SMEC

MVF 5000

VERTICAL 5-AXIS MACHINING CENTER

SMEC

- 1988 - Started as Samsung Heavy Industries Machine Tools Business
- 1989 - Horizontal and vertical machining center technology partnership with OKK Japan
- 1991 - Turning center and vertical machining center technology partnership with Mori Seiki
- 1996 - 5-sided processing center technology partnership with Toshiba
- 1999 - Spun out from Samsung Aerospace Industries and established SMEC Co., Ltd

Samsung
Machine Tools
Engineering
Company

High Productivity

High rigidity Roller LM Guides applied to the X/Y/Z axes reduces the non-cutting time, while the worm gear driven revolving B/C axes that function as both rotary table and rotary encoder comes standard and enhances productivity

High Performance, High Precision

The feed axes ball screws come standard with cooled ball screw nuts, minimizing the thermal growth caused by rapid feeds, repeated travels and extended operation times to provide high precision machining

Vertical 5-axis Machining Center

MVF 5000

5-axis machining center ideal for mass production and high precision machining

A Variety of Convenience Features

User centered convenience features and optional functions needed for automation are available while a grease-based lubrication is used for eco-friendly operations

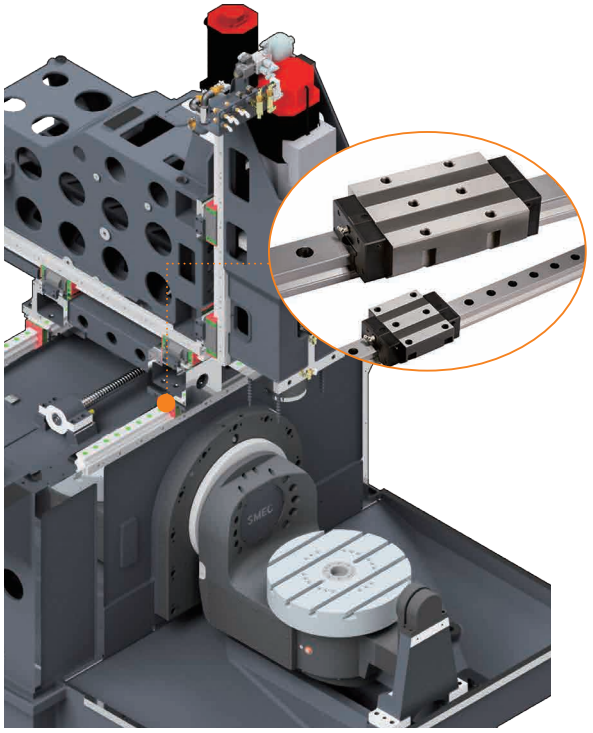
Various Configurations Available

Simultaneous 5-axis and 4+1 configurations are available to satisfy the working conditions needed to machine diverse and complex shapes and forms

MVF 5000

VERTICAL MACHINING CENTER

High Productivity



Roller type LM guide way

Highly responsive Roller Type LM Guideways offer superior rapid traverse speeds, reducing non-cutting time while minimizing noise during operation.

- high speed, high rigidity, enhanced durability
- compared to Ball Type LM Guides, it offers improved wear resistance, precision travel and product lifetime

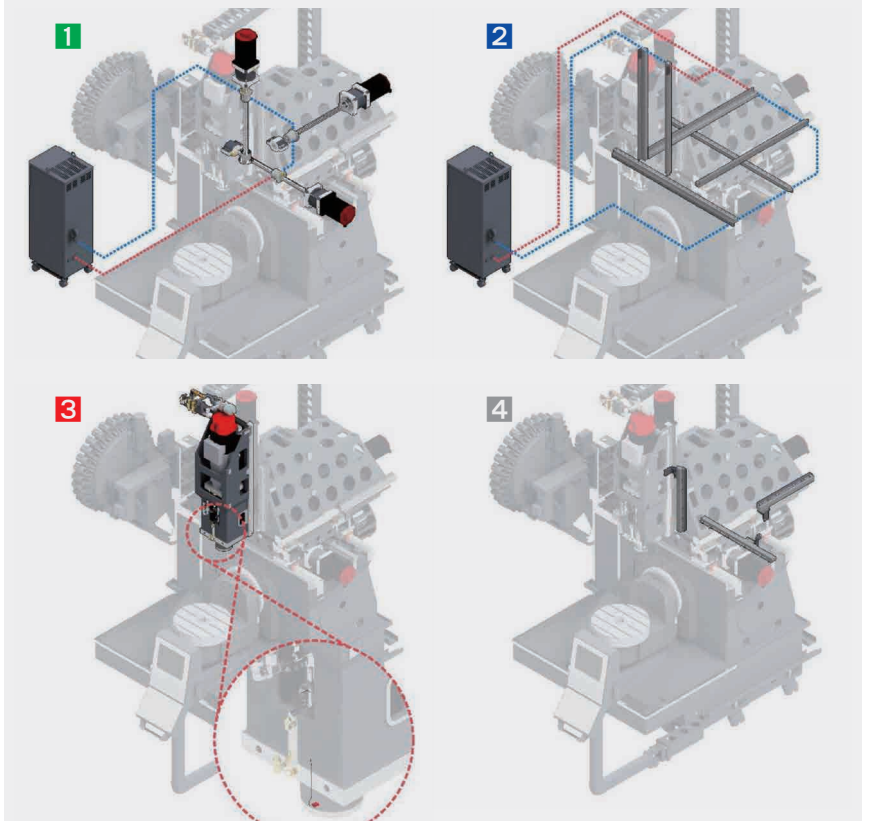
Rapid traverse (X/Y/Z axis)

1574.81/1574.81/1574.81ipm

Rapid traverse (B/C axis)

16/25rpm

High Performance, High Precision Machining



1 Feed axes ball scew nut cooling (STD)

- minimizes thermal growth from rapid feeds, repeated travels and extended operations
- improves machining quality and extended ball screw lifetimes

2 Feed axes LM guide rail cooling (OPT)

- minimizes both thermal growth from extended operations and heat transfer to the structure
- minimizes thermal growth of the structure
- improves machining quality

3 Spindle thermal growth sensor (OPT)

- thermal growth compensation along the spindle's axis
- maintains machine precision through direct and immediate compensation

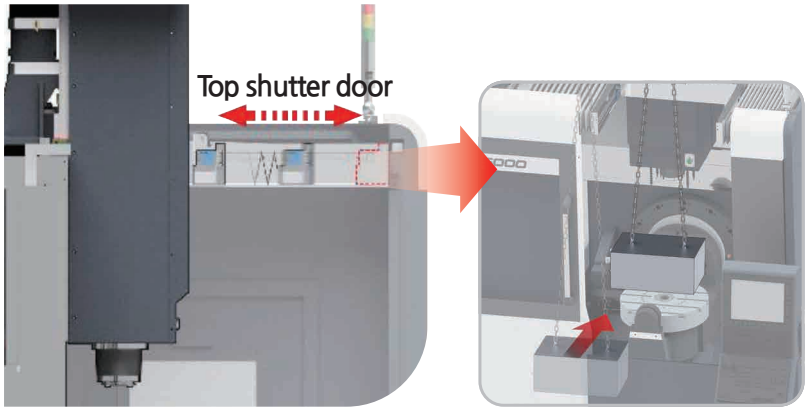
4 Linear scale (OPT)

- minimizes the effect of thermal growth and backlash
- maintains machine precision through extended operations

Various Convenience Features

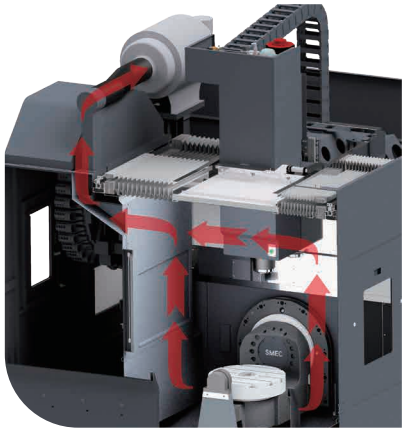
Auto top shutter door (STD)

Allows access to the entire surface of the table when using a crane to move the workpiece into position making setup easier



Mist collector (OPT)

Collects mist generated during machining, improving the work environment



Front spin window (OPT)

Clear field of vision into machine

Front auto door (OPT)

For use with robots and/or automation

Various Configurations Available

F0i(4+1axis)

F31iB5
(Simultaneous 5-axis)

12,000rpm

15,000rpm

30MG

40MG

60MG

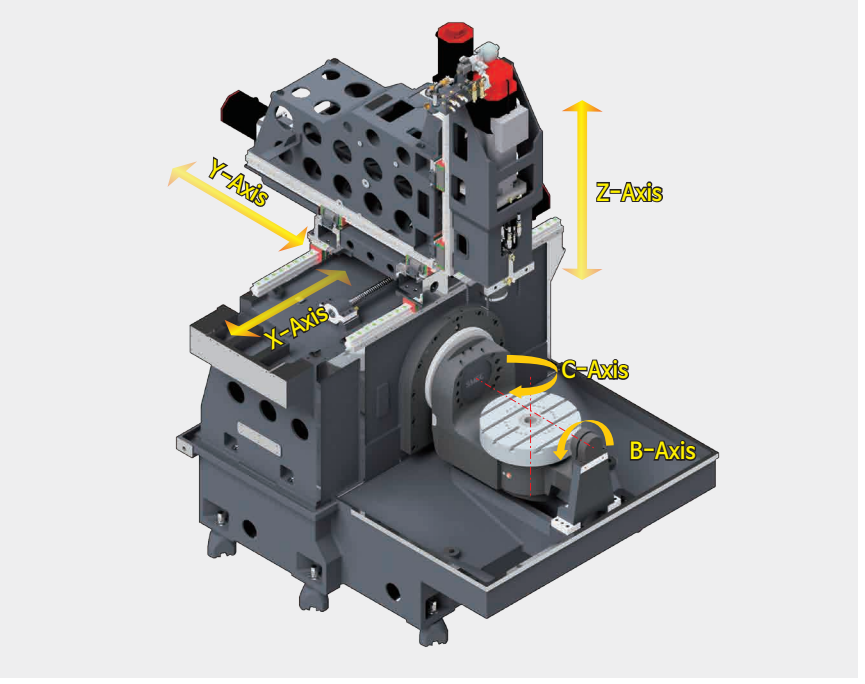
4+1 or simultaneous 5-axis

Available as 4+1 or simultaneous 5-axis configurations to meet the machining conditions required to process diverse and complex forms and shapes

MVF 5000

VERTICAL MACHINING CENTER

Machine Design



Model	Travel				
	X-axis(inch)	Y-axis(inch)	Z-axis(inch)	C-axis(deg)	B-axis(deg)
MVF 5000	25.60(15.75+9.85)	20.48	18.70	360	-110 ~ +45

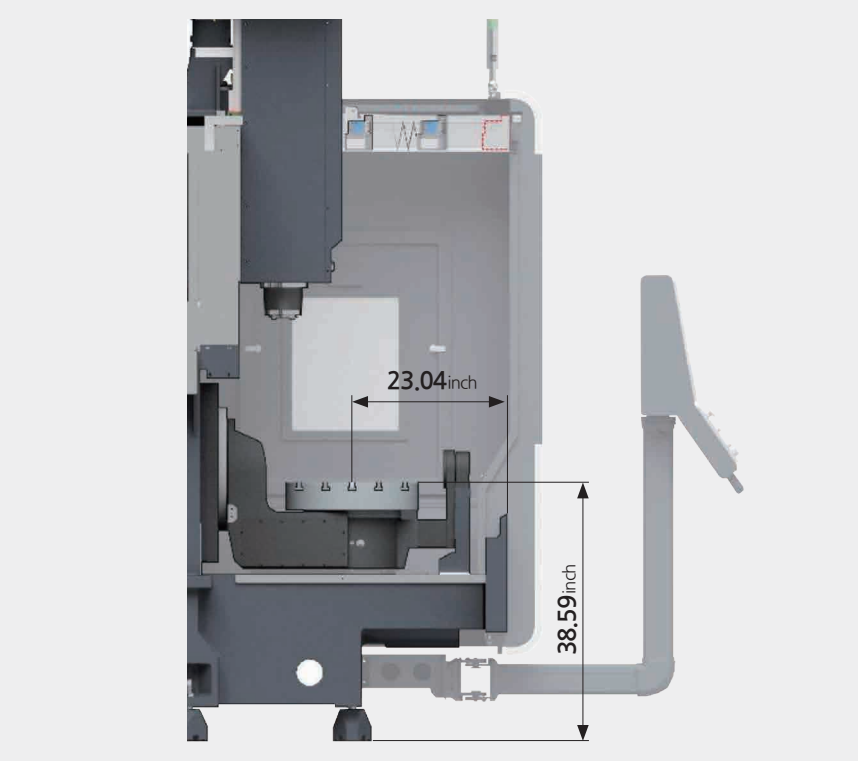
The application of Roller Type LM Guides to all axes minimizes the noise created during travel and the superior accel/decel minimizes the amount of non-cutting time

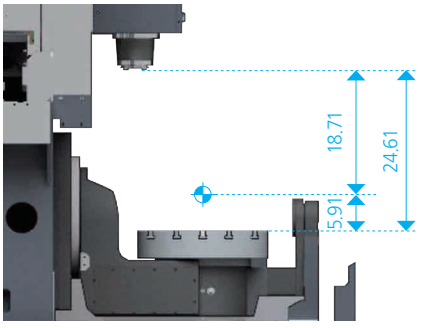
High rigidity feed design

With a guideway design where rigidity is not lost while going up the Z-axis by optimizing the distance between the spindle and frame to minimize spindle deformation during extended operations, while the worm gear driven revolving B/C axes that function as both rotary table and rotary encoder comes standard

Dedicated for automation and easy to maintain

The B-axis tilting type design makes it easy to apply automation equipment through the side doors, with the B-axis motor located within the column making it easier to wire-up and maintain.





Distance between face of spindle and table top

5.91 ~ 24.61inch

Distance from front door to table edge

23.04inch

Distance from floor to table top

38.59inch

Spindle

High Efficiency Spindle Cooling System (STD)

For long-term high speed continuous operation, an oil cooler may be installed to circulate chilled oil around the spindle bearings to prevent thermal growth in the spindle and allow high precision machining

The ultra precision spindle is supported by 4 rows of P4 class high-speed angular bearings allowing high speed, high precision machining with the direct-coupled head that minimizes thermal growth through forced heat dissipation.

For 12,000rpm Motor

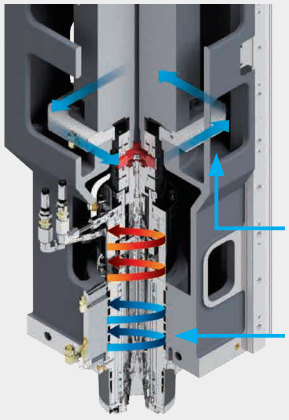
Power(Cont/Max)
14.76/29.78HP

Torque(Cont/Max)
51.63/104.30lbs.ft

For 15,000rpm Motor

Power(Cont/Max)
14.76/20.12HP

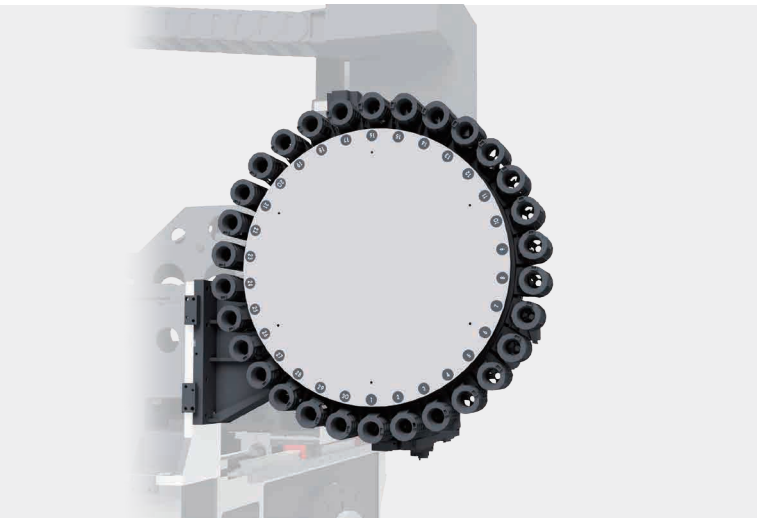
Torque(Cont/Max)
42.27/87.77lbs.ft



JACKET Circulation Cooling

Semi-permanent grease lubrication applied to the bearings, while thermal growth is minimized using jacket circulation cooling around the bearing housing (a source of heat) via a Fan Cooler, ensuring stable performance and extending the lifetime of the spindle.

ATC / Magazine



ATC Magazine

Designed with a standard 30 tool magazine with short travel distance to enable quick tool changes

Fast and errorless tool changes are made possible using the memory random technique and double arm type tool changer, minimizing non-cutting time

Tool storage capacity : 30(40/60)

Tool-to-tool time : 1.3(60Hz)sec

Max. tool dia.(adjacent empty) : 3.15(4.93)inch

Max. tool length : 11.82inch

Max. tool weight : 17.64lb

Table

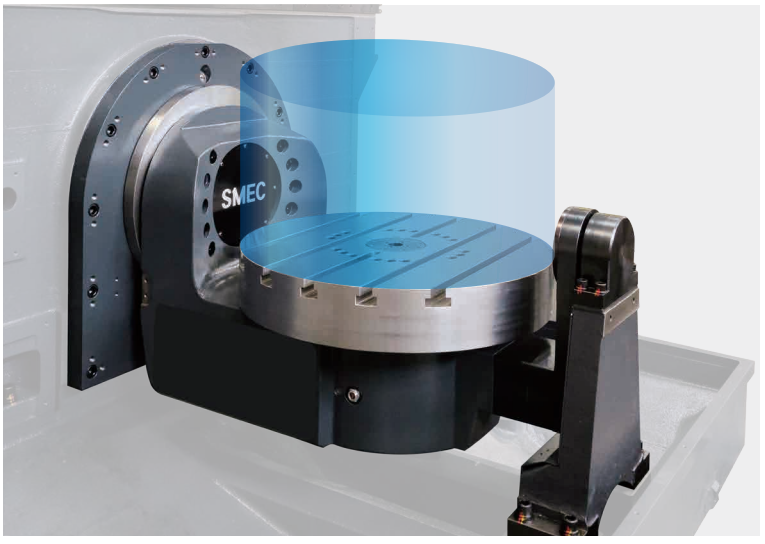


Table size and Table loading capacity were increased to support larger work area

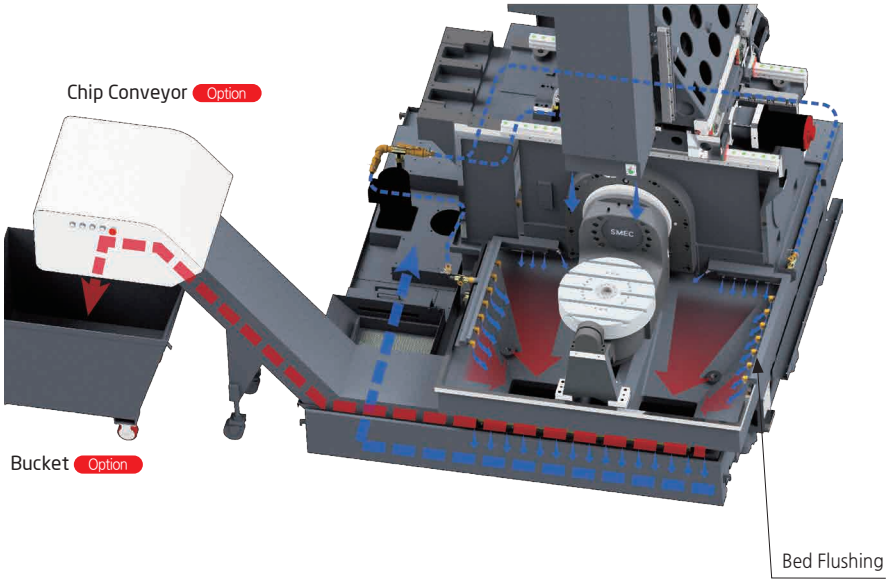
Table size : Ø19.69inch(STD)
Ø23.63inch(OPT)

Max part size : Ø25.60×H14.97inch

Table surface : 0.71H8×p3.94×5ea

Table loading capacity : 1,102.32lb

Eco-Friendly Chip Disposal

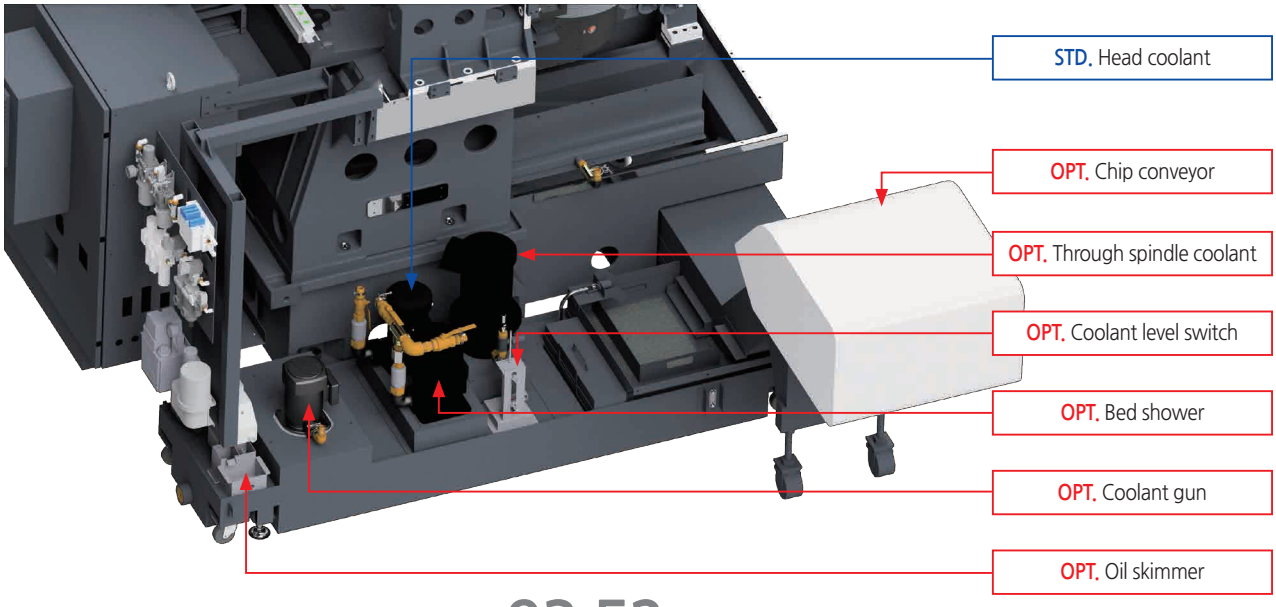


Complete chip discharge through the series of chip disposal processes by the coolant nozzle, bed flush, coil conveyor and chip conveyor

- the large, rectangular S/GUARD design and rear coolant tank ensures easy chip removal
- using bed flushing, complete chip disposal off the surface of the bed

Automated Coolant Supply

Large capacity coolant tank located behind the machine enables easy coolant exchange, tank cleaning and pump maintenance

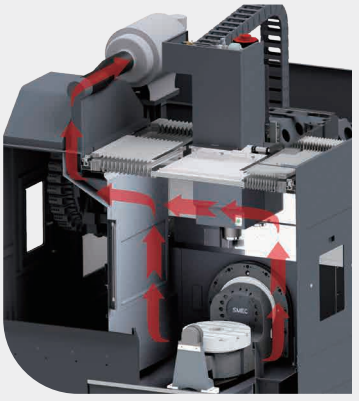


Coolant tank capacity : 93.52gallons

Options

Mist collector

Collects the fine mist created during the machining process, improving the surrounding environment and air quality, protecting the operator, extending the machine's lifetime and increasing productivity



Auto door

Opens and closes the front door via program increasing productivity within an automation line.

Spin window

Allows the operator to see into the during machining by keeping the view clear from coolant spray

Chip conveyor

Equipment meant to remove chips created during machining

Tool measurement probe

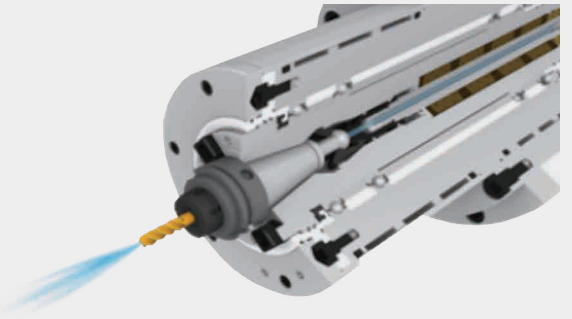
Various automated tool diameter, length and lifetime measuring devices may be installed.

Measurement method : Touch probe
Repeatability : ± 1 ㎛

Measurement method : Non-contact
Repeatability : ± 0.1 ㎛
Min. tool detection : 0.03mm

Through spindle cooling (TSC)

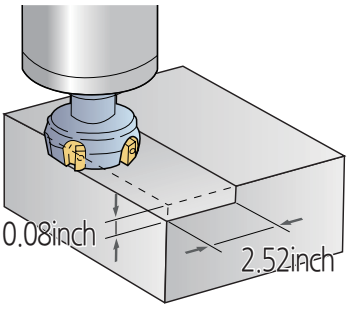
The TSC option may be added to improve machining effectiveness



Cutting Performance

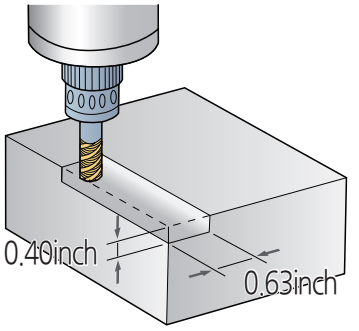
Face mill (Ø3.15inch) / Carbon steel (SM45C)

Chip removal rate (inch³/min)	Spindle speed (r/min)	Feedrate (ipm)
21.12	1,500	106.30



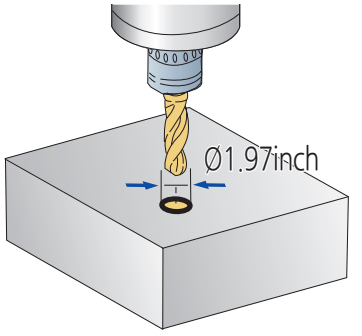
End mill (Ø0.99inch) / Carbon steel (SM45C)

Chip removal rate (inch³/min)	Spindle speed (r/min)	Feedrate (ipm)
1.35	1,528	5.44



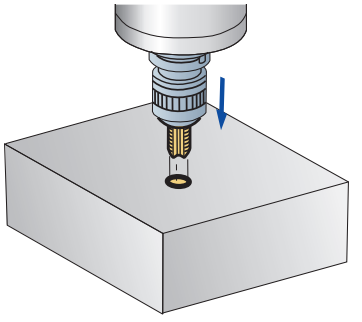
U-Drill (Ø1.97inch) / Carbon steel (SM45C)

Cutting rate (inch³/min)	Spindle speed (r/min)	Feedrate (ipm)
21.55	1,500	7.09



Tap / Carbon steel (SM45C)

Feedrate (ipm)	Spindle speed (r/min)	Tap size (mm)
38.04	276	M30×3.5



TEST conditions : 12,000rpm [BBT40]

※ The above data is based on internal testing. Values may change depending on cutting conditions.

Spindle Power & Torque Diagram

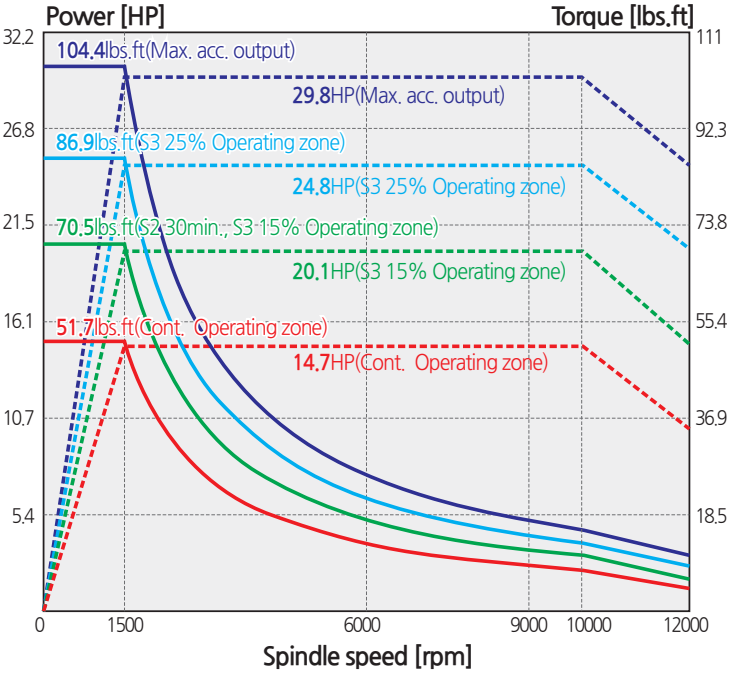
Spindle 12,000rpm Motor

Power(Cont/Max)

14.76/29.78HP

Max. Torque(Cont/Max)

51.63/104.30lbs.ft



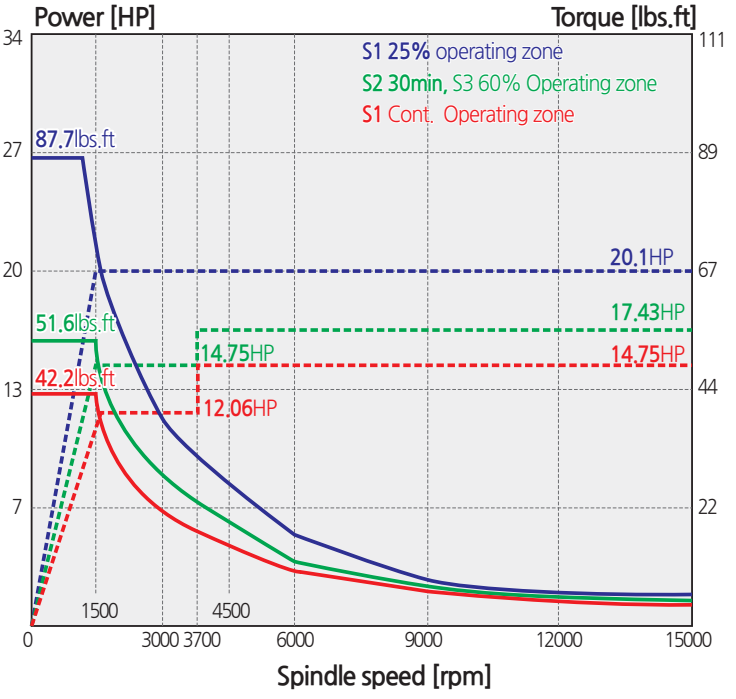
Spindle 15,000rpm Motor

Power(Cont/Max)

14.76/20.12kW

Max. Torque(Cont/Max)

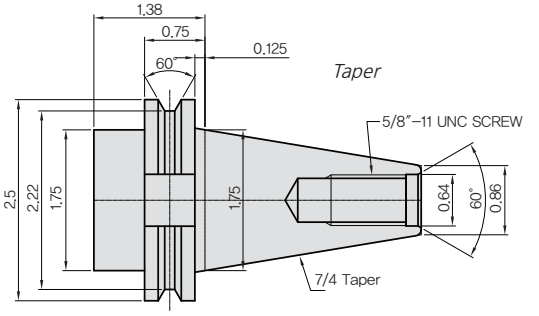
42.27/87.77lbs.ft

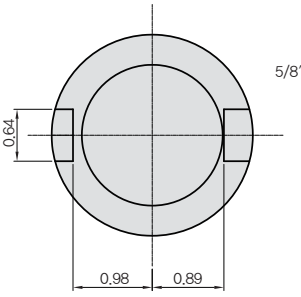


Tool Shank

Unit : inch

CAT40





PULL STUD

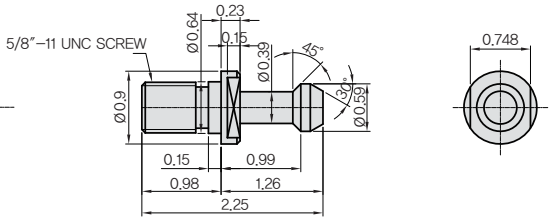
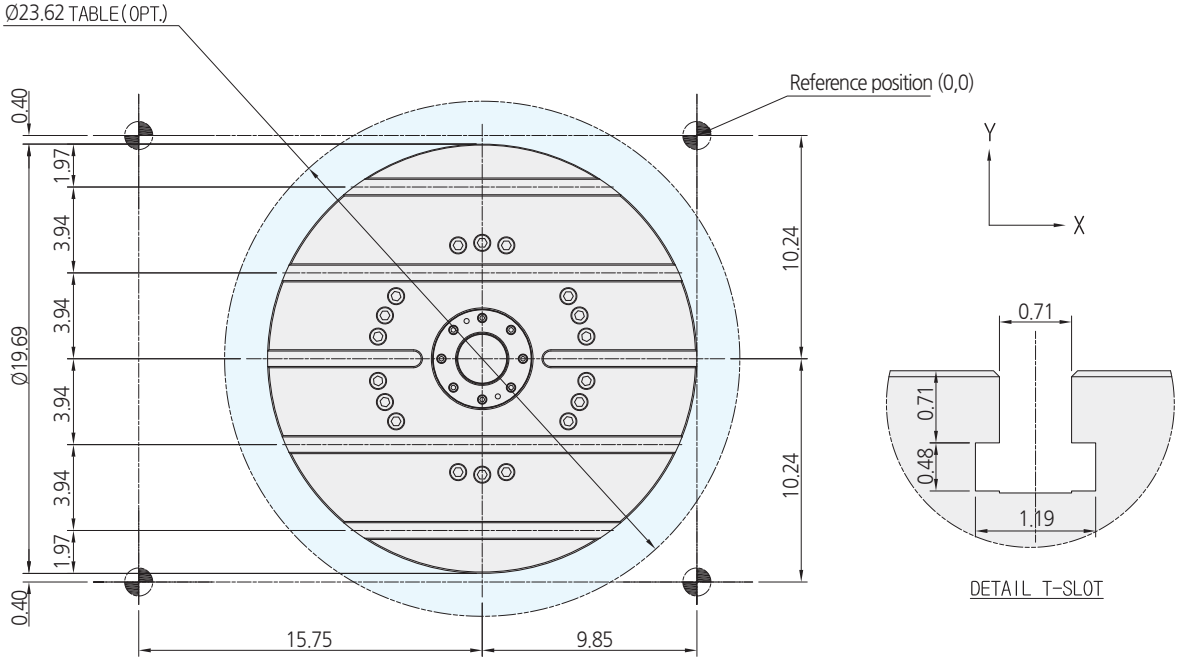


Table & T-Slot

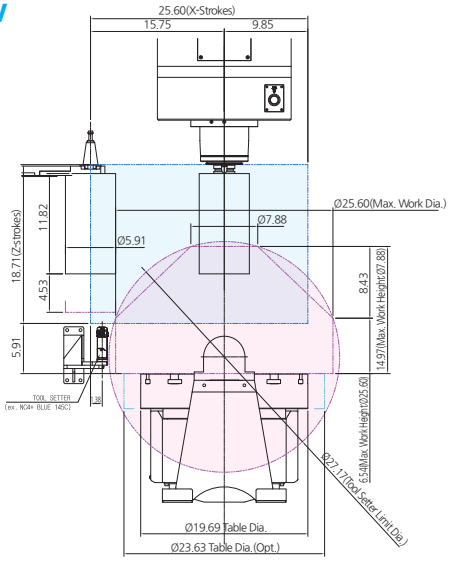
Unit : inch



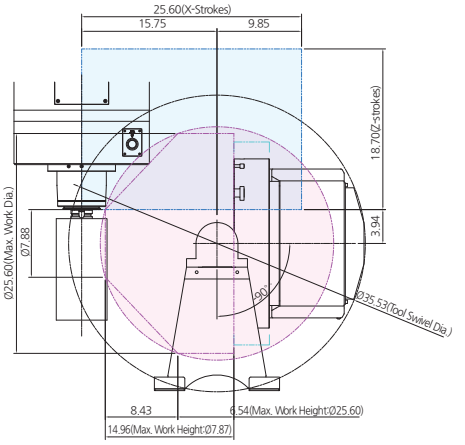
ATC Interference

Unit : inch

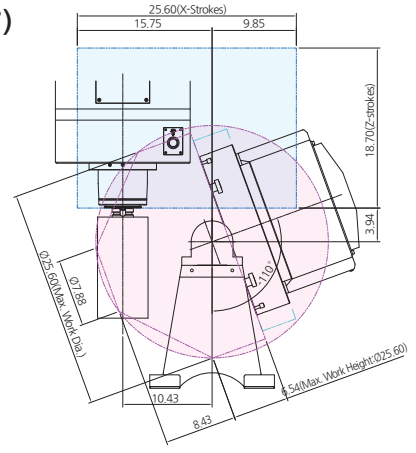
Front view (B-Axis 0°)



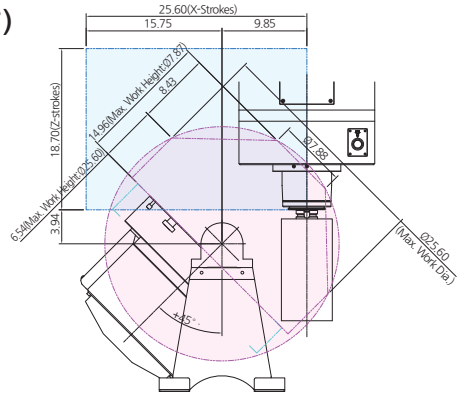
Front view (B-Axis -90°)



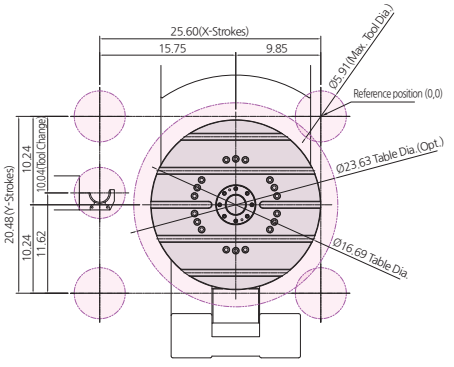
Front view (B-Axis -110°)



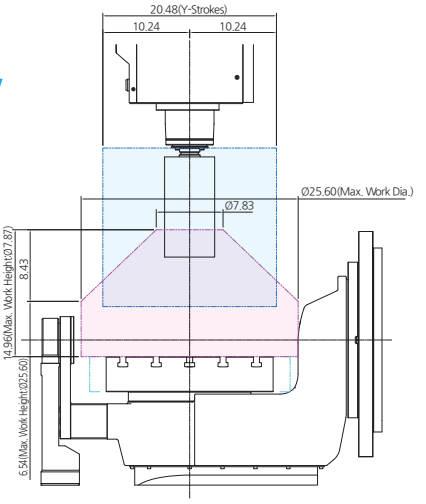
Front view (B-Axis +45°)



Top view



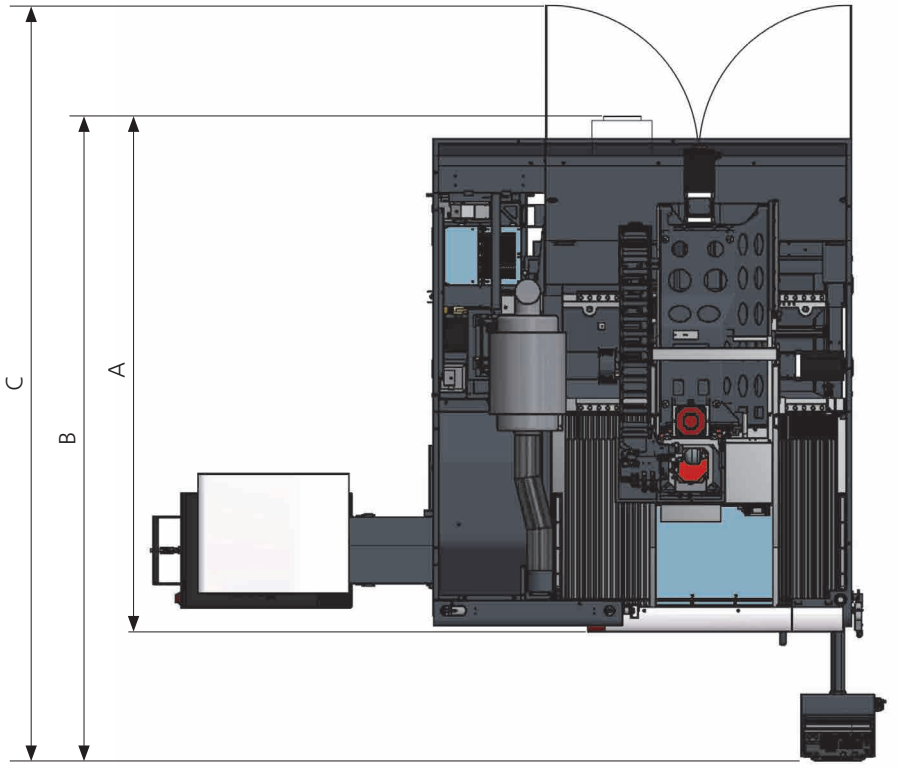
Right view



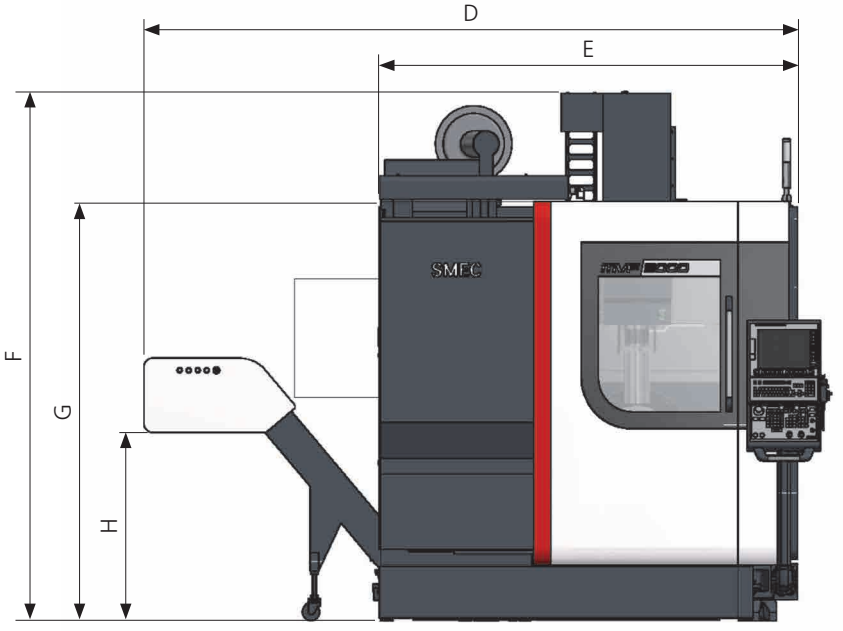
Machine Dimensions

Unit : inch

Top view



Front view

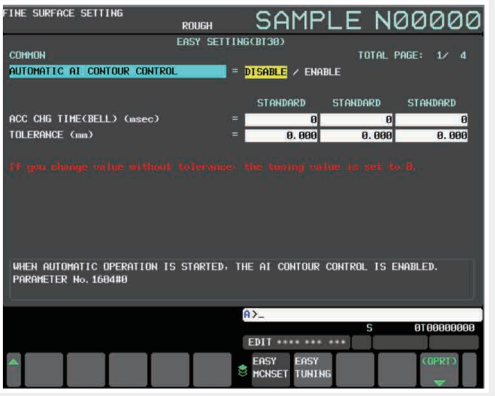


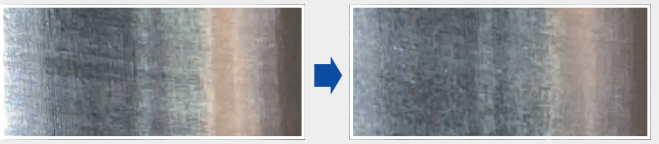
Model	A (Length)	B	C	D	E (Width)	F [Height (max)]	G	H
MVF 5000	119.56	150.19	176.50	151.35	122.09	122.09	97.05	43.47

Machining Solution (STD)

S4 (SMEC SMOOTH SURFACE SYSTEM) Package

High performance NC options to improve machining performance provided as standard





Without S4 Package | With S4 Package

15 inch LCD monitor standard	
AICC II (AI Contour Control II)	Efficient accel/decelaration (200 block look ahead)
Jerk control	Speed control during acceleration changes
Smooth tolerance plus control	Stable curved shape forming
Machining conditions selection function	Adjust accuracy level according to machining conditions
Machining quality selection function	
Manual Guide i	Visual machining check and setup guide
Data server	Trnasfer large program files
Part rogram storage	2MB (5,120M)
Number of registered programs	1,000ea

IoT Solution (OPT)

NC-Gate
Basic Platform

IoT-Gate
Expansion Platform

NC-Gate / IoT-Gate

The NC-Gate / IoT-Gate that was developed in-house with our ICT technology is a universal gateway that not only interworks with our machine tools, but machine tools from other manufacturers, robots, automation equipment, and analog / digital sensors as a network device capable of bi-directional communication.

Supported drivers : Fanuc / Mitsubishi / Siemens NC, Modbus TCP, DeviceNet, Profibus, Ethernet, AI/DI/DO

KPI (Key Performance Indexes)

Provides key performance indicators and displays target achievement

- Indicators : achievement rate, productivity, process defect rate, equipment and factory usage, quality defect rate, lead time, and average cycle time

OEE (Overall Equipment Effectiveness)

Provides figures and graphs of overall equipment effectiveness

- Availability, performance, quality, etc.

Realtime Monitoring

Provides operation status and alarm information in case of problems in the production line

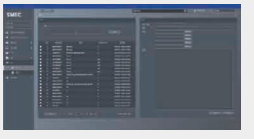
- Provides information about the operation status, speed, production alarms, etc. of each machine

Remote Control/ Management

Remote control and operation

- Emergency stop switch, program editing, etc.

Remote A/S



Problem diagnosis via remote control

- Provide remote diagnosis services to users via the IIoT solution

SMEC User Interface

Fanuc Series

- 15'' LCD color display
- Part program size 2MB
- High quality designed OP Panel
- SMEC Custom S/W
- Portable M.P.G

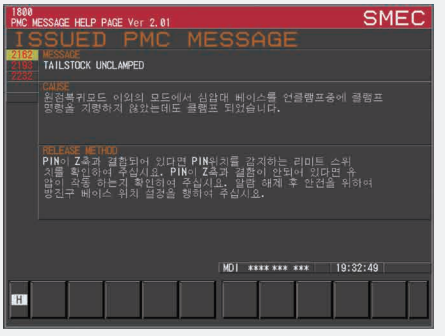
SMEC Custom S/W displayed using MDI's button or OP Panel's button

◀ **CUSTOM** : Provide operator convenience and improve productivity using the support function for tool management and additional device setting.

SMEC HMI

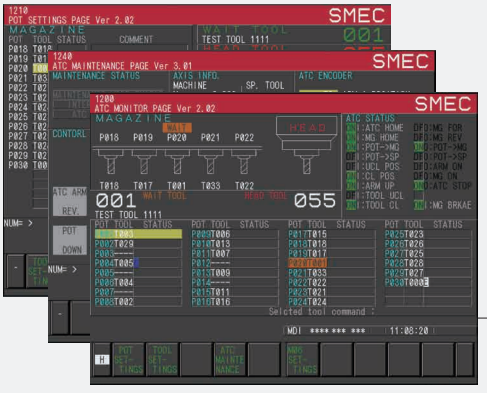
M/G-Code check function

Allows the operator to directly read the M/G-Code on the machine for easy application programming

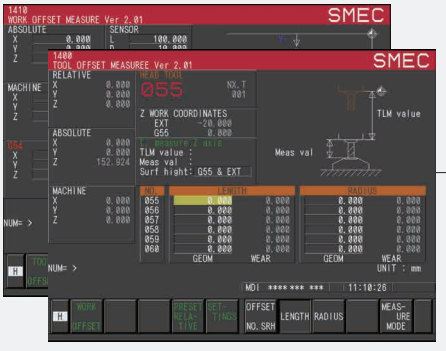


PMC alarm check function

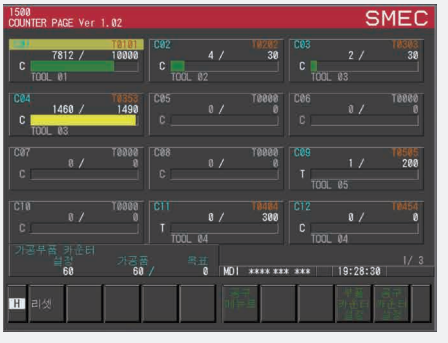
When a PMC alarm occurs, the cause and countermeasures are described in detail, making operation and maintenance more convenient



ATC Magazine status check, setting and maintenance function



Work coordinates, tool setting support function



Counter for each T-Code

MVF 5000

VERTICAL MACHINING CENTER

Standard / Optional

● : Standard ☆ : Required Selection ○ : Optional X : N/A

Category		MVF 5000
Spindle		
RPM	12R	●
	15R	○
ATC		
Tool type	BBT40	○
	CAT40	●
	HSK-A63	X
Pull Stud	45°	●
Lubrication		
Grease (feed system)		●
Cooling		
Spindle		●
ball screw(X/Y/Z)		●
Motor base(spindle/Z)		●
LM guide(X/Y/Z)		○
Table & Column		
Rotary Table	Ø500	●
	Ø600	○
APC		X
T-Slot Table		●
Coolant Equipment		
FULL SPLASH GUARD		●
Through spindle coolant	20bar	○
	30bar	○
	70bar	○
Shower coolant		●
Coolant gun		○
Bed flushing		○
Air gun		○
Air blow		○
Tool measurement air blow (with tool measuring device)		○
Internal screw conveyor		X
Chip conveyor, HINGE	Left	☆
	Right	X
	Rear	X
Chip conveyor, SCRAPER	Left	☆
	Right	X
	Rear	X
Chip bucket	STD (380ℓ)	○
	Rotating (200ℓ)	○
Electrical Equipment		
3 step patrol lamp & buzzer		●
Elec. cabinet light		○
Remote MPG		○
3-axis MPG		●
Work counter	GUI	●
Total counter	GUI	●
Tool counter	GUI	●
Multi counter	GUI	●
Residual current breaker		○

Category		MVF 5000
Electrical equipment		
AVR (Auto Voltage Regulator)		○
Transformer	50kVA	○
Auto power off		○
Power outage backup module		○
Z-axis drop prevention		●
Precision machining option		
AICC Ⅱ (AI Contour Control Ⅱ)		●
Jerk control		●
Smooth tolerance plus control		●
Machining quality selection function		●
Nano smoothing		●
Polar coordinate interpolation		○
High-speed processing		○
Look ahead block expansion		○
Repeating canned cycle		○
Repeating canned cycle 2		○
Drilling canned cycle		○
Convenience feature		
Manual guide i		●
Measurement / sensor		
Workpiece contact check device	TACO	○
	SMC	○
Auto tool measuring device		○
Tool breakage detection		○
Linear scale	X-axis	○
	Y-axis	○
	Z-axis	○
	B-axis	●
	C-axis	●
Thermal growth sensor		○
Coolant level detection		○
Environmental		
Air conditioner		●
Oil mist collector		○
Oil skimmer		○
Front spin window		○
Fixture & automation		
Auto door	STD	○
	High speed	X
Auto shutter		X
Operation sub-console		○
Add. M-code (4 sets)		○
Robot interface		○
I/O expansion		○
Hydraulic equipment		
Hydraulic unit for fixtures		○
Safety device		
Door interlock		●
KCs		●

※ For detailed information, please contact your local SMEC dealer.

Machine Specifications

[ ] : Optional

Category			MVF 5000
Travel	X-axis travel	inch	25.60(15.74+9.85)
	Y-axis travel	inch	20.48
	Z-axis travel	inch	18.70
	B-axis travel	deg	-110 ~ +45
	C-axis travel	deg	360
	Spindle to table surface	inch	5.91 ~ 24.61
Table	Table size	inch	Ø19.69[23.63]
	Table loading capacity	lb	1,102.32
	Table surface	inch	0.71H8 T-slot × p3.94 × 5ea
Spindle	Spindle speed	rpm	12,000 [15,000]
	Power (Cont/Max)	HP	14.76/29.78 [14.76/20.12]
	Torque (Cont/Max)	lbs.ft	51.63/104.30 [42.27/87.77]
Feedrate	X-axis rapid traverse rate	ipm	1574.81
	Y-axis rapid traverse rate	ipm	1574.81
	Z-axis rapid traverse rate	ipm	1574.81
	B-axis rapid traverse rate	rpm	16
	C-axis rapid traverse rate	rpm	25
	Cutting feed (X/Y/Z)	ipm	0.0394~590.56
ATC	Tool shank	-	CAT40 [BBT40]
	Pull stud	-	MAS P40T-1
	Tool storage capacity	ea	30 [40/60]
	Max tool diameter (adjacent empty)	inch	Ø3.15(5.90)
	Max tool length / weight	inch/lb	11.82/17.64
	Tool-to-tool time	sec	1.3(60Hz), 1.6(50Hz) [2.45(60Hz), 2.75(50Hz)]
	Tool changing method	-	Double Arm Swing
	Tool select type	-	Memory random
Machine	Size (with SIDE chip conveyor) L×W×H	inch	96.86(151.34) × 176.50 × 122.09
	Size (with REAR chip conveyor) L×W×H	inch	-
	Weight	lb	22,046.23
Coolant tank capacity		gal	93.52
Electric power supply		kVA/V	41/220
Controller			FANUC 0i-MF Plus [FANUC 31i-MB5]

※ Design and specifications are subject to change without notice.

MVF 5000

VERTICAL MACHINING CENTER

NC Specification / FANUC

● : STD ○ : Optional ( ) : Option X : N/A

Category		0*i*-MF Plus
Controlled axis	Controlled axes	X, Y, Z
	Max simultaneously controlled axes	4
	Least input increment	0.001mm / 0.0001"
	Built-in stroke limit	Soft overtravel 1, 2, 3
	Machine lock	●
Operation function	Manual handle feed	X1, X10, X100
	Dry run	●
	Single block	●
	Feed per minute	G94
	Feed per revolution	G95
	DNC operation	Ethernet, CF card
	Thread cutting pause	●
Interpolation function	Linear interpolation	G01
	Circular interpolation	G02, G03
	Dwell	G04
	Cylindrical interpolation	G70.1
	Skip	G31
	Fine surface machining	●
	Smooth tolerance Control	●
	Nano Smoothing	X
	Polar coordinate interpolation	X
	Reference position (zero) return	G28
	Reference position (zero) return check	G27
	2nd, 3rd, 4th reference point return	G30
Feed function	Rapid traverse override	F0, 25%, 50%, 100%
	Feedrate override	0~200%
	Jog override	0 ~ 5,000 mm/min
	AI look ahead	20 block
	AI contour control II	200 block
	Look ahead block expansion (F0i) (400 Block)	○
	High-speed processing (600 Block)	X
	Look ahead block expansion (F31i) (1,000 Block)	X
	Jerk control	●
Spindle function	Spindle orientation	●
	Rigid tapping	M29
	Spindle override	50 ~ 150%
Tool function	Tool number command	T2-Digt Tool number
	Tool nose radius compensation	G40 ~ G42
	Tool offset pairs	400 pairs
	Tool geometry / wear offset	●
	Tool length compensation	●
	Tool life management	●
	Tool path graphic display	●

NC Specification / FANUC

● : STD ○ : Optional ( ) : Option X : N/A

Category		0*i*-MF Plus
Program input	Absolute / incremental command	G90/G91
	Repeating canned cycle	X
	Repeating canned cycle 2	X
	Canned cycles	X
	Drilling canned cycle	G73/74/76, G80~89
	Decimal point input	●
	Inch / metric conversion	G20 / G21
	Program restart	●
	Sub program call	●
	Max programmable value	±99999.999mm/±9999.9999"
	M function	3 digit
	Custom macro	●
	Addition of custom macro common variables	#100~#199, #500~#999 (#98000~#98499)
	Programmable data input	G10
	Tape code	ISO / EIA
	Optional block skip	●
	Workpiece coordinate system	G52 ~ G59
	Addition of workpiece coordinate system	48(300) pairs
Interface function	Embedded ethemet	●
	Fast ethernet	100 Mbps
Setting and display	Alarm and operator history display	●
	Run hour and parts count display	●
	Loadmeter display	●
	Self diagnosis function	●
	Extended part program editing	●
	Machining condition selection function (10 levels)	●
	Machining quality level adjustment (3 levels)	●
	Display screen	15" LCD
	Multi-language display	25 language
Data input/output	Fast data server	●
	RS232C interface	●
	Memory card input / output	●
	USB memory input / output	●
Editing operation	Part program storage size	2MB
	Number of registered programs	1,000 EA
	Manual guide i	●
	Manual guide 0i	X

NC Specification / FANUC

● : Standard ○ : Optional ( ) : Option X : N/A

Category		31*i*-MB5
Controlled axis	Controlled axes	X, Y, Z, A(4), C(5)
	Max simultaneously controlled axes	5
	Least input increment	0.001mm / 0.0001"
	Built-in stroke limit	Soft overtravel 1, 2, 3
	Machine lock	●
Operation function	Manual handle feed	X1, X10, X100
	Dry run	●
	Single block	●
	Feed per minute	G94
	Feed per revolution	G95
	DNC operation	Ethernet, CF card
	Thread cutting pause	●
Interpolation function	Linear interpolation	G01
	Circular interpolation	G02, G03
	Dwell	G04
	Cylindrical interpolation	G70.1
	Skip	G31
	Fine surface machining	●
	Smooth tolerance Control	●
	Nano Smoothing	●
	Polar coordinate interpolation	○
	Reference position (zero) return	G28
	Reference position (zero) return check	G27
	2nd, 3rd, 4th reference point return	G30
Feed function	Rapid traverse override	F0, 25%, 50%, 100%
	Feedrate override	0~200%
	Jog override	0 ~ 5,000 mm/min
	AI look ahead	20 block
	AI contour control II	200 block
	Look ahead block expansion (F0i)	X
	High-speed processing (600 Block)	○
	Look ahead block expansion (F31i) (1,000 Block)	○
	Jerk control	●
Spindle function	Spindle orientation	●
	Rigid tapping	M29
	Spindle override	50 ~ 150%
Tool function	Tool number command	T2-Digt Tool number
	Tool nose radius compensation	G40 ~ G42
	Tool offset pairs	99 pairs
	Tool geometry / wear offset	●
	Tool length compensation	●
	Tool life management	●
	Tool path graphic display	●

NC Specification / FANUC

● : Standard ○ : Optional ( ) : Option X : N/A

Category		31*i*-MB5
Program input	Absolute / incremental command	G90/G91
	Repeating canned cycle	○
	Repeating canned cycle 2	○
	Canned cycles	○
	Drilling canned cycle	G73/74/76, G80~89
	Decimal point input	●
	Inch / metric conversion	G20 / G21
	Program restart	●
	Sub program call	●
	Max programmable value	±99999.999mm/±9999.9999"
	M function	3 digit
	Custom macro	●
	Addition of custom macro common variables	#100~#199, #500~#999 (#98000~#98499)
	Programmable data input	G10
	Tape code	ISO / EIA
	Optional block skip	●
	Workpiece coordinate system	G52 ~ G59
	Addition of workpiece coordinate system	48(300) pairs
Interface function	Embedded ethemet	●
	Fast ethernet	100 Mbps
Setting and display	Alarm and operator history display	●
	Run hour and parts count display	●
	Loadmeter display	●
	Self diagnosis function	●
	Extended part program editing	●
	Machining condition selection function (10 levels)	●
	Machining quality level adjustment (3 levels)	●
	Display screen	15" LCD
	Multi-language display	25 language
Data input/output	Fast data server	●
	RS232C interface	●
	Memory card input / output	●
	USB memory input / output	●
Editing operation	Part program storage size	1MB (2MB ~ 8MB)
	Number of registered programs	1,000 EA (4,000 EA)
	Manual guide i	●
	Manual guide 0i	X

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