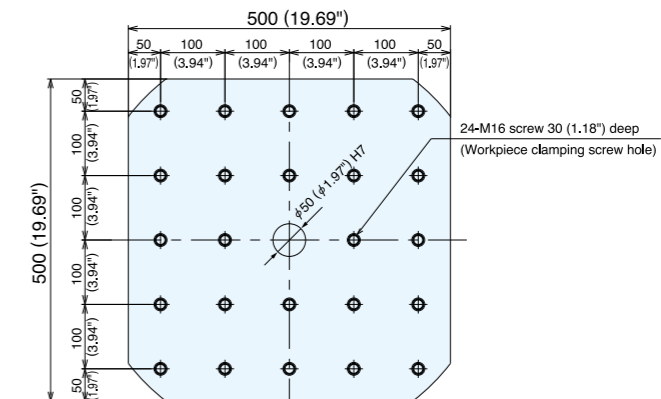
Side View



Floor Space



Table

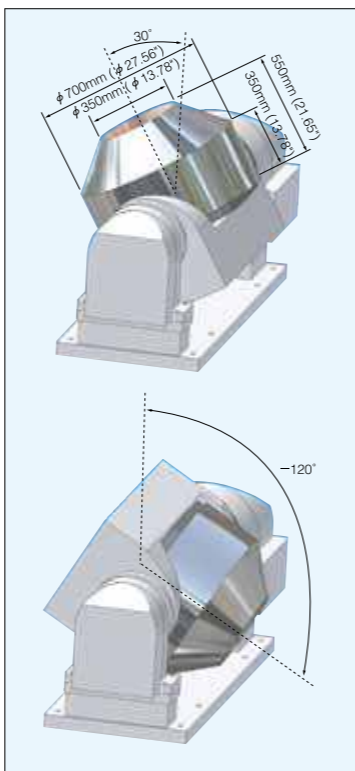


Machining Capabilities (Workpiece material: S45C)

	Face Mill 5" × 6 t	Roughing End Mill φ40 (φ1.57") × 6 t	Roughing End Mill φ40 (φ1.57") × 6 t
Spindle speed	350 min ⁻¹	200 min ⁻¹	200 min ⁻¹
Cutting speed	140m/min (5512ipm)	25m/min (984ipm)	25m/min (984ipm)
Cut width	(A) 100mm (3.94")	(C) 20mm (0.79")	(E) 40mm (1.58")
Cut depth	(B) 7mm (0.28")	(D) 50mm (1.97")	(F) 20mm (0.79")
Feed rate	800mm/min (31ipm)	240mm/min (9ipm)	300mm/min (12ipm)
Feed per tooth	0.381mm/tooth (0.01500inch/tooth)	0.200mm/tooth (0.00787inch/tooth)	0.250mm/tooth (0.00984inch/tooth)
Cutting amount	560cm ³ /min (34.2cu-inch/min)	240cm ³ /min (14.6cu-inch/min)	240cm ³ /min (14.6cu-inch/min)
Spindle motor load	86%	71%	75%

- Note 1: The above machining data are obtained at the position of 0-degree table tilting angle.
- Note 2: The above machining data show a sample actual machining and are for reference only.

Maximum Dimensions Loadable on Table



Specifications **VG5000**

Item	Unit	Specification	
Travel	Travel on X axis (Saddle: right/left)	760 (29.92")	
	Travel on Y axis (Table: back/forth)	900 (35.43")	
	Travel on Z axis (Spindle head: up/down)	610 (24.02")	
	Travel on A axis (Table tilting)	-120 to 30	
	Travel on C axis (Table turning)	360	
Table	Distance from table top surface to spindle nose	140 ~ 750 (5.51" ~ 29.53")	
	Table (Pallet) work surface area (X-axis direction × Y-axis direction)	500 (19.69") and 500 (19.69")	
	Max. workpiece weight loadable on table (pallet)	600 (1323 lbs) (for indexing)	
	Table (Pallet) work surface configuration (nominal screw-hole size × number of holes)	M16 × 24 holes	
	Distance to the table work surface from the floor	1280 (50.39")	
Spindle	Pallet exchange time	16	
	Spindle speed	35 to 12000	
	Number of spindle speed change steps	Stepless (electrical 2 steps)	
	Spindle nose (nominal number)	7/24 taper, No. 50	
	Spindle bearing bore diameter	φ100 (φ3.94")	
Feed Rate	Rapid traverse rate	X, Y and Z axes: 24 (945 ipm) A and C axes: A: 20 C: 30	
	Cutting feed rate	X, Y and Z axes: 1 to 24000 (0.04 to 945 ipm) ※1	
		A and C axes: A: 20 C: 30	
Automatic Tool Changer	Tool shank (nominal number)	JIS B6339 BT50	
	Pull stud (nominal number)	OKK only 90°	
	Number of stored tools	40 ※2	
	Maximum tool diameter (with adjacent tools)	φ115 (φ4.53")	
	Maximum tool diameter (without adjacent tools)	φ230 (φ9.06")	
	Maximum tool length (from the gauge line)	400 (15.75")	
	Maximum tool weight	20 (44 lbs)	
	Tool selection method	Address fixed method	
	Tool exchange time (tool-to-tool)	4.5	
	Tool exchange time (cut-to-cut)	10	
Motors	For spindle (25%ED/30-min rating/continuous rating)	45/30/26 (61/41/35 HP)	
	For feed axes	X, Y and Z axes: FANUC: 5.5 × 5.5 × 5.5 (7 × 7 × 7 HP)	
		A and C axes: FANUC: 5.5 × 5.5 (7 × 7 HP)	
Power supply	kVA	FANUC: 64	
Required Power Supply	Supply voltage × supply frequency	V × Hz	200 ± 10% × 50/60 ± 1 220 ± 10% × 60 ± 1 ※3
	Compressed air supply pressure	MPa	0.4 to 0.6 (58 to 87 psi) ※4
	Compressed air supply flow rate	L/min(ANR)	500 (132 gpm) ※5
Tank Capacity	Coolant tank	L	380 (100 gal)
	Spindle head cooling oil tank	L	72 (19 gal)
	Hydraulic unit tank	L	20 (5 gal)
Machine Size and Required Floor Space	Machine height from the floor surface	mm	3805 (149.80")
	Floor space required for operation (width × depth)	mm	3794 × 4260 (149.37" × 167.72")
	Floor space including maintenance area (width × depth)	mm	4600 × 5000 (181.10" × 196.85")
	Machine weight	kg	25000 (55100 lbs)
Controller type	Controller type	°C	F31i-B5
	Temperature of operation environment	°C	5 to 40

※1: Under the HQ or Hyper HQ control
 ※2: The number of stored tools refers a total number of tools including the one installed on the spindle i.e. subtract one from the above for the actual number of tools stored in the tool magazine.
 ※3: When the supply voltage is 220VAC, the supply frequency of 60Hz only is applicable.
 ※4: Purity of the supplied air should be equivalent to Class 3.5.4 specified in ISO 8573-1 / JIS B8392-1 or higher.
 ※5: The flow rate for the standard specification machines is specified in the above.
 When optional specification such as an air blow is added, add the corresponding air supply according to the operating frequency.

Standard Accessories **VG5000**

Item	Q'ty
Lighting system (Tow LED)	1 set
Coolant unit (Separate coolant tank)	1 set
Entire machine cover (Splash guard)	1 set
Door interlock control	1 set
Top cover	1 set
ATC shutter (operated automatically)	1 set
Slideway protection covers for X and Y axes	1 set
Spindle air purge	1 set
Spindle head and ball screw cooling oil temperature controller	1 set
Automatic grease lubrication unit	1 set
Hydraulic unit (for clamping the 5-axis table)	1 set
Coil-type chip conveyor	2 sets
Automatic pallet changer (2APC)	1 set
Leveling block	1 set
Foundation parts (Bond for anchoring is optional.)	1 set
Parts for machine transfer (excluding the hoisting jig)	1 set
Automatic power off	1 set
Electrical spare parts (fuses)	1 set
Instruction manual	1 set
Electrical manuals (including Hardware diagrams)	1 set

Optional Accessories **VG5000**

Item	Specification
<input type="checkbox"/> Compatibility with Dual contact tool	
<input type="checkbox"/> Pull stud	<input type="checkbox"/> MAS I <input type="checkbox"/> MAS II
<input type="checkbox"/> Tool magazine	<input type="checkbox"/> 60 <input type="checkbox"/> 80 <input type="checkbox"/> 120
<input type="checkbox"/> Additional pallet	
<input type="checkbox"/> Splash guard front door automatically open / close	
<input type="checkbox"/> Lift-up type chip conveyor	<input type="checkbox"/> Fixed type (for Lift-up type chip conveyor) <input type="checkbox"/> Swing type (for Lift-up type chip conveyor)
<input type="checkbox"/> Chip bucket	
<input type="checkbox"/> Workpiece flushing gun	
<input type="checkbox"/> Oil skimmer	
<input type="checkbox"/> Air blow nozzle	
<input type="checkbox"/> Oil-mist / air blow nozzle	
<input type="checkbox"/> Mist collector	
<input type="checkbox"/> High-pressure unit (for external fixed nozzles)	<input type="checkbox"/> 2MPa (290 psi) <input type="checkbox"/> 7MPa (1015 psi)
<input type="checkbox"/> Compatibility with through-spindle (including high-pressure unit)	<input type="checkbox"/> 2MPa (290 psi) <input type="checkbox"/> 7MPa (1015 psi)
<input type="checkbox"/> Thickener bag filter (Spare parts for high-pressure unit)	
<input type="checkbox"/> Fine amount coolant supply unit (Maker: Bluebe)	
<input type="checkbox"/> Coolant (for Bluebe)	
<input type="checkbox"/> Linear scale	<input type="checkbox"/> For X and Y axes <input type="checkbox"/> For X, Y and Z axes
<input type="checkbox"/> Coolant cooler	
<input type="checkbox"/> Signal lamp	<input type="checkbox"/> 2-lamp tower type <input type="checkbox"/> 3-lamp tower type <input type="checkbox"/> 2-lamp rotary type <input type="checkbox"/> 3-lamp rotary type
<input type="checkbox"/> Additional M code	<input type="checkbox"/> 4 sets <input type="checkbox"/> 8 sets
<input type="checkbox"/> A set of bond for foundation work	
<input type="checkbox"/> Standard tool set	
<input type="checkbox"/> Coating color specified by customer	
<input type="checkbox"/> Grease cartridge for automatic grease lubrication unit	
<input type="checkbox"/> Touch panel for APC	
<input type="checkbox"/> Touch sensor system	<input type="checkbox"/> T0 (Manually operated type) <input type="checkbox"/> T1-A (Workpiece measurement) <input type="checkbox"/> T1-B (Workpiece measurement, Tool length measurement, Tool break detection) <input type="checkbox"/> T1-C (Tool length measurement, Tool break detection) <input type="checkbox"/> T0 software
<input type="checkbox"/> Laser measurement	<input type="checkbox"/> Micro laser system (without covers) made by Blum: Max φ85 (φ3.35")
<input type="checkbox"/> Cumulative hour meter (9999H)	
<input type="checkbox"/> Work counter (5 digits)	
<input type="checkbox"/> Calendar timer	
<input type="checkbox"/> OKK Manual Guide i (Animation of milling cycle for F31i)	
<input type="checkbox"/> MG operation panel	

VM-X5

For machining small-to-medium-sized turbine blades efficiently at high speed



Sample workpiece

Material: SUS304
Coolant: Water-soluble coolant
Tooling: $\phi 25\text{mm}$ ($\phi 0.98''$) end mill
 $\phi 12\text{mm}$ ($\phi 0.47''$) radius end mill
Cutting condition: S1500 ~ S6000
F2400

VM-X5/250B

※ Machine picture includes optional accessories.

- The VM-X5 is the Perfect 5-axis machining center for blade machining having a tilting spindle (B axis) and rotary tables (A axis).
- Its high cutting performance is inherited from the VM5 III enabling shorter roughing times.
- The roller gear mechanism and the synchronized facing rotary tables on the machine generate no backlash and support high-precision machining.

VM-X5



Main body structure has excellent rigidity and vibration damping

- VM5 III base is box-way construction on the X, Y & Z axis delivering rigidity and excellent vibration dampening.
- The large diameter support bearings on the B axis maintain overall rigidity.
- Maximum 600mm (23.62") long blades can be machined.

Machining an entire blade without reclamping

Large travel of the B axis and supporting both ends of a workpiece on the A axis enable machining the small to medium-size turbine blades completely from their roots to the blades without reclamping.



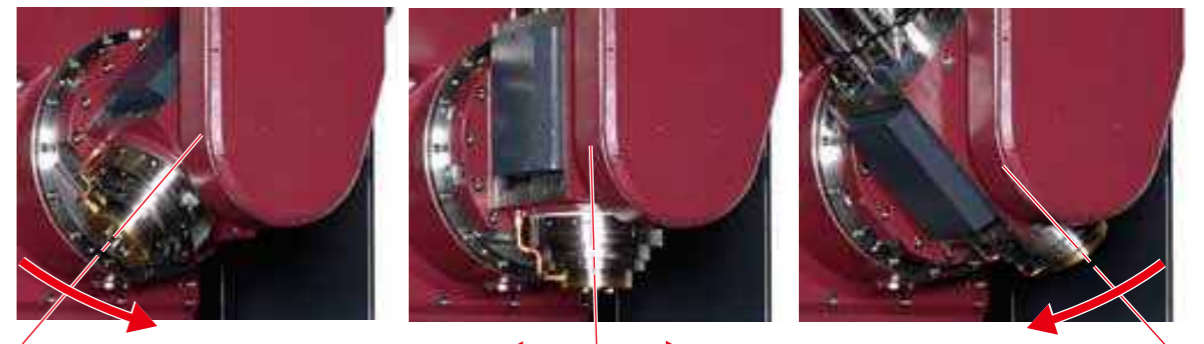
Rotary table

A axis direct drive rotary table outputs zero backlash, agile response and tight accuracy. Optional dual drive synchronized rotaries eliminate work piece twisting.



Tilting spindle

The roller gear mechanism used for driving the B axis combines the features of worm gear and rolling drive which supports the machine's high torque, high efficiency, smooth movements and high-precision machining.



Accuracy

Positioning Accuracy (without linear scale) mm (inch)

Positioning Accuracy (X, Y, Z) ±0.0030 (±0.00012") /full stroke

Repeatability (X, Y, Z) ±0.0020 (±0.00008") /full stroke

Positioning Accuracy (with linear scale) (OKK tolerance) mm (inch)

Positioning Accuracy (X, Y, Z) ±0.0020 (±0.00020") /full stroke

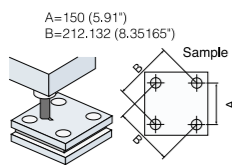
Repeatability (X, Y, Z) ±0.0010 (±0.00004") /full stroke

Positioning Accuracy (with encoder) (OKK tolerance)

Positioning Accuracy A axis: ±5 sec C axis: ±3 sec

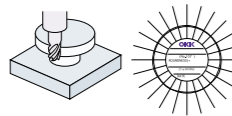
Cutting Accuracy mm (inch)

Item	OKK tolerance	Result
Axis direction	0.015 (0.00059")	0.002 (0.00008")
Diagonal direction	0.015 (0.00059")	-0.005 (-0.00020")
Deviation of hole dia	0.010 (0.00039")	0.003 (0.00012")



Circular Cutting Accuracy mm (inch)

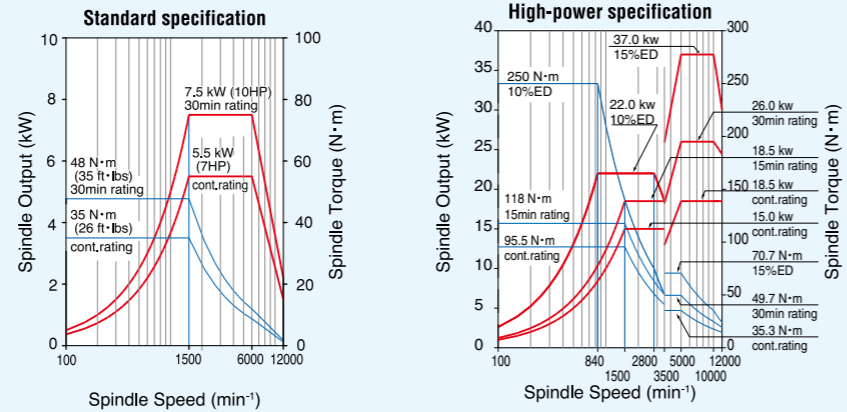
Item	OKK tolerance	Result
Circularity	0.0150 (0.00059")	0.0055 (0.00022")



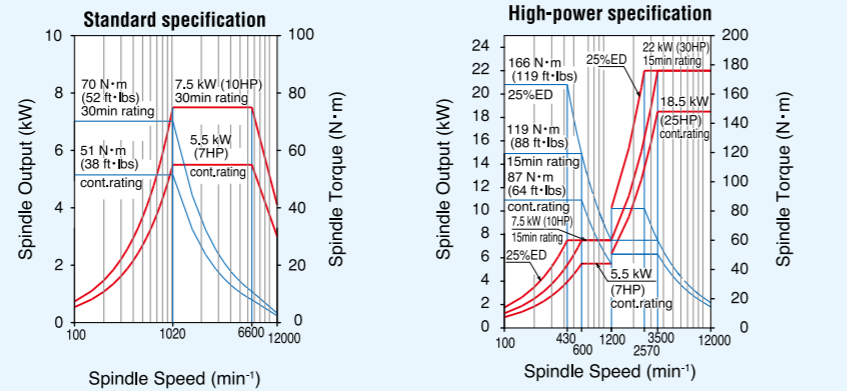
- Remarks
- *1: The above sample data shows a short-time machining example and the results of continuous machining may differ from them.
 - *2: The above sample data shows the accuracy under OKK's in-house cutting test conditions. The results may vary with the conditions of the cutting tools and fixtures.
 - *3: The accuracy shown above are values obtained based on OKK's inspection standards under the conditions that the machine is installed according to OKK's foundation drawing and the ambient temperature remains constant.

Spindle Output and Torque Diagram

FANUC



MITSUBISHI

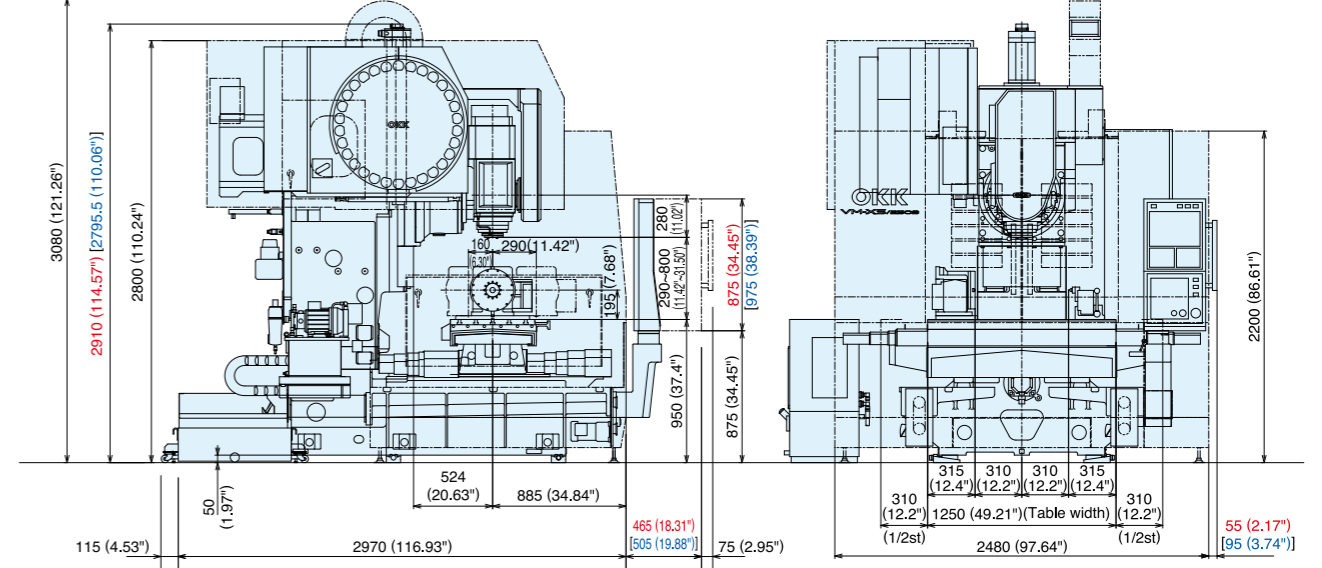


Main Dimensions of the Machine

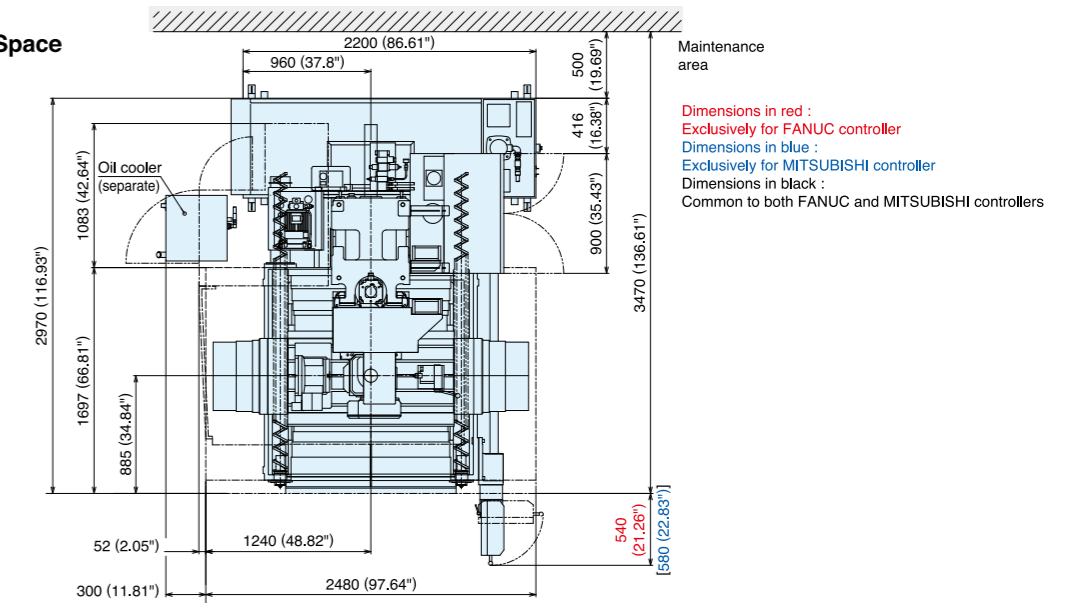
VM-X5

Side View

Front View



Floor Space



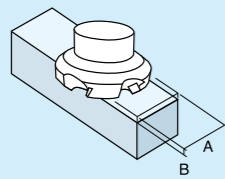
Maintenance area

- Dimensions in red : Exclusively for FANUC controller
 Dimensions in blue : Exclusively for MITSUBISHI controller
 Dimensions in black : Common to both FANUC and MITSUBISHI controllers

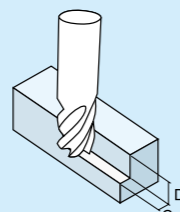
Machining Capabilities (Workpiece material: S43C)

VM-X5

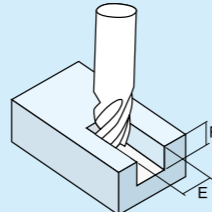
Face Mill 4" × 5 t



End Mill φ32 (φ 1.26") × 6 t



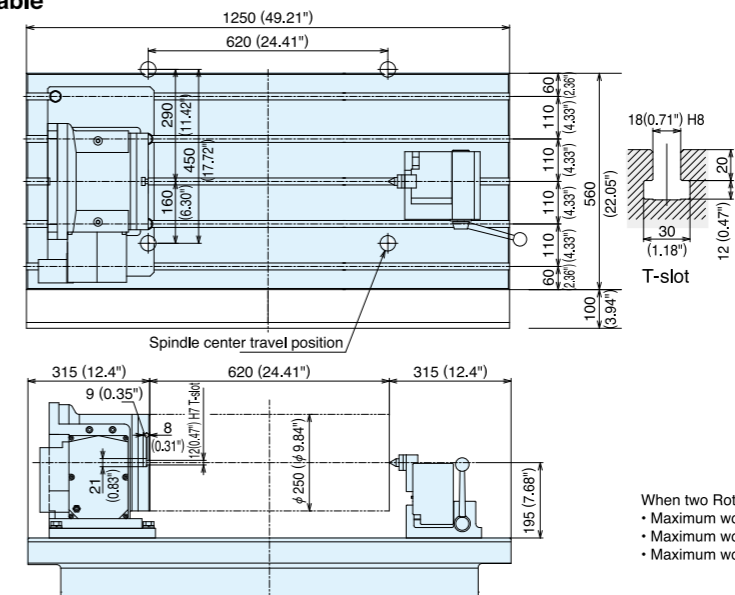
End Mill φ32 (φ 1.26") × 6 t



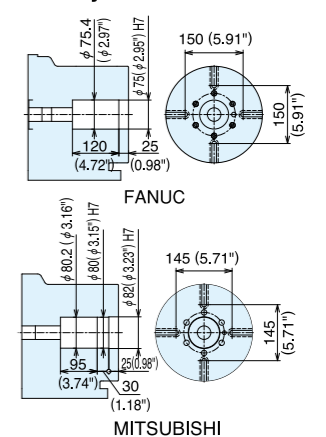
	Face Mill 4" × 5 t	End Mill φ32 (φ 1.26") × 6 t	End Mill φ32 (φ 1.26") × 6 t
Spindle speed	600min ⁻¹	1600min ⁻¹	1350min ⁻¹
Cutting speed	190m/min (7480ipm)	160m/min (6299ipm)	135m/min (5315ipm)
Cut width	(A) 80mm (3.15")	(C) 16mm (0.63")	(E) 32mm (1.26")
Cut depth	(B) 3mm (0.12")	(D) 5mm (0.20")	(F) 3mm (0.12")
Feed rate	900mm/min (35ipm)	800mm/min (31ipm)	800mm/min (31ipm)
Feed per tooth	0.300mm/tooth (0.01181inch/tooth)	0.167mm/tooth (0.00657inch/tooth)	0.198mm/tooth (0.00780inch/tooth)
Cutting amount	216cm ³ /min (13.2cu-inch/min)	64cm ³ /min (3.9cu-inch/min)	76.8cm ³ /min (4.7cu-inch/min)
Spindle motor load	83%	12%	11%

- Note 1: The above machining data are obtained at the position of 0-degree table tilting angle.
 Note 2: The above machining data show a sample actual machining and are for reference only.

Table



Rotary table



- When two Rotary tables are used
- Maximum workpiece length : 600[mm] (23.62")
 - Maximum workpiece diameter : φ 250[mm] (φ 9.84")
 - Maximum workpiece weight : 200[kg] (441lbs)
- (Workpiece both end must be fixed with Rotary table)
 (* for a Rotary table 100[kg] (221lbs))

Main Specifications

VM-X5

Item	Unit	Specification
Travel	Travel on X axis (Table right / left)	mm 620(24.41")
	Travel on Y axis (Saddle back / forth)	mm 450(17.72")
	Travel on Z axis (Spindle head up / down)	mm 510(20.08")
	Travel on A axis (Table turning)	deg 360
	Travel on C axis (Spindle head swiveling)	deg -90~90
	Table	Distance from table top surface to spindle nose
Distance from column front to spindle center		mm 524(20.63") [510(20.08") ^{※1}]
Table work surface area (X axis direction × Y axis direction)		mm 1250 × 560(49.21" × 22.05")
Max. workpiece weight loadable on table		kg 800(1764lbs)
Spindle	Table work surface configuration (T-slot nominal dimension × spacing × number of T slots)	mm 18(0.71") × 110(4.33") × 5 slots
	Distance to the table work surface from the floor	mm 950(37.40")
	Spindle speed	min ⁻¹ 100~12000
Feed Rate	Number of spindle speed change steps	Electric stepless speed change (MS)
	Spindle nose (nominal number)	7/24 taper, No.40
	Spindle bearing bore diameter	mm φ70(φ2.76")
	Rapid traverse rate	X, Y and Z axes: m/min X,Y:30(1181ipm) Z:20(787ipm) A and B axes: min ⁻¹ A:100 B:30
Automatic Tool Changer	Cutting feed rate	X, Y and Z axes: mm/min X/Y/Z:1~20000(0.04~787ipm) ^{※2} A and B axes: min ⁻¹ A:100 B:30
	Tool shank (nominal number)	BT40 Dual contact tool
Motors	Pull stud (nominal number)	MAS 403 P40T-1
	Number of stored tools	tools 30
	Max. tool diameter (with tools in adjacent pots)	mm φ80(φ3.15")
	Max. tool diameter (with no tools in adjacent pots)	mm φ110(φ4.33")
	Max. tool length (from gauge line)	mm 280(11.02")
	Maximum tool weight [moment]	kg [N·m] 10(22lbs) [9.8(7.2ft·lbs)]
	Tool selection method	Memory random method
	Tool exchange time (tool-to-tool)	sec 5
	Tool exchange time (cut-to-cut)	sec 15
	for Spindle (30min rating/continuous rating)	kW 7.5/5.5(10/7HP)
Required Power Supply	for Feed axes	X, Y and Z axes: kW MITSUBISHI X/Y:2.0(2.7HP) Z:4.5(6HP) FANUC X/Y:3.0(4HP) Z:7.0(9.4HP)
	for Coolant pump	kW 0.4(0.5HP)
	for Spindle head cooling pump	kW 0.4(0.5HP)
	for Coil-type chip conveyor	kW 0.2(0.3HP) × 2
Tank Capacity	for ATC	kW 0.4(0.5HP)
	Power supply	kVA MITSUBISHI 38 FANUC 28
	Supply voltage × Supply frequency	V × Hz 200 ± 10% × 50/60 ± 1 220 ± 10% × 60 ± 1
Machine Size and Required Floor Space	Compressed air supply pressure ^{※3}	MPa 0.4~0.6(58~87PSI)
	Compressed air supply flow rate ^{※3 ※4}	L/min(ANR) 400(106gpm)
Machine Weight	Spindle head cooling oil tank	L 50(13gal)
	Coolant tank capacity	L 280(74gal)
Controller	Machine height (from floor surface)	mm 3080(121.26")
	Floor space required for operation (width × depth)	mm 2540 × 2970(100.00" × 116.93")
Temperature of operation environment	Floor space required incl. maintenance area (width × depth)	mm 3800 × 4050(149.61" × 159.45")
	Machine weight	kg 7900(17400lbs)
Humidity of operation environment	Controller	Neomatic 750 F311-B5
	Temperature of operation environment	°C 5~40
Humidity of operation environment	Humidity of operation environment	% 10~90 (No dew)

※1: Z axis shutter specification
 ※2: Under the HQ or Hyper HQ control
 ※3: The value for the standard specification. It may vary with added options.
 ※4: Purity of the supplied air should be equivalent to Class 3.5.4 specified in ISO 8573-1 / JIS B8392-1 or higher.

Optional Accessories

VM-X5

Item	Specification
<input type="checkbox"/> Additional one axis control	
<input type="checkbox"/> Column-up 250mm(9.84") [Standard: Column-up 150mm(5.91")]	
<input type="checkbox"/> Extension of X-axis stroke 1020mm(36.22") X-axis stroke	
<input type="checkbox"/> High-speed 20000min ⁻¹ spindle (22/18.5kW (35/25HP))	
<input type="checkbox"/> High-torque spindle drive motor (22/18.5 kW (35/25HP))	
<input type="checkbox"/> Compatibility with Dual contact tool (HSK-A63)	
<input type="checkbox"/> Pull stud	<input type="checkbox"/> MAS II <input type="checkbox"/> OKK90°
<input type="checkbox"/> Splash guard front door automatically open / close	
<input type="checkbox"/> Sliding surface protection steel sliding cover for Z axis	
<input type="checkbox"/> Ceiling cover	
<input type="checkbox"/> Chip flow coolant(400W)	
<input type="checkbox"/> Lift-up type chip conveyor	
<input type="checkbox"/> Chip bucket	<input type="checkbox"/> Fixed type (for Lift-up type chip conveyor) <input type="checkbox"/> Swing type (for Lift-up type chip conveyor)
<input type="checkbox"/> Workpiece flushing gun	
<input type="checkbox"/> Oil skimmer (Belt type)	
<input type="checkbox"/> Air blow nozzle [*]	
<input type="checkbox"/> Mist collector	<input type="checkbox"/> 2.2kW(3HP) installed separately <input type="checkbox"/> Compatibility with supplied device
<input type="checkbox"/> High-pressure unit	<input type="checkbox"/> 2MPa (290 psi) <input type="checkbox"/> 7MPa (1015 psi) <input type="checkbox"/> 2MPa (290 psi)
<input type="checkbox"/> Compatibility with through-spindle (including high-pressure unit) [*]	<input type="checkbox"/> 7MPa (1015 psi) <input type="checkbox"/> Separately installed type <input type="checkbox"/> High-pressure unit integrated type (High-pressure unit is also required)
<input type="checkbox"/> Coolant cooler	
<input type="checkbox"/> Fine amount coolant supply unit (Maker: Bluebe) [*]	
<input type="checkbox"/> Coolant (for Bluebe)	
<input type="checkbox"/> Linear scale	<input type="checkbox"/> for X and Y axes <input type="checkbox"/> for X, Y and Z axes
<input type="checkbox"/> Lighting system	<input type="checkbox"/> Addition of 1-LED light <input type="checkbox"/> 2-lamp tower type <input type="checkbox"/> 3-lamp tower type <input type="checkbox"/> 2-lamp rotary type <input type="checkbox"/> 3-lamp rotary type
<input type="checkbox"/> Signal lamp	<input type="checkbox"/> with Buzzer alarm
<input type="checkbox"/> Additional M code	<input type="checkbox"/> 4 sets <input type="checkbox"/> 8 sets
<input type="checkbox"/> Coating color specified by customer	
<input type="checkbox"/> Foundation bolts for bond anchoring	
<input type="checkbox"/> A set of bond for foundation work	
<input type="checkbox"/> Touch sensor system	<input type="checkbox"/> T1-A (Workpiece measurement) (OMP60 / MP700) <input type="checkbox"/> T1-B (Workpiece measurement, Tool length measurement, Tool break detection) (OMP60 / MP700) <input type="checkbox"/> T1-C (Tool length measurement, Tool break detection) <input type="checkbox"/> T0 software
<input type="checkbox"/> Laser measurement Laser system (without Covers): Max. φ85 (φ3.35")	
<input type="checkbox"/> Cumulative hour meter (9999H)	
<input type="checkbox"/> Work counter (5 digits)	
<input type="checkbox"/> Calendar timer	
<input type="checkbox"/> OKK Manual Guide i (Animation of milling cycle for F31i)	
<input type="checkbox"/> IMG operation panel	

^{*} Optional specifications that can be added to the spindle at the same time vary with the spindle. For details, ask our company's sales department.

Standard Accessories

VM-X5

Item	Qty	Remark
Lighting system	1 set	LED light
Coolant unit (Separate coolant tank)	1 set	Tank capacity: 280L (74 gal)
Entire machine cover (Splash guard)	1 set	Including front door and maintenance cover electromagnetic lock
Magazine safety cover	1 set	Including electromagnetic lock
Sliding surface protection steel sliding cover for X/Y/Z axes	1 set	
Spindle head cooling oil temperature controller	1 set	
Rear discharge coil-type chip conveyor	2 sets	1 set for each of right and left
Leveling block	1 set	
Parts for machine transfer	1 set	
Automatic power-off unit (with M02 or M30)	1 set	
Electric spare parts (fuses)	1 set	
Instruction manual (Specification, Foundation & Installation manual)	1 set	
Electrical instruction manuals (including Hardware diagram)	1 set	

VC-X350

VC-X350L

VC-X500

VP9000-5AX

Drastically reduced workpiece machining time

This specialized 5-axis machining center has been developed from OKK's advanced technologies. This machine eliminates loss of accuracy and burden on the operators caused by multi-setup operation and shortens lead time under process integration.

VC-X350

Rapid traverse rate 50 m/min (1969ipm) (X and Y)

36 m/min (1418 ipm) (Z)

Maximum feed acceleration 0.7 G

Spindle startup time 1.5 sec (0 → 12000 min⁻¹)*1

Tool exchange time 1.3 sec (Tool-to-tool)

4.5 sec (Cut-to-cut)

*1 Spindle motor 22/18.5kW (30/25HP): option

High-speed Table Control

Delivering high-speed 5-axis machining of large 800mm (31.50") diameter workpieces by utilizing 25 min⁻¹ tilt axis feed and 50 min⁻¹ rotation axis feed. [VP9000-5AX](#)

Wide selection of the spindle

Cutting performance is largely improved by the use of the motorized spindle (MS) which integrates a motor covering a wide and high output range. Acceleration time of the spindle can be as short as only 1.5 seconds(**) from the non-operating state to the speed of 12000 min⁻¹. High-speed spindle of 20000 min⁻¹ or 26/18.5kW(**)(35/25HP) high-power spindle can also be adopted optionally.

*1 Spindle motor 22/18.5kW (35/25HP): option
** Mitsubishi 22/18.5kW

Sample Workpiece

Material: SKD61

Coolant: Water-soluble coolant

Tooling: R2~5mm (R0.08 ~ 0.20") end mill

Cutting condition: S6000 ~ S8000
F1000 ~ F2400

Cutting time: 8 hours 59 minutes

Sample Workpiece

Material: A7075

Coolant: Water-soluble coolant

Tooling: φ10 ~ 25mm (φ0.39 ~ 0.98") end mill

Cutting condition: S8000 ~ S12000
F2400 ~ F8000

Cutting time: 1 hour 30 minutes

Accuracy

Positioning Accuracy (without linear scale)

Item	mm (inch)
Positioning Accuracy (X, Y, Z)	±0.0020 (±0.00008") /full stroke
Repeatability (X, Y, Z)	±0.0010 (±0.00004") /full stroke

(OKK tolerance)

Positioning Accuracy (with linear scale)

Item	mm (inch)
Positioning Accuracy (X, Y, Z)	±0.0010 (±0.00004") /full stroke
Repeatability (X, Y, Z)	±0.0005 (±0.00002") /full stroke

(OKK tolerance)

Positioning Accuracy (without encoder)

Item	mm (inch)
Positioning Accuracy	C axis: ±10 sec

(OKK tolerance)

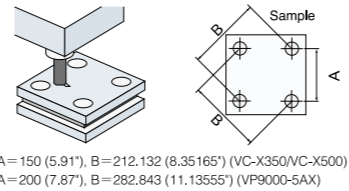
Positioning Accuracy (with encoder)

Item	mm (inch)
Positioning Accuracy	A axis: ±5 sec C axis: ±3 sec

(OKK tolerance)

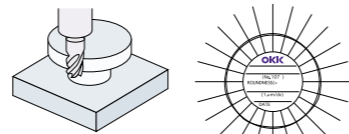
Cutting Accuracy

Item	OKK tolerance	Result		
		VC-X350	VC-X500	VP9000-5AX
Axis direction	0.015 (0.00059")	0.003 (0.00012")	0.003 (0.00012")	0.008 (0.00031")
Diagonal direction	0.015 (0.00059")	0.005 (0.00020")	0.005 (0.00020")	0.006 (0.00024")
Deviation of hole dia	0.010 (0.00039")	0.005 (0.00020")	0.005 (0.00020")	0.004 (0.00016")



Circular Cutting Accuracy

Item	OKK tolerance	Result		
		VC-X350	VC-X500	VP9000-5AX
Circularity	0.005 (0.00020")	0.0042 (0.00017")	0.0042 (0.00017")	0.0040 (0.00016")

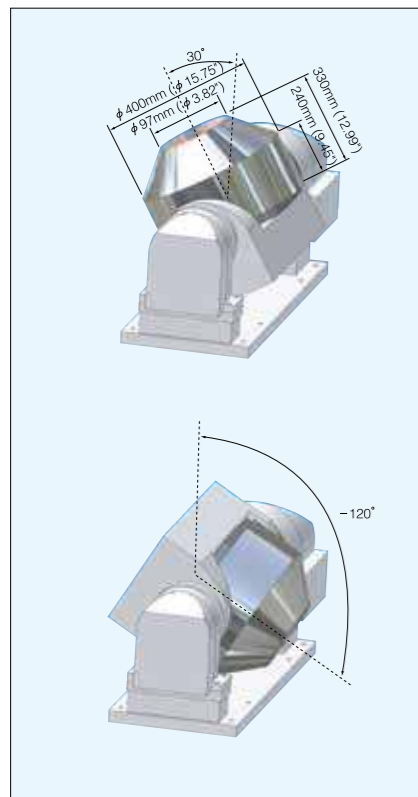


Remarks

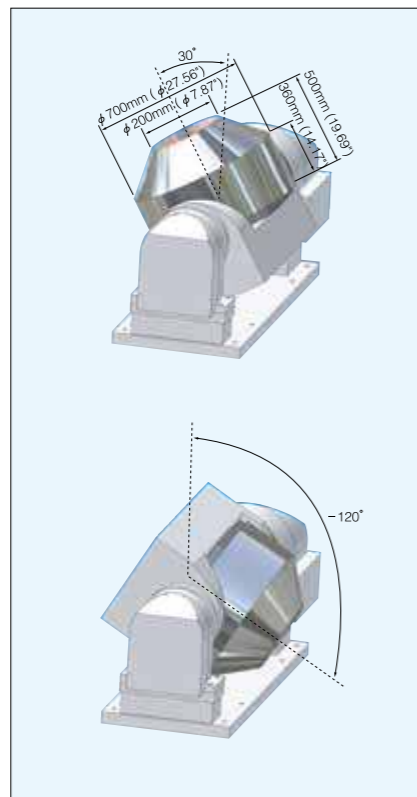
- ※1: The above sample data shows a short-time machining example and the results of continuous machining may differ from them.
- ※2: The above sample data shows the accuracy under OKK's in-house cutting test conditions. The results may vary with the conditions of the cutting tools and fixtures.
- ※3: The accuracy shown above are values obtained based on OKK's inspection standards under the conditions that the machine is installed according to OKK's foundation drawing and the ambient temperature remains constant.

Maximum Dimensions Loadable on Table

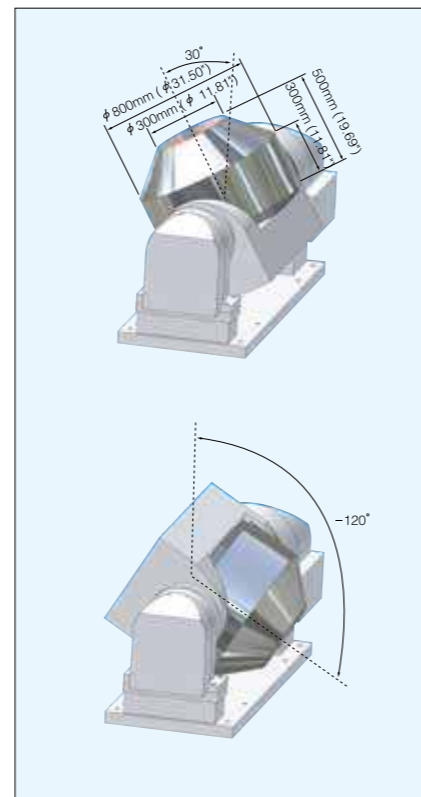
VC-X350



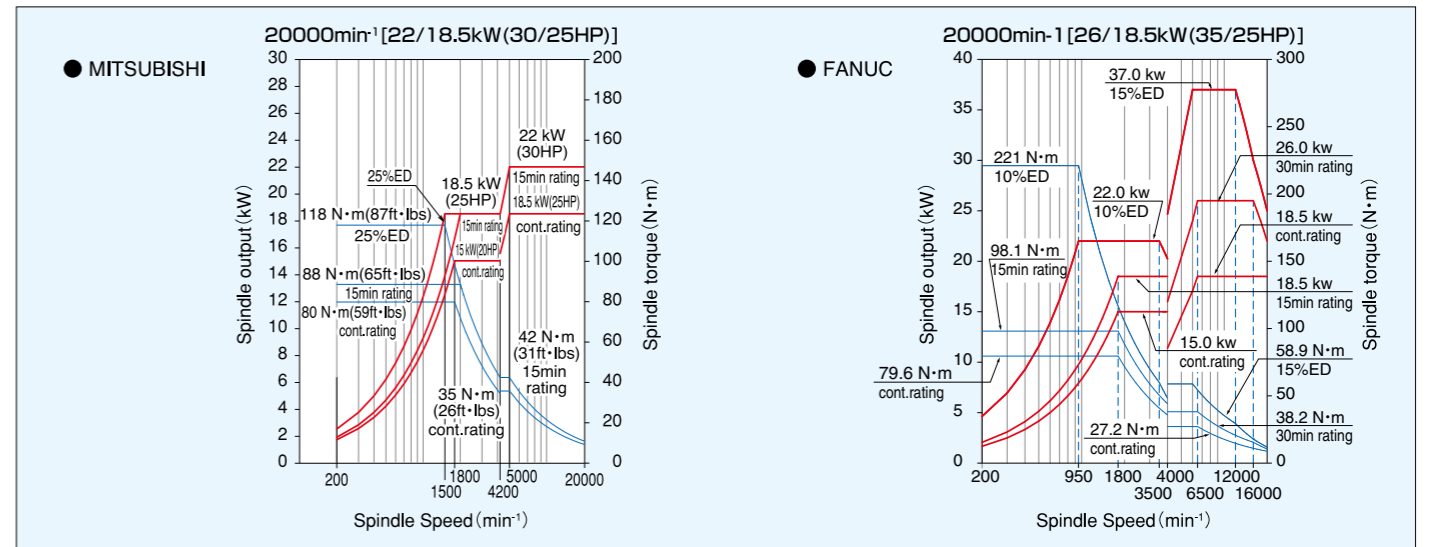
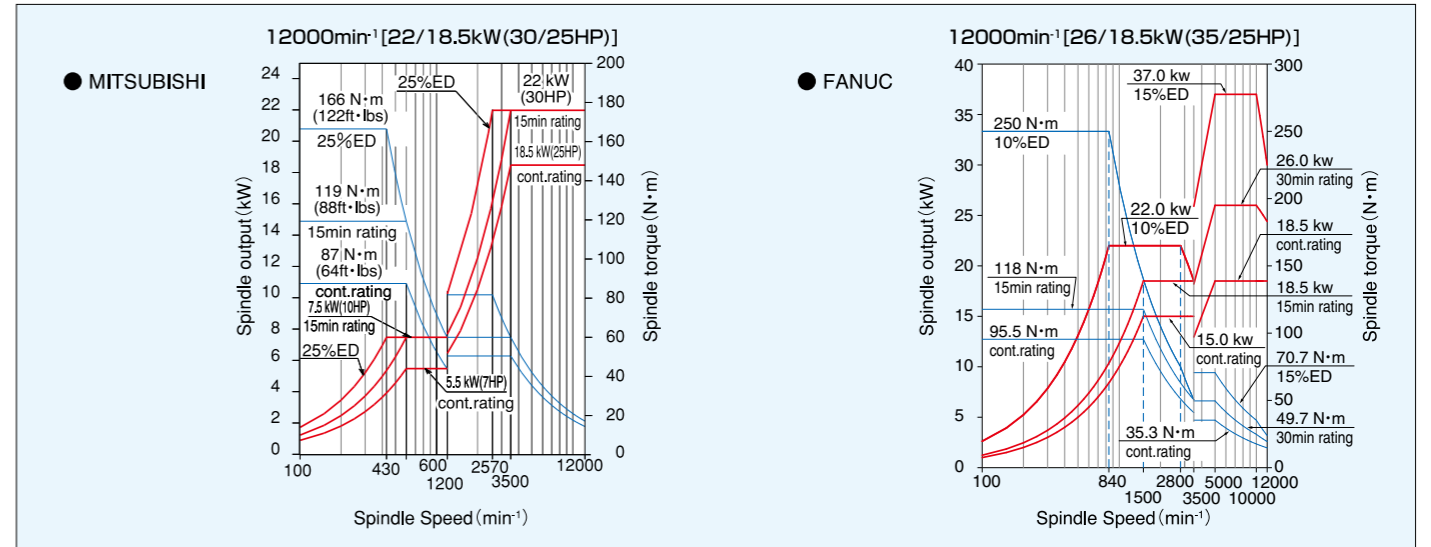
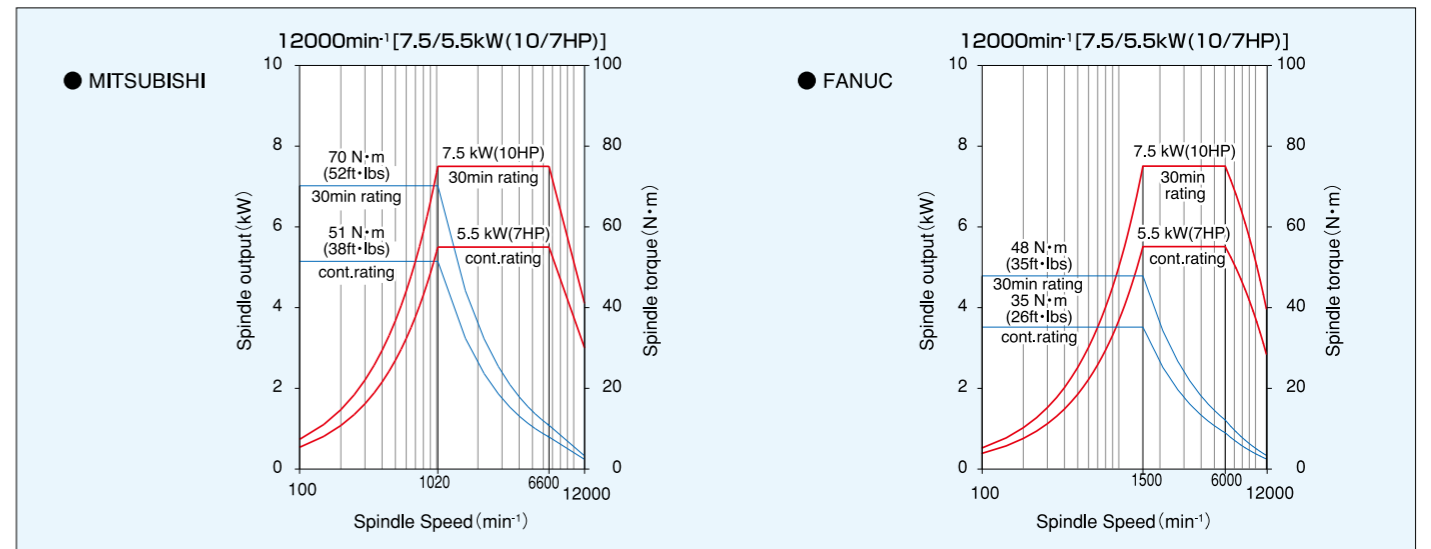
VC-X500



VP9000-5AX



Spindle Output and Torque Diagram



	12000min ⁻¹ 7.5/5.5kW (10/7HP)	12000min ⁻¹ MITSUBISHI 22/18.5kW FANUC 26/18.5kW	20000min ⁻¹ MITSUBISHI 22/18.5kW FANUC 26/18.5kW
VC-X350	Standard	Option	Option
VC-X350L	Standard	Option	Option
VC-X500	-	Standard	Option
VP9000-5AX	Standard	Option	Option

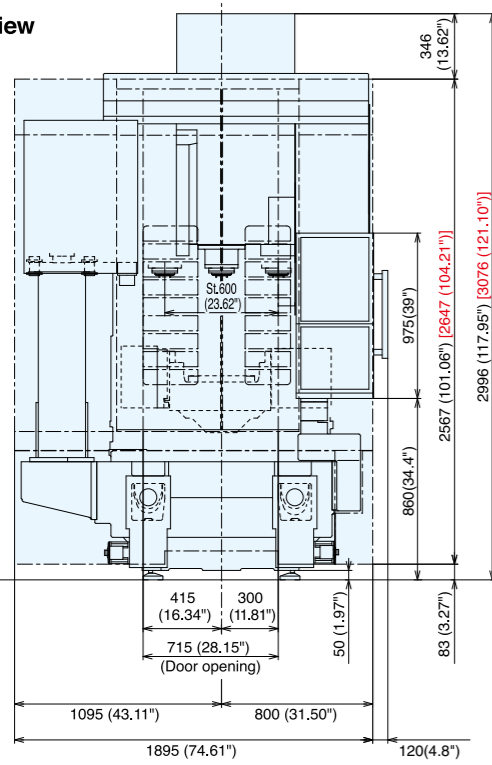
※Controller for VC-X350L is FANUC only.

Main Dimensions of the Machine

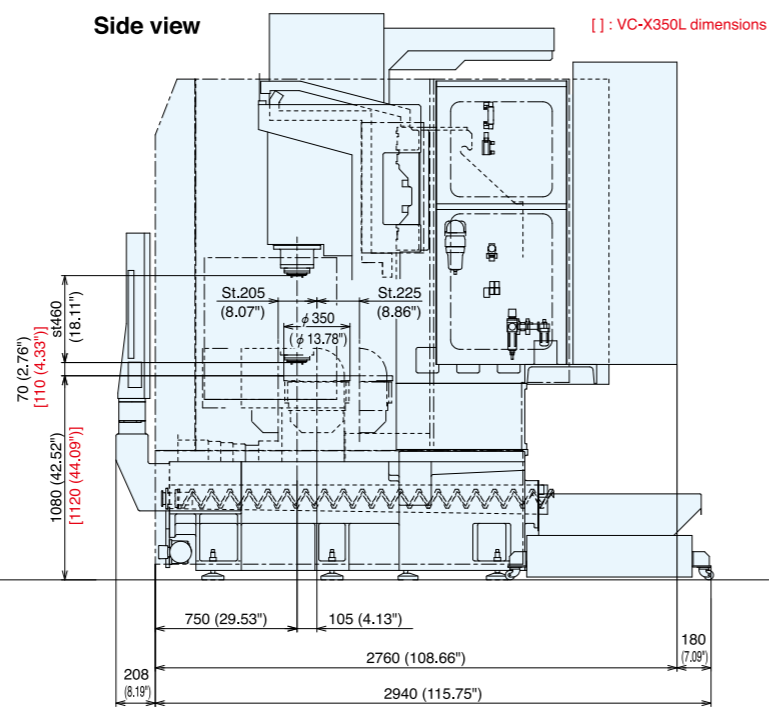
VC-X350

VC-X350L

Front view



Side view



Floor Space

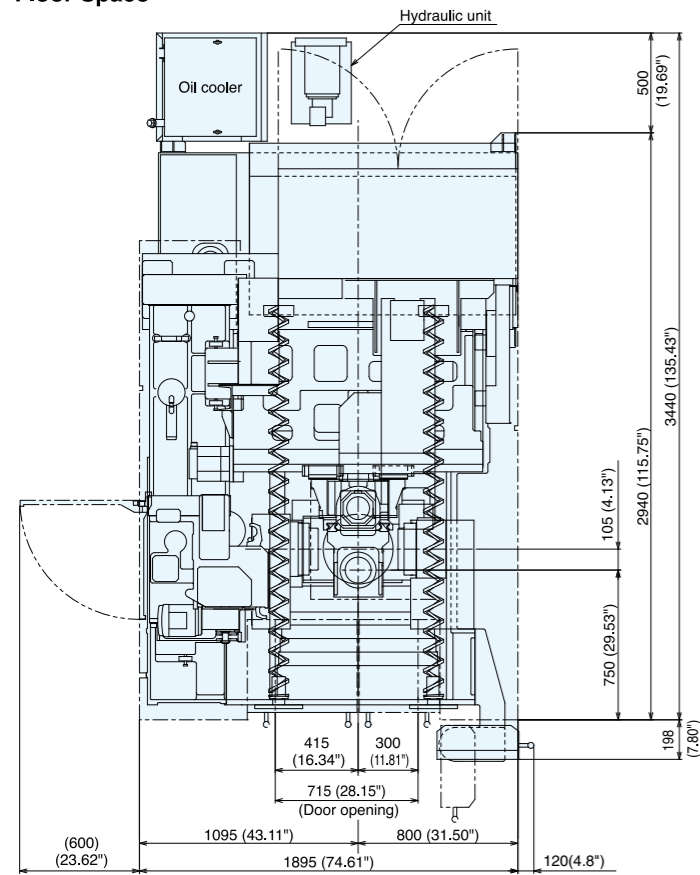
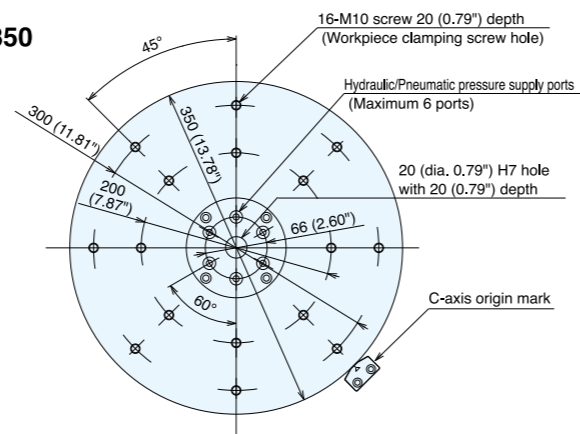
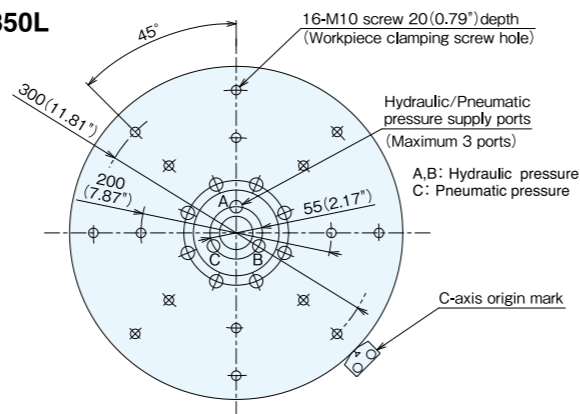


Table VC-X350



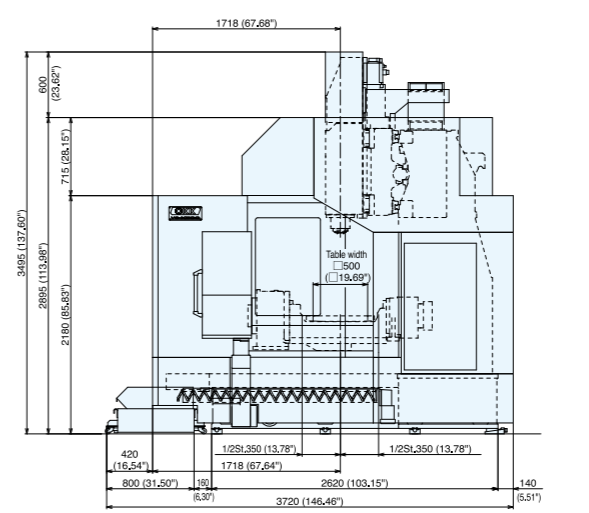
VC-X350L



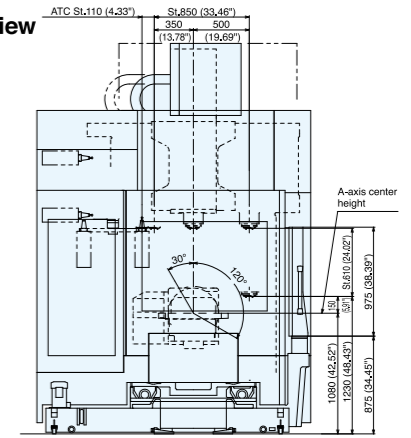
VC-X500

Main Dimensions of the Machine

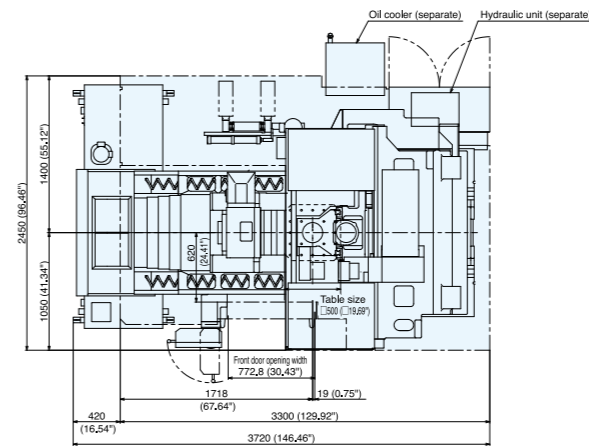
Front view



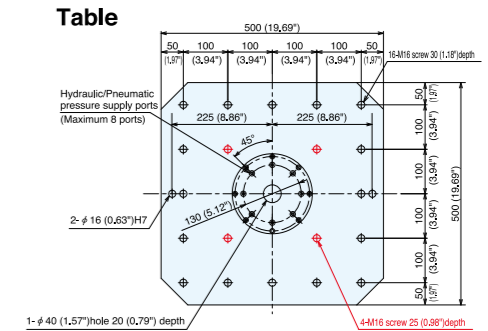
Side view



Floor Space



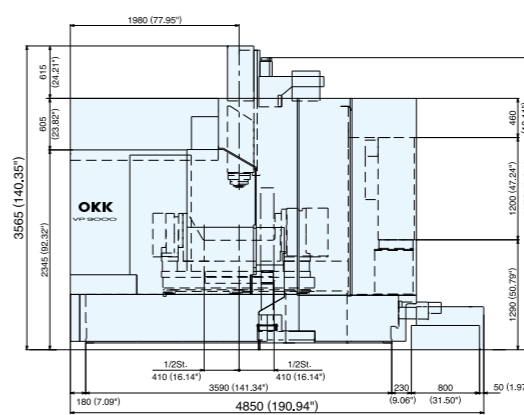
Table



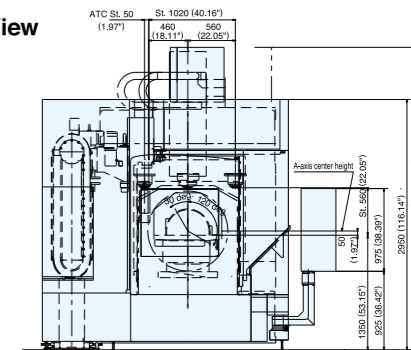
Main Dimensions of the Machine

VP9000-5AX

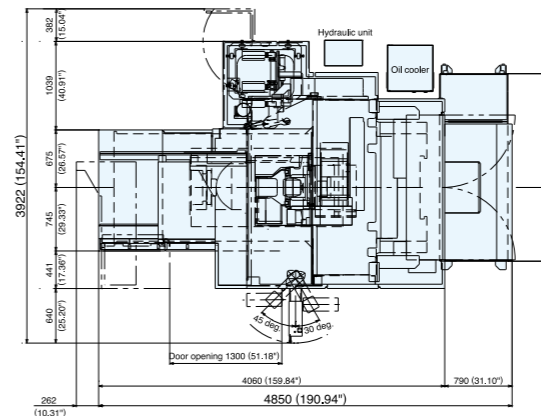
Front View



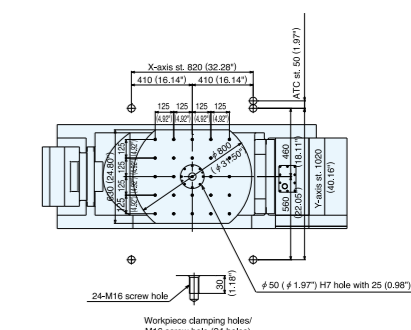
Side View



Floor Space



Table



Specifications		VC-X350	VC-X350L	VC-X500	VP9000-5AX		
Item	Unit	Specification					
Travel	Travel on X axis	mm	600 (23.62") (Spindle head right / left)	600 (23.62") (Spindle head right / left)	700 (27.56") (Table right / left)	820 (32.28") (Table right / left)	
	Travel on Y axis	mm	430 (16.93") (Tabl back / forth)	430 (16.93") (Tabl back / forth)	850 (33.46") (Spindle head back / forth)	1020 (40.16") (Spindle head back / forth)	
	Travel on Z axis (Spindle head up / down)	mm	460 (18.11")	460 (18.11")	610 (24.02")	560 (22.05")	
	Travel on A axis (Table tilting)	deg	-120~30	-120~30	-120~30	-120~30	
	Travel on C axis (Table turning)	deg	360	360	360	360	
Table	Distance from table top surface to spindle nose	mm	70~530 (2.76"~20.87")	110~570 (4.33"~22.44")	150~760 (5.91"~29.92")	0~560 (0"~22.05")	
	Distance from column front to spindle center	mm	520 (20.47")	520 (20.47")	530 (20.87")	520 (20.47")	
	Table work surface area	mm	φ350 (φ 13.78")	φ350 (φ 13.78")	500×500 (19.69"×19.69")	φ800×630 (φ 31.50"×24.80")	
	Max. workpiece weight loadable on table	kg	200 (441 lbs)	100 (220 lbs) ^{#1}	500 (1102 lbs)	500 (1102 lbs)	
	Table work surface configuration (nominal screw-hole size × number of holes)		M10×16 holes	M10×16 holes	M16×20 holes	M16×24 holes	
Spindle	Distance to the table work surface from the floor	mm	1080 (42.52")	1120 (44.09")	1080 (42.52")	1350 (53.15")	
	Spindle speed	min ⁻¹	100~12000	100~12000	100~12000	100~12000	
	Number of spindle speed change steps		Electric stepless speed change(MS)	Electric stepless speed change(MS)	Electric 2-step speed change(MS)	Electric stepless speed change(MS)	
	Spindle nose (nominal number)		7/24 taper, No.40	7/24 taper, No.40	7/24 taper, No.40	7/24 taper, No.40	
	Spindle bearing bore diameter	mm	φ65 (φ 2.56")	φ65 (φ 2.56")	φ65 (φ 2.56")	φ65 (φ 2.56")	
Feed Rate	Rapid traverse rate	X, Y and Z axes: A and C axes:	m/min min ⁻¹	XY:50 (1969 ipm) Z:36 (1417 ipm) A:44.4 C:66.7	XY:50 (1969 ipm) Z:36 (1417 ipm) A:44.4 C:100	XY:48 (1890 ipm) Z:32 (1260 ipm) A:25 C:50	XYZ:32 (1260 ipm) A:25 C:50
	Cutting feed rate	X, Y and Z axes:	mm/min	1~36000 (0.04~1417 ipm) ^{#2}	1~36000 (0.04~1417 ipm) ^{#2}	1~32000 (0.04~1260 ipm) ^{#2}	1~32000 (0.04~1260 ipm) ^{#2}
		A and C axes:	min ⁻¹	A:44.4 C:66.7	A:44.4 C:100	A:25 C:50	A:25 C:50
		in the turning function mode	min ⁻¹	-	C:1000	-	-
		Tool shank (nominal number)		JIS B6339 BT40	BT40 Dual contact tool	BT40 Dual contact tool	JIS B6339 BT40
Automatic Tool Changer	Pull stud (nominal number)		MAS403 P40T-1	MAS403 P40T-1	MAS403 P40T-1	MAS403 P40T-1	
	Number of stored tools	tools	20	20	40	40	
	Maximum tool diameter	mm	φ125 (φ 4.92")	φ125 (φ 4.92")	φ82 (φ 3.23") (φ 125 (φ 4.92") with no tools in adjacent post)	φ82 (φ 3.23") (φ 125 (φ 4.92") with no tools in adjacent post)	
	Maximum tool length (from the gauge line)	mm	300 (11.81")	300 (11.81")	350 (13.78")	300 (11.81")	
	Maximum tool weight	kg	7 (15 lbs)	7 (15 lbs)	7 (15 lbs)	7 (15 lbs)	
Motors	Tool selection method		Memory random method	Memory random method	Address fixed random method	Address fixed random method	
	Tool exchange time (tool-to-tool)	sec	1.3	1.3	2.0	3.2	
	Tool exchange time (cut-to-cut)	sec	4.5 ^{#3}	4.5 ^{#3}	4.8	6.5	
	for Spindle (30min rating/continuous rating)		kW	7.5/5.5 (10/7 HP)	7.5/5.5 (10/7 HP)	MITSUBISHI 22/18.5(15min/cont.rating) FANUC 26/18.5(30min/cont.rating)	7.5/5.5 (10/7 HP)
		X, Y and Z axes	kW	MITSUBISHI XY:2 (2.7 HP) Z:3.5 (4.7 HP) FANUC XY:3 (4 HP) Z:4 (5.4 HP)	- FANUC XY:3 (4 HP) Z:4 (5.4 HP)	MITSUBISHI X:4.5 (6 HP) YZ:3.5 (4.7 HP) FANUC X:5.5 (7.4 HP) YZ:4.5 (6 HP)	MITSUBISHI XYZ:3.5 (4.7 HP) FANUC X:5.5 (7.4 HP) YZ:4.5 (6 HP)
for Feed axes	A and C axes	kW	MITSUBISHI A:3.5 (4.7 HP) C:2.2 (3 HP) FANUC A:4.5 (6 HP) C:2.7 (3.6 HP)	MITSUBISHI A:4.5 (6 HP) C:6 (8 HP) FANUC A:4.5 (6 HP) C:6 (8 HP)	MITSUBISHI A:4.5 (6 HP) C:3.5 (4.7 HP) FANUC A:5.5 (7.4 HP) C:4.5 (6 HP)	MITSUBISHI A:7 (9.4 HP) C:3.5 (4.7 HP) FANUC A:6 (8 HP) C:4.5 (6 HP)	
Required Power Supply	Power supply	kVA	MITSUBISHI:33 FANUC:25	FANUC:25	MITSUBISHI:51 FANUC:54	MITSUBISHI:42 FANUC:33	
	Supply voltage × supply frequency	V×Hz	200±10%×50/60±1 220±10%×60±1 ^{#4}	200±10%×50/60±1 220±10%×60±1 ^{#4}	200±10%×50/60±1 220±10%×60±1 ^{#4}	200±10%×50/60±1 220±10%×60±1 ^{#4}	
	Compressed air supply pressure	MPa	0.5 (73psi) ^{#5}	0.5 (73psi) ^{#5}	0.4~0.6 (58~87 psi) ^{#5}	0.4~0.6 (58~87 psi) ^{#5}	
Tank Capacity	Compressed air supply flow rate	L/min(ANR)	200 (53 gpm) ^{#6}	200 (53 gpm) ^{#6}	200 (53 gpm) ^{#6}	230 (61 gpm) ^{#6}	
	Coolant tank	L	280 (74 gal)	280 (74 gal)	260 (69 gal)	380 (100 gal)	
	Spindle head cooling oil tank	L	50 (13 gal)	50 (13 gal)	50 (13 gal)	72 (19 gal)	
Machine Size and Required Floor Space	Hydraulic unit tank	L	20 (5 gal)	20 (5 gal)	20 (5 gal)	20 (5 gal)	
	Machine height from the floor surface	mm	2996 (117.95")	3076 (121.10")	3500 (137.80")	3565 (140.35")	
	Floor space required for operation (width × depth)	mm	1895×3440 (74.61"×135.43")	1895×3440 (74.61"×135.43")	3720×2450 (146.46"×96.46")	4850×3660 (190.94"×144.09")	
	Machine weight	kg	8500 (18700 lbs)	8500 (18700 lbs)	12000 (26500 lbs)	18000 (39700 lbs)	
	Temperature of operation environment	°C	5~40	5~40	5~40	5~40	
Humidity of operation environment	%	10~90 (No dew)	10~90 (No dew)	10~90 (No dew)	10~90 (No dew)		

#1: Max. inertia is 0.9 kg·m² for turning function.
#2: Under the HQ or Hyper HQ control
#3: Includes the ATC shutter operating time
#4: When the supply voltage is 220VAC, the supply frequency of 60Hz only is applicable.
#5: Purity of the supplied air should be equivalent to Class 3.5.4 specified in ISO 8573-1 / JIS B8392-1 or higher.
#6: The flow rate for the standard specification machines is specified in the above.
When optional specification such as an air blow is added, add the corresponding air supply according to the operating frequency.

Standard Accessories		VC-X350	VC-X350L	VC-X500	VP9000-5AX
Item		Q'ty			
Lighting system		LED 1 lamp	LED 1 lamp	LED 1 lamp	LED 2 lamp
Coolant unit (Separate coolant tank)		1 set	1 set	1 set	1 set
Entire machine cover (Splash guard)		1 set	1 set	1 set	1 set
Door interlock		1 set	1 set	1 set	1 set
Top cover		1 set	1 set	1 set	1 set
Ceiling shower		-	-	option	1 set
ATC shutter (operated automatically)		1 set	1 set	1 set	1 set
Slideway protection covers for X and Y axes		1 set	1 set	1 set	1 set
Spindle air purge		1 set	1 set	1 set	1 set
Spindle head and ball screw cooling oil temperature controller		1 set	1 set	1 set	1 set
Automatic grease lubrication unit		Self Lubricated type	Self Lubricated type	1 set	1 set
Hydraulic unit (for clamping the 5-axis table)		1 set	1 set	1 set	1 set
Coil-type chip conveyor		1 set	1 set	1 set	1 set
Leveling block		1 set	1 set	1 set	1 set
Parts for machine transfer (excluding the hoisting jig)		1 set	1 set	1 set	1 set
Foundation parts (Bond for anchoring is optional)		-	-	-	1 set
Automatic power off		1 set	1 set	1 set	1 set
Rotary encoder (for A axis)		1 set	-	-	1 set
Rotary encoder (for A and C axes)		-	1 set	1 set	-
Electrical spare parts (fuses)		1 set	1 set	1 set	1 set
Instruction manual		1 set	1 set	1 set	1 set
Electrical manuals (including Hardware diagrams)		1 set	1 set	1 set	1 set

Optional Accessories		VC-X350	VC-X350L	VC-X500	VP9000-5AX
Item		Specification			
<input type="checkbox"/> High-speed 20000min ⁻¹ spindle (22/18.5kW (35/25HP))					
<input type="checkbox"/> High-torque spindle drive motor	MITSUBISHI 22/18.5kW(35/25HP) FANUC 26/18.5kW(35/25HP)	VC-X350	VC-X350L		VP9000-5AX
<input type="checkbox"/> Compatibility with Dual contact tool		VC-X350	VP9000-5AX		
<input type="checkbox"/> Pull stud					<input type="checkbox"/> MAS II <input type="checkbox"/> OKK only 90° <input type="checkbox"/> 30 <input type="checkbox"/> 40 <input type="checkbox"/> 60 <input type="checkbox"/> 80 <input type="checkbox"/> 120
<input type="checkbox"/> Tool magazine					<input type="checkbox"/> Automatic operation of splash guard front door <input type="checkbox"/> Lift-up type chip conveyor <input type="checkbox"/> Chip bucket <input type="checkbox"/> Fixed type (for Lift-up type chip conveyor) <input type="checkbox"/> Workpiece finishing gun <input type="checkbox"/> Oil-mist / air blow nozzle
<input type="checkbox"/> Mist collector					<input type="checkbox"/> BIG <input type="checkbox"/> NIKKEN <input type="checkbox"/> Others
<input type="checkbox"/> Compatibility with oil-through-holder					<input type="checkbox"/> 2MPa (290 psi) <input type="checkbox"/> 7MPa (1015 psi)
<input type="checkbox"/> Compatibility with through-spindle (including high-pressure unit)					<input type="checkbox"/> Air
<input type="checkbox"/> Preparation for through-spindle					<input type="checkbox"/> Thickener bag filter (Spare parts for high-pressure unit) <input type="checkbox"/> Fine amount coolant supply unit (Maker: Bluebe) <input type="checkbox"/> Coolant (for Bluebe)
<input type="checkbox"/> Linear scale					<input type="checkbox"/> for X and Y axes <input type="checkbox"/> for X, Y and Z axes
<input type="checkbox"/> Rotary encoder (C axis)		VC-X350	VP9000-5AX		
<input type="checkbox"/> Coolant cooler					
<input type="checkbox"/> Lighting system					
<input type="checkbox"/> Signal lamp					<input type="checkbox"/> 2-lamp tower type <input type="checkbox"/> 3-lamp tower type <input type="checkbox"/> 2-lamp rotary type <input type="checkbox"/> 3-lamp rotary type <input type="checkbox"/> 4 sets <input type="checkbox"/> 8 sets
<input type="checkbox"/> Additional M code					
<input type="checkbox"/> Foundation bolts for bond anchoring		VC-X350	VC-X350L	VC-X500	
<input type="checkbox"/> A set of bond for foundation work					
<input type="checkbox"/> Coating color specified by customer					
<input type="checkbox"/> Grease cartridge for automatic grease lubrication unit		VC-X500	VP9000-5AX		
<input type="checkbox"/> Touch sensor system					<input type="checkbox"/> T0 (Manually operated type) <input type="checkbox"/> T1-A (Workpiece measurement) <input type="checkbox"/> T1-B (Workpiece measurement, Tool length measurement, Tool break detection) <input type="checkbox"/> T1-C (Tool length measurement, Tool break detection) <input type="checkbox"/> T0 software <input type="checkbox"/> Laser system (without covers) made by Renishaw: Max. φ85 (φ 3.35") <input type="checkbox"/> Micro laser system (without covers) made by Blum: Max. φ85 (φ 3.35")
<input type="checkbox"/> Laser measurement(There is workpiece size limit on VC-X500)					
<input type="checkbox"/> Cumulative hour meter (9999H)					
<input type="checkbox"/> Work counter (5 digits)					
<input type="checkbox"/> Calendar timer					
<input type="checkbox"/> OKK Manual Guide i (animation of milling cycle for F31i)					
<input type="checkbox"/> IMG operation panel					

KCV800-5AX KCV1000-5AX

KCV800-5AX

KCV1000-5AX

Even large-sized aircraft parts can be machined at high speed and quite efficiently!



Tilting and swiveling structure of the spindle achieves 5-axis machining of large-sized workpieces.

High-speed and highly efficient machining of aluminum workpieces is possible with the excellent cutting performance of the No. 50 taper high-speed and high-power spindle.

Long table enables easy machining of long workpieces.

Easy access to the spindle and workpieces are ensured by the structure of traversing column.

Improved chip discharge mechanism enables processing a large amount of chips.

Tilting and swiveling structure of the spindle



Movable operation panel



Sample Workpiece

Material: Aluminum
Coolant: Water-soluble coolant
Tooling: $\phi 50\text{mm}$ ($\phi 1.97''$) end mill
Cutting condition: S1000 ~ S6000

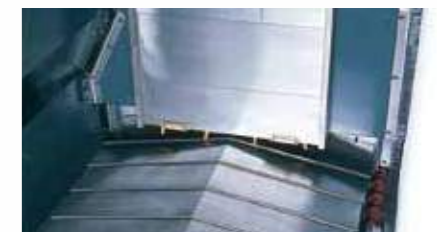
Thorough measures to control thermal displacement

Thermal displacement caused by generation of heat on the bearing is suppressed by the spindle housing cooling mechanism. In addition, the machine has the core-chilled ball screws in the feed axes.



Comprehensive chip processing

Besides the standard coil-type chip conveyors front and back of the table, the machine has additional coil-type chip conveyors on the right and left of the column for improved chip processing capability. Chips on the front face of the column and both sides of the X-axis shutter are flushed out into the conveyors.



※ The machines in the photographs of this brochure may include optional accessories.

Accuracy

Positioning Accuracy (without linear scale) mm (inch)

	X	Y	Z
Positioning Accuracy	±0.0090 (±0.00035")	±0.0030 (±0.00012")	±0.0050 (±0.00020")
Repeatability	±0.0020 (±0.00008") /full stroke		

Positioning Accuracy (with linear scale) mm (inch)

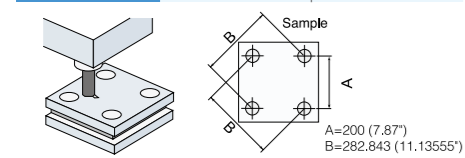
	X	Y	Z
Positioning Accuracy	±0.0060 (±0.00024")	±0.0020 (±0.00008")	±0.0030 (±0.00012")
Repeatability	±0.0010 (±0.00004") /full stroke		

Positioning Accuracy (with encoder) mm (inch)

Positioning Accuracy	A axis: ±5 sec B axis: ±5 sec	
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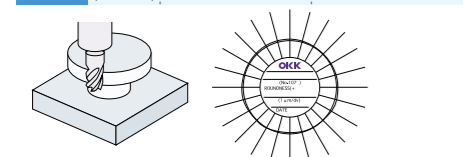
Cutting Accuracy mm (inch)

Item	OKK tolerance	Result
Axis direction	0.015 (0.00059")	0.007 (0.00028")
Diagonal direction	0.015 (0.00059")	0.008 (0.00031")
Deviation of hole dia	0.010 (0.00039")	0.005 (0.00020")

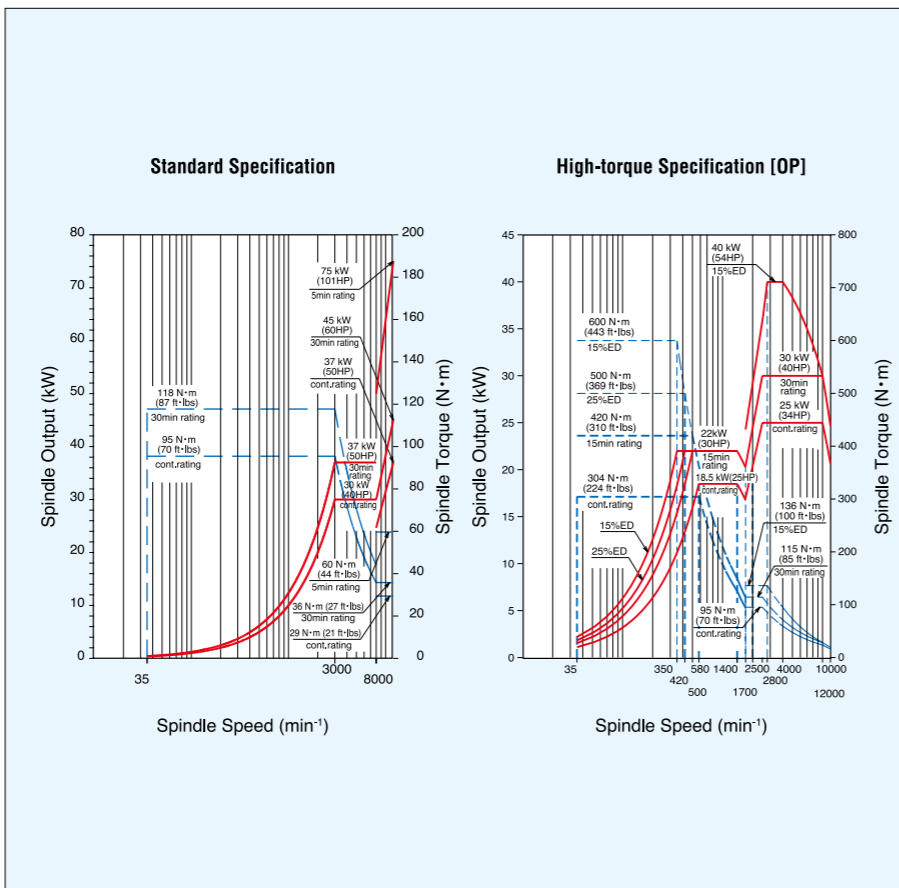


Circular Cutting Accuracy mm (inch)

Item	OKK tolerance	Result
Circularity	0.015 (0.00059")	0.0056 (0.00022")
		0.0058 (0.00023")



Spindle Output and Torque Diagram (FANUC)



Remarks

※1: The above sample data shows a short-time machining example and the results of continuous machining may differ from them.

※2: The above sample data shows the accuracy under OKK's in-house cutting test conditions. The results may vary with the conditions of the cutting tools and fixtures.

※3: The accuracy shown above are values obtained based on OKK's inspection standards under the conditions that the machine is installed according to OKK's foundation drawing and the ambient temperature remains constant.

Machining Capabilities (Workpiece material: S45C)

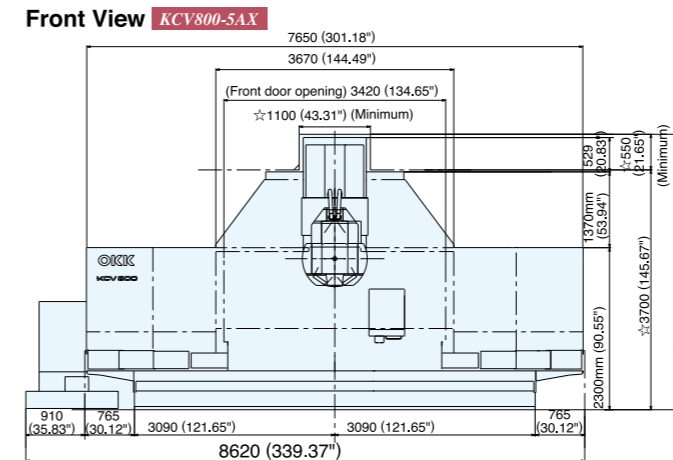
	Face Mill 5" × 6 t	Roughing End Mill φ 50 (φ 1.97") × 6 t	Roughing End Mill φ 50 (φ 1.97") × 6 t
Spindle speed	300min ⁻¹	160min ⁻¹	160min ⁻¹
Cutting speed	120m/min (4724ipm)	25m/min (984ipm)	25m/min (984ipm)
Cut width	(A) 100mm (3.94")	(C) 50mm (1.97")	(E) 50mm (1.97")
Cut depth	(B) 3mm (0.12")	(D) 5mm (0.20")	(F) 5mm (0.20")
Feed rate	300mm/min (12ipm)	140mm/min (6ipm)	192mm/min (8ipm)
Feed per tooth	0.167mm/tooth (0.00657inch/tooth)	0.146mm/tooth (0.00575inch/tooth)	0.200mm/tooth (0.00787inch/tooth)
Cutting amount	90cm ³ /min (5.5cu-inch/min)	35cm ³ /min (2.1cu-inch/min)	48cm ³ /min (2.9cu-inch/min)
Spindle motor load	129%	100%	111%

Note 1: The above machining data show a sample actual machining and are for reference only.

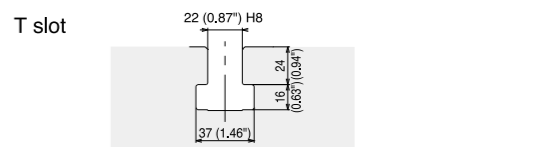
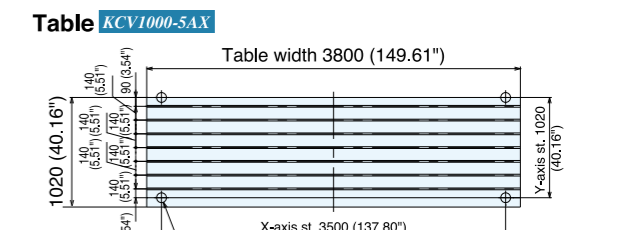
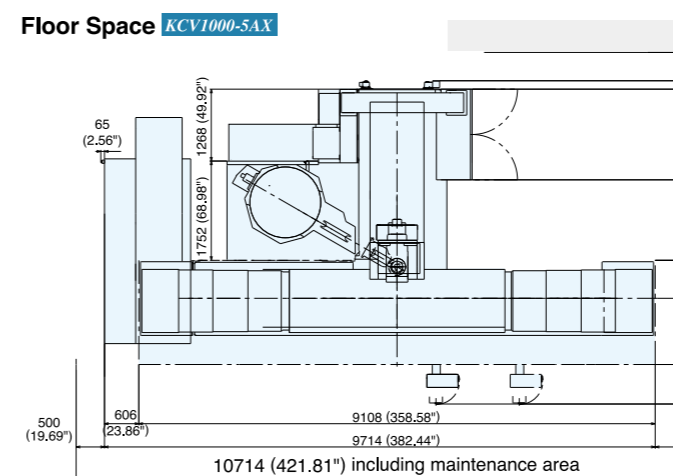
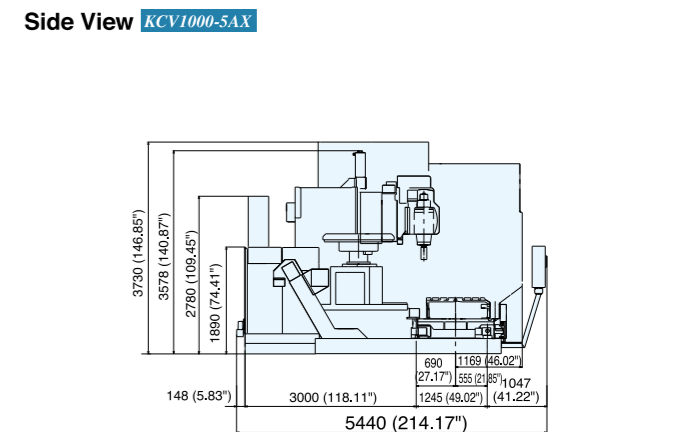
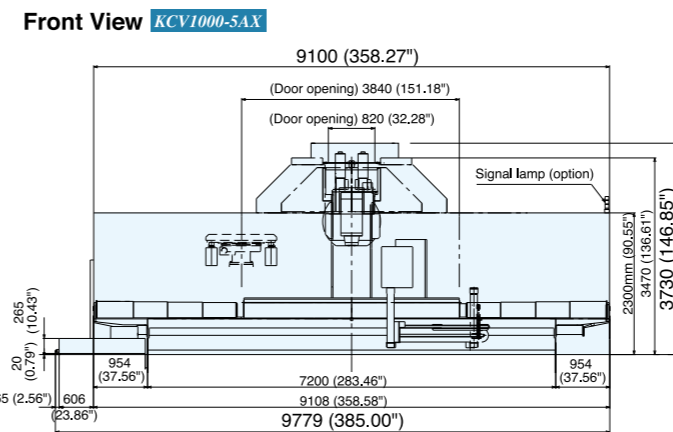
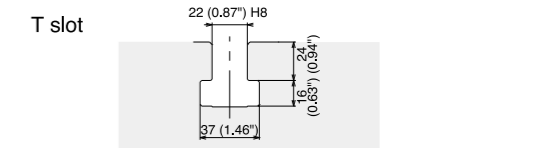
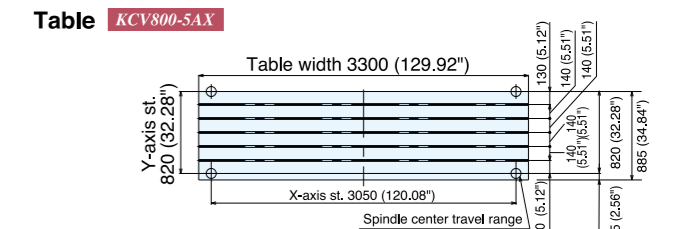
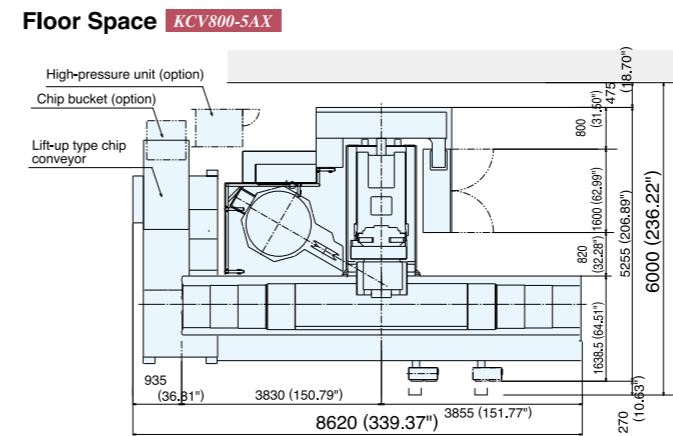
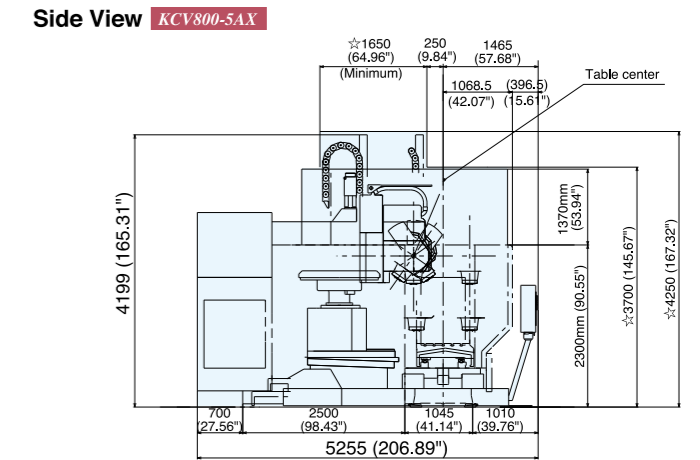
Main Dimensions of the Machine

KCV800-5AX

KCV1000-5AX



[Note] ☆: Minimum space required for interference above the machine. Practical use will require more space.



Specifications		KCV800-5AX	KCV1000-5AX	
Item	Unit	Specification		
Travel	Travel on X axis (Table: right/left)	mm	3050 (120.08")	3500 (137.80")
	Travel on Y axis (Column: back/forth)	mm	820 (32.28")	1020 (40.16")
	Travel on Z axis (Spindle head: up/down)	mm	720 (28.35")	720 (28.35")
	Travel on A axis (Spindle head: back/forth)	deg	-35 to 35 OP: -40 to 40	-35 to 35 OP: -40 to 40
	Travel on B axis (Spindle head: right/left)	deg	-35 to 35 OP: -40 to 40	-35 to 35 OP: -40 to 40
	Distance from table top surface to spindle nose	mm	200 (7.87") to 920 (36.22")	200 (7.87") to 920 (36.22")
Table	Distance from column front to spindle center	mm	830mm (32.68")	1085 (42.72")
	Table work surface area (X-axis direction × Y-axis direction)	mm	3300×820 (129.92"×32.28")	3800×1020 (149.60"×40.16")
	Max. workpiece weight loadable on table	kg	3000 (6600 lbs)	4000 (8800 lbs)
	Table work surface configuration (T-slot nominal dimension × spacing × number of T slots)	mm	22 (0.87")×140 (5.51")×5 slots	22 (0.87")×140 (5.51")×7 slots
Spindle	Distance to the table work surface from the floor	mm	980 (38.58")	1000 (39.37")
	Spindle speed	min ⁻¹	35 to 12000	35 to 12000
	Number of spindle speed change steps		Stepless	Stepless
	Spindle nose (nominal number)		7/24 taper, No.50	7/24 taper, No.50
Feed Rate	Spindle bearing bore diameter	mm	φ100mm (φ3.94")	φ100 (φ3.94")
	Rapid traverse rate	m/min	XY=24 (945 ipm) Z=20 (787 ipm)	XYZ=20 (787 ipm)
	Cutting feed rate	mm/min	A=10 B=10	A=10 B=10
		min ⁻¹	1 to 10000 (0.04 to 394 ipm)	1 to 10000 (0.04 to 394 ipm)
Automatic Tool Changer	Tool shank (nominal number)		JIS B 6339 BT50	JIS B 6339 BT50
	Pull stud (nominal number)		OKK only 90°	OKK only 90°
	Number of stored tools	tools	30 tools	30 tools
	Maximum tool diameter (with adjacent tools)	mm	φ100 (φ3.94")	φ100 (φ3.94")
	Maximum tool diameter (without adjacent tools)	mm	φ200 (φ7.87")	φ200 (φ7.87")
	Maximum tool length (from the gauge line)	mm	350 (13.78")	350 (13.78")
	Maximum tool weight	kg	20 (44 lbs)	20 (44 lbs)
	Tool selection method		Address fixing method	Address fixing method
	Tool exchange time (tool-to-tool)	sec	2.5	2.5
	Tool exchange time (cut-to-cut)	sec	13	15
Motors	For spindle (30min rating/continuous rating)	kW	45/37 (60HP/50HP) OP: 40/25 (54HP/34HP) (15%ED/cont.)	45/37 (60HP/50HP) OP: 40/25 (54HP/34HP) (15%ED/cont.)
	For feed axes	kW	X, Y and Z axes FANUC X/Y/Z: 9.0 (12HP)	A and B axes FANUC X/Y: 6.0 (8HP) Z: 9.0 (12HP)×2
		kW	FANUC A/B: 4.0 (5HP)	FANUC A/B: 4.0 (5HP)
Required Power Supply	Power supply	kVA	FANUC: 76	FANUC: 87
	Supply voltage × supply frequency	V×Hz	200±10%×50/60±1 220±10%×60±1 ^{*1}	200±10%×50/60±1 220±10%×60±1 ^{*1}
	Compressed air supply pressure	MPa	0.4 (58 psi) to 0.6 (87 psi) ^{*2}	0.4 (58 psi) to 0.6 (87 psi) ^{*2}
Tank Capacity	Compressed air supply flow rate	L/min(ANR)	400 (106 gpm) ^{*3}	400 (106 gpm) ^{*3}
	Coolant tank	L	1000 (264 gal)	1000 (264 gal)
	Spindle head cooling oil tank	L	70 (18 gal)	70 (18 gal)
	Spindle lubricating oil tank	L	2 (0.5 gal)	2 (0.5 gal)
	Slideway lubricating oil tank	L	6 (1.6 gal)	6 (1.6gal)
Machine Size and Required Floor Space	Hydraulic unit tank	L	20 (5 gal)	20 (5 gal)
	Machine height from the floor surface	mm	4200 (165.35")	3730 (146.85")
	Floor space required for operation (width × depth)	mm	8620×5255 (339.37"×206.89")	9714×5703 (382.44"×224.53")
Machine weight	Floor space including maintenance area (width × depth)	mm	8620×6000 (339.37"×236.22")	10714×6203 (421.81"×244.21")
	Machine weight	kg	25000 (55100 lbs)	32000 (70500 lbs)
	Controller type		F30i	F30i
Temperature of operation environment	℃	5 to 40	5 to 40	

*1: When the supply voltage is 220VAC, the supply frequency of 60Hz only is applicable.
 *2: Purity of the supplied air should be equivalent to Class 3.5.4 specified in ISO 8573-1 / JIS B8392-1 or higher.
 *3: The flow rate for the standard specification machines is specified in the above.
 When optional specification such as an air blow is added, add the corresponding air supply according to the operating frequency.

Standard Accessories	KCV800-5AX	KCV1000-5AX
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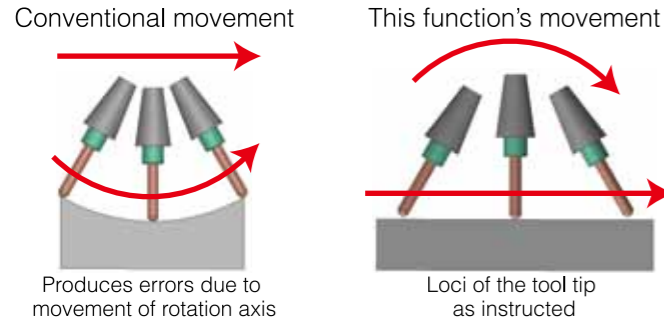
Item	Q'ty
Lighting system (Two fluorescent lamps)	1 set
Coolant unit with lift-up type chip conveyor (for backwashing aluminum chips)	1 set
Coolant-through-spindle (Spindle compatibility only)	1 set
Entire machine cover (Splash guard)	1 set
Door inter-lock	1 set
Top cover	1 set
ATC shutter (operated automatically)	1 set
Slideway protection covers for X, Y and Z axes	1 set
Spindle air purge	1 set
Spindle head and ball screw cooling oil temperature controller	1 set
Hydraulic unit	1 set
Coil-type chip conveyor	4 sets
Leveling block	1 set
Foundation parts (Bond for anchoring is optional.)	1 set
Parts for machine transfer (excluding the hoisting jig)	1 set
Automatic power off	1 set
Rotary encoder (A axis/B axis)	1 set
Electrical spare parts (fuses)	1 set
Instruction manual	1 set
Electrical manuals (including Hardware diagrams)	1 set

Optional Accessories	KCV800-5AX	KCV1000-5AX
Item	Specification	
<input type="checkbox"/> High-torque specification (15% ED/cont.rating)	600/304 N·m (443/224 ft·lbs), 40/25kW (54/34HP)	
<input type="checkbox"/> Compatibility with Dual contact tool		
<input type="checkbox"/> Change of pull stud	<input type="checkbox"/> MAS I <input type="checkbox"/> MAS II	
<input type="checkbox"/> Tool magazine	<input type="checkbox"/> 40	
<input type="checkbox"/> Splash guard front door automatically open / close		
<input type="checkbox"/> Chip bucket	<input type="checkbox"/> Fixed type (for Lift-up type chip conveyor) <input type="checkbox"/> Swing type (for Lift-up type chip conveyor)	
<input type="checkbox"/> Workpiece flushing gun		
<input type="checkbox"/> Oil skimmer		
<input type="checkbox"/> Air blow nozzle		
<input type="checkbox"/> Mist collector		
<input type="checkbox"/> High-pressure unit (for external fixed nozzles): 7MPa (1015 psi)		
<input type="checkbox"/> Compatibility with through-spindle (including high-pressure unit): 7MPa (1015 psi)		
<input type="checkbox"/> Thickener bag filter (Spare parts for high-pressure unit)		
<input type="checkbox"/> Linear scale	<input type="checkbox"/> For X and Y axes <input type="checkbox"/> For X, Y and Z axes	
<input type="checkbox"/> Coolant cooler		
<input type="checkbox"/> Signal lamp	<input type="checkbox"/> 2-lamp tower type <input type="checkbox"/> 3-lamp tower type <input type="checkbox"/> 2-lamp rotary type <input type="checkbox"/> 3-lamp rotary type <input type="checkbox"/> 4 sets <input type="checkbox"/> 8 sets	
<input type="checkbox"/> Additional M code		
<input type="checkbox"/> A set of bond for foundation work		
<input type="checkbox"/> Standard tool set		
<input type="checkbox"/> Coating color specified by customer		
<input type="checkbox"/> Touch sensor system (Wireless types should use FM radio waves only.)	<input type="checkbox"/> T1-A (Workpiece measurement) <input type="checkbox"/> T1-B (Workpiece measurement, Tool length measurement, Tool break detection)	
<input type="checkbox"/> Laser measurement	<input type="checkbox"/> Laser system (without covers) made by Renishaw <input type="checkbox"/> Max φ85 (φ3.35") <input type="checkbox"/> Max φ135 (φ5.31") <input type="checkbox"/> Max φ185 (φ7.28")	
<input type="checkbox"/> OKK Manual Guide i (Animation of milling cycle for F30i)		
<input type="checkbox"/> MG operation panel	<input type="checkbox"/> Micro laser system (without covers) made by Blum: Max φ85 (dia. 3.35")	

5-axis support technologies

5-axis Control Function

Tool center point control

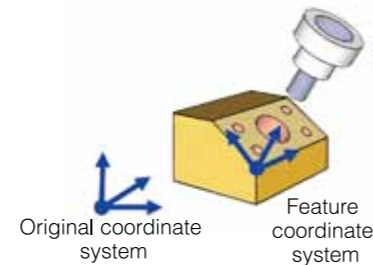


Tool Center Point Control simplifies 5-axis machining by controlling tool movement at the tool center, even if the tool axis direction changes. Tool tip speed is maintained and high-quality surfacing achieved.

5-axis indexing function

Inclined surface indexing (machining) command (Option)

The inclined surface indexing (machining) commands allow easy setting the surface to be machined by using the newly defined coordinate system (feature coordinate system). It enables the simple creation of the machining programs similar to the programming for the normal 3-axis machining centers.



5-axis processing software MULTI-FACER II

When indexing the planes to be processed on 5-axis machining centers, it may take time for setting the workpiece origins. Those workpiece origins can be set with ease by using MULTI-FACER II that enables creating index programs easily without using calculators.

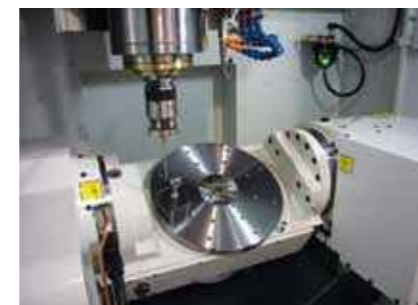


A⁵ system (Option)

In the machining with the 5-axis machining center, the geometric errors (rotation axis's inclination and displacement) influence the machining accuracy largely.

This function automatically measures and corrects the geometric errors with the touch sensor.

It makes the high-accuracy 5-axis indexing and the high quality simultaneous 5-axis machining even better.



CONTROLLER

F31i-A5

Standard Specification	VC-X350		
	VC-X350L	VC-X500	
	HM-X6000	VP9000-5AX	VM-X5
	F31i-B5(WindowsCE-installed Open CNC)		
No. of controlled axes : 5 (X, Y, Z, A, C) (X, Y, Z, A, B) ※1			
No. of simultaneously controlled axes : 5 axes			
Least input increment: 0.001mm / 0.0001"			
Max. programmable dimension: ±999999.999mm / ±39370.0787"			
Absolute / Incremental programming: G90 / G91			
Decimal point input / Pocket calculator type decimal point input			
Inch / Metric conversion: G20 / G21			
Program code: ISO / EIA automatic discriminator			
Program format: FANUC standard format			
Nano interpolation(internal)			
Positioning: G00			
Linear interpolation: G01			
Circular interpolation: G02 / G03(CW / CCW) (including Radius designation)			
Cutting feed rate: 6.3-digit F-code, direct command			
Dwell: G04			
Manual handle feed: manual pulse generator 1 set (0.001, 0.01, 0.1mm)			
Rapid traverse override: 0 / 1 / 10 / 25 / 50 / 100%			
Cutting feed rate override: 0 to 200% (every 10%)			
Feed rate override cancel: M49 / M48			
Rigid tapping: G84, G74 (Mode designation: M29)			
Part program storage capacity: 160m[64KB]			
No. of registered programs: 120			
Part program editing			
Background editing			
Extended part program editing			
15" color LCD/QWERTY key MDI			
Clock function			
MDI (Manual Data Input) operation			
Memory card / USB interface			
Spindle function: 5-digit S-code direct command			
Spindle speed override: 50 to 150% (every 5%)			
Tool function: 4-digit T-code direct command			
ATC tool registration			
Auxiliary function: 3-digit M-code programming			
Multiple M-codes in 1 block: 3 codes (Max. 20 settings) (HM-X6000: 2 codes)			
Tool length offset: G43, G44/G49			
Tool diameter and cutting edge R compensation: G41, G42/G40			
Tool offset sets: 99 sets			
Tool offset memory C			
Manual reference position return			
Automatic reference position return: G28/G29			
2nd reference position return: G30			
Reference position return check: G27			
Automatic coordinate system setting			
Coordinate system setting: G92			
Machine coordinate system: G53			
Workpiece coordinate system: G54 to G59			
Local coordinate system: G52			
Program stop: M00			
Optional stop: M01			
Optional block skip: /			
Dry run			
Machine lock			
Z-axis feed cancel			
Auxiliary function lock			
Program number search			
Sequence number search			
Program restart			
Cycle start			
Auto restart			
Single block			
Feed hold			
Manual absolute on/off : parameter			
Sub program control			
Canned cycle: G73, G74, G76, G80 to G89			
Mirror image function : parameter			
Automatic corner override			
Exact stop check/mode			
Programmable data input: G10			
Graphic display			
Backlash compensation for each rapid traverse and cutting feed			
Smooth backlash compensation			
Memory pitch error compensation (Interpolation type)			
Skip function			
Tool length manual measurement			
Emergency stop			
Data protection key			
NC alarm display / alarm history display			
Machine alarm display			
Stored stroke limit 1			
Load monitor			
Self-diagnosis			
Absolute position detection			
Manual Guide i (Basic) ※ excluding VC-X350L			
Stored stroke limit 2,3 (for OKK use)??			
3rd & 4th reference position return (for OKK use)			
Tool center point control for 5 axis machining			
Inverse time feed			
Unidirectional positioning: G60			
Data server: ATA card(1GB)			
Coordinate system rotation: G68, G69			
Instruction of inclined plane indexing (Instruction of inclined plane machining)			
Manual feed for 5 axis machining			

Standard Specification	VC-X350		
	VC-X350L	VC-X500	
	HM-X6000	VP9000-5AX	VM-X5
	F31i-A5/-B5(WindowsCE-installed Open CNC)		
Tool length compensation along tool vector			
Straightness compensation			
3-dimensional coordinate system conversion	OP	OP	OP
Multi spindle control		VC-X350L only	
Constant surface speed control		VC-X350L only	
Multiple repetitive cycles		VC-X350L only	
Tool offset for Milling and Turning function		VC-X350L only	
Tool geometry/wear compensation		VC-X350L only	
Turning/Machining G code system switching function		VC-X350L only	
Turning G code system B/C		VC-X350L only	
Optional Specification			
Least input increment: 0.0001mm / 0.00001"			
FS15 tape format			
Helical interpolation PK1			
Cylindrical interpolation			
Hypothetical axis interpolation			
Spiral/Conical interpolation			
Smooth interpolation			
NURBS interpolation			
Involute interpolation			
One-digit F code feed			
Handle feed 3 axes (Standard pulse handle is removed)			
Part program storage capacity: 320m (128KB) (250 in total)			
Part program storage capacity: 640m (256KB) (500 in total)			
Part program storage capacity: 1280m (512KB) (1000 in total) PK1			
Part program storage capacity: 2560m (1MB) (1000 in total)			
Part program storage capacity: 5120m (2MB) (1000 in total)			
Part program storage capacity: 10240m (4MB) (1000 in total)			
Part program storage capacity: 20480m (8MB) (1000 in total)			
RS232C interface: RS232C-1CH			
Data server: ATA card(4GB)			
Spindle contour control (Cs contour control)			
Tool position offset			
3-dimensional compensation			
Tool offset sets: 200 sets in total PK1			
Tool offset sets: 400 sets in total			
Tool offset sets: 499 sets in total			
Tool offset sets: 999 sets in total			
Addition of workpiece coordinate system (48 sets in total): G54.1 P1 to P48 PK1			
Addition of workpiece coordinate system (300 sets in total): G54.1 P1 to P300			
Machining time stamp			
Optional block skip: Total 9			
Tool retract and return			
Sequence number comparison and stop			
Manual handle interruption			
Programmable mirror image PK1			
Optional chamfering / corner R			
Custom macro PK1 STD			
Interruption type custom macro			
Addition of custom macro common variables: 600			
Figure copy			
Scaling: G50, G51			
Chopping			
Playback			
Automatic tool length measurement: G37 / G37.1			
Tool life management: 256 sets in total PK1			
Addition of tool life management sets: 1024 sets in total			
High-speed skip			
Run hour and parts count display PK1			
Manual Guide i (Milling cycle) ※ excluding VC-X350L			

Original OKK Software			
Machining support integrated software (incl. Help guidance, etc.)	STD	STD	STD
Tool support	STD	STD	STD
Program Editor	STD	STD	STD
EasyPRO	STD	STD	STD
A5 system(A) Measure rotation center	OP	OP	
A5 system(B) Measure rotation center and location error	OP	OP	
Work Manager	OP	OP	OP
HQ control	STD	STD	STD
Hyper HQ control mode B	※3	STD	STD
5 Axis NC Option Package A	OP(VG5000)	STD	STD
NC option package (including the items with PK1)	OP	OP	OP
Multi-Facer II (5-axis Processing Software)	STD	STD	
Special canned cycle (including circular cutting)	OP	OP	OP
Cycle Mate F	OP	OP	OP
Soft Scale II m	STD	STD	
Soft Scale III			STD
Touch sensor T0 software	OP	OP	
Tool failure detection system (Soft CCM)	OP	OP	OP
Adaptive control (Soft AC)	OP	OP	OP
Automatic restart at tool damage	OP	OP	OP

※1 HM-X6000, VM-X5
 ※2 Standard for VC-X500, VP9000-5AX
 ※3 included in "5 Axis NC Option Package A" option

CONTROLLER

F30i

	KCV800-5AX	KCV1000-5AX
Standard Specification	F31-B5(WindowsCE-installed Open CNC)	
No. of controlled axes : 5 (X, Y, Z, A, B)		
No. of simultaneously controlled axes : 5 axes		
Least input increment: 0.001mm / 0.0001"		
Max programmable dimension: ±999999.999mm / ±39370.0787"		
Absolute / Incremental programming: G90 / G91		
Decimal point input / Pocket calculator type decimal point input		
Inch / Metric conversion: G20 / G21		
Program code: ISO / EIA automatic discriminator		
Program format: FANUC standard format		
Nano interpolation(internal)		
Positioning: G00		
Linear interpolation: G01		
Circular interpolation: G02 / G03(CW / CCW) (including Radius designation)		
Cutting feed rate: 6.3-digit F-code, direct command		
Dwell: G04		
Manual handle feed: manual pulse generator 1 set (0.001, 0.01, 0.1mm)		
Rapid traverse override: 0 / 1 / 10 / 25 / 50 / 100%		
Cutting feed rate override: 0 to 200%(every 10%)		
Feed rate override cancel: M49 / M48		
Rigid tapping: G84, G74(Mode designation: M29)		
Part program storage capacity: 160m [64KB]		
No. of registered programs: 120		
Part program editing		
Background editing		
Extended part program editing		
15"color LCD/QWERTY key MDI		
Clock function		
MDI (Manual Data Input)operation		
Memory card / USB interface??		
Spindle function: 5-digit S-code direct command		
Spindle speed override: 50 to 150%(every 5%)		
Tool function: 4-digit T-code direct command		
ATC tool registration		
Auxiliary function: 3-digit M-code programming		
Multiple M-codes in 1 block: 3 codes(Max. 20 settings)		
Tool length offset: G43, G44/G49		
Tool diameter and cutting edge R compensation: G41, G42/G40		
Tool offset sets: 99 sets		
Tool offset memory C		
Manual reference position return		
Automatic reference position return: G28/G29		
2nd reference position return: G30		
Reference position return check: G27		
Automatic coordinate system setting		
Coordinate system setting: G92		
Machine coordinate system: G53		
Workpiece coordinate system: G54 to G59		
Local coordinate system: G52		
Program stop: M00		
Optional stop: M01		
Optional block skip: /		
Dry run		
Machine lock		
Z-axis feed cancel		
Auxiliary function lock		
Program number search		
Sequence number search		
Program restart		
Cycle start		
Auto restart		
Single block		
Feed hold		
Manual absolute on/off : parameter		
Sub program control		
Canned cycle: G73, G74, G76, G80 to G89		
Mirror image function : parameter		
Automatic corner override		
Exact stop check/mode		
Programmable data input: G10		
Graphic display		
Backlash compensation for each rapid traverse and cutting feed		
Smooth backlash compensation		
Memory pitch error compensation(interpolation type)		
Skip function		
Tool length manual measurement		
Emergency stop		
Data protection key		
NC alarm display / alarm history display		
Machine alarm display		
Stored stroke limit 1		
Load monitor		
Self-diagnosis		
Absolute position detection		
Manual Guide i (Basic)		
Tool center point control for 5 axis machining		
Inverse time feed		
Unidirectional positioning: G60		
Data server: ATA card(1GB)		
Instruction of inclined plane indexing (Instruction of inclined plane machining)		
Manual feed for 5 axis machining		
Tool length compensation along tool vector		
Straightness compensation		
3-dimensional coordinate system conversion		

	KCV800-5AX	KCV1000-5AX
Optional Specification		
Least input increment: 0.0001mm / 0.00001"		
FS15 tape format		
Helical interpolation PK1		
Cylindrical interpolation		
Hypothetical axis interpolation		
Spiral/Conical interpolation		
Smooth interpolation		
NURBS interpolation		
Involute interpolation		
One-digit F code feed		
Handle feed 3 axes(Standard pulse handle is removed)		
Part program storage capacity: 320m [128KB] (250 in total)		
Part program storage capacity: 640m [256KB] (500 in total)		
Part program storage capacity: 1280m [512KB] (1000 in total) PK1		
Part program storage capacity: 2560m [1MB] (1000 in total)		
Part program storage capacity: 5120m [2MB] (1000 in total)		
Part program storage capacity: 10240m [4MB] (1000 in total)		
Part program storage capacity: 20480m [8MB] (1000 in total)		
RS232C interface: RS232C-1CH		
Data server: ATA card(4GB)		
Spindle contour control(Cs contour control)		
Tool position offset		
3-dimensional cutter compensation		
Tool offset sets: 200 sets in total PK1		
Tool offset sets: 400 sets in total		
Tool offset sets: 499 sets in total		
Tool offset sets: 999 sets in total		
Addition of workpiece coordinate system(48 sets in total): G54.1 P1 to P48 PK1		
Addition of workpiece coordinate system(300 sets in total): G54.1 P1 to P300		
Machining time stamp		
Optional block skip: Total 9		
Tool retract and return		
Sequence number comparison and stop		
Manual handle interruption		
Programmable mirror image PK1		
Optional chamfering / corner R		
Custom macro PK1		
Interruption type custom macro		
Addition of custom macro common variables: 600		
Figure copy		
Coordinate system rotation: G68, G69		
Scaling: G50, G51		
Chopping		
Playback		
Automatic tool length measurement: G37 / G37.1		
Tool life management: 256 sets in total PK1		
Addition of tool life management sets: 1024 sets in total		
High-speed skip		
Run hour and parts count display PK1		
Manual Guide i (Milling cycle)		

	STD	OP
Original OKK Software		
Machining support integrated software (incl. Help guidance, etc.)	STD	
Tool support	STD	
Program Editor	STD	
EasyPRO	STD	
Work Manager	OP	
HQ control	STD	
Hyper HQ control mode B	STD	
NC option package (including the items with "PK")	OP	
Special canned cycle (including circular cutting)	OP	
Cycle Mate F	OP	
Tool failure detection system (Soft CCM)	OP	
Adaptive control (Soft AC)	OP	
Automatic restart at tool damage	OP	

CONTROLLER

Neomatic 750

	VC-X350	VC-X500	VP9000-5AX	VM-X5
Standard Specification				
No. of controlled axes : 5 (X, Y, Z, A, C) (X, Y, Z, A, B)※1				
No. of simultaneously controlled axes : 5 axes				
Least input increment : 0.001mm / 0.0001"				
Max. programmable dimension: ±99999.999mm / ± 9999.9999"				
Absolute / Incremental programming: G90 / G91				
Decimal point input I / II				
Inch / Metric conversion: G20 / G21				
Program code: EIA / ISO automatic discrimination				
Program format: Melder standard format (M2 format needs to be instructed)				
Least control increment: 1nm				
Positioning: G00				
Linear interpolation: G01				
Circular interpolation: G02 / G03(CW / CCW) (including Radius designation)				
Cutting feed rate: 5.3-digit F-code, direct command				
One digit F-code feed				
Dwell: G04				
Manual handle feed: Manual pulse generator 1 set(0.001, 0.01, 0.1mm)				
Rapid traverse override: 0 / 1 / 10 / 25 / 50 / 100%				
Cutting feed rate override: 0 to 200%(every 10%)				
Feed rate override cancel: M49 / M48				
Rigid tap cycle: G84, G74				
Part program storage capacity: 160m [60KB]				
No. of registered programs: 200				
Part program editing				
Background editing				
Buffer modification				
15"color touch panel LCD/QWERTY key MDI				
Integrating time display				
Clock function				
User definable key				
MDI (Manual Data Input)operation				
Menu list				
Parameter/Operation/Alarm guidance				
Ethernet interface				
IC card/USB memory interface				
IC card driving				
Hard disk driving				
Spindle function: 5-digit S-code direct command				
Spindle speed override: 50 to 150%(every 5%)				
Tool function: 4-digit T-code direct command				
ATC tool registration				
Miscellaneous function: 3-digit M-code programming				
Multiple M-codes in 1 block: 3 codes(Max. 20 settings)				
Tool length offset: G43				
Tool position offset: G45 to G48				
Cutter compensation: G38 to G42				
Tool offset sets: 200 sets				
Tool offset memory II : tool geometry and wear offset				
Manual reference position return				
Automatic reference position return: G28 / G29				
2nd to 4th reference position return: G30 P2 to P4				
Reference position return check: G27				
Automatic coordinate system setting				
Coordinate system setting: G92				
Selection of machine coordinate system setting: G53				
Selection of workpiece coordinate system setting: G54 to G59				
Local coordinate system setting: G52				
Program stop: M00				
Optional stop: M01				
Optional block skip: /				
Dry run				
Machine lock				
Z-axis feed cancel				
Miscellaneous function lock				
Program number search				
Sequence number search				
Program restart				
Cycle start				
Auto restart				
Single block				
Feed hold				
Manual absolute on / off parameter				
Machining time computation				
Automatic operation handle interruption				
Manual numerical command				
Sub program control				
Canned cycle: G73, G74, G76, G80 to G89				
Linear angle designation				
Circular cutting				
Mirror image function: Parameter				
Mirror image function: G code				
Variable command: 200 sets				
Automatic corner override				
Exact stop check / mode				
Programmable data input: G10 / G11				
3D solid program check				
Graphic display check				
Backlash compensation				
Memory pitch error compensation				
Manual tool length measurement				
Emergency stop				
Data protection key				
NC alarm display				

	VC-X350	VC-X500	VP9000-5AX	VM-X5
Standard Specification				
Machine alarm message				
Stored stroke limit 1 / II				
Load monitor				
Self-diagnosis				
Absolute position detection				
Tool center point control for 5 axis machining				
Inverse time feed				
Unidirectional positioning: G60				
Programmable coordinate system rotation:G68, G69 / G68.1, G69.1 PK				
Inclined surface machining command		OP		OP
Tool handle feed		-		-
Tool length compensation along tool vector		-		-

	Neomatic 750		
Optional Specification			
Program format: M2 / M0 format			
Helical interpolation PK1			
Cylindrical interpolation			
Hypothetical axis interpolation			
Spiral/Conical interpolation			
NURBS interpolation			
Handle feed 3 axes(Standard pulse handle is removed)			
Part program storage capacity:320m [125KB] (200)			
Part program storage capacity:600m [250KB] (400)			
Part program storage capacity:1280m [500KB] (1000) PK1			
Part program storage capacity:2560m [1MB] (1000)			
Part program storage capacity:5120m [2MB] (1000)			
RS232C interface: RS232C-1CH			
Computer link B: RS232C			
Spindle contour control (Spindle position control)			
3-dimensional cutter compensation			
Tool offset sets: 400 sets			
Tool offset sets: 999 sets			
Extended workpiece coordinate system selection (48 sets): G54.1 P1 to P48 PK1			
Extended workpiece coordinate system selection (96 sets): G54.1 P1 to P96			
Optional block skip: Total 9			
Tool retract and return			
Sequence number comparison and stop			
Corner chamfering / corner R: Insert into straight line-straight line / straight line-circle arc PK1			
User macro and user macro interruption PK1			
Variable command: 300 sets in total			
Variable command: 600 sets in total PK1			
Pattern rotation			
Parameter coordinate system rotation PK1			
Special canned cycles: G34 to G36, G37.1 / G34 to G37			
Scaling: G50, G51			
Chopping function			
Playback			
Skip function: G31 PK1			
Automatic tool length measurement: G37 / G37.1			
Tool life management II : 200 sets PK1			
Additional tool life management sets: 400 in total			
Additional tool life management sets: 600 in total			
Additional tool life management sets: 800 in total			
Additional tool life management sets: 1000 in total			
External search (Standard for the machine with APC)			

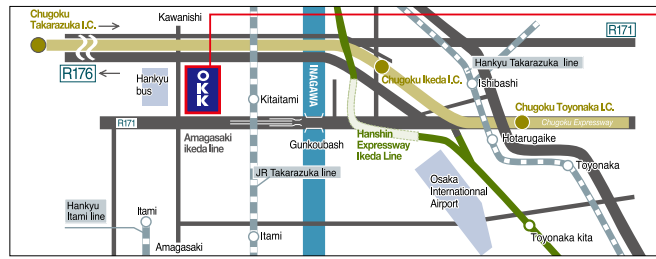
	STD	OP	OP※2
Original OKK Software			
Machining support integrated software (incl. Help guidance, etc.)	STD	STD	
Tool support	STD	STD	
Program Editor	STD	STD	
EasyPRO	STD	STD	
A5 system(A) Measure rotation center	OP	-	
A5 system(B) Measure rotation center and location error	OP	-	
Work Manager	OP	OP	
HQ control	STD	STD	
Hyper HQ control mode II	STD	STD	
NC option package (including the items with "PK")	OP	OP	
Multi-Facer II (5-axis Processing Software)	STD	-	
WinGMC7	OP	OP	
Cycle Mate	OP	OP	
Soft Scale II m	STD	-	
Soft Scale III	-	STD	
Touch sensor T0 software	OP	-	
Tool failure detection system(Soft CCM)	OP	OP	
Adaptive control (Soft AC)	OP	OP	
Automatic restart at tool damage	OP	OP	

※1 VM-X5

※2 To be provided to the machines ordered in and after 2014 year

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Access map



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Please take a airport bus bound for
Osaka (Itami) International Airport
and take a taxi to OKK.

Technical Center

S-Plant

W-Plant

Technical center is for test cutting, demonstration and training.
S-plant is for machining and assembly of spindles and tables.
W-plant is for final assembly of large sized machining centers.
All are located at Inagawa, Itami city, Hyogo, Japan

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**OKK A DIVERSIFIED MANUFACTURER OF
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- Grinding centers
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- Conventional milling machines
- Total die and mold making systems
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Other Products Include:

- Textile Machinery
- Water Maters

NOTE :

OKK reserves the right to change the information contained in this brochure without notice.
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The machines in the photographs of this brochure may include optional accessories.

The export of this product is subject to an authorization from the government of the exporting country.
Check with the government agency for authorization.

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