

5-AXIS VERTICAL MACHINING CENTER

DNM

200/5AX • **350/**5AX





DNM 5AX SERIES **200**/5AX • **350**/5AX

DNM 5AX series machines are high-performance 5-axis vertical machining centers designed for machining complex parts in single set ups. The machines are easy to use, even for manufacturers with no prior knowledge or experience of 5-axis machining.







OPTIMIZED COLUMN AND BED DESIGN

 High feedrates and ultra high-precision are realized by the machines' optimized column and bed design using 3D simulation modelling.

DIRECTLY COUPLED SPINDLE

 Directly-coupled spindles help minimize noise and vibration.
 Both high-speed and heavyduty machining can be performed with a single set up.

HIGH-PRECISION TRAVEL SYSTEM

 Roller-type LM guideways and high-rigidity couplings have been adopted to ensure excellent stability and the accuracy of the X-, Y-, and Z-axis linear travel system.

BASIC STRUCTURE

High feedrates and precision machining are achieved by the optimized column and bed design.

High-precision machine structure

High-speed cutting and the highest accuracies are achieved as a result of the machine's rigid and precision built structure.

Travel distance (X / Y / Z axis)

DNM 200/5AX

400 (+200, -200) /

435 (+180, -255) **/ 500** mm

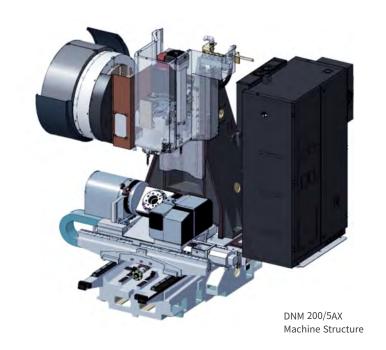
15.75 (+7.87, -7.87) /

17.13 (+7.09, -10.04) / 19.69 inch

DNM 350/5AX

400 / 655 / 500 mm

15.75 / 25.78 / 19.69 inch



Axis drive system

The high rigidity and precision of the X-,Y-and Z-axis drive systems are achieved by using Roller-type linear guideways and highly rigid couplings. Speed and accuracy are further enhanced with the nut cooling system which minimizes thermal displacement of the machine's ball screws.

Rapid traverse (X / Y / Z axis)

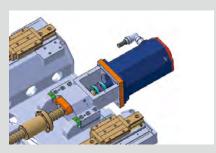
DNM 200/5AX

36 / 36 / 30 m/min 1417.3 / 1417.3 / 1181.1 ipm

DNM 350/5AX

36 / 36 / 30 m/min 1417.3 / 1417.3 / 1181.1 ipm

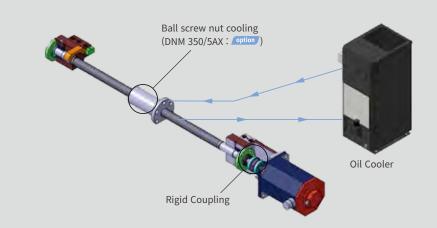
Highly-rigid Roller-type linear guideways



Rigidity and accuracy of the feed system are improved with Roller-type linear guideways and rigid couplings.



Roller-type linear guideways



SPINDLE

Directly-coupled spindle head minimizes noise and vibration.

Directly-coupled high precision spindles

Directly-coupled, high precision spindles ensure that high speed and heavy duty cutting can be achieved in single set ups. Machining performance is optimised by minimising vibration and noise, while power loss at high speed is also minimised.

Max. spindle speed

DNM 200/5AX

12000 r/min

DNM 350/5AX

12000 r/min, **20000** r/min •••••

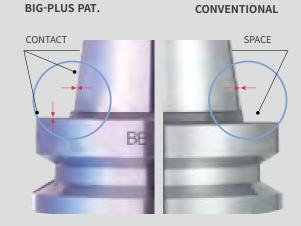
Spindle motor power

18.5 / 11 kW 24.8 / 14.8 Hp

Dual contact spindle

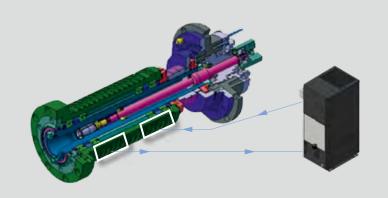
Machining performance, cutting tool life and workpiece surface finishes are all improved due to reduced vibrations - a major advantage of the dual contact spindle configuration.





Spindle cooling

A high-accuracy oil cooler helps mitigate heat generated by the bearings and motor and minimizes thermal displacement of the spindle.



ROTARY TABLE | TOOL CHANGER

Rotary table

Wide machining area enables a different sized workpieces to be set up quickly and efficiently

- Features high-rigidity, high-precision axial and radial roller bearings
- Backlash reduced owing to higher structural stability
- A- and C-axes are hydraulically clamped for maximum rigidity

Max. workpiece swing diameter x height

DNM 200/5AX

Ø300 x 200 mm 11.8 x 7.9 inch

DNM 350/5AX

Ø400 x **335** mm 15.7 x 13.2 inch

Table loading capacity

DNM 200/5AX

60 kg (A-axis 0°) 132.3 lb

DNM 350/5AX

250 kg 551.1 lb

* Actual appearance of the DNM 200/5AX rotary table may differ from the picture to the right. Rotary encoder option * Actual appearance of the DNM 350/5AX rotary table may differ

from the picture below.

A-axis

Item		A-axis	C-axis
DNM 200/5AX	Travels (deg)	150 (+30, -120)	360
	Rapid traverse (r/min)	20	30
DNM 350/5AX	Travels (deg)	150 (+30, -120)	360
	Rapid traverse (r/min)	20	30

TOOL CHANGER

As well as rapid tool change characteristics (for high productivity), a wide range of different tool magazine options is also available.

Automatic Tool Changer (ATC)

Enhanced productivity is achieved via the CAM-type tool changer that enables faster tool changing to occur.

Tool storage capacity

DNM 200/5AX

30 ea / 40 ea option

DNM 350/5AX

30 ea / **40**, **60** ea option

Tool-to-Tool time





MACHINING PERFORMANCE

Cutting performance

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

DNM 200/5AX

Face mill Carbon steel (SM45C)			
ø80mm Face Mill (6Z)			
Machining removal rate cm³/min (inch³/min)	Spindle speed r/min	Feed rate (mm/min)	64mm
269 (16.42)	1500	2100 (82.7)	(2.5 inch)
Drill Carbon steel (SM45C)			12000
ø32mm Drill (2Z)	32mm (1.3 inch)		
Spindle speed r/min		Feed rate mm/min (ipm)	
1200		120 (4.7)	
Tap Carbon steel (SM45C)			
ø73mm Drill (2Z)			
Tool mm		Spindle speed r/min	S
M30 x 3.5		212	

DNM 350/5AX

Face mill Carbon steel (SM45C) ø80mm Face Mill (6Z) Machining removal rate Spindle speed Feed rate cm³/min (inch³/min) r/min (mm/min) 64mm (2.5 inch) 1900 (74.8) 365 (22.3) 1500 Drill Carbon steel (SM45C) 40mm ø32mm Drill (2Z) (1.6 inch) Spindle speed r/min mm/min (ipm) 1200 180 (7.09) Tap Carbon steel (SM45C) ø73mm Drill (2Z) Spindle speed Tool r/min mm M30 x 3.5 212

^{*} 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.

STANDARD | OPTIONAL SPECIFICATIONS

Various optional features are available to meet customers' specific machining requirements and applications.

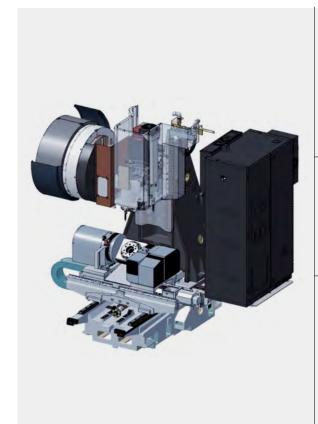
Description	Features	DNM 200/5AX	DNM 350/5AX
Air blower		0	0
Air gun		0	0
	30 Tools	•	•
Automatic tool changer	40 Tools	0	0
	60 Tools	X	0
	RENISHAW / TS27R- FANUC 31i-5	X	0
Automatic tool measurement	RENISHAW / TS27R - DN Solutions-FANUC i Series	0	0
	NONE	•	•
Automatic workpiece measurement	OMP60_RENISHAW	0	0
Chip conveyor	Hinge / Scraper / Drum filter type	0	0
Coolant gun		0	0
Coolant Tank		•	•
	Tool load monitor	•	•
asy Operation Package	Alram / M-code / G-code / ATC recovery help	•	•
	Table moving for setup / Easy work coordinate setting	•	•
Electric cabinet air conditioner		0	0
lectric cabinet light		0	0
Electric cabinet line filter		0	0
	X Axis	0	0
inear scale	Y Axis	0	0
	Z Axis	0	0
	1 MPG_PORTABLE TYPE	•	•
MPG	1 MPG_PORTABLE_W/ENABLE TYPE	0	0
	3 MPG_PORTABLE	0	0
	DN Solutions FANUC i	•	•
NC System	FANUC 31iB5	X	0
	HEIDENHAIN	X	0
	10.4 inch_FANUC (Color)	•	•
NC system lcd size	15.1 inch_HEIDENHAIN (Color)	×	0
Dil Skimmer	Belt Type	0	0
Power transformer		0	0
Shower coolant		0	0
	18.5 / 11 kW (24.8 / 14.8 Hp)	•	•
Spindle motor power	22 / 18.5 kW (29.5 / 24.8 Hp)	X	0
	22 / 11 kW (29.5 / 14.8 Hp)	X	0
	12000 r/min	•	•
Spindle speed	20000 r/min	X	0
Гest bar		0	0
	NONE	•	•
	1.5 KW_2.0 MPA	0	0
Through spindle coolant	4.0 KW_2.0 MPA	0	0
.	5.5 KW_7.0 MPA_DUAL BAG FILTER	X	0
	7.5KW_7.0 MPA_CYCLONE FILTER	0	X
Nork & tool counter	WORK / TOOL	0	0
	12K DIRECT_ANALOGE SENSOR TYPE	0	0
	12K DIRECT HSK63A	0	0
	Spindle 15K DIRECT_BT-DIN, DIN-DIN	0	0
	20K_BUILT IN SPINDLE_HSK	0	0
	60T ATC	0	0
Customized Special Option	Top flushing coolant system	0	0
	Drum chip conveyor	0	0
	Axis cooling system: Nut cooling	0	0
	Auto door (w/Safty edge)	0	0
	. att door (w/ outry cage/		

^{*} Please contact DN Solutions for detailed specification information.

● Standard ○ Optional X Not applicable

^{*}When using a semi-synthetic type or synthetic type, contact our sales representative or service center in advance.

PERIPHERAL EQUIPMENT







Hinge type





Scraper type type

Large capacity coolant tank built-in with chip pan and box filter



Shower coolant option



Coolant system



Auto-door type top cover

The top cover helps enhancing convenience when loading /unloading heavy workpiece on the processing table.



Internal screw conveyor



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

Software



FANUC NC: DCP-i (Developed by DN Solutions)

Touch probe



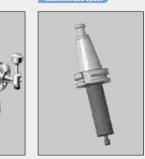
Heidenhain NC: Kinematic opt

Receiver

Datum ball



Automatic Tool Measurement



Master tool

FANUC 31i PLUS

Fanuc 31i Plus maximizes customer productivity and convenience.

15" Touch screen + New OP

DN Solutions Fanuc 31iB/B5 Plus' operation panel enhances operating convenience by incorporating common-design buttons and layout. It features a Qwerty keyboard for fast and easy data input and operation.

Fanuc 31i Plus

- 15-inch color display
- Intuitive and user-friendly design

USB and PCMCIA card QWERTY keyboard

- EZ-Guide i standard
- Ergonimic operator panel
- 4MB Memory
- Hot keys
- Enhance AICC BLOCK
- Touch pen provided as standard



iHMI touchscreen

iHMI provides an intuitive interface that uses a touchscreen for quick and easy operation.

Range of applications

Providing various applications related to planning, machining, improvement and utility, for customer convenience.



NUMERIC CONTROL SPECIFICATIONS

FANUC

Item		o .t	F31iB5 Plus	0i PLUS
		Specifications	DNM200/5AX, DNM350/5AX	
	Controlled axes		5 (X,Y,Z,C,A)	5 (X,Y,Z,A,C)
Controlled axis	Simultaneously controlled axes		5 axes	4 axes
	Additional controlled Axis	Add 1 Axis (5th Axis)	•	•
	Fast data server		0	0
	Memory card input/output		•	•
Data input/output	USB memory input/output		•	•
	Large capacity memory(2GB)*2	Available Option only with 15" Touch LCD (iHMI Only) *2)	0	0
	Embedded Ethernet		•	•
Interface function	Fast Ethernet		0	0
	Enhanced Embedded Ethernet function		•	•
Operation	DNC operation	Included in RS232C interface.	•	•
Operation	DNC operation with memory card		•	•
	Workpiece coordinate system	G52 - G59	•	•
Dragram innut	Addition of workpiece coordinate system	G54.1 P1 X 48 (48 pairs)	•	•
Program input	Tool number command		T4 digits	T4 digits
	Tilted working plane indexing command	G68.2 TWP	•	•
	Al contour control I	G5.1 Q_, 40 Blocks	X	Х
	AI contour control II	G5.1 Q_, 200 Blocks	Х	•
Feed function	Al contour control II	G5.1 Q_, 600 Blocks	Х	Х
	Al contour control II	G5.1 Q_, 1000 Blocks *1)	•	Х
	High smooth TCP		•	Х
	EZ Guidei (Conversational Programming Solution)		•	•
Operation guidance function	iHMI with Machining Cycle	Only with 15" Touch LCD standard *2)	X	Х
lunction	EZ Operation package		•	•
Setting and display	CNC screen dual display function		•	•
Network	FANUC MTConnect		0	•
network	FANUC OPC UA		0	•
		10.4" color LCD	Х	Х
	Display unit	15" color LCD	Х	Х
		15" color LCD with Touch Panel	•	•
		640M(256KB)_500 programs	X	Х
		1280M(512KB)_1000 programs	0	Х
		2560M(1MB)_1000 programs	0	Х
Others		5120M(2MB)_1000 programs	0	•
	Part program storage size & Number of	10240M(4MB)_1000 programs	•	Х
	registerable programs	20480M(8MB)_1000 programs	0	Х
		2560M(1MB)_2000 programs	0	X
		5120M(2MB)_4000 programs	0	X
		10240M(4MB)_4000 programs	0	Х
		20480M(8MB)_4000 programs	0	Х

EZ WORK

The software developed by DN Solutions's own technology provides numerous functions designed for convenient operation.

EZ work

The EZ work package delivers speed and efficiency. This menu-driven innovation not only helps customers reduce setup times, but also simplifies common tasks and procedures, reducing the potential for errors. EZ work reduces operating time, protects machinery, enhances quality and speeds up maintenance interventions.



Thermal Compensation

A function to maintain high-precision machining quality by analyzing and correcting the amount of thermal displacement of a structure through a temperature sensor



Operation Rate

Machine operation history management function by date based on load



M/G-Code List

Functional description of M code and G code



Adaptive Feed Control

Function to control feedrate so that the cutting can be carried out at a constant load



Tool Management

Function to manage tool information [Tool information / Tool No. / Tool condition (normal, large diameter, worn / damaged, used for the rst time, manual) / Tool name]



IKC (DCP-I)

The function to compensate the position of the workpiece and the tool tip to be constant regardless of the rotation of the rotating shaft error.



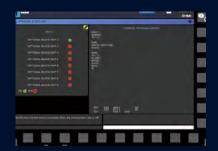
Spindle Warm Up

A function that assists spindle warm-up for spindle life when the spindle has not been used for a certain period of time



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)



Addition of Optional Block Skip

In addition to the OPTIONAL BLOCK SKIP of the operation panel, the function to skip a specific block selected in the machining program

CONVENIENT OPERATION

HEIDENHAIN TNC 640

Superior hardware specifications

The TNC 640 features optimized motion control, short block processing times and special control strategies. Together with its uniform digital design and its integrated digital drive control (including inverters), it enables you to achieve high machining speeds and the best possible contour accuracy.

- 15.6" display
- 21GB Storage memory
- 1024 look ahead blocks
- High user convenience with folder structure data management



Conversational convenient function



Data are controlled in the folder structure; convenient communication via USB devices



KinematicOpt & KinematicComp option (Touch probe cycle for automatic measurement)



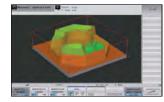
Collision protection system



Adaptive feed control option



Various built-in pattern cycles for a wider scope of application (Software standard)



Graphic simulation

NUMERIC CONTROL SPECIFICATIONS



	Item	Specifications	TNC640 DNM
Controlled axis	Controlled axis		5 (X,Y,Z,C,A)
	Simultaneously controlled axis		5 axis
Data input/output	USB memory input/output		•
Interface function	Embedded ethernet		•
Feed function	Look-ahead	5000 blocks	•
Axis compensation	KinematicsOpt	Automatic measurement and optimization of machine kinematics	•
Collision monitoring	Dynamic collision monitoring (DCM)		0
Network	MTConnect		0
Others		15.1 inch TFT color flat panel	•
	Display unit	15.1 inch TFT color with Touch Panel	0
		19 inch TFT color flat panel	0
		19 inch TFT color with Touch Panel	0
	Part program storage size & number of registerable	21GB	•
	programs	1.8GB	Х

POWER | TORQUE

DNM 200/5AX DNM 350/5AX

Max. spindle speed:

12000 r/min

Spindle motor power:

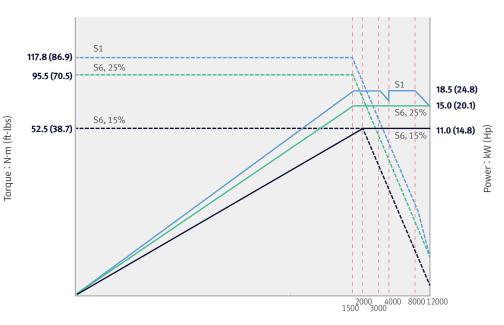
18.5 / 11 kW

24.8 / 14.8 Hp

Spindle motor torque:

118.0 N·m

87.1 ft-lbs



Spindle speed: r/min

DNM 350/5AX

Max. spindle speed:

20000 r/min option

(Only DNM 350/5AX)

Spindle motor power:

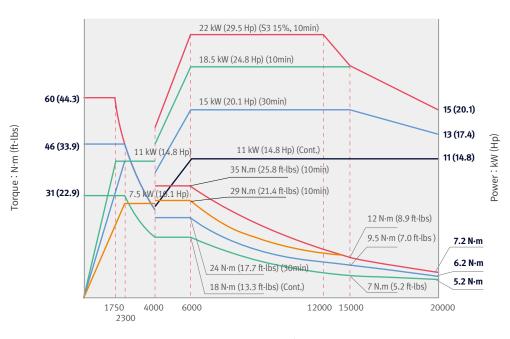
22 / 11 kW

29.5 / 14.8 Hp

Spindle motor torque:

60 N·m

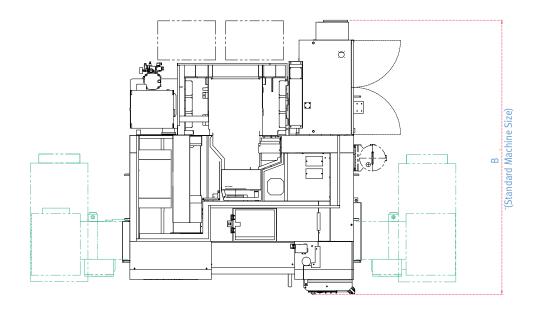
44.3 ft-lbs



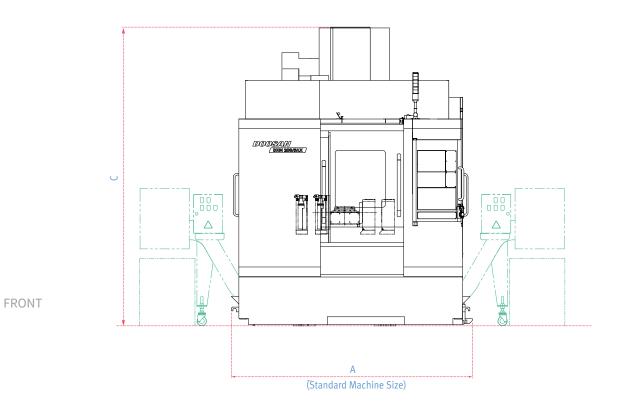
Spindle speed: r/min

DIMENSIONS

Units : mm (inch)



TOP



Model	A [with Chip Conveyor]	В	С	
DNM 200/5AX	2490 [3447] (98.0 [135.7])	2835 (111.6)	3091 (121.7)	
DNM 350/5AX	3150 [4085] (124.0 [160.8])	3209 (126.3)	3091 (121.7)	

^{*} Some peripheral equipment can be placed in other places

TABLE DIMENSIONS | MACHINING AREA

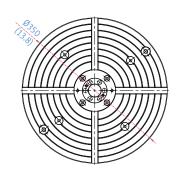
Table dimension

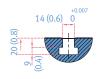
DNM 200/5AX

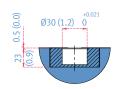
31.5 (1.2) 12.1 (0.5) 6-M10 TAP DP 20 (0.8)15 (0.6) 12 (0.5) 20 (0.8)

DNM 350/5AX

Units: mm (inch)







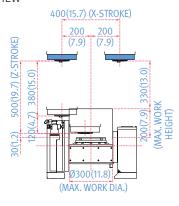
Machining Area

DNM 200/5AX

A AXIS 0⊠ FRONT VIEW

A AXIS 90⊠ RIGHT VIEW

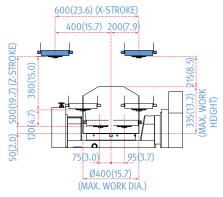
A-AXIS CENTER

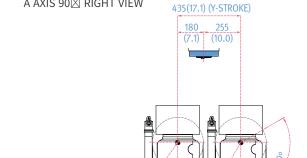


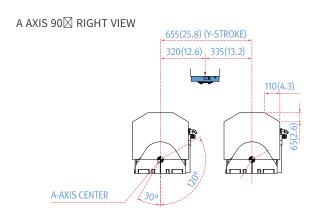
DNM 350/5AX

Units: mm (inch)

A AXIS 0⊠ FRONT VIEW







MACHINE SPECIFICATIONS

Description			Unit	DNM 200/5AX	DNM 350/5AX
Travel		Х	mm (inch)	400 (15.7)	400 (15.7)
		Υ	mm (inch)	435(+180, -255) (17.1 (+7.1, -10.0))	655 (25.8)
	Travel distance	Z	mm (inch)	500 (19.7)	
		A	deg	150 (+30 ~ -120)	
		С	deg	360	
	Distance from spindle	nose to table top	mm (inch)	30 ~ 530 (1.2 ~ 20.9)	50 ~ 550 (2.0 ~ 21.7)
Feedrate		Х	m/min (ipm)	36 (1417.3)	
		Υ	m/min (ipm)	36 (1417.3)	
	Rapid traverse rate	Z	m/min (ipm)	30 (1181.1)	
		A	r/min		20
		С	r/min		30
		X, Y, Z	m/min (ipm)	15000	(590.6)
	Cutting feedrate	A, C	deg/min	7:	200
Table	Table size	Table size		Ø200 (7.9)	Ø350 (13.8)
	Table loading capaci	ty	kg (lb)	40 (88.2) (Horizontal) / 60 (132.3) (Vertical)	250 (551.1)
	Table type	Table type		T-SLOT (12H8)	T-SLOT (14H8)
Spindle	Max. spindle speed	Max. spindle speed		12000 12000 (20000)	
Spind	Spindle taper	Spindle taper		ISO #40, 7/24 TAPER	
	Max. spindle torque		N·m (ft-lbs)	117 (86.3)	117 { 167 / 60 } (86.3 {123.2 / 44.3})
Automatic tool				MAS403 BT 40	
changer	Type of tool shank		-	{ CAT 40 }	
			-	{ DIN 69871-A40 }	
	Tool storage capacity		ea	30 { 40 }	30 { 40, 60 }
	Max. tool diameter (Continuous)		mm (inch)	30 Tools: 80 / 40 Tools: 76	
	Max. tool diameter (Near port empty)		mm (inch)	30 Tools: 125 / 40 Tools: 125	
	Max. tool length		mm (inch)	300 (11.8)	Ø80:270/Ø125:210 (3.15:10.6/4.9:8.3)
	Max. tool weight		kg (lb)	8 (17.6)	
	Max. tool moment		N·m (ft-lbs)	5.88 (4.3)	
	Method of tool selec	tion	-	Memory Random	
	Tool change time (tool-to-tool)		S	1.3	
	Tool change time (c	hip-to-chip)	s	3.7	
Motor	Spindle motor powe	r	kW (Hp)	18.5 / 11 (24.8 / 14.8)	18.5 / 11 (22 / 18.5 or 22 / 11) (24.8 / 14.8 (29.5 / 24.8 or 29.5 / 14.8))
	Coolant pump moto	Coolant pump motor power		0.25 (0.3)	0.4 (0.5)
Power source	Electric power supply		kVA	31,3	40.6 (45.7)
	Compressed air supp	oly	Mpa (psi)	0.54 (78.3)	
Tank capacity	Coolant pump capac	Coolant pump capacity		5.5 (1.5)	13 (3.4)
Lubrication tank capacity		acity	L (galon)	3.1 (0.8)	
Machine size	Height		mm (inch)	3091 (121.7)	3190 (125.6)
	Length		mm (inch)	2835 (111.6)	3209 (126.3)
	Width		mm (inch)	2490 (98.0)	3150 (124.0)
	Weight		kg (lb)	5500 (4059.0)	8500 (6273.0)
Control	NC System		-	DN Solutions Fanuc i Plus, Fanuc 31i Plus	DN Solutions Fanuc i Plus / Fanuc 31i Plus / HEIDENHAIN

WHY 5-AXIS MACHINING?

Single setup efficiency

5-axis machining allows you to approach the workpiece from all angles, with complete access to five sides of the part in a single setup. This reduces the overall number of part setups compared to traditional machining, which minimizes machine downtime and maximizes chip making time.



Improved part accuracy

When making parts with multi-sided features using traditional 3-axis machining, multiple part setups are required. This means new inaccuracies can arise each time the workpiece is repositioned. 5-axis machining eliminates stacked tolerances and improves overall part dimensional accuracy.

Extended machine shop capability

DN Solutions 5-axis machines open up new doors for your machine shop. The increased efficiency will make you instantly more competitive, and full 5-axis machining capabilities give you the opportunity to quote on jobs that previously weren't possible. So, what are you going to make today?



"Compared with similar machines from Japan or Europe, DN Solutions has the same level of precision and quality at a better value for money." "Our DN Solutions 5-axis is making complex, high precision parts for aerospace and defense. Cycle times have been reduced dramatically."

WHY DN SOLUTIONS

The DN Solutions promise, MACHINE GREATNESS, has two important meanings. The first is simple: DN Solutions makes great machines. The second is a challenge to our end-users. With a product line that is this comprehensive, accurate and reliable, we equip our customers to machine greatness. The big question: **Why should you choose DN Solutions over other options?**

Here's why…



WHAT YOU MAKE AND HOW YOU MAKE IT MATTERS—SO MAKE IT GREAT WITH DN SOLUTIONS.

UNBEATABLE MACHINES

You won't find a more comprehensive range or a better combination of value, performance and reliability anywhere else.

ROBUST PRODUCT LINE

We offer an impressive range of machine models and hundreds of configurations. Whatever your machining needs and requirements, there's a DN Solutions for you.

READILY AVAILABLE - ANYWHERE IN THE WORLD

Machining centres (including 5-axis machines), lathes, multi-tasking turning centres and mill-turn machines, and horizontal borers with best-in-class specifications are all available…ready to install.

EXPERT SERVICE

Our dedicated, experienced and knowledgeable team is totally committed to improving your productivity, growth and success.

RESPONDING TO CUSTOMERS ANYTIME, ANYWHERE

DN Solutions Global Network

DN Solutions provides systems-based professional support services, before and after the machine tool sale, by responding quickly and efficiently to customers. By supplying spare parts, product training, field service and technical support, we provide the expert care, attention and assistance our customers expect from a market leader.

Global sales and service support network		51	Technical centers Technical center, Sales support, Service support, Parts support
4	Corporations	200	Service posts
155	Dealer networks	3	Factories



CUSTOMER SUPPORT AND SERVICES

We're there for you whenever you need us.

We help our customers operate at maximum efficiency by providing them with a range of tried, tested and trusted services - from pre-sales consultancy to post-sales support.



Field services

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



Parts supply

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



Training

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



Technical support

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









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^{*} Specifications and information contained within this catalogue may be changed without prior notice.



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