

DOOSAN



VC 630/5AX

Simultaneous 5-axis Vertical
Machining Center

VC 630/5AX

VC 630/5AX

VC 630/5AX with APC



**MACHINE
GREATNESS™**

Product Overview

Basic Information

Basic Structure
Cutting
Performance

Detailed Information

Options
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Specifications

Customer Support Service



VC 630/5AX

The VC 630/5AX machining center provides full 5 axis simultaneous machining capability. It's highly rigid integral rotary/tilt table and high precision built in spindle provide the solution for both high speed and heavy duty machining of complex parts in one setting.



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High-Rigidity Machine Structure

the highly rigid structure designed by 3D simulation techniques, and responsive axis feed system provide world class precision machining capability.

Built-in Spindle

The high performance built in spindle ensures optimum machining performance at high speed and heavy duty cutting.

Higher Machining Accuracy

For higher accuracy, we provide the thermal displacement compensation system even during a prolonged period of machining and high-rigidity machine structure.

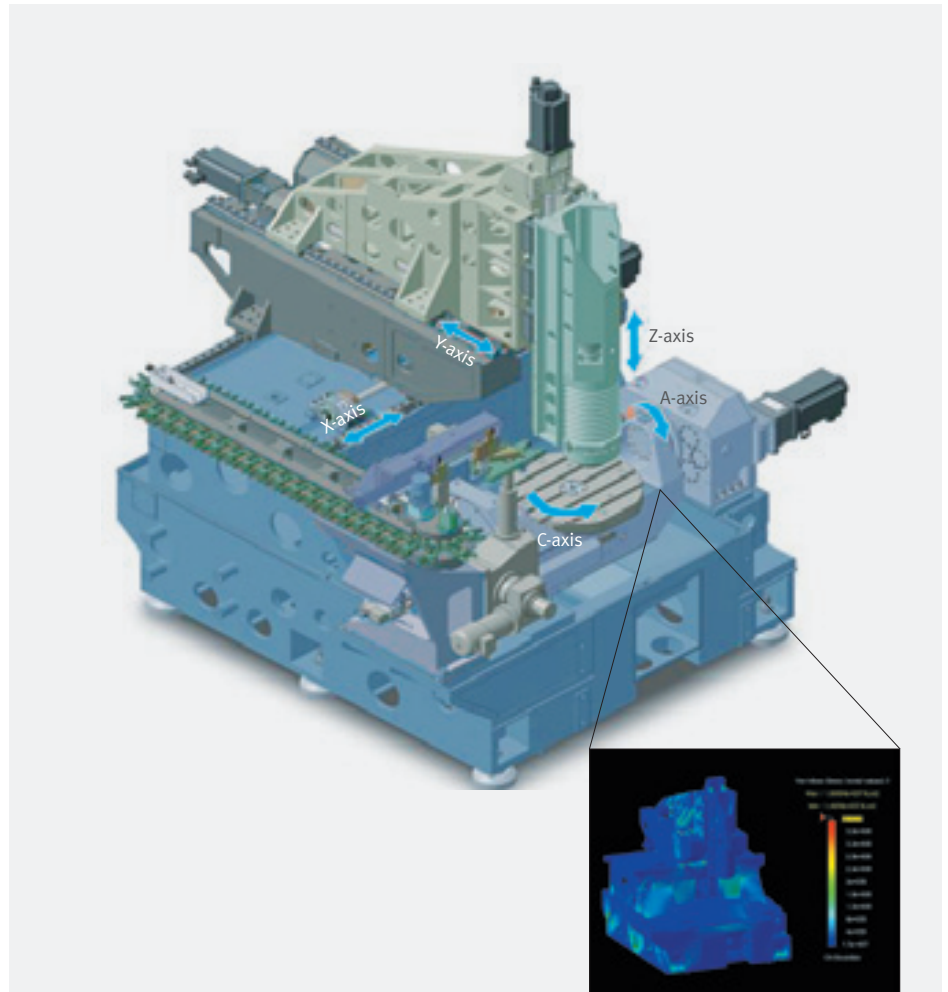


Basic Structure

High rigidity machine structure results in optimum static and dynamic rigidity verified by 3D simulation, resulting in highly stable precision machining.

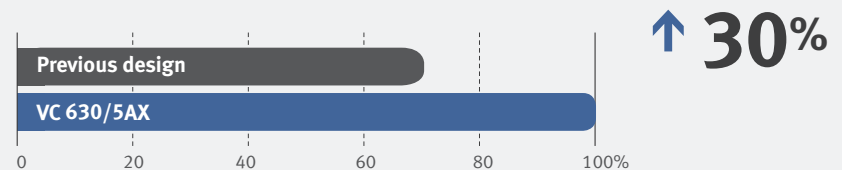
High-Rigidity Design and Structure

Machine structure is designed by Finite Element Analysis Method (FEM) and the static/dynamic rigidity is further enhanced.



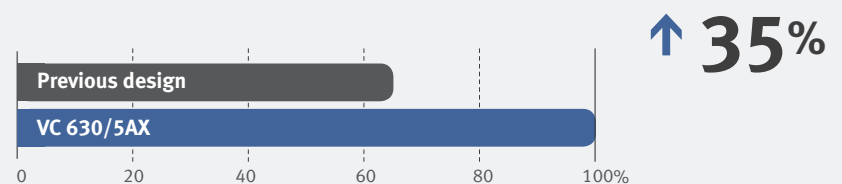
Static Rigidity

The static rigidity structure of the VC630/5AX has been increased by 30% through the FEM analysis.



Dynamic Rigidity

FEM analysis was also used to improve the frequency response and vibration damping property by 35% over the previous design.

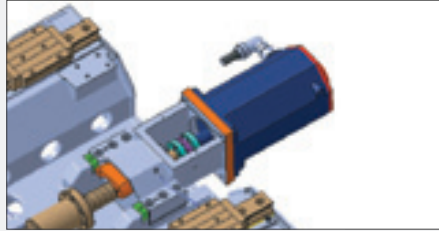


Axis Feed System

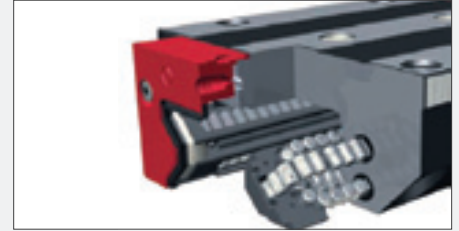
High-Rigidity Axis Feed System

The axis feed system structure is designed to achieve the combination of high rigidity and responsive feed motion. The base casting is made of heavy duty Meehanite Cast Iron which provides excellent vibration damping characteristics and guarantees highly stable machining conditions. Roller type linear guideways and highly rigid couplings are included to provide both rigidity and sensitive X, Y, Z axis feed. Ballscrew nut cooling reduces heat generation to minimise thermal displacement.

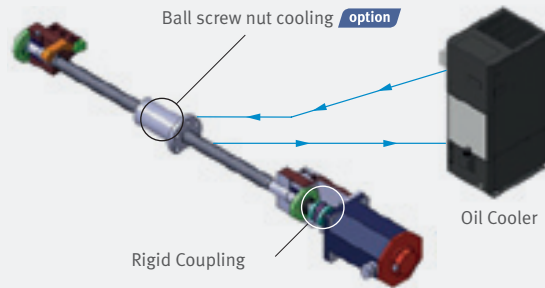
High-rigidity roller type guideway



Rigidity and accuracy of feed system are improved with roller type guideway and coupling.



Roller type linear guideway



VC 630/5AX

Division	Unit	X-axis	Y-axis	Z-axis
Travels	mm (inch)	650 (25.6)	765 (30.1)	520 (20.5)
Rapid travers	m/min (ipm)	40 (1574.8)	40 (1574.8)	36 (1417.3)

Linear scale option

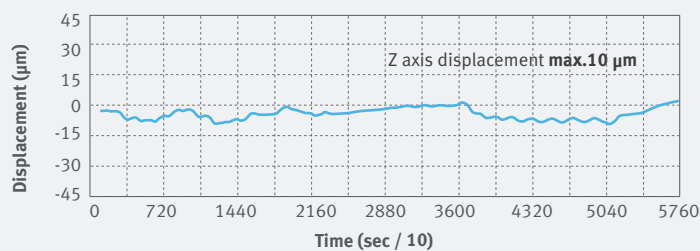
All axes are equipped with the linear scale as an optional feature to maintain the highest degree of accuracy over many hours of operation.



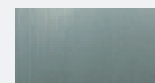
Thermal Error Compensation

live data is collected from multiple temperature sensors around the machine are combined with Doosan feed system smoothing algorithms to provide real time thermal compensation and provide optimum precision.

Heat displacement of VC630/5AX after compensation



Without smoothing



With smoothing



Rotary Table

Large workpiece capacity allows a variety of parts to be machined in one set up.

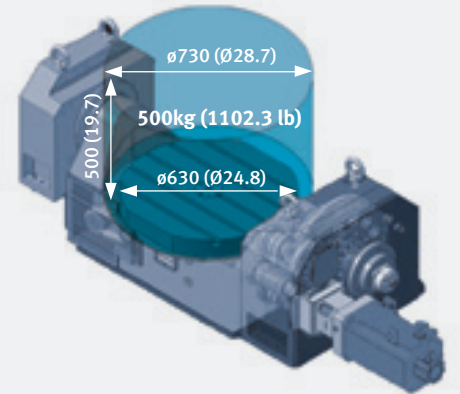
Max. Workpiece Size and Weight

Max. size

ø730 x 500mm
(Ø28.7 x 19.7 inch)

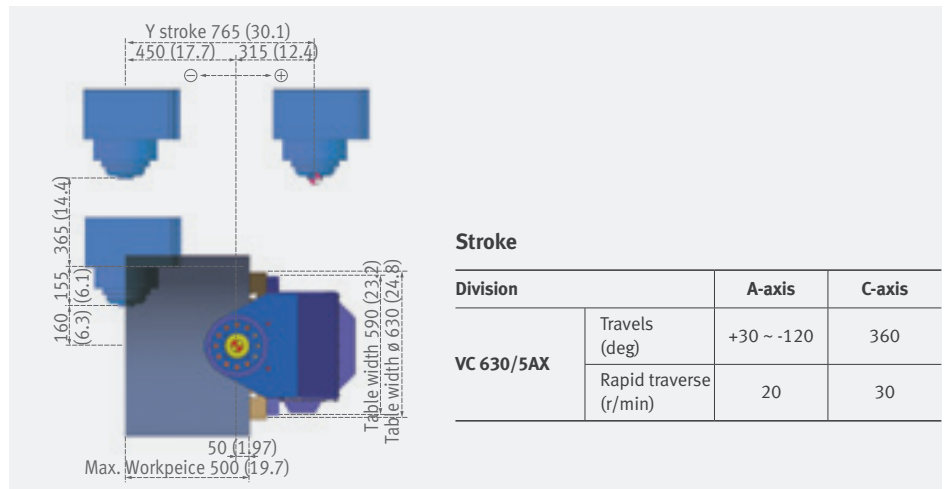
Max. weight

500kg
(1102.3 lb)



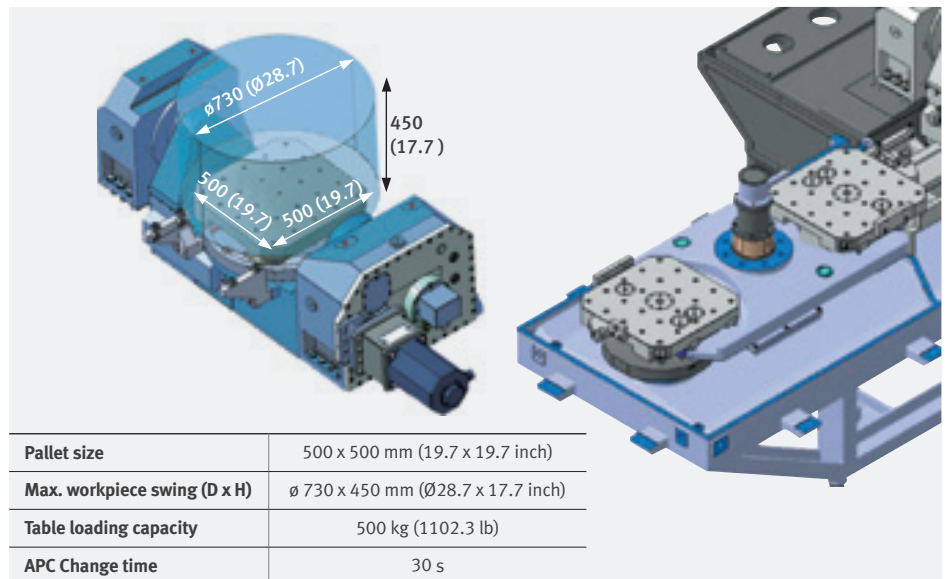
Wider Machining Area

A wide machining area allows access to machine many features of large workpieces.



Automatic Pallet Changer (APC) option

The automatic pallet changer allows setting the workpiece even during the machining process to further improve productivity.



Tool Changer

Along with the rapid tool change that enables higher productivity, a wide range of choices is available for tool magazines.

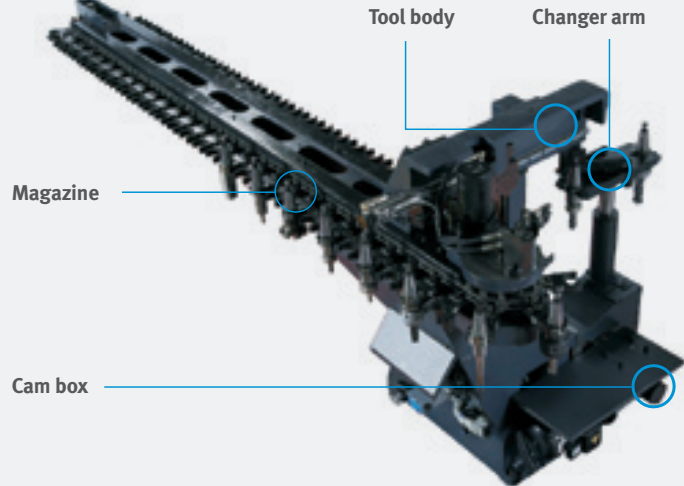
Automatic Tool Changer

Tool change time

1.0^s

40 tools CAM Type ATC

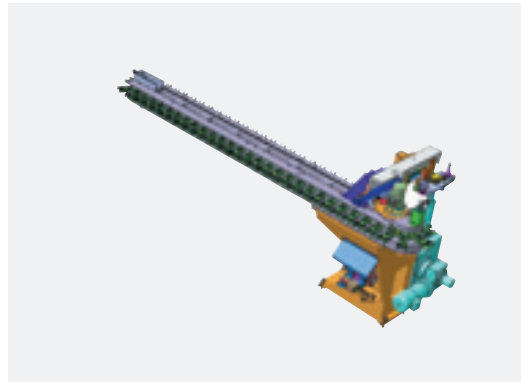
(60, 81, 101, 121 tool) option



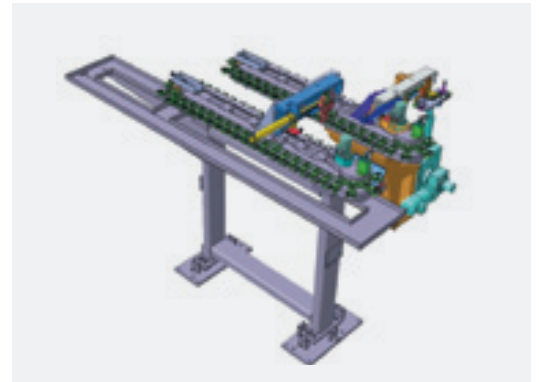
High-Capacity Magazines option

A wide range of tool magazine choices (60 / 81 / 101 / 121 tools magazines) is available. The Increased tool capacity will improve user convenience and efficiency.

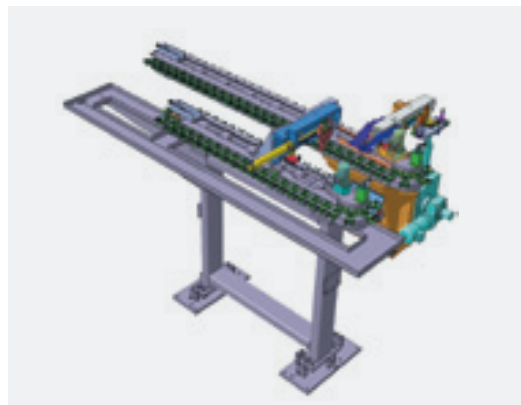
60 Tools



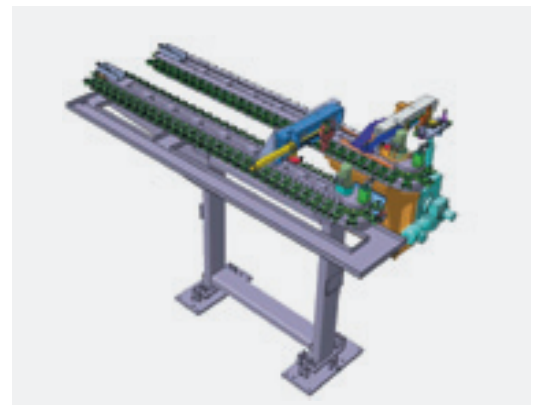
81 Tools



101 Tools



121 Tools



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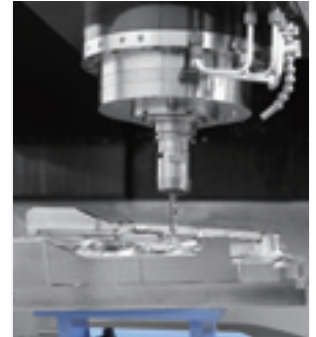
Customer Support Service

Spindle

Built-in motor minimizes vibration and noise generated.

Built-in Spindle

The main spindle is optimally designed with 4 row precision ceramic bearing whose features, low centrifugal force and minimum heat generation, are great merits at high speed condition. The high productivity is realized by reduction of the acceleration time to the maximum speed of main spindle.



30000 r/min spindle selection for high productivity is available. (Please consult with DOOSAN in advance for detailed specifications.)

Spindle Motor

Spindle Motor Power Output (30min/cont. : 12000 r/min)

FANUC

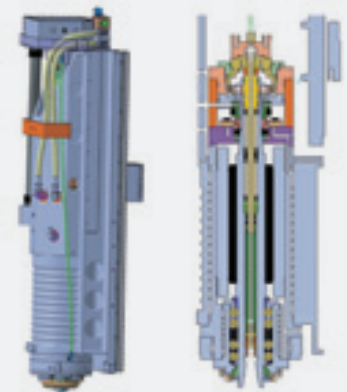
22/18.5 kW
(29.5/24.8 Hp)

HEIDENHAIN

30/24 kW
(40.3/32.2 Hp)

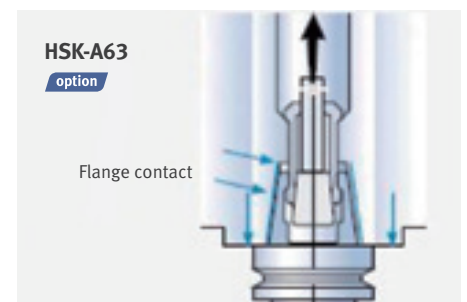
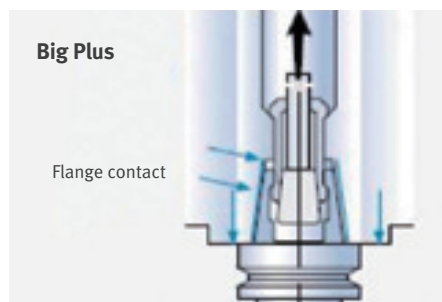
SIEMENS

30/24 kW
(40.3/32.2 Hp)



Dual Contact Spindle

Dual contact spindle is adopted to improve spindle life and surface roughness in high-speed cutting process.



Cutting Performance

From high-speed machining to heavy-duty cutting, diverse machining processes are applicable for complex-shaped workpiece.

Machining Performance

Max. chip throughput

Item	Material		Condition (SM45C, AL6061 same)
	SM45C	AL6061	
Machining removal rate	739.2 cm ³ /min	2688 cm ³ /min	Ø80mm (3.15 in.) Face Mill (6Z)
Feed rate	3300 mm/min (130 ipm)	7000 mm/min (275.8 ipm)	
Depth	2.5 mm (0.1 inch)	2.5 mm (0.1 inch)	
Width	64 mm (2.5 inch)	64 mm (2.5 inch)	

Max. / min. tapping capabilities

Item	Material	
	SM45C	AL6061
Tool size	M42 x P4.5	M3 x P0.5
Feed rate	675 mm/min (26.6 ipm)	1800 mm/min (70.9 ipm)

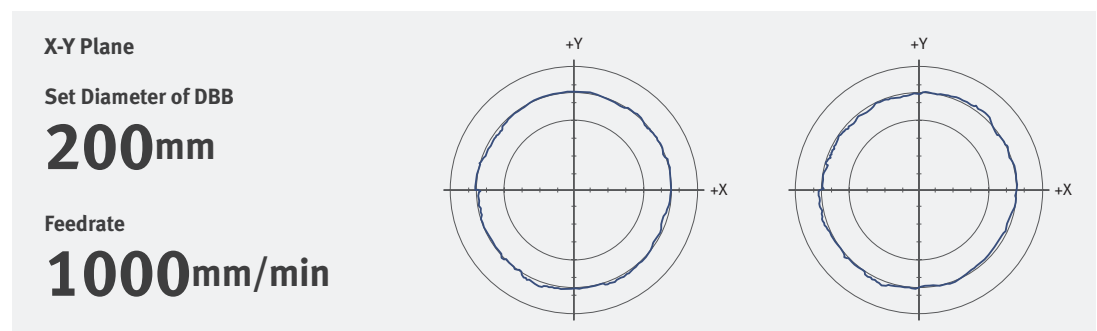
* The results, indicated in this catalogue are provides as example. They may not be obtained due to differences in cutting conditions and environmental conditions during measurement.

Machining Examples

Tire Mold		
Workpiece size	400 x 400 x 150 mm (15.7 x 15.7 x 5.9 inch)	
Material	Wood plastic	
Mold Package	332 Tuning Cycle (Heidenhain TNC 640)	
Cutting	Finish	
Tool	Ø0.8mm Ball EM	
Spindle speed	24000 r/min	
Feed rate	400 mm/min (15.7 ipm)	
Hinge Fitting		
Workpiece size	270 x 138 x 90 mm (10.6 x 5.4 x 3.5 inch)	
Material	AL7075	
Mold Package	DSQ 1	
Cutting	Finish	
Tool	Ø12 mm Ball EM	
Spindle speed	12000 r/min	
Feed rate	1000 mm/min (39.4 ipm)	
Impeller		
Workpiece size	D290 x 153 mm (D11.4 x 6 inch)	
Material	AL7075	
Mold Package	DSQ 3	
Cutting	Finish	
Tool	Ø8 mm Ball EM	
Spindle speed	12000 r/min	
Feed rate	2500 mm/min (98.4 ipm)	

Ball Bar Measurement Test

Higher roundness accuracy is realized by the advanced design of machine structure and Doosan control system.





Basic Information

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Diverse optional features are available to meet specific customer requirements.

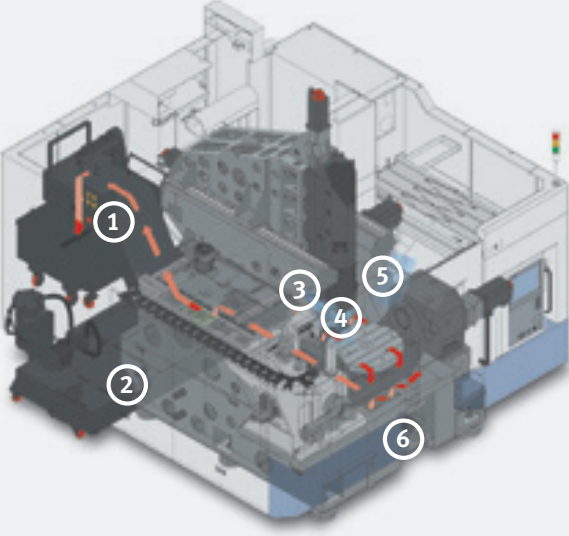
Detailed Information


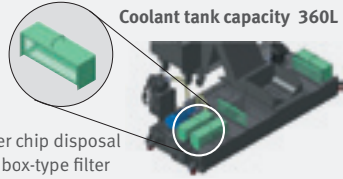
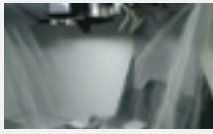
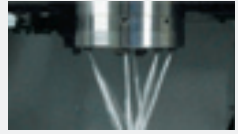


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Customer Support Service

NO.	Description	Features	VC 630/5AX
1	Air blower		○
2	Air gun		○
3	Automatic tool changer	40 Tools	●
4		60 Tools	○
5		80 Tools	○
6		101 Tools	○
7		121 Tools	○
8	Automatic Tool Length Measurement	TS27R : RENISHAW	●
9	Chip conveyor	Hinge / Scraper / Drum filter type	○
10	Coolant gun		○
11	Coolant tank		●
12	DSQ (high speed / high precision contour control)	DSQ1 (AICC II_200 block)	●
13		DSQ2 (DSQ1 & Data server 1GB)	○
14		DSQ3 (DSQ2 & 600 block)	○
15		DSQ4 (DSQ3 & 1000 block)	○
16	Easy Operation Package (E.O.P)	Tool management system	●
17		Alarm / M-code / G-code / ATC restoration guidance	●
18		Table movement / Guidance on work coordinate system setup	●
19	Electric cabinet air conditioner		○
20	Electric cabinet light		○
21	Electric cabinet line filter		○
22	Linear scale	X Axis	○
23		Y Axis	○
24		Z Axis	○
25	MPG	1 MPG_PORTABLE TYPE	●
26		1 MPG_PORTABLE_W/ENABLE TYPE	○
27	NC system	DOOSAN Fanuc i Plus	○
28		FANUC 31i-5	●
29		HEIDENHAIN TNC 640	○
30		SIEMENS S840Dsl	○
31	NC system lcd size	15" DOOSAN Fanuc I Plus	●
32		15" color LCD with Touch Panel	○
33		15" (Color)_HEIDENHAIN	○
34		15" (Color)_SIEMENS	○
35	Oil Skimmer	Belt Type	○
36	Power transformer		○
37	Shower coolant		○
38	Spindle motor power	22/18.5 kW (29.5/24.8 Hp) : FANUC (12000, 20000 r/min)	●
39		91 kW (122.0 Hp) (FANUC : 30000 r/min)	○
40		30/24 kW (40.3/32.2 Hp) : HEIDENHAIN (12000 r/min)	○
41		30/24 kW (40.3/32.2 Hp) : HEIDENHAIN (20000 r/min)	○
42		30/24 kW (40.3/32.2 Hp) : SIEMENS (12000 r/min)	○
43		30/24 kW (40.3/32.2 Hp) : SIEMENS (20000 r/min)	○
44	Spindle speed	12000 r/min	●
45		20000 r/min	○
46		30000 r/min	○
47	Test bar		○
48	Through spindle coolant	NONE	●
49		1.5 KW_2.0 MPA	○
50		4.0 KW_2.0 MPA	○
51		5.5 KW_7.0 MPA_DUAL BAG FILTER	○
52	Work & tool counter	WORK / TOOL	○
53	Customized special option	Axis cooling system	○
54		Auto door (w/safty edge)	○
55		IKC (Intelligent Kinematic Compensation)	○
56		Aerospace solution package	○
57		APC	○
58		Rotary joint for table	○

Peripheral Equipment



<p>1. Chip conveyor <small>option</small></p>  <p>Hinge type Scraper type Drum filter type</p>	<p>2. Large capacity coolant tank built-in with chip pan and box filter</p>  <p>Coolant tank capacity 360L</p> <p>Easier chip disposal with box-type filter</p>
<p>3. Shower coolant <small>option</small></p> 	<p>4. Coolant system</p> 
<p>5. Auto-door type top cover</p> <p>The top cover helps enhancing convenience when loading/unloading heavy workpiece on the processing table.</p> 	<p>6. Internal screw conveyor</p> 

Intelligent Kinematic Compensation for 5-axis

For high accuracy 5-axis machining, Intelligent Kinematic Compensation function is recommended. This function minimizes error in complex 5-axis machining applications by maintaining tip of the tool in correct position in respect to the workpiece. In order to properly utilize this function, following four optional items are required.



Recommended optional items

1. Software



FANUC NC: DCP-i (Developed by DOOSAN)



Heidenhain NC: Kinematic opt

2. Receiver

Recommended Option



3. Touch Probe

Recommended Option



4. Datum ball

Recommended Option



5. Automatic Tool Measurement



6. Master Tool

Recommended Option



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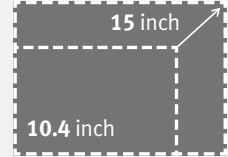
User convenience has been significantly enhanced with a new operation panel.

User-Friendly Operation Panel

Large 15inch screen and user-friendly operating function ensure convenient and efficient operation.



Large 15inch screen display



Design optimized for customers' needs based on extensive know-how

Designed for user convenience	Convenient and intuitive UI Optimized button size High-visibility lamps Long lifecycle buttons Partitioned to prevent operator error
Convenient option buttons	Detachable buttons Spare I/O signal ports for optional devices
Customized functionality	Customer-specific function switches Available for auxiliary panel design

Easy Operation Package

Setting up of tools, work pieces and programs, as well as troubleshooting for abnormal condition of main parts, is designed to minimize waiting time, maximize operational efficiency, and enhance operator convenience.

<p>Adaptive Feed Control (AFC) Function to control feedrate so that the cutting can be carried out at a constant load (To adapt to the spindle load set up with constant load feedrate control function)</p>	<p>Tool Management Function to manage tool information [Tool information] - Tool No. - Tool condition : normal, large diameter, worn/damaged, used for the first time, manual - Tool name</p>
<p>Tool Load Monitor Function to automatically monitor tool load (Different loads can be set for one tool according to M700 ~ M704)</p>	<p>Pattern Cycle (Engraving function : option) Function to create frequently-used cutting programs automatically - Pattern Cycle: creates a program for a pre-defined shape - Engraving: creates a program for cutting a shape described with characters (option)</p>
<p>Work Offset Setting Function to configure various work offset settings</p>	<p>Alarm Guidance Function to show detailed info on frequently triggered alarms and recommended actions</p>
<p>Sensor Status Monitor Function to view sensor conditions of the machine</p>	<p>ATC Recovery Function to view detailed info with recommended actions and to perform step-by-step operation manually (when an alarm is triggered during an ATC operation)</p>




SIEMENS 840D

SIEMENS CNC optimized for DOOSAN machine tools maximizes users' productivity.

15.6 inch screen + New OP

The newly-designed operation panel enhances operating convenience by incorporating common-design buttons and layout, and features the Qwerty keyboard for fast and easy operation.



15.6-inch display

- 10MB high capacity user memory
- USB & Ethernet (standard)
- QWERTY Keyboard (standard)
- High speed calculation and simulation can be fulfilled by improved processor skill


The machining monitoring function developed on the basis of the Shop Mill – an interactive machining support function of SIEMENS – provides users with cutting, servicing and maintenance screens for easy and convenient machine operation.




HEIDENHAIN TNC 640

Superior Hardware Specifications

15" LCD and capacious 21GB memory



15" LCD



Description	HEIDENHAIN TNC 640	Remarks
Screen size	15" STD	-
Storage memory	21GB STD	-
Interference prevention system	Optional	-
Kinematic OPT.	Optional	Measuring device not included
Look-ahead block	1024 blocks	-
3D line graphics	Std.	-

Spindle

Basic Information

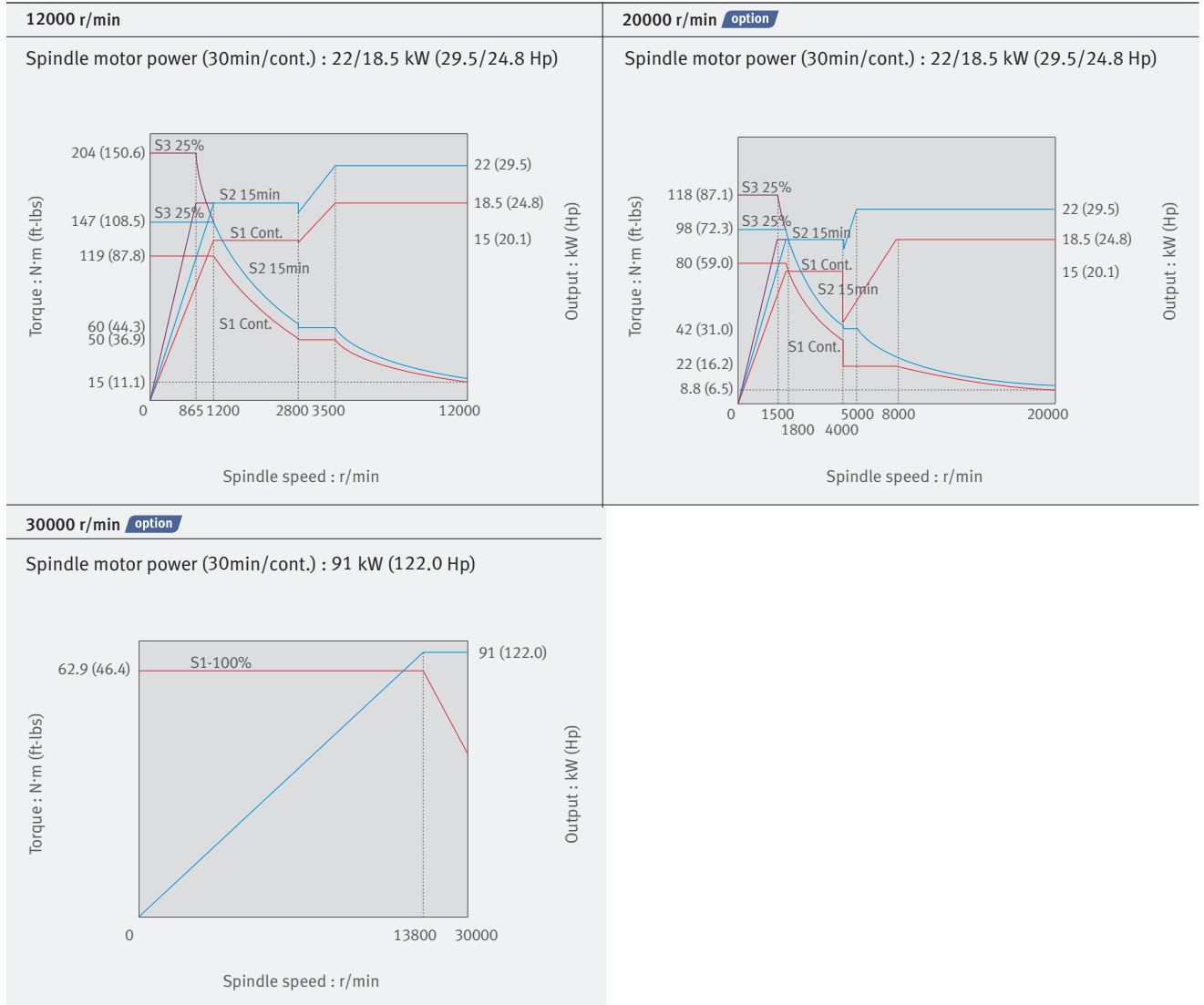
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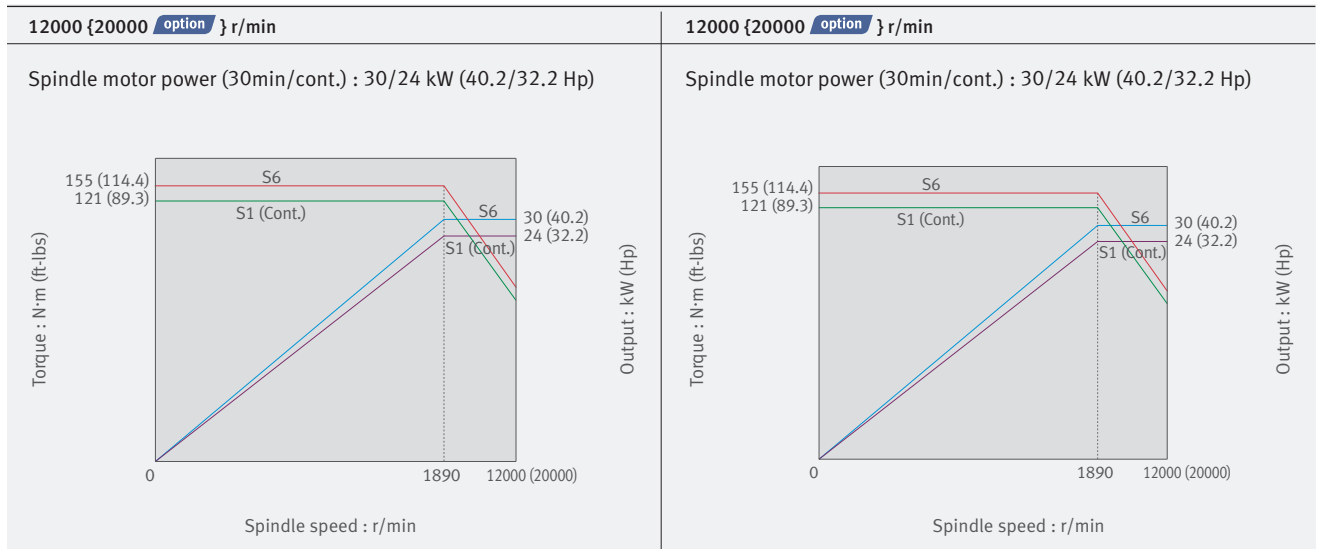
Customer Support Service

FANUC 31i-5



HEIDENHAIN TNC 640 option

SIEMENS 840Dsl option

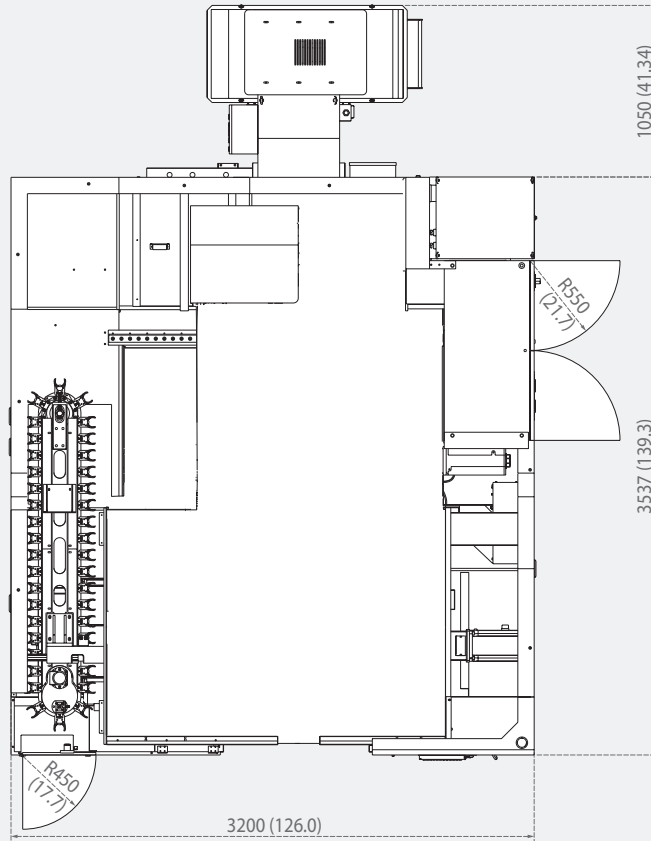


External Dimensions

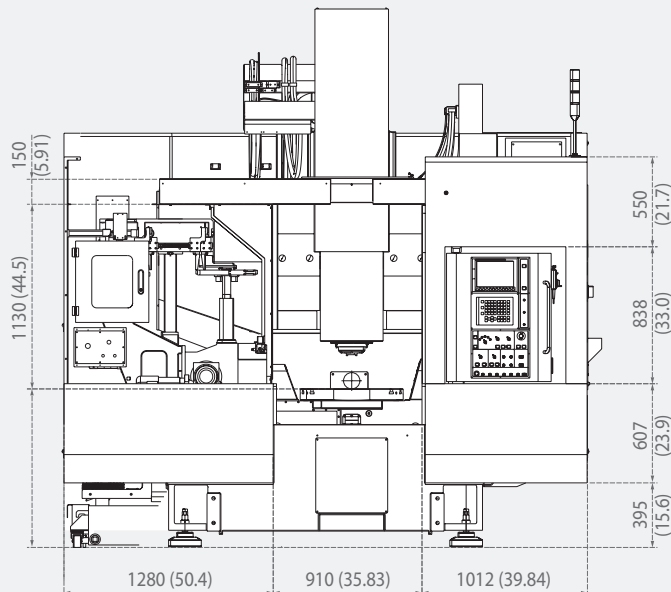
VC 630/5AX (Standard type)

Unit : mm (inch)

Top view



Front view



* Some peripheral equipment can be placed in other places

External Dimensions

Basic Information

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VC 630/5AX (APC type)

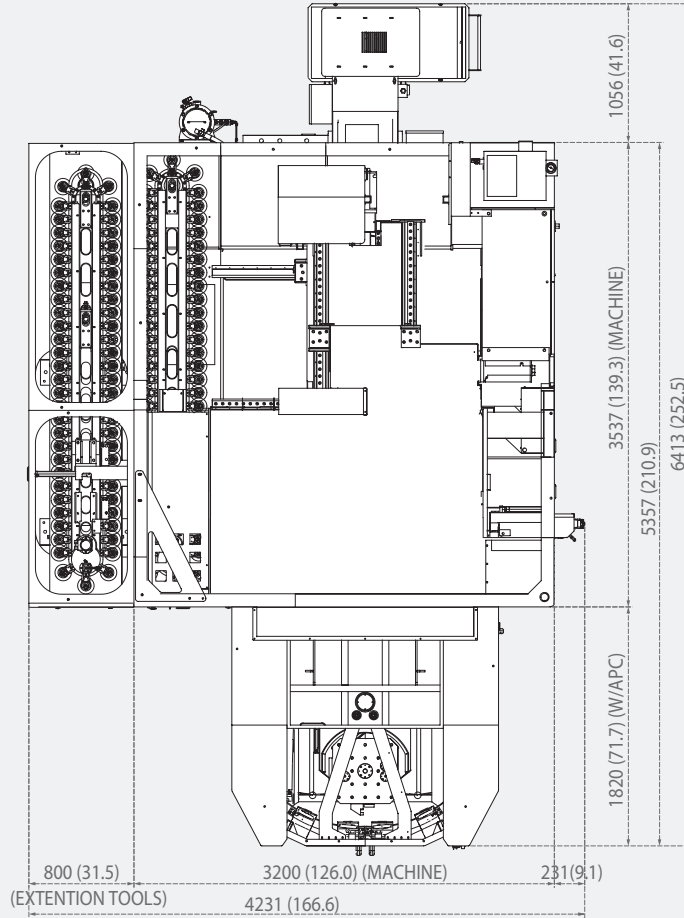
Unit : mm (inch)

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Top view



Front view

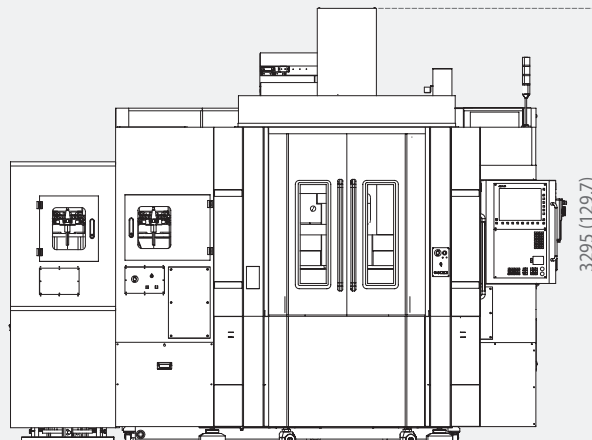
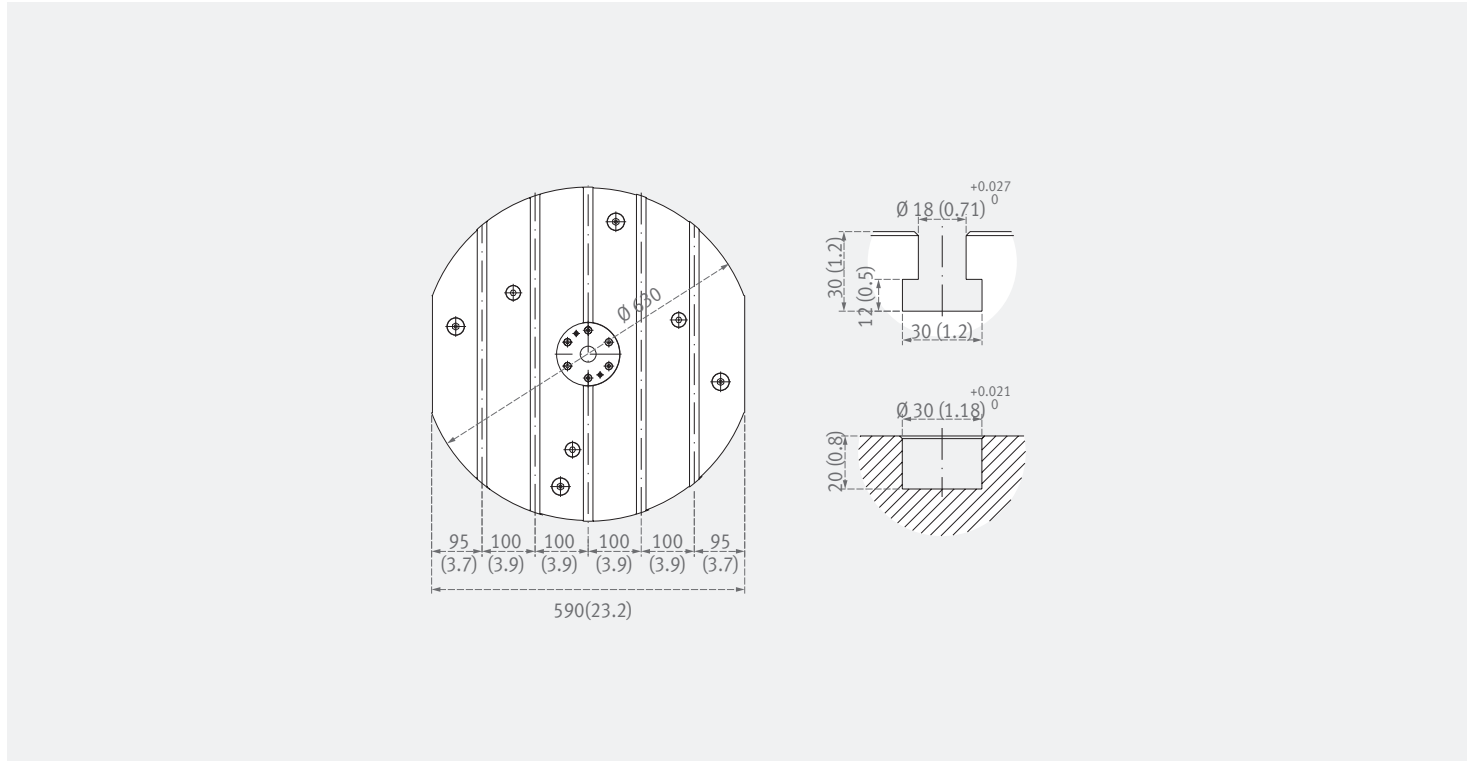


Table dimension / Tool shank

Table dimension

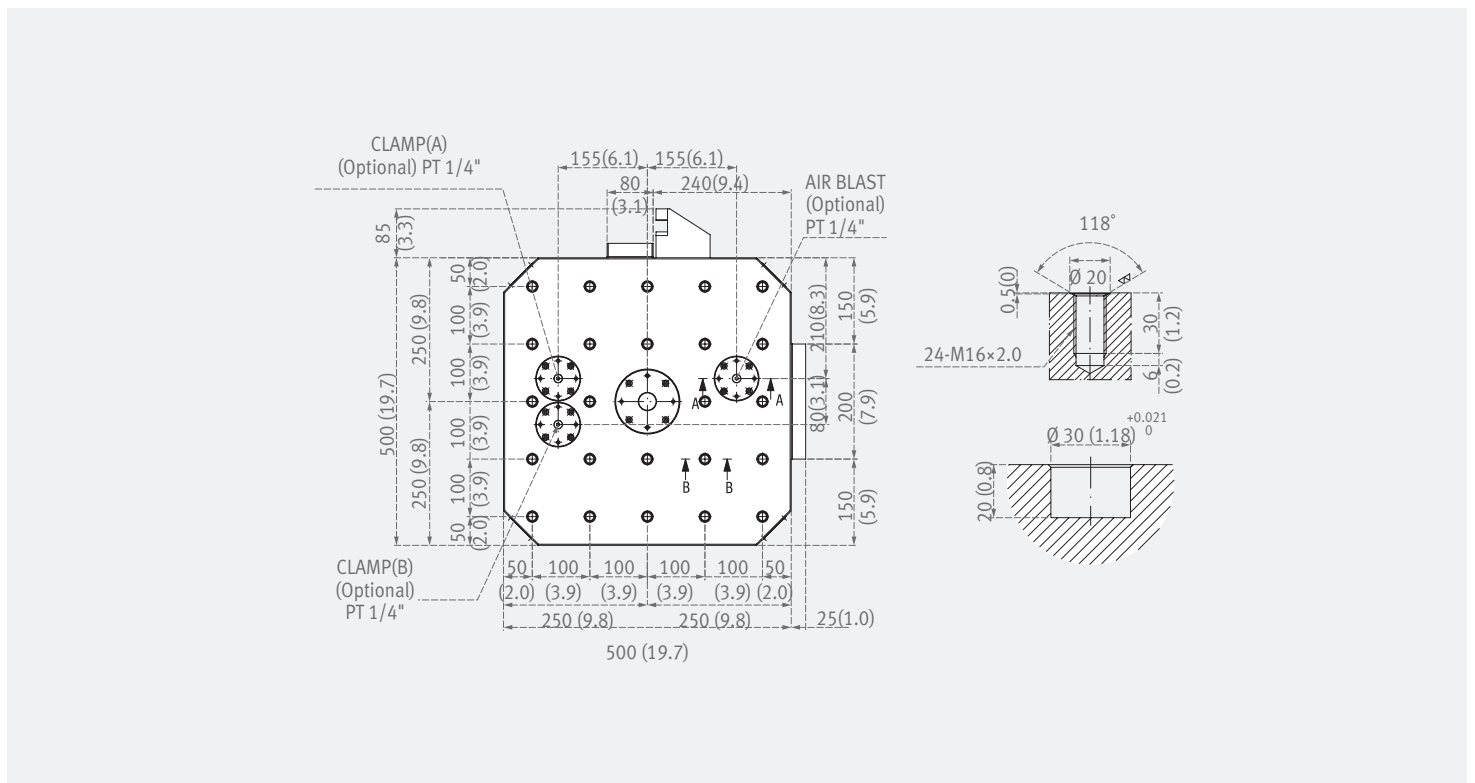
Standard type

Unit : mm (inch)



APC type

Unit : mm (inch)



Machine Specifications



Description		Unit	VC 630/5AX	VC 630/5AX with APC	
Travels	X-axis	mm (inch)	650 (25.6)		
	Y-axis	mm (inch)	765 (30.1)		
	Z-axis	mm (inch)	520 (20.5)		
	A-axis	deg.	150 (+30~ -120)		
	C-axis	deg.	360		
	Distance from spindle nose to table top	mm (inch)	210 ~ 730 (8.3~28.7)	160 ~ 680 (6.3~26.8)	
	Distance from spindle center to column guideway	mm (inch)	220 (8.7)		
Feedrate	Rapid traverse rate (X / Y / Z)	m/min (ipm)	40 / 40 / 36 (1574.8 / 1574.8 / 1417.3)		
	Rapid traverse rate (A / C)	r/min	20 / 30		
	Cutting feedrate (X / Y / Z)	mm/min (ipm)	18000 (708.7)		
	Cutting feedrate (A / C)	deg/min	7200		
Table	Table size	mm (inch)	ø 630 (24.8)	500 x 500 (19.7 x 19.7)	
	Table loading capacity	kg (lb)	500 (1102.3)		
	Max. workpiece swing diameter x height	mm (inch)	ø 730 x 500 (28.7 x 19.7)	ø 730 x 450 (28.7 x 17.7)	
	Minimum table indexing angle	-	0.001		
Spindle	Max. spindle speed	r/min	12000 {20000 / 30000}*		
	Spindle taper	-	ISO#40 7 / 24 Taper		
	Max. spindle torque	N·m (ft·lb)	204 (150.6) (25% ED) {118 (87.1) (25% ED)} {62.9 (46.4)}*		
Automatic tool changer	Type of tool shank	-	MAS403 BT40		
	Tool storage capacity	ea	40 {60 / 81 / 101 / 121}*		
	Max. tool diameter	mm (inch)	ø 80 (59.0)		
	Max. tool diameter without adjacent tools	mm (inch)	ø 125 (92.3)		
	Max. tool length	mm (inch)	300 (221.4)		
	Max. tool weight	kg (lb)	8 (17.6)		
	Max. tool moment	N·m (ft·lb)	5.88 (4.3)		
	Method of tool selection	-	Fixed address		
	Tool change time (tool-to-tool)	s	1.0		
Automatic pallet changer	Number of pallet	ea	-	2	
	Type	-	-	Rotary shuttle	
	Pallet change time	s	-	30	
Motor	Spindle motor power	kW (Hp)	FANUC 31i-5 : 22/18.5 {91} (29.5/24.8 {122.0}*) {HEIDENHAIN TNC 640 : 30/24 (40.3/32.2 Hp) : 12000 r/min, 30/24 (40.3/32.2 Hp) : 20000 r/min}* {SIEMENS 840 Dsl : 30/24kw (40.3/32.2 Hp) : 12000 r/min, 30/24kw (40.3/32.2 Hp) : 20000 r/min}*		
Power source	Electric power supply	kVA	53.3		
	Compressed air supply	MPa	0.54		
Tank capacity	Coolant tank capacity	L (gallon)	360 (95.1)		
	Lubrication tank capacity	L (gallon)	1.32 (0.4)		
Machine Dimensions	Machine dimension (L x W x H)	mm (inch)	3537(4587 : with chip conveyor) x 3200 x 3295 (139.3(180.6 : with chip conveyor) x 126 x 129.7)	5357(with chip conveyor : 6413) x 4231 x 3295 (210.9(with chip conveyor : 252.5) x 166.6 x 129.7)	
	Machine weight	kg (lb)	12500 (27557.4)	16000 (35273.4)	
Control	NC System		FANUC 31i-5 {DOOSAN Fanuc i Plus / SIEMENS 840 Dsl / HEIDENHAIN TNC 640}*		

* { } : Option

NC Unit Specifications

● Standard ○ Optional X N/A



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NO.	Description	Spec.	DOOSAN Fanuc i Plus	FANUC 31i-5	
1	AXES CONTROL	Controlled axes	X, Y, Z, B, (5)	X, Y, Z, B, (5)	
2		Additional controlled axes	●	●	
3		Least command increment	0.001 mm / 0.0001"	●	●
4		Least input increment	0.001 mm / 0.0001"	●	●
5		Interpolation type pitch error compensation		●	○
6	INTERPOLATION & FEED FUNCTION	2nd reference point return	G30	●	
7		3rd / 4th reference return		●	
8		Inverse time feed		●	
9		Cylindrical interpolation	G07.1	●	
10		Helical interpolation B	Only Fanuc 30i	X	
11		Smooth interpolation		X	
12		NURBS interpolation		X	
13		Involute interpolation		X	
14		Helical involute interpolation		X	
15		Bell-type acceleration/deceleration before look ahead interpolation		●	
16		Smooth backlash compensation		○	
17		Automatic corner override	G62	●	
18		Manual handle feed	Max. 3unit	1 unit	
19		Manual handle feed rate	x1, x10, x100 (per pulse)	●	
20		Handle interruption		●	
21		Manual handle retrace		○	
22		Manual handle feed 2/3 unit		X	
23		Nano smoothing	AI contour control II is required.	X	
24		AI APC	20 BLOCK	X	
25		AICC I	30 BLOCK	X	
26			40 BLOCK	X	
27		AICC II	200 BLOCK	●	
28			400 BLOCK	○ ¹⁾	
29		High-speed processing	600 BLOCK	X	
30		Look-ahead blocks expansion	1000 BLOCK	X	
31		DSQ I	AICC II (200block) + Machining condition selection function	X	
32		DSQ II	AICC II (200block) + Machining condition selection function + Data server (1GB)	X	
33		DSQ III	AICC II with high speed processing (600block) + Machining condition selection function + Data server(1GB)	X	
34		SPINDLE & M-CODE FUNCTION	M- code function	●	
35			Retraction for rigid tapping	●	
36	Rigid tapping		G84, G74		
37	TOOL FUNCTION	Number of tool offsets	64 ea	X	
38			99 ea	X	
39			200 ea	X	
40			400 ea	400 ea	
41			499 / 999 / 2000 ea	X	
42		Tool nose radius compensation	G40, G41, G42	●	
43		Tool length compensation	G43, G44, G49	●	
44		Tool life management		●	
45		Addition of tool pairs for tool life management		●	
46		Tool offset	G45 - G48	●	

NO.	Description	Spec.	DOOSAN Fanuc i Plus	FANUC 31i-5	
47	Custom macro		●	●	
48	Macro executor		●	●	
49	Extended part program editing		●	●	
50	Part program storage	256KB (640m)	X	640m	
51	Part program storage	512KB (1,280m)	X	○	
52	Part program storage	1MB (2,560m)	X	○	
53	Part program storage	2MB (5,120m)	○	○	
54	Part program storage	4MB (1,0240m)	X	○	
55	Part program storage	8MB (2,0480m)	X	○	
56	PROGRAMMING & EDITING FUNCTION	Inch/metric conversion	G20 / G21	●	●
57		Number of Registered programs	400 ea	X	X
58		Number of Registered programs	500 ea	X	500 ea
59		Number of Registered programs	1000 ea	1000 ea	○
60		Number of Registered programs	4000 ea	X	○
61		Optional block skip	9 BLOCK	●	○
62		Optional stop	M01	●	●
63		Program file name	32 characters	●	●
64		Program number	04-digits	X	X
65		Playback function		●	○
66		Addition of workpiece coordinate system	G54.1 P1 - 48 (48 pairs)	48 pairs	48 pairs
67		Addition of workpiece coordinate system	G54.1 P1 - 300 (300 pairs)	○	○
68		Embedded Ethernet		●	●
69		Graphic display	Tool path drawing	●	●
70		Loadmeter display		●	●
71		MDI / DISPLAY unit	15" color LCD	●	●
72			15" color LCD with Touch Panel	○	X
73		Memory card interface		●	●
74		USB memory interface	Only Data Read & Write	●	●
75		Operation history display		●	●
76		DNC operation with memory card		●	●
77		Optional angle chamfering / corner R		●	●
78		Run hour and part number display		●	●
79		High speed skip function		●	○
80		Polar coordinate command	G15 / G16	●	○
81		Polar coordinate interpolation	G12.1 / G13.1	X	○
82		Programmable mirror image	G50.1 / G51.1	●	○
83	OTHERS FUNCTIONS (Operation, setting & Display, etc)	Scaling	G50, G51	●	○
84		Single direction positioning	G60	●	○
85		Pattern data input		●	○
86		Jerk control	AI contour control II is required.	○	○
87		Fast Data server with 1GB PCMCIA card		○	○
88		Fast Ethernet		○	○
89		3-dimensional coordinate conversion		○	○
90		3-dimensional tool compensation		X	○
91		Figure copying	G72.1, G72.2	○	○
92		Machining time stamp function		○	○
93		Machine alarm diagnosis		●	X
94		CNC screen display		●	●
95		CNC screen dual display function		●	●
96		One touch macro call	G15 / G16	●	○
97		Machining quality level adjustment	G50.1 / G51.1	●	○
98		EZ Guide i (Conversational Programming Solution)	G50, G51	● ²⁾	○
99		iHMI with Machining Cycle	G60	○ ³⁾	X
100		MANUAL GUIDE i		X	○

1) AICC2 (400block) of 0iMF must be changed to High Speed Main board. Ask R&D center for information.

2) Only with 15" LCD standard 3) Only with 15" Touch LCD standard



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NO.	Description	Spec.	S840Dsl	
1	Controlled axes	3 axes	X	
2		4 axes	X	
3		5 axes	X, Y, Z, C, A	
4	AXES CONTROL Simultaneously controlled axes	Positioning(G00)/Linear interpolation(G01) : 3 axes Circular interpolation(G02, G03) : 2 axes	X	
5		Positioning(G00)/Linear interpolation(G01) : 4 axes Circular interpolation(G02, G03) : 2 axes	X	
6		Least command increment	0.001mm (0.0001 inch)	●
7		Least input increment	0.001mm (0.0001 inch)	X
8	Maximum commandable value	±99999.999mm (±3937 inch)	●	
9	INTERPOLATION & FEED FUNCTIONS	Reference point return	●	
10		Inverse time feedrate	G93	○
11		Spline interpolation (A, B and C splines)		●
12	SPINDLE FUNCTIONS	Retraction for rigid tapping	●	
13		Rigid tapping	●	
14	TOOL FUNCTIONS	Tool radius compensations in plane		
15		• With approach and retract strategies	●	
16		• With transition circle / ellipse on outer edges	●	
17		Number of tools / cutting edges in tool list	256 / 512	X
18		Tool length compensation		●
19		Tool offset selection via T and D numbers		●
20		Replacement tools for tool management		●
21		Monitoring of tool life and workpiece count		●
22	PROGRAMMING & EDITING FUNCTIONS	Main program call from main program and subroutine	●	
23		Subroutine levels and interrupt routines, max.		16 / 2
24		Number of subroutine passes ≤ 9999		●
25		Number of levels for skip blocks 1		●
26		Number of levels for skip blocks 8		○
27		Polar coordinates		●
28		Auxiliary function output		
29		• Via M word, max. programmable value range: INT 231-1		●
30		• Via H word, max. range: REAL ± 3.4028 ex 38/ INT -231 ... 231-1		●
31		High-level CNC language with		
32		• User variables, configurable		●
33		• Read/write system variables		●
34		• Indirect programming		●
35		• Program jumps and branches		●
36		• Arithmetic and trigonometric functions		●
37	• Compare operations and logic combinations		●	
38	• Macro techniques		●	
39	• Control structures IF-ELSE-ENDIF		●	
40	• Control structures WHILE, FOR, REPEAT, LOOP		●	
41	• STRING functions		●	
42	Program functions			
43	• Dynamic preprocessing memory FIFO		●	
44	• Look ahead number of blocks		150	
45	• Frame concept		●	
46	• Inclined-surface machining with swivel cycle		●	
47	Online ISO dialect interpreter		●	

SIEMENS

NO.	Description	Spec.	S840Dsl
48	Program / workpiece management		
49	• Parts programs on NCU, max. number		1000
50	• Workpieces on NCU, max. number		250
51	• On additional plug-in CF card		●
52	• On USB storage medium (e.g. disk drive, USB stick)		●
53	• On network drive		●
54	Basic frames, max. number		16
55	Settable offsets, max. number		100
56	Program editor		
57	PROGRAMMING & EDITING FUNCTIONS • Programming support for cycles program (Program Guide)		●
58	• CNC editor with editing functions: Marking, copying, deleting		●
59	• Programming graphics / free contour input (contour calculator)		●
60	Technology cycles for drilling / milling		●
61	Pocket milling free contour and islands stock removal cycle		●
62	Residual material detection		●
63	Access protection for cycles		●
64	Programming support can be extended, e.g. customer cycles		●
65	2D simulation		●
66	3D simulation, finished part		●
67	Simultaneous recording		●
68	JOG		
69	• Handwheel selection		●
70	• Switchover: inch / metric		●
71	Automatic		
72	• Execution from USB or CF card interface on operator panel front		●
73	• Execution from network drive		●
74	• DRF offset		●
75	• Block search with / without calculation		●
76	Preset		
77	• Set actual value		●
78	10.4" color display		X
79	15.0" color display		●
80	Plain text display of user variables		●
81	OTHERS Operating software languages		
82	FUNCTIONS (Operation, setting & Display, etc) • Ch_S, Ch_T, En, Fr, Gr, It, Kr, Pt, Sp		●
83	• Additional languages, use of language extensions		●
84	Working area limitation		●
85	Limit switch monitoring		●
86	Software and hardware limit switches		●
87	Remote Control System (RCS) remote diagnostics		
88	• RCS Host remote diagnostics function		○
89	• RCS Commander (viewer function)		●
90	Integrated service planner for the monitoring of service intervals		●
91	Automatic measuring cycles		●
92	Easy Extend		X
93	TRANSMIT / cylinder surface transformation		●
94	Contour handwheel		●
95	Integrate screens in SINUMERIK Operate with SINUMERIK Integrate Run MyScreens		●
96	Cross-mode actions (ASUPs and synchronized actions in all operating modes)		●



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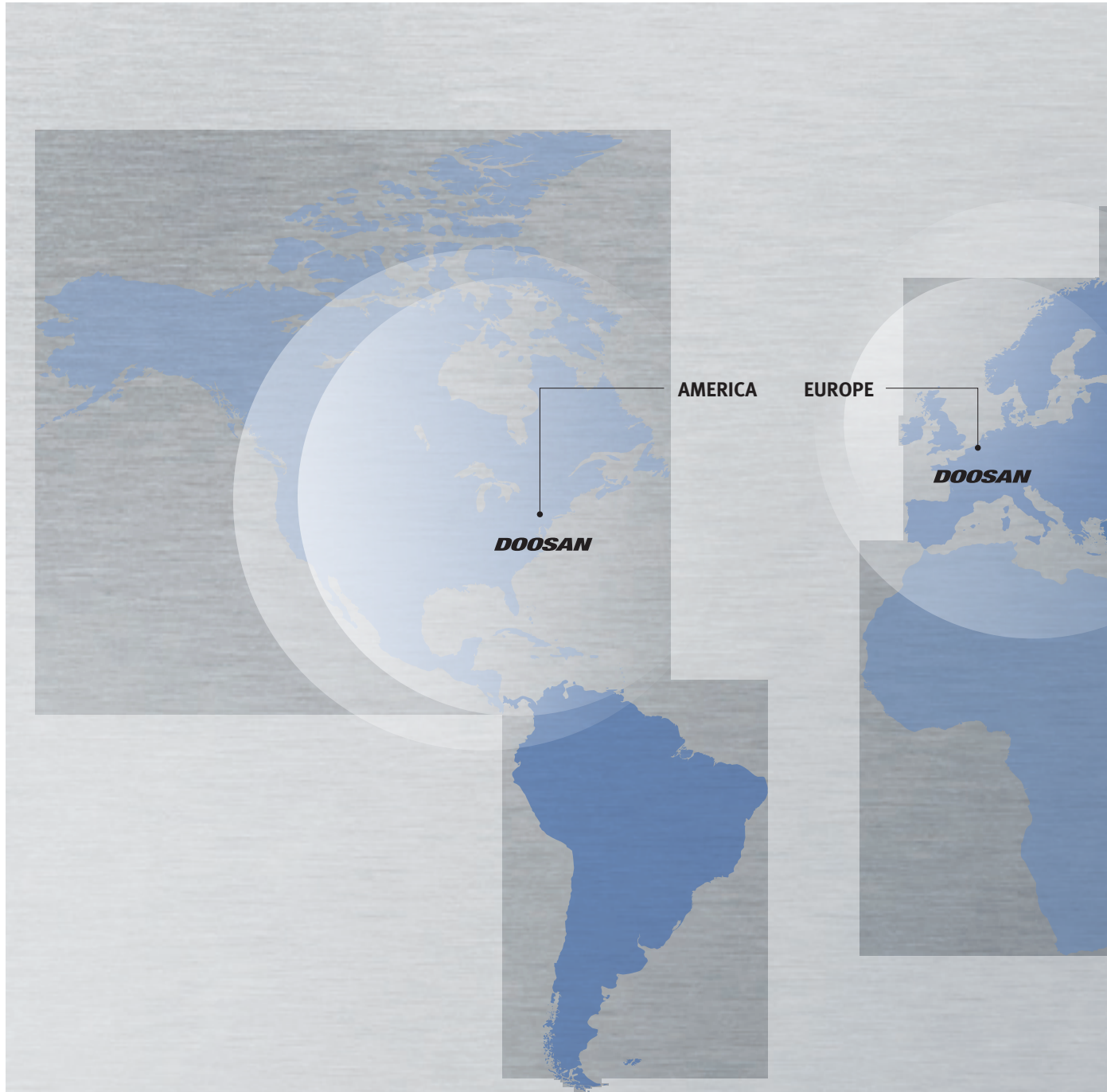
Customer Support Service

No.	Description	Spec.	TNC 640
1	Axes	Controlled axes	5 axes
2			Max. 18 axes in total
3		Least command increment	0.0001 mm (0.0001 inch), 0.0001°
4		Least input increment	0.0001 mm (0.0001 inch), 0.0001°
5		Maximum commandable value	±99999.999mm (±3937 inch)
6		Axis feedback control	Double-speed control loops for high-frequency spindles and torque/linear motors
7		MDI / DISPLAY unit	15.1 inch TFT color flat panel
8			19 inch TFT color flat panel
9		Program memory for NC programs	SSDR
10		Block processing time	
11		Cycle time for path interpolation	CC 61xx
12		Encoders	Absolute encoders
13	Commissioning and diagnostics	Data interfaces	Ethernet interface
14			USB interface (USB 2.0)
15	Machine functions	Look-ahead	Intelligent path control by calculating the path speed ahead of time (max. 1024 blocks.)
16		HSC filters	
17		Switching the traverse ranges	
18	User functions	Program input	According to ISO
19			With smarT.NC
20		Position entry	Nominal positions for lines and arcs in Cartesian coordinates
21			Incremental or absolute dimensions
22			Display and entry in mm or inches
23			Display of the handwheel path during machining with handwheel superimpositioning
24			Paraxial positioning blocks
25		Tool compensation	In the working plane and tool length
26			Radius-compensated contour lookahead for up to 99 blocks (M120)
27			Three-dimensional tool radius compensation
28		Tool table	Central storage of tool data
29			Multiple tool tables with any number of tools
30		Cutting-data table	Calculation of spindle speed and feed rate based on stored tables
31		Constant contouring speed	relative to the path of the tool center or to the tool's cutting edge
32		Parallel operation	Creation of a program while another program is being run
33		Tilting the working plane with Cycle 19	
34		Tilting the working plane with the PLANE function	
35		Manual traverse in tool-axis direction	after interruption of program run
36	Function TCPM	Retaining the position of tool tip when positioning tilting axes	
37	Rotary table machining	Programming of cylindrical contours as if in two axes	
38		Feed rate in distance per minute	
39	FK free contour programming	for workpieces not dimensioned for NC programming	
40	Program jumps	Subprograms and program section repeats	
41		Calling any program as a subprogram	
42	Program verification graphics	Plan view, view in three planes, 3-D view	
43	Programming graphics	3-D line graphics	
44	Program-run graphics	(plan view, view in three planes, 3-D view)	

HEIDENHAIN

No.	Description	Spec.	TNC 640		
45	Datum tables	Saving of workpiece-specific datums	●		
46	Preset table	Saving of reference points	●		
47	Freely definable table	after interruption of program run	●		
48	Returning to the contour	With mid-program startup	●		
49		After program interruption (with the GOTO key)	●		
50	Autostart		●		
51	Actual position capture		●		
52	Enhanced file management		●		
53	Context-sensitive help for error messages		●		
54	TNCguide	Browser-based, context-sensitive helpsystem	●		
55	Calculator		●		
56	Entry of text and special characters		●		
57	Comment blocks in NC program		●		
58	"Save As" function		●		
59	Structure blocks in NC program		●		
60	Entry of feed rates	FU (feed per revolution)	●		
61		FZ (tooth feed per revolution)	●		
62		FT (time in seconds for path)	●		
63		FMAXT (only for rapid traverse pot: time in seconds for path)	●		
64	Dynamic collision monitoring (DCM)		○		
65	Fixture monitoring		○		
66	Processing DXF data		○		
67	Global program settings (GS)		○		
68	Adaptive feed control (AFC)		○		
69	KinematicsOpt	Automatic measurement and optimization of machine kinematics	●		
70	KinematicsComp	Three-dimensional compensation	○		
71	3D-ToolComp	Dynamic 3-D tool radius compensation	○		
72	Fixed cycles	Working plane	Cycle 19	●	
73		Cylinder surface	Cycle 27	●	
74		Cylinder surface slot milling	Cycle 28	●	
75		Cylinder surface ridge milling	Cycle 29	●	
76	Cycles for automatic workpiece inspection	Calibrate TS		●	
77		Calibrate TS length		●	
78		Measure axis shift		●	
79		Save kinematics		○	
80		Measure kinematics		○	
81		Preset compensation		○	
82	Options	Software option 1		●	
83		- Rotary table machining	Programming of cylindrical contours as if in two axes		●
84			Feed rate in mm/min		
85		- Coordinate transformation	Tilting the working plane, PLANE function		
86		- Interpolation	Circular in 3 axes with tilted working plane		
87		Software option 2		●	
88		- 3-D machining	3-D tool compensation through surface normal vectors		
89			Tool center point management (TCPM)		
90			Keeping the tool normal to the contour		
91			Tool radius compensation normal to the tool direction		
92		- Interpolation	Line in 5 axes (subject to export permit)		
93	Spline: execution of splines (3rd degree polynomial)				

Responding to Customers Anytime, Anywhere



Global Sales and Service Support Network

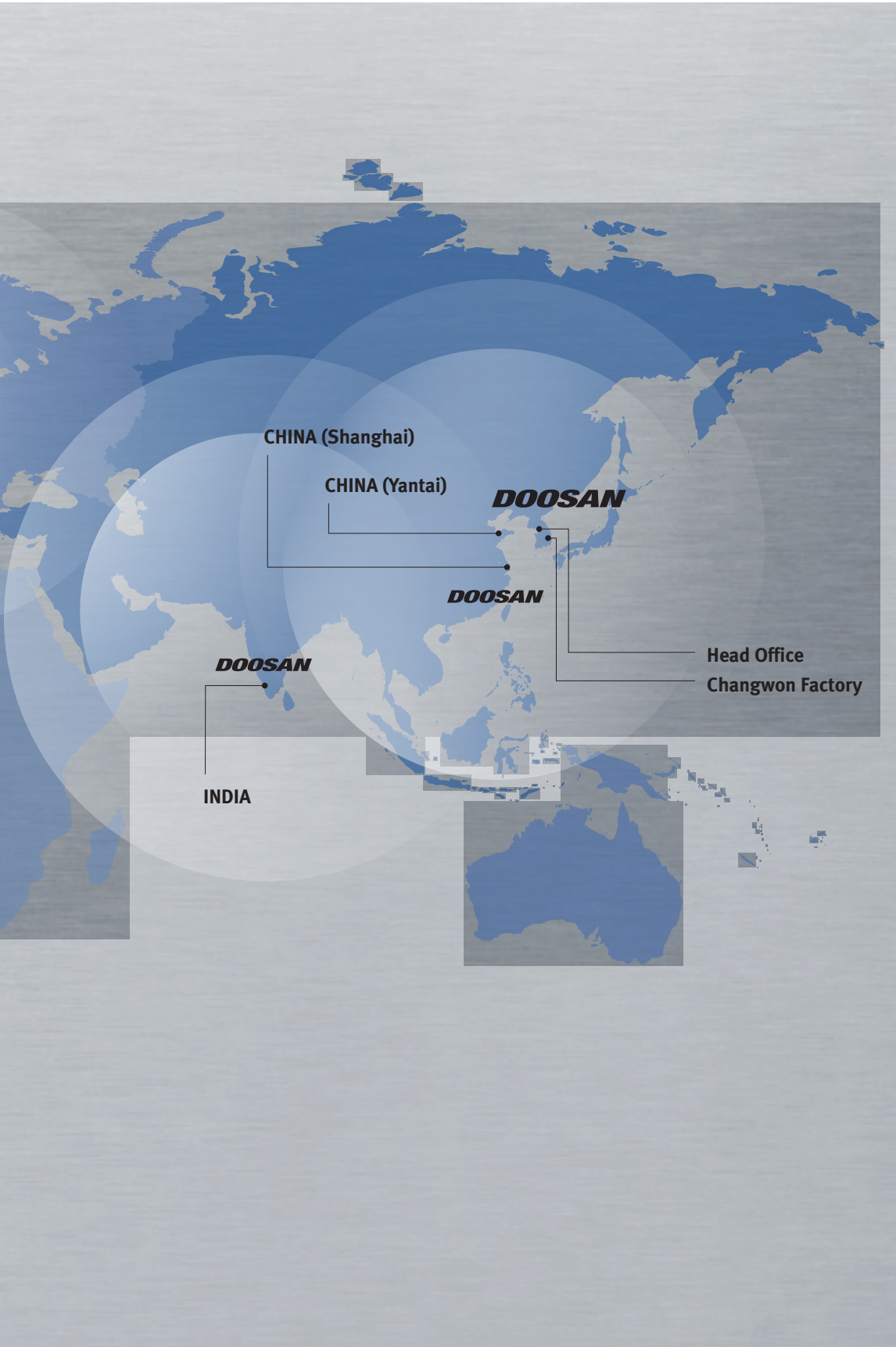
Corporations	Dealer Networks	Technical Centers	Service Post	Factories
4	164	51	198	3

Technical Center: Sales Support, Service Support, Parts Support

Doosan Machine Tools' Global Network, Responding to Customer's Needs nearby, Anytime, Anywhere

Doosan machine tools provides a system-based professional support service before and after the machine tool sale by responding quickly and efficiently to customers' demands.

By supplying spare parts, product training, field service and technical support, we can provide top class support to our customers around the world.



Customer Support Service

We help customers to achieve success by providing a variety of professional services from pre-sales consultancy to post-sales support.

Supplying Parts



- Supplying a wide range of original Doosan spare parts
- Parts repair service

Field Services



- On site service
- Machine installation and testing
- Scheduled preventive maintenance
- Machine repair

Technical Support



- Supports machining methods and technology
- Responds to technical queries
- Provides technical consultancy

Training



- Programming / machine setup and operation
- Electrical and mechanical maintenance
- Applications engineering

Major Specifications

VC 630/5AX



Description	Unit	VC 630/5AX	VC 630/5AX with APC
Max. spindle speed	r/min	12000 {20000 / 30000}*	
Spindle motor power	kW (Hp)	FANUC : 22 / 18.5 {91}* (29.5 / 24.8 {122.0})	
Tool shank	Taper	ISO#40 7/24	
Travels (X, Y, Z)	mm (inch)	650 / 765 / 520 (25.6 / 30.1 / 20.5)	
Number of tools	ea	40	
Table size	mm (inch)	Ø630 (Ø23.6)	500 x 500 (19.7 x 19.7)
Travels (A, C)	deg	A-axis : 150 , C-axis : 360	

*{ } Option

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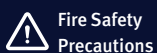
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**Fire Safety
Precautions**

There is a high risk of fire when using non-water-soluble cutting fluids, processing flammable materials, neglecting use coolants and modifying the machine without the consent of the manufacturer. Please check the SAFETY GUIDANCE carefully before using the machine.

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