DN SOLUTIONS

HIGH PRECISION DIE & MOLD VERTICAL MACHINING CENTER

DVM 500·650Ⅱ

DVM 500Ⅱ
DVM 650Ⅱ

DVM 500·650II

DVM II series seeks to make the spindle harder and last longer than the preceding DVM II series by opting for a static pressure spindle. The door width has been expanded to 2-door to make product installation more convenient. Furthermore, the quality of machining has been improved by standardizing the nut cooling ball screws of each spindle and the heat-shielding insulation in the columns in order to minimize heat displacement.

CONTENTS

High Rigidity, High Precision Built-in Spindle

For the rigidity and extended life of the spindle, hydrostatic spindle has been adopted.

Increased User Convenience

With 2 Door System and expanded door width, workpiece mounting becomes more convenient.

Highly Rigid Machine Structure with Excellent Cutting Performance

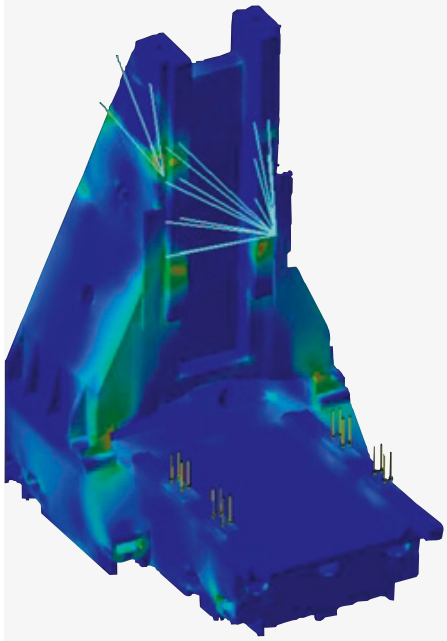
Ball screw nut cooling feature has been applied to all axes (X/Y/Z) to decrease 47% of heat displacement and thermal shielding insulation helps minimize heat deflection.

BASIC STRUCTURE

The high rigidity structure of DVM II serieshas raised the static rigidity up by 30% more than previous model.

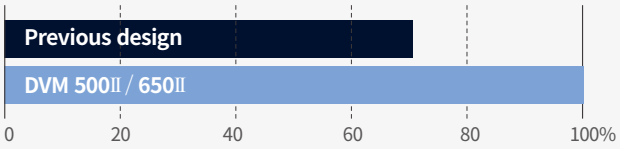
High rigidity design

To minimize the bearing and motor heat a high-precision oil cooler controls the temperature to 0.1 degree.



Static rigidity

The high rigidity structure of DVM II has raised the static rigidity up by 30% more than previous model with no weak point through FEM* analysis.

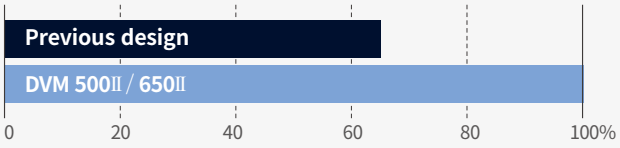


30 % ↑

Dynamic rigidity

Improving the frequency response and the damping ability of vibration makes it possible to increase the eigenfrequency 35% up on the previous model.

** FEM : Finite Element Method*



35 % ↑

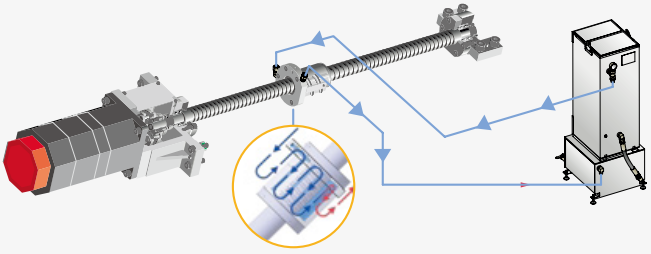
High strength feed drive

Ball screw nut cooling

Feed axis thermal displacement largely reduced
Feed drive strength maintained in stable condition.

Improvement of machining quality

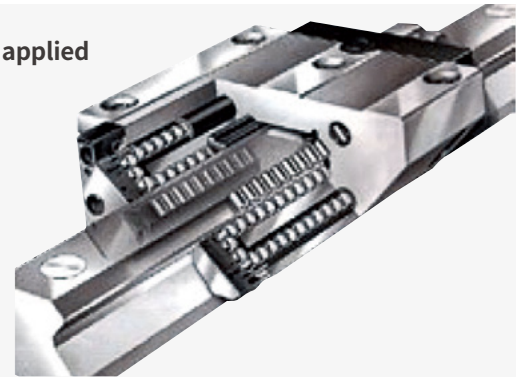
Using nut cooling ball screws on every spindle (X, Y, and Z) reduces heat displacement by up to 47% compared with previous models



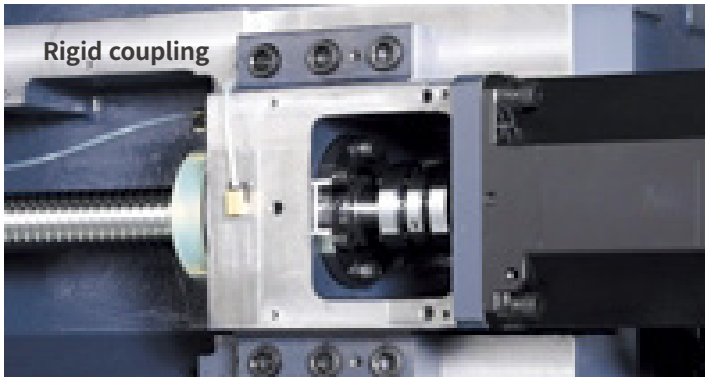
Thermal displacement reduction

47 % ↓

Roller guide applied



Rigid coupling



SPINDLE

High speed and high precision built-in spindle ensures maintaining stable precision level while spindle head cooling system minimizes the heat deflection.

Spindle vabration is minimized by shortening its length and optimization bearing pre-tension

Spindle length

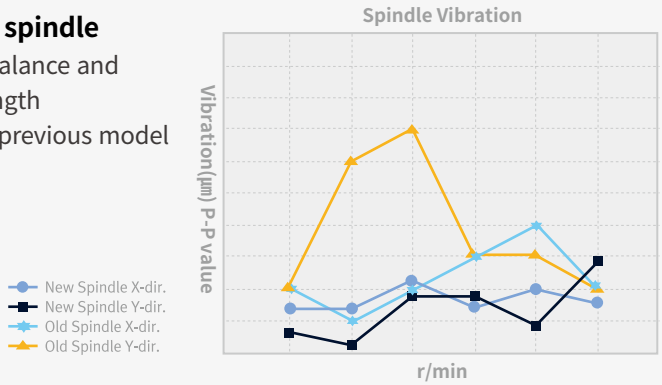
Improving productivity (high speed at rough machining, high precision at finish machining)

Spindle length

80 % ↓

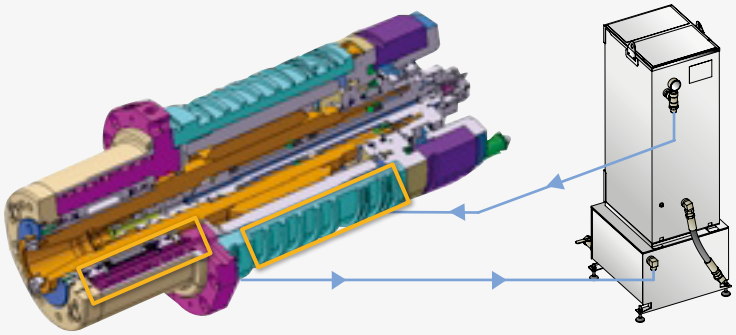
Low vibration spindle

High precision balance and short spindle length by 40% han the previous model



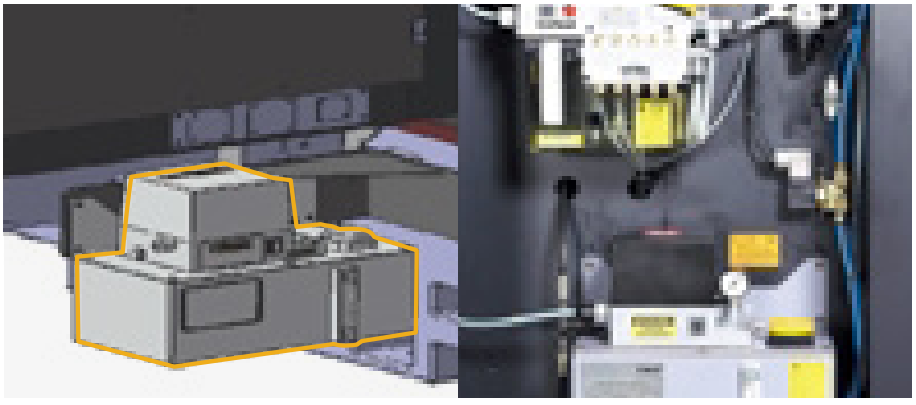
0.1 degree spindle head cooling system

To minimize the bearing and motor heat a high-precision oil cooler controls the temperature to 0.1 degree.



Oil air lubrication

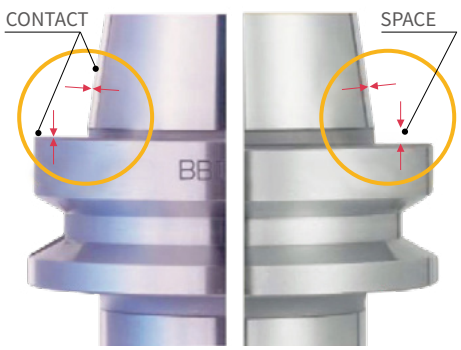
A optimal amount lubrication oil is applied by high pressure air to the bearings.



2-Face locking tool system (BBT40)

BT40 tool & 2-Face locking tool system (BIG PLUS) applied as standard.

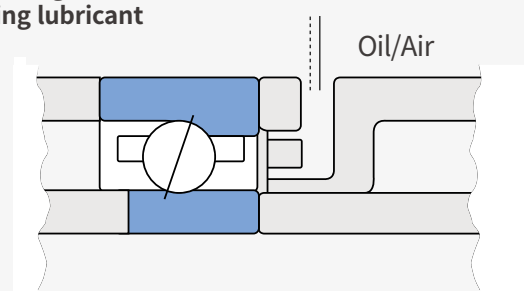
BIG-PLUS PAT. | CONVENTIONAL



Increases capacity of lubricating unit to reduce frequency ofreplacing lubricant

DVM 500Ⅱ / 650Ⅱ

4.3 L ↑



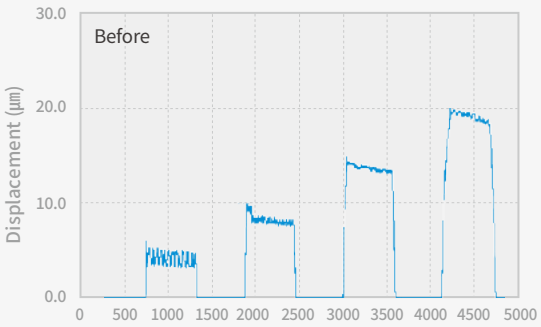
THERMAL DISPLACEMENT COMPENSATION

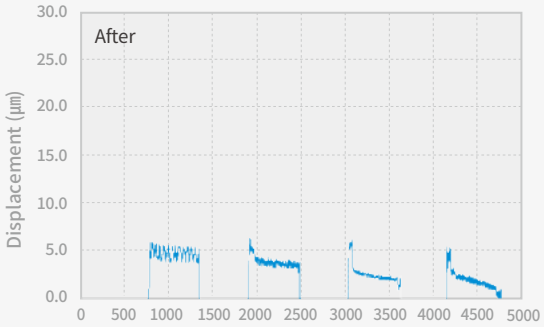
Thermal displacement of the spindle is minimized, so processing accuracy can be maintained for even long periods of use. Automatic tool measurement device and High-performance oil-cooler as standard.

Spindle static displacement compensation

To compensation displacement of tool by thermal deformation of spindle at high RPM.

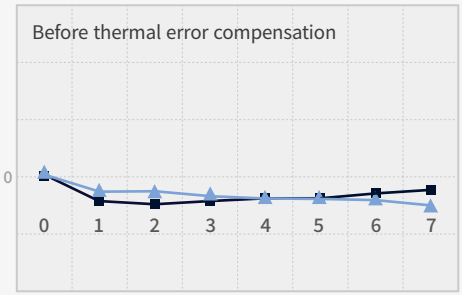
** DHC : DN Solutions Heat Control*

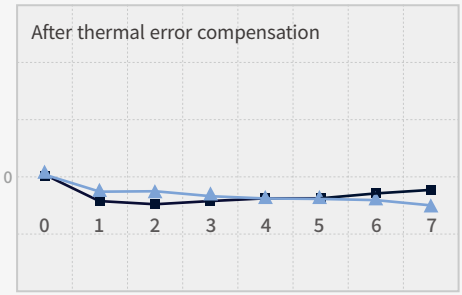


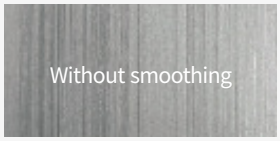


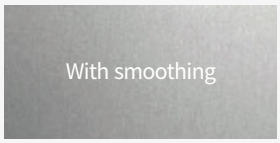
Thermal displacement compensation

Thermal error of the spindle is calculated with the spindle temperature feedback and automatically compensated to maintain the highest level of work accuracy.









Thermal displacement compensation is achieved with 5 algorithm including smoothing function.

HIGH SPEED | PRECISION CONTOUR CONTROL

Smoothes the movement of the machine, improving surface roughness and profile accuracy of corners and edges.

Cutting condition selection function

Cutting condition	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
Quality	Normal									Excellent
Tool life	Long	←								Normal
Application	High-speed roughing									High-precision finishing

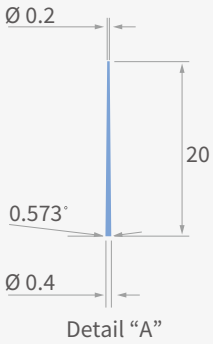
- Use the R code in the program to change the cutting condition by up to 10 steps.
  - Improved productivity (high-speed roughing, high-precision finishing)
- Various servo-related NC parameters such as acceleration and deceleration time constants and maximum cutting feed can be set automatically.

HIGH PRECISION | HIGH PRODUCTIVITY

DVM II series realizes high quality mold technology with high precision spindle run-out and highly rigid axis travel system.

High precision spindle run-out and highly rigid axis traverse system

ø 0.2 mm micro feed needle machining : Needle machining is achieved by minimum spindle run-out and low vibration micro feed using a highly rigid axis traverse system.

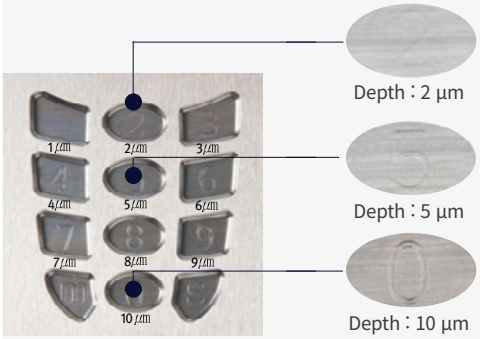


High precision micro feed / surface roughness

Work sample

Variation of offset value of workpiece height is less than 0.5µm

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



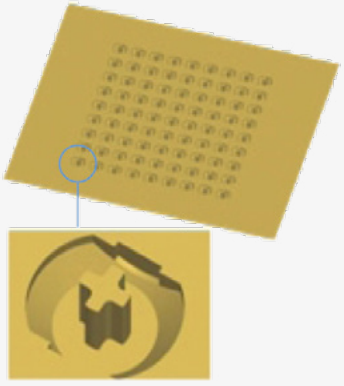
The comparison of cycle time (actual result)

A competitor’s machine

44 hr **44** min

DVM 500II

34 hr **30** min



VASE (Verification sample) cycle time

A competitor’s machine

22 min **44** s

DVM 500II

21 min **32** s

Interpolation of XYZ-axis

STANDARD | OPTIONAL SPECIFICATIONS

Diverse optional features are available for customer-specific work applications.

Division	Item		Specifications	DVM 500II	DVM 650II
Spindle	20000 r/min		22/11 KW, 60.0 N·m	●	●
Magazine	Tool storage capacity		30ea	●	●
			40ea	○	○
Tool shank type	MAS403 BT 40			●	●
	CAT 40			○	○
	DIN 69871-A40			○	○
Coolant	Flood Max pressure 60Hz/50Hz (Pump motor power)		0.16/0.12 MPa (0.4 kW)	●	●
			1.0/0.75 MPa (1.1 kW)	○	○
	TSC Max pressure 60Hz/50Hz (Pump motor power)		None	●	●
			2.0/1.9 MPa (1.5 kW)	○	○
			2.0/1.3 MPa (4.0 kW)	○	○
			2.0 MPa (4.0 kW)	○	○
			3.0/3.0 MPa (2.9 kW)	○	○
			7.0 MPa (7.5 kW)	○	○
	Shower Coolant Max pressure 60Hz/50Hz (Pump motor power)		0.1/0.065 MPa (1.1 kW)	○	○
Chip disposal options	Chip pan			○	○
	Chip conveyor	Type	Hinged type	○	○
			Magnetic scraper type	○	○
		Outlet direction	Left side/ Right side	○	○
	Chip bucket	Capacity	220 / 300 / 380	○	○
		Type	Rotation / Forklift	○	○
	Air blower			●	●
	Air gun			○	○
	Coolant Gun			○	○
Precision machining option	Linear scale		X/Y/Z	○	○
Measuring & automation	Automatic tool measurement		TS27R_RENISHAW	●	●
	Automatic tool breackage detection			○	○
	Automatic workpiece measurement		OMP60_RENISHAW	○	○
Customized Special Option	DRUM CHIPCONVEYOR		HINGE TYPE	○	○
			SCRAPER TYPE	○	○
	GRAPHITE PAKAGE		BELLOWS COVER	○	○
			TABLE SUB COVER	○	○
			ATC FULL COVER	○	○
			BALLSCREW COVER	○	○
	LUBRICATION		GREASE TYPE	○	○
	OIL RECOVERY DEVICE		SPINDLE BEARING OIL RECOVERY DEVICE	○	○
	ANCHORING		SLIDE CLAMP & CHEMICAL ANCHOR BOLT	○	○
	Water soluble Coolant Chiller**			○	○
	TSA MAX PRESSURE 0.54 MPa			○	○
Accessories	LED Lamp			●	●
	3-color Signal Tower			●	●
	Leveling Block & Bolt			●	●
	Smart Thermal Control			●	●
	Installation Tool Kit			●	●
	Maintenance Tool Kit			○	○
	4th axis Preparation Cabling		For servo/1-pneumatic piping	○	○
	4th axis with CNC R. Table		320mm	○	○
	Mist Collector		1.5/2.2 kW	○	○

**Please contact your DN Solutions representative for detailed machine information.*
** When using a semi-synthetic type or synthetic type, contact our sales representative or service center in advance.*
*** Technical consultation is mandatory for the chilling of non-water soluble coolant*

● *Standard* ○ *Optional* *X N/A*

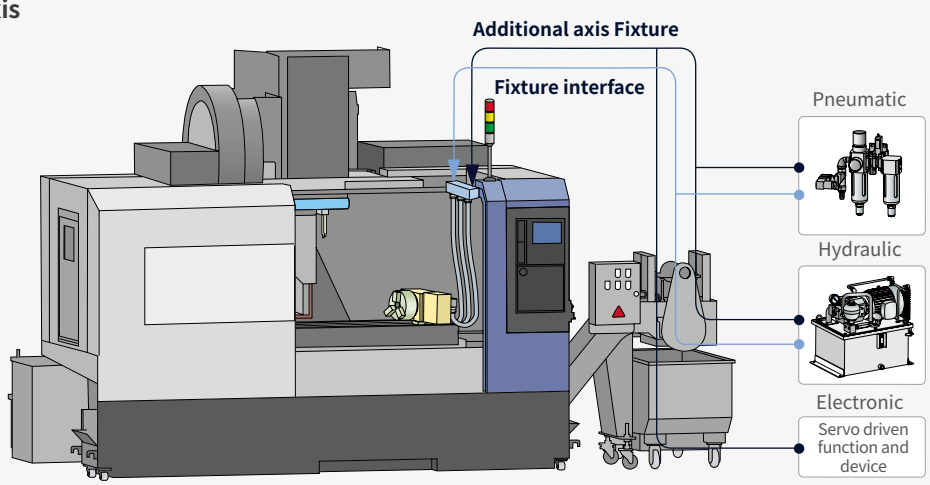
Fire Safety Precautions There is a high risk of fire when using non-water-soluble cutting fluids, processing flammable materials, neglecting the controlled and careful use of coolants and modifying the machine without the consent of the manufacturer. Always check the SAFETY GUIDELINES carefully before using the machine.

PERIPHERAL EQUIPMENT

Interface for additional equipment OPTION

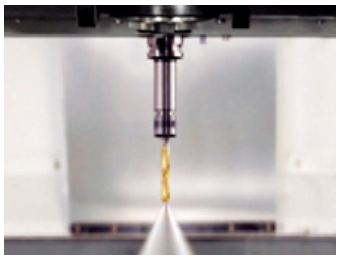
Connection example of additional 4 axis interface, fixture interface

* Recommended rotary table : Ø250, Ø320
* Please check your rotary table's drive system (hydraulic/pneumatic) before purchasing the equipment.



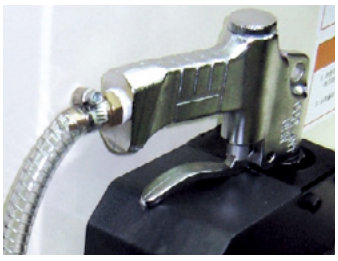
Air blower

Through spindle coolant (TSC)

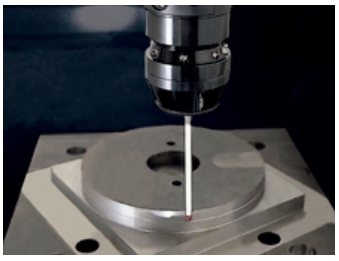


Oil skimmer

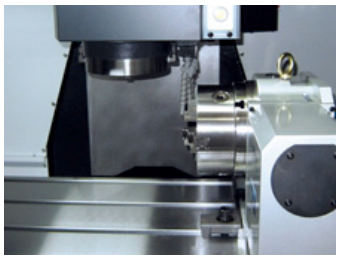
Coolant gun



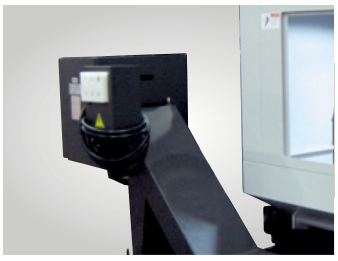
Automatic tool measurement



Additional axis interface



Rear chip conveyor

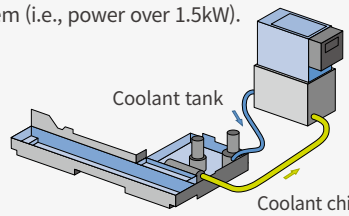


Automatic tool breakage detection

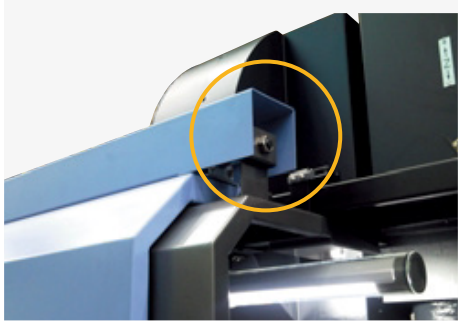
Auto tool measurement device (TS27R)

Coolant chiller (recommended) OPTION

A coolant chiller is recommended to help prevent temperature rises and to reduce thermal deformation when using a water-insoluble coolant or high-pressure coolant system (i.e., power over 1.5kW).



Automatic front door



MQL (Minimum quantity lublication)

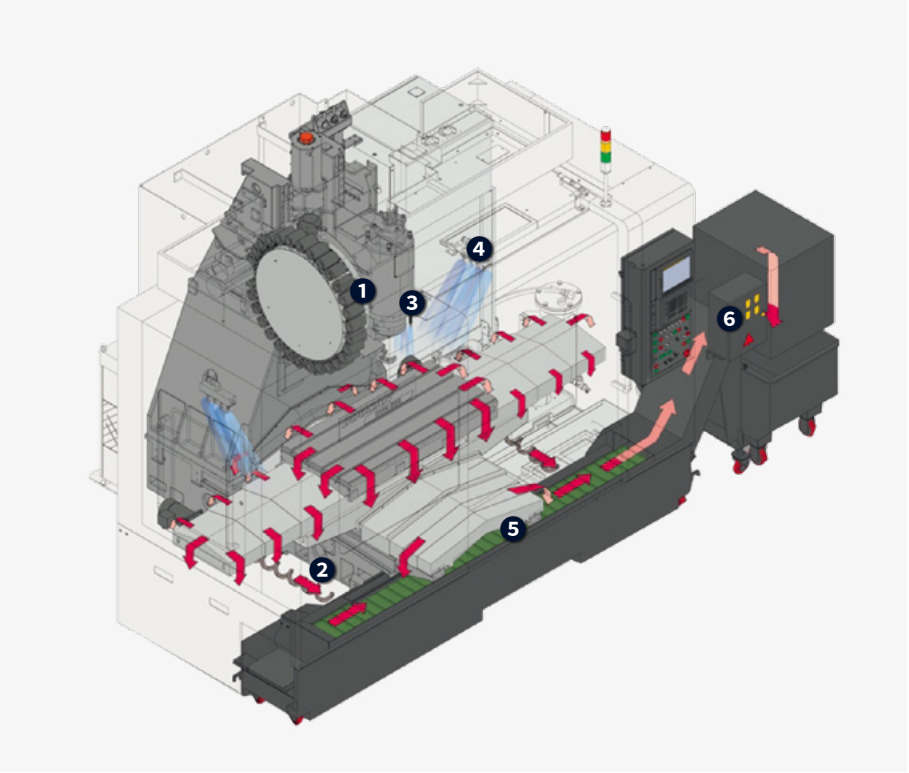
PERIPHERAL EQUIPMENT

Chip disposal

Managment of chips from the viewpoint of productivity improvement and environmental countermeasure is important. DVM II series offer a variety of chip control equipment to provide enhanced accuracy and better chip removal capabilities.

Easy chip disposal structure

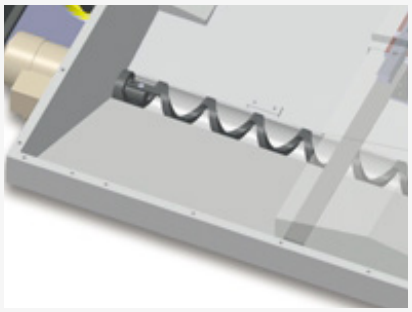
The completely enclosed DVM II series guarantee the confinement of chips and coolant to the inside of the machining area. Chips fall into the removable forward mounted chip pan for easy disposal.



❶ Oil/Water separation structure OPTION

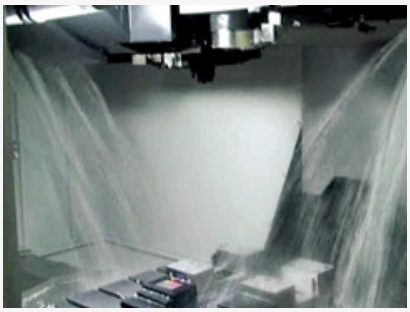
Middle pressure : 1.96 Mpa [20 bar]
High pressure : 6.86 Mpa [70 bar]
※ *The pump's discharge outlet. The pressure at the tip of the tool can be decreased by 20-30 %.*

❷ Screw conveyor

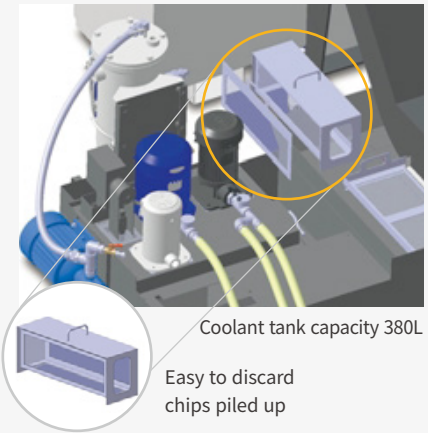


❸ Flood coolant pump

❹ Shower coolant OPTION



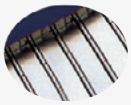
❺ Large capacity coolant tank



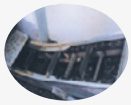
Coolant tank capacity 380L

Easy to discard chips piled up

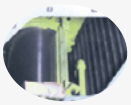
❻ Chip conveyor OPTION



Hinge type



Scraper type



Drum filter type

PERIPHERAL EQUIPMENT

Operators Panel

❶ Swivelling 0perating console

An easy-to-use operation panel which can swivel from 0-90°

❷ ATC operating button is arranged to main panel

This can give much easier operation and maintenance for ATC.

Magazine : CW

Magazine : CCW

❸ Portable MPG

Portable MPG makes a workpiece setting easier for the operator.

2-Door

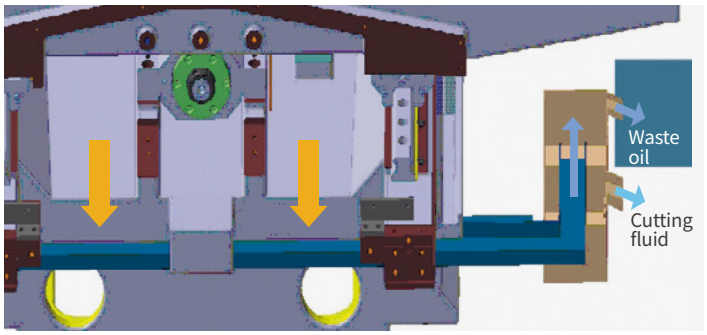
Top cover can be opened to provide easy access for loading heavy workpieces to the center of the table.

Brighter working area

Fluorescent lamps for safety and clear view of the working area.

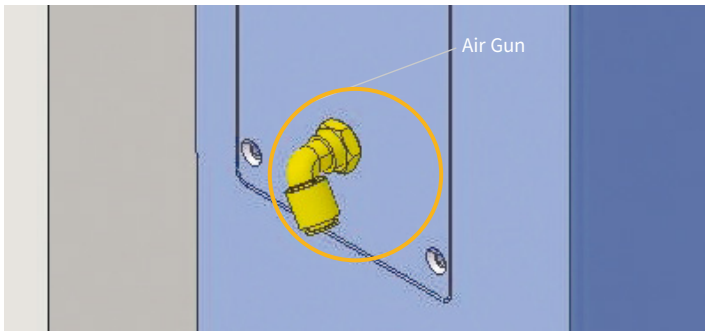
Seperates cutting fluid from wasted oil in coolant tank

It prolongs the use of cutting fluid and also enhances productivity. As an optional feature, oil skimmer can be attached for better efficiency.



Air port

Air port is provided as a standard feature. (Air Gun : OPTION)



FANUC 31iB 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

Division	Item	Specifications	DVM 500 II/650 II F31iB Plus
Controlled axis	Controlled axes		5 (X,Y,Z)
	Simultaneously controlled axes		5 axes
	Additional controlled Axis	Add 1 Axis (5th Axis)	○
Data input/output	Fast data server		○
	Memory card input/output		●
	USB memory input/output		●
	Large capacity memory(2GB)*2	Available Option only with 15" Touch LCD (iHMI Only) *2)	○
Interface function	Embedded Ethernet		●
	Fast Ethernet		○
	Enhanced Embedded Ethernet function		●
Operation	DNC operation	Included in RS232C interface.	●
	DNC operation with memory card		●
Program input	Workpiece coordinate system	G52 - G59	●
	Addition of workpiece coordinate system	G54.1 P1 X 48 (48 pairs)	●
	Tool number command		T4 digits
	Tilted working plane indexing command	G68.2 TWP	○
Feed function	AI contour control I	G5.1 Q_, 40 Blocks	X
	AI contour control II	G5.1 Q_, 200 Blocks	X
	AI contour control II	G5.1 Q_, 600 Blocks	X
	AI contour control II	G5.1 Q_, 1000 Blocks *1)	●
	High smooth TCP		X
Operation Guidance Function	EZ Guidei (Conversational Programming Solution)		●
	iHMI with Machining Cycle	Only with 15" Touch LCD standard *2)	X
	EZ Operation package		●
Setting and display	CNC screen dual display function		●
Network	FANUC MTConnect		✪
	FANUC OPC UA		✪
Others	Display unit	10.4" color LCD	X
		15" color LCD	X
		15" color LCD with Touch Panel	●
	Part program storage size & Number of registerable programs	640M(256KB)_500 programs	X
		1280M(512KB)_1000 programs	○
		2560M(1MB)_1000 programs	○
		5120M(2MB)_1000 programs	○
		10240M(4MB)_1000 programs	●
		20480M(8MB)_1000 programs	○
		2560M(1MB)_2000 programs	○
		5120M(2MB)_4000 programs	○
		10240M(4MB)_4000 programs	○
		20480M(8MB)_4000 programs	○

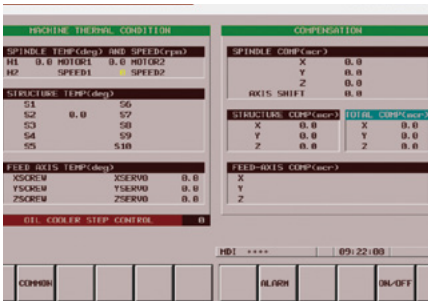
● *Standard* ○ *Optional* *X N/A* ✪ *Available*

EZ WORK

F31iB Plus

EZ WORK

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.

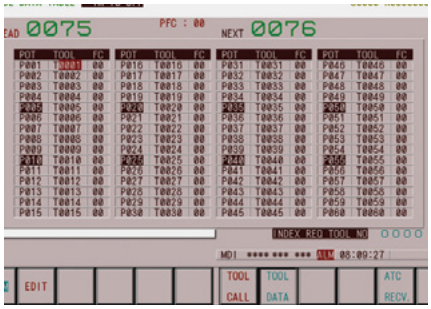


Thermal Compensation

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

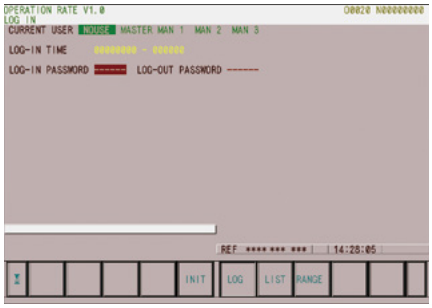
M/G-Code List

Functional description of M code and G code



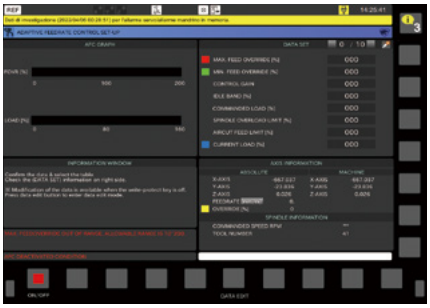
Tool Management

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



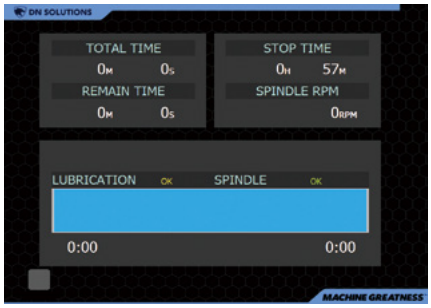
Operation Rate

Machine operation history management function by date based on load



Adaptive Feed Control

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

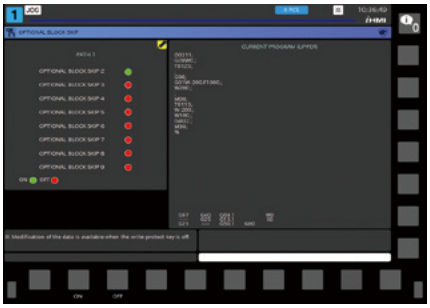


Spindle Warm Up

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

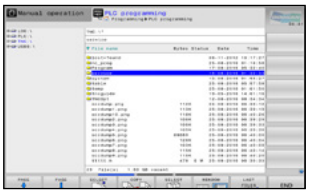
HEIDENHAIN TNC620

Superior hardware specifications

The TNC 620 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.

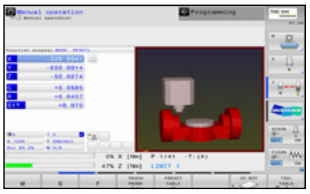
- 15.6" display
- 21GB Storage memory
- 1024 look ahead blocks
- High user convenience with folder structure data management

Conversational convenient function



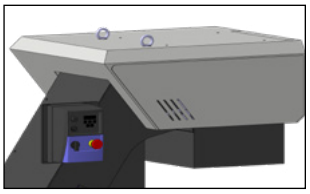
Data are controlled in the folder structure; convenient communication via USB devices

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

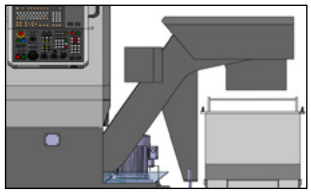


Collision protection system OPTION

Adaptive feed control OPTION



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



Graphic simulation

NUMERIC CONTROL SPECIFICATIONS

HEIDENHAIN

Item		Specifications	TNC620 DVM 500 II/650 II
Controlled axis	Controlled axis		5 (X,Y,Z)
	Simultaneously controlled axis		5 axes
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)		X
Network	MTConnect		✪
Others	Display unit	15" color LCD with touch panel	●
	Part program storage size & number of registerable programs	4GB	●

● *Standard* ○ *Optional* *X N/A* ✪ *Available*

CONVENIENT OPERATION

HEIDENHAIN TNC7

<TNC7>

Visualized, intuitive task support, customized UI

The TNC7 makes machining even easier, for everything from programming to program validation and from machine setup to actual machining. You intuitively operate highly complex applications directly on the touchscreen with various integrated solutions for standard tasks.

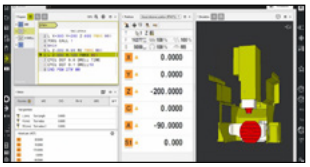
TNC7 NEW

- 24 inch touch screen
- 189GB Program memory
- Look-ahead 5000 blocks
- Touch Probe Cycles Graphical Programming

Conversational convenient function

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

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



Collision protection system OPTION

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

Graphic simulation

Enhanced collision protection function DCMv2 OPTION

Improved maintenance environment

Highly practical programming and setup based on touch operation

NUMERIC CONTROL SPECIFICATIONS

HEIDENHAIN

	Item	Specifications	TNC7
Controlled axis	Controlled axis		5 (X,Y,Z)
	Simultaneously controlled axis		5 axes
Interface function	Embedded ethernet		●
	USB interface (USB 2.0)		●
Feed function	Look-ahead	5000 blocks	●
Axis compensation	KinematicsOpt	Automatic measurement and optimization of machine kinematics	●
Collision monitoring	Dynamic collision monitoring (DCM)		○
Network	MT Connect		✪
Others	Display unit	touch panel	24"
	Program memory for NC programs		189GB

● *Standard* ○ *Optional* *X N/A* ✪ *Available*

POWER | TORQUE

F31iB Plus

Max. spindle speed

20000 r/min

Max. spindle power

22 kW
(29.5 HP)

Max. Spindle torque

60 N·m
(44.3 ft-lbs)

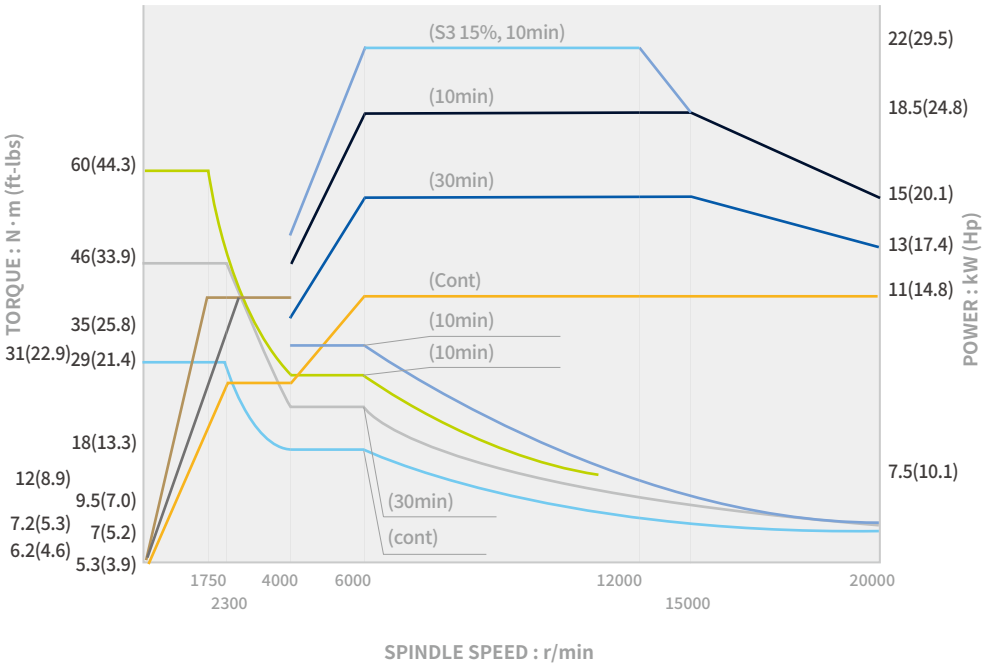
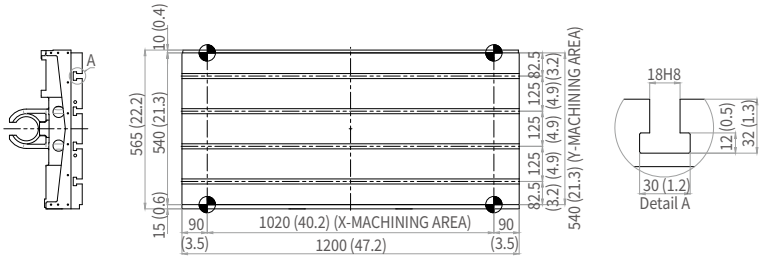
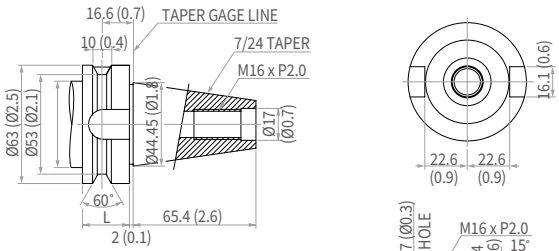


TABLE DIMENSIONS

DVM 500II

Unit : mm (inch)

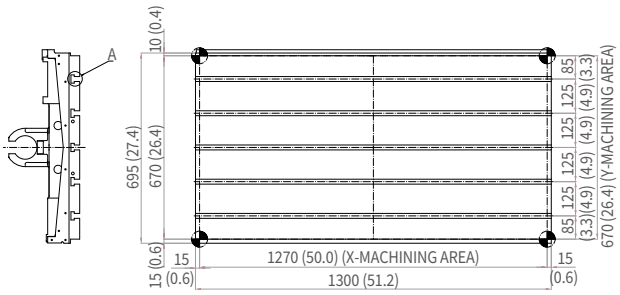




Tool shank type (MAS 403 BT 40)

** Pull Stud's standard specification is 15°.*
PS BT40 M16 JIS B (by TaeguTec) or PS-806 (by NIKKEN)

DVM 650II

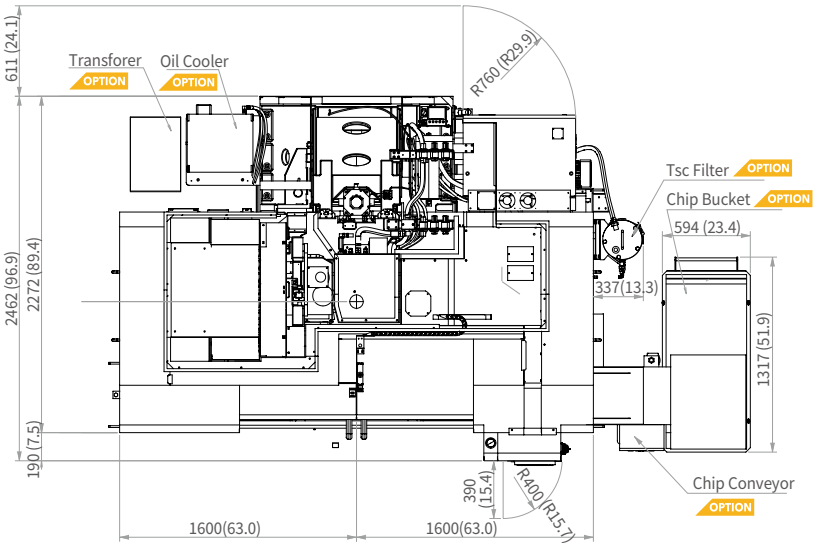


EXTERNAL DIMENSIONS

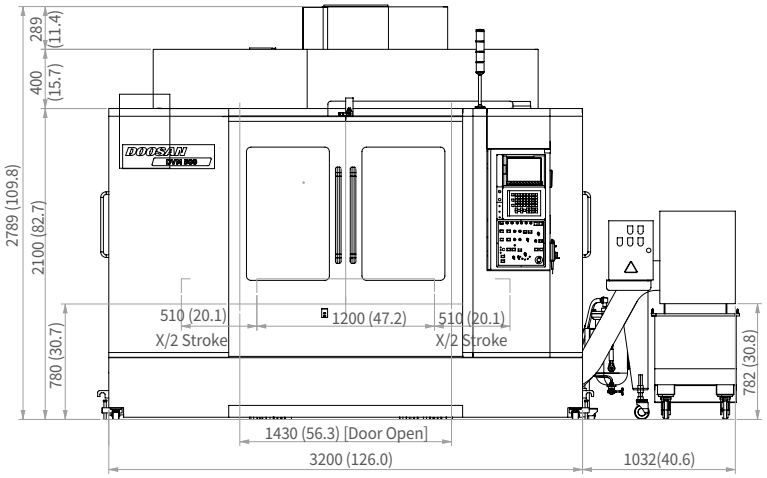
DVM 500II

Unit : mm (inch)

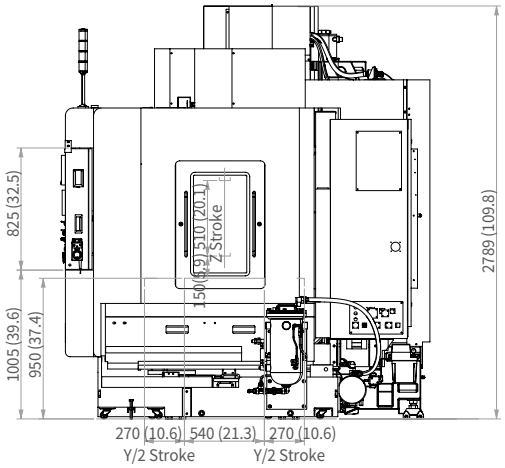
TOP



FRONT



SIDE



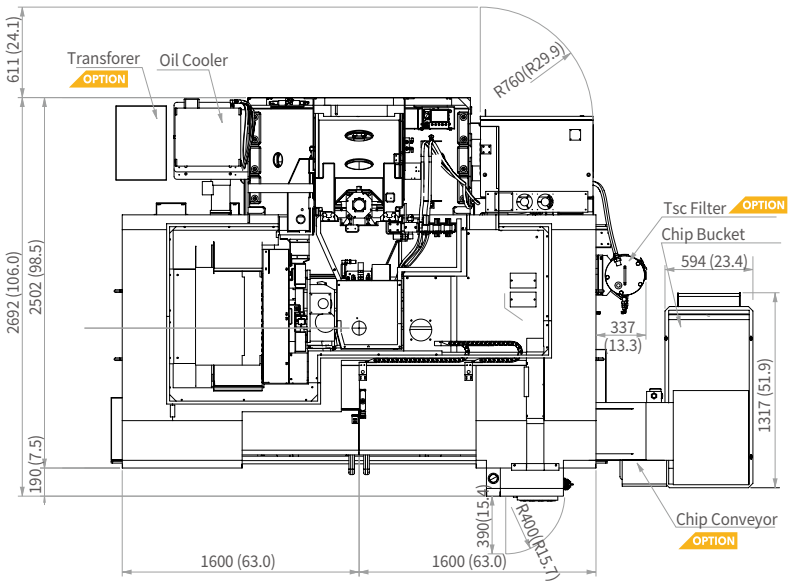
** Some peripheral equipment can be placed in other areas.*

EXTERNAL DIMENSIONS

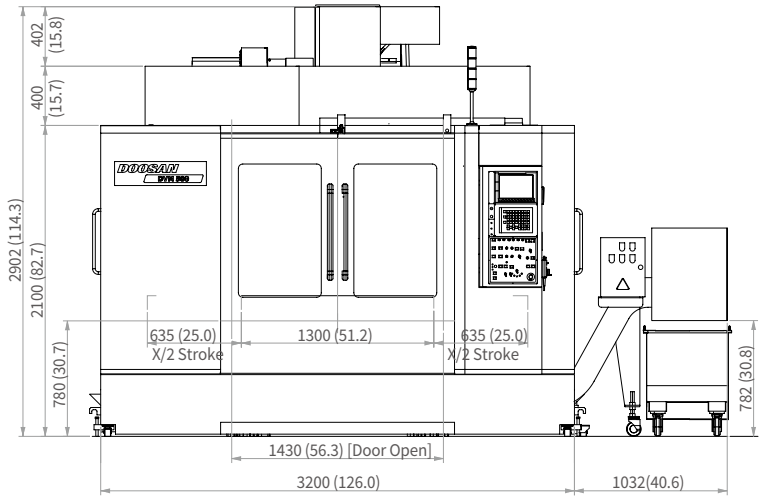
DVM 650II

Unit : mm (inch)

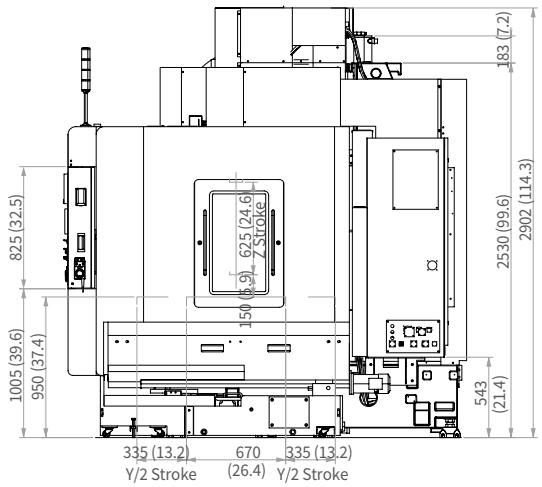
TOP



FRONT



SIDE



** Some peripheral equipment can be placed in other areas.*

MACHINE SPECIFICATIONS

Description		Unit	DVM 500 Ⅱ	DVM 650 Ⅱ
Travels	X axis	mm (inch)	1020 (40.2)	1270 (50.0)
	Y axis	mm (inch)	540 (21.3)	670 (26.4)
	Z axis	mm (inch)	510 (20.1)	625 (24.6)
	Distance from spindle nose to table top	mm (inch)	150 - 660 (5.9 - 26.0)	150 - 775 (5.9 - 30.5)
Feedrates	Rapid traverse rate (X / Y / Z)	m/min (ipm)	30 / 30 / 30 (1181.1 / 1181.1 / 1181.1)	
	Cutting feedrate	m/min (ipm)	15000 (590.6)	
Table	Table size	mm (inch)	1200 x 540 (47.2 x 21.3)	1300 x 670 (51.2 x 26.4)
	Table loading capacity	kg (lb)	800 (1763.7)	1000 (2204.6)
Spindle	Max. spindle speed	r/min	20000	
	Taper		ISO #40, 7/24 Taper	
	Max. spindle torque	N·m (ft-lbs)	60 (44.3)	
Automatic Tool Changer	Tool shank type		MAS403 BT40	
	Tool storage capa.	ea	30 {40}	
	Max. tool diameter	mm (inch)	80 / 125 {76 / 125} (3.2 / 4.9 {3.0 / 4.9})	
	Max. tool length	mm (inch)	300 (11.8)	
	Max. tool weight	kg (lb)	8 (17.6)	
	Max. tool moment	N·m (ft-lbs)	5.88 (4.3)	
	Tool selection		Memory random	
	Tool change time (Tool-to-tool)	s	1.3	
	Tool change time (Chip-to-chip)	s	3.7	
Motor	Spindle motor (Cont. / 30 min/ S3 15%)	kW (Hp)	11 / 15 / 22 (14.8 / 20.1 / 29.5)	
Tank capacity	Coolant tank capacity	L (gal)	380 (100.4)	
	Lubrication tank capacity	L (gal)	4.3 (1.1)	
Power Source	Electric power supply	kVA	44.6	
Machine dimensions	Height	mm (inch)	2799 (110.2)	2917 (114.8)
	Length x Width	mm (inch)	2464 x 3350 (97.0 x 131.9)	2694 x 3350 (106.1 x 131.9)
	Weight	kg (lb)	6500 (14329.8)	8500 (18739.0)

*{} : option

dn-solutions.com

Head Office

19F, 10, Tongil-ro, Jung-gu, Seoul,
Republic of Korea, 04527

Tel: +82-2-6972-0370
Fax: +82-2-6972-0400

DN Solutions America

360 E State PKWY,
Schaumburg, IL. 60173,
United states

Tel: +1-315-265-7500

DN Solutions Europe

Emdener Strasse 24, D-41540
Dormagen, Germany

Tel: +49-2133-5067-100
Fax: +49-2133-5067-111

DN Solutions India

No.82, Jakkuar Village
Yelahanka Hobil,
Bangalore-560064

Tel: +91-80-2205-6900
E-mail: india@dncompany.com

DN Solutions China

Room 101,201,301,
Building 39 Xinzhuan Highway
No.258 Songjiang District
China Shanghai (201612)

Tel: +86 21-5445-1155
Fax: +86 21-6405-1472

DN Solutions Vietnam

M.O.R.E building 2F, 40A-40B Ut
Tich Street, 04 Ward 04,
District Tan Binh District,
Ho Chi Minh City, Vietnam

Tel: +84 28-7304-0163

DN Solutions Mexico

Avenida Parque Bicentenario
#100 Nave M65L3-6,
Fraccionamiento San Isidro
Business Park,
Santa Rosa Jauregui,
Querétaro, México

E-mail: efrain.figueroa@
dncompany.com

Sales inquiry

sales@dncompany.com

** For more details, please contact DN Solutions.*
** Specifications and information contained within this catalogue may be changed without prior notice.*

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