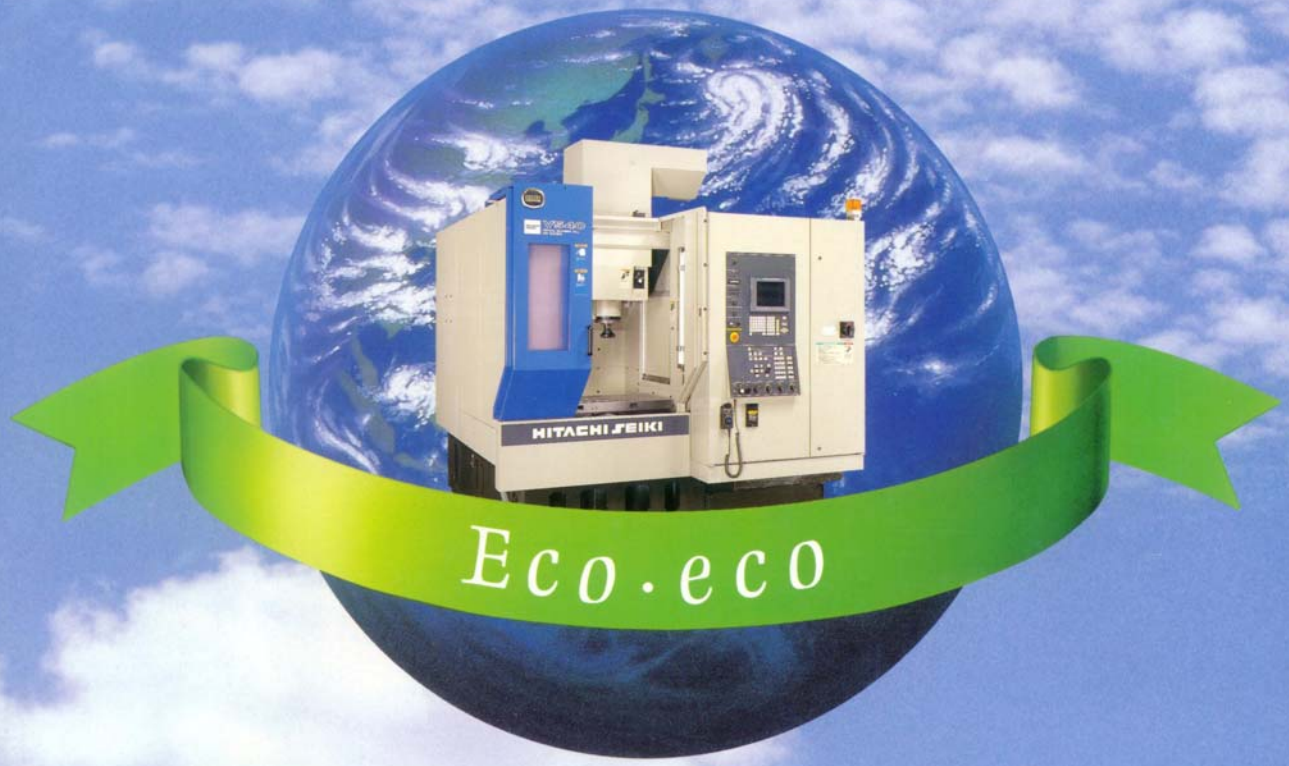
VS40

S-SERIES

VS40

"Eco•eco" Super Productive Vertical Machining Center



Environment and User-Friendly, High Speed High Efficiency Machine

VS40 Vertical Machining Center is in conformity with the EC DIRECTIVE for the essential health and safety requirements regarding to machinery.

"Eco·eco" 〈Ecology and Economy〉 Super Productive Vertical Machining Center

VS40

Standard type
High grade type
Die & Mold type

High Grade type /Die & Mold type 20-tool ATC

Standard type 16-tool ATC

Major Development Points of VS40

- High productivity
  - Stable accuracy → Geometry accuracy at high speed cutting 〈P4〉
  - Shortened net cutting time → Spindle (high speed, high power) 〈P3〉
  - Shortened non-cut time → Rapid traverse(X,Y 40m/min,Z 30m/min)
  - Shortened idle time → Proven setup saving function 〈P6〉
- High Speed machining 〈P7〉
- User and environment friendly
  - Environment conscious → Prevention of coolant decomposition 〈P5〉
  - Energy saving → Hydraulic and lubrication oil unnecessary 〈P5〉
  - Operability → ATC free from interference with workpiece 〈P8〉

"Awarded"
'99 The Enegy Conservation Division of Japan Machinery Federation Presidential Prize. (From The Japan Machinery Federation)

Specifications	
• Spindle nose	7/24 taper No.40
• Travel	
X axis	600mm(24.0")
Y axis	450mm(17.7")
Z axis	450mm(17.7")
• Rapid traverse	
X-Y axis	40m/min(1575 ipm)
Z axis	30m/min(1181 ipm)
• Spindle Speed〔Motor〕	
Standard type	60~8000min^{-1}(rpm)/ (5.5/3.7kW(7.5/5HP))
High grade type	35~12000min^{-1}(rpm)/ (11/5.5kW(15/7.5HP))
Die & Mold type	35~12000min^{-1}(rpm)/ (22/18.5kW(30/25HP)) 〈Option〉 35~20000min^{-1}(rpm)/ (18.5/15kW(25/20HP))
• CNC Unit	
Standard /High grade type	SEICOS Σ 18M
Die & Mold type	SEICOS Σ 16M

Accuracy(Standard type)	
• Positioning accuracy	±0.0025mm(0.0001")/ full Stroke
• Repeatability	±0.001mm(0.00004")

Mecha. Softwares Supporting High Speed Machining

VS40 Cutting capabilities

Material : Carbon Steel

	Face mill φ80mm(3.1") 5-blade	End mill φ16mm(5/8") 4-flute Carbide	End mill φ40mm(1.5") 2-flute H·S·S	Drill φ30mm(1.2") H·S·S	Tap H·S·S
Chip volume cu.cm/min. (cu.inch/min.)	341 (20.8)	300 (18.3)	24 (1.5)	——	M24×P3.0
Cutting width depth mm(inch)	65×3.5 (2.56"×0.14")	4×30 (0.16"×1.2")	20×30 (0.78"×1.2")	——	
Sp.speed min^{-1}	1000	5000	200	265	130
Feedrate mm/min.(ipm)	1500 (59.1)	2500 (98.4)	40 (1.57)	0.5 mm/rev. (0.02ipr)	Small Tap(Mat.ALM) M2×P0.4 Spindle speed 3000min^{-1}

**Accuracy data are the actual results obtained under static testing conditions in a temperature controlled environment per JIS -Standards.*

High Speed

Rapid traverse

X·Y axis 40m/min (1575ipm)

Z axis 30m/min (1181ipm)

Max.cutting feedrate

X·Y axis 40m/min(1575ipm)

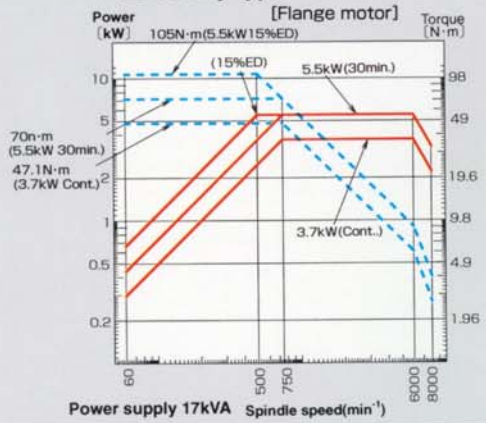
Z axis 30m/min(1181ipm) (w/SHG1)

**Accuracy data are the actual results obtained under static testing conditions in a temperature controlled environment per JIS -Standards.*

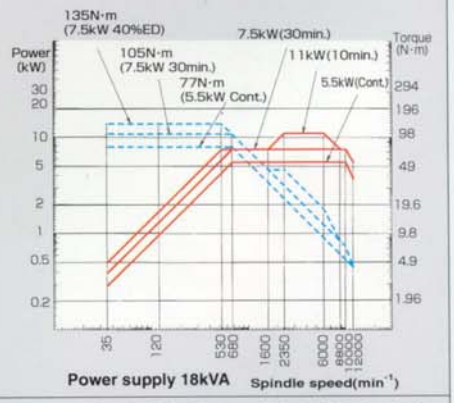
Spindle power and speed diagram

Standard type spindle head

Economy type 8000min^{-1}

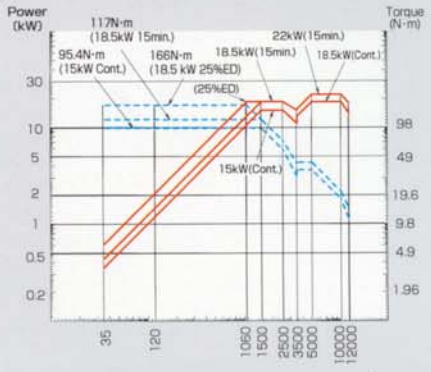


Std. type 12000min^{-1}

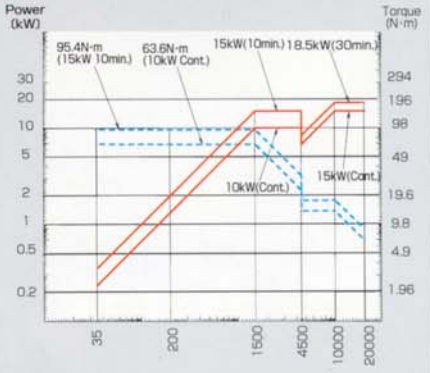


High grade / Die & Mold type spindle head

Die & Mold type(1) 12000min^{-1} High power



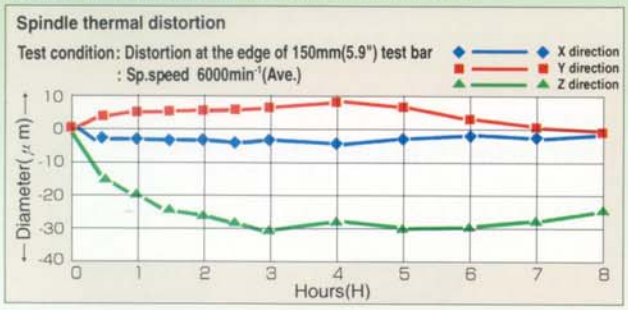
Die & Mold type(2) 20000min^{-1}



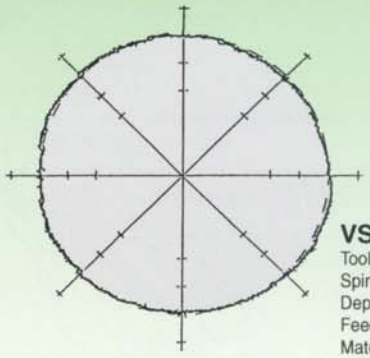
Reasons for High Accuracy

Built-in motor provides high rigidity and high accuracy

Use of a large diameter spindle and a built-in motor provides high rigidity and high accuracy, free from vibration. (Ambient temperature controlled spindle cooling unit is built in as standard equipment.)



Roundness 2.5 μm



VS40 Test conditions
Tool: ϕ 25(1")×8-flute end mill
Spindle speed : 12000min⁻¹
Depth of cut : 0.1mm(0.004")
Feedrate : 2000mm(78")/min
Material : Aluminium

*Accuracy data are the actual results obtained under static testing conditions in a temperature controlled environment per JIS -Standard.

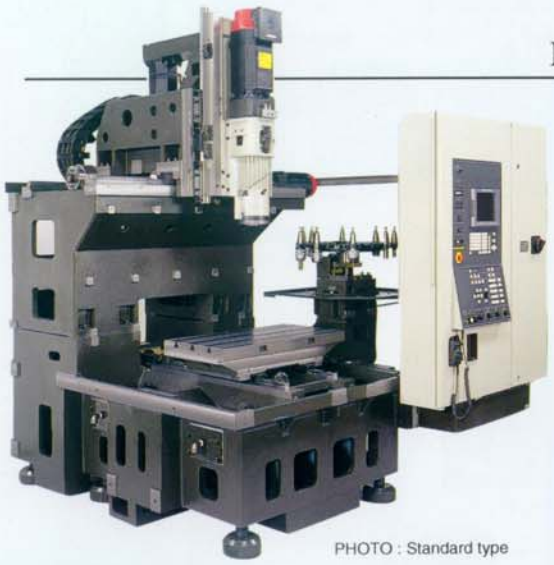


PHOTO : Standard type

Mecha.Softwares supporting High Accuracy

SEIKI-ATAC10* (option)
New Y, Z Axis Thermal Distortion Compensator (PAT.)

This AI (Artificial Intelligence) thermal distortion compensating function eliminates thermal influence caused during operation and maintains the machining conditions to high accuracy.

- It judges totally the thermal distortion of mechanical sections affected by a tempera ture change, and compensates the Y axis and Z axis respectively.
- In conjunction with the spindle cooling unit, it maintains high accuracy.
- The compensating function works immediately after power on, thus shortening warm up time substantially.
- Operates in Manual or Automatic, without operator intervention.
- The AI control with the know-how attained through conventional thermal distortion compensator further improves the reliability.

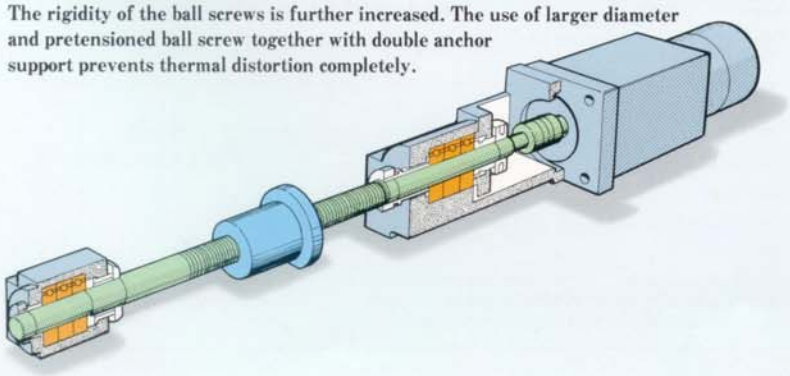
* A : Artificial Intelligence
T : Thermal Distortion
A : Accuracy
C : Control
10 : within ±10 μm(±0.0004")

Highly Rigid Machine Structure

To ensure stabilized high speed travel, a saddle traverse system is employed, where the saddle traverses on the column.

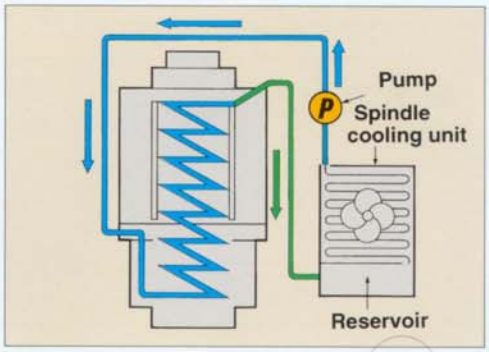
Pretensioned Ball Screws and Double Anchor Supports

The rigidity of the ball screws is further increased. The use of larger diameter and pretensioned ball screw together with double anchor support prevents thermal distortion completely.



Spindle Cooling Unit

The use of a spindle cooling unit prevents the heat generated by the built-in motor from transmitting to the machine body,
thus minimizing the thermal distortion.



VS40 Machine Specifications

Items			unit	Standard type	High grade type	Die & Mold type
Capacity	Spindle longitudinal (X axis)		mm(inch)	600(24.0)		
	Table cross (Y axis)		mm(inch)	450(17.7)		
	Spindle head vertical (Z axis)		mm(inch)	450(17.7)		
	Column face to spindle center		mm(inch)	525(20.7)		
	Table surface to spindle nose		mm(inch)	130~580(5.1~22.8)		
Table	Work area		mm(inch)	900 ×450(35.4×17.7)		
	Maximum loading capacity		kg(ℓ bs)	350(770)		
	Table surface			18mm(0.7") T-Groove		
Spindle	Spindle speed	STD.	min^{-1}(rpm)	60~8000	35~12000	35~12000
		High speed		———	———	35~20000
	Number of speed ranges			Stepless		
	Spindle taper hole			7/24 taper No.40		
Feed	Rapid traverse rate	(X·Y axis)	m(inch)/min	40(1575)		
		(Z axis)	m(inch)/min	30(1181)		
	Cutting feedrate	(X·Y axis)	m(inch)/min	0.001~40(0.04~1575)(w/SHG1)*1		
	Jog feedrate		mm(inch)/min	0~5000(0~200)		
ATC	Type of tool shank			BT40/DIN40/CAT40		
	Type of pull-stud			45 deg.		
	Tool storage capacity		pcs.	16	20	20
	Maximum tool diameter		mm(inch)	90(3.5)	110(4.3)	110(4.3)
	Maximum tool diameter(w/o Adjacent tools)		mm(inch)	125(4.9)		
	Maximum tool length		mm(inch)	300(11.8)		
	Maximum tool weight		kg(ℓ bs)	8(17.6)		
	Tool selection method			Fixed address random bi-direction		
APC (Option)	Number of pallets		pcs	2		
	Pallet change system			Parallel shuttle type		
	Pallet size		mm(inch)	800×400(31.5×15.7)		
	Pallet loading capacity		kg(ℓ bs)	250(550)		
Motors	Spindle drive motor *2		kW(HP)	5.5/3.7(7.5/5)	11/5.5(15/7.5)	22/18.5(30/25)
	Hydraulic pump motor		kW(HP)	0.75(1)	Not used	
	Lubrication pump motor			Not used		
	Coolant pump motor		W(HP)	180+400(1/4+1/2)		
Power sources	Electric power supply*2		kVA	17	18	36
	Power supply voltage		V	200/220 ±10%		
	Power supply frequency		Hz	50/60		
	Air pressure source		MPa(psi)	0.5(5kgf/cm^2)(70)		
	Air flow rate		N ℓ /min(gal)	100(26)		
Tank capacity	Hydraulic tank		ℓ (gal)	7(1.8)	Not used	
	Lubricant tank			Not used		
	Coolant tank		ℓ (gal)	420(110)		
Machine weight			kg(ℓ bs)	7000(13700)	7300(16100)	7300(16100)

*1 w/o SHG1 Max.cutting feedrate is 10m/min (393ipm)
*2 Optional spindle specification please see page3.

※Specifications are subject to change for improvement without notice.

※Accuracy and cutting data may vary depending on machining condition, tools, material, and room temperature. These are not guaranteed numbers.

Standard accessories

- Direct tapping function 1~3000min^{-1}
- ATC Economy type 16 tool
  Std / Die &Mold type 20 tool
- Chip flow jet coolant
- Flood coolant
- Total enclosed splash cover
- Operator side door interlock
- ATC guard
- ATC door interlock
- Manual pulse generator
- Sp.load meter (on screen)
- Spindle speed / feedrate override
- Call light
- Electric leakage detection breaker
- W-setter / Easy setter
  (Std / Die & Mold type : Standard)
  (Economy type : Option)
- Safety guard
  (Std / Die &Mold type : Standard)
  (Economy type : Option)
- Spindle cooling device (Std / Die &Mold type only)
- Machining completion pre-call / Work counter/ Run hour display (on screen)
- Work light
- Leveling pads.
- Spanners and wrenches

Optional accessories

- Scale feed back
- High column
- High speed spindle 20000min^{-1}
- ATC expansion with guard
- Automatic pallet changer
- Different type pull stud
- Chip conveyor rear type
- Spiral chip conveyor × 2 pcs
- Chip wagon w/ roller
- Air blow for cutting point
- Spindle through air blow
- Jet coolant
- Gun coolant
- Oil hole coolant
- Sp.through coolant
- Coolant filtration device
- Oil mist
- Mist collector
- Auto door
- Key-switch for door interlock auto/maintenance
- Fixture plate
- Additional pallet
- Power supply on table
- Additional pull stud
- NC rotary table
- Spindle speed meter, (Separate type)
- Spindle load meter, (Separate type)
- Work counter 6-digit
- Run hour meter (Separate type)
- Weekly timer
- Additional call light (2/3 Collor)
- Call buzzer
- Melody horn
- Automatic power cut-off device
- M-code out put (M70~M73)
- Tool length measuring & Tool breakage detection
- Auto.centering (UTS / Renishaw)
- Auto.measuring (UTS / Renishaw)
- On the machine measuring (UTS / Renishaw)
- Measuring master gauge
- Cleaning tool for measuring
- SEIKI-ATAC10(Y-Z-axis thermal displacement offset)
- Coolant fluid temperature control
- Safety regulations
- Transformer

CNC UNIT SEICOS Σ(Sigma) 18M / SEICOS Σ(Sigma)16M

● : Standard ○ : Option

Standard specifications		S-Σ18M	S-Σ16M
● Controlled axes	3 axes, 3axes simultaneous	●	●
● Least input increment	0.001mm/0.0001"	●	●
● Interpolation	Positioning,Linear, Circular	●	●
● Inch/ Metric conversion		●	●
● Tape code	EIA/ISO auto.recognition	●	●
● Buffer register		●	●
● Decimal point programming		●	●
● Multi- buffer	12 blocks	●	●
● Separate inposition check	Feed / Rapid	●	●
● Feedrate command	F code /feedrate direct	●	●
● Rapid traverse override	0, 1, 10, 50, 100%	●	●
● Feedrate override	0~200%(10% step)	●	●
● Override cancel		●	●
● Spindle override	50~150%(10% step)	●	●
● Automatic override memory		●	●
● Direct tapping		●	●
● Manual feed function	Rapid, Jog feed, Handle	●	●
● Manual pulse generator	×1, ×10, ×100(inch=×50)	●	●
● Part program storage	80m	●	●
● Add.registered programs	100pcs.	●	●
● Back ground editing		●	●
● Expanded program edit. (program copy)		●	●
● Display	9.5"monochrome	●	—
	10.4"color TFT	○	●
● Memory lock		●	●
● Language display	English / German	●	●
● Tape mode operation	RS232C *1	●	●
● I/O interface	RS232C *1	●	●
● Function	G3,M3, T4	●	●
● Spindle speed command	S code/speed direct	●	●
● Tool position offset	G45~G48	●	●
● Tool length compensation	G43 G44 G49	●	●
● Tool radius compensation C	G40~G42	●	●
● Tool offsets	32 pcs.	●	●
● Tool offset memory C		●	●
● Machine coordinate system selection	G53	●	●
● Work coordinate system	G54~G59	●	●
● Work coordinate system preset		●	●
● Local coordinate system setting	G52	●	●
● Coordinate system setting	G92	●	●
● Reference point return Manual, Auto	G27~G29	●	●
● 2nd reference point return	G30	●	●
● 3rd-4th reference point return		●	●
● Graphic display Before and synchronized machining		●	●
● 16-character program name		●	●
● Single block		●	●
● Block skip 1 pc.		●	●
● Optional stop		●	●
● Dry run		●	●
● Machine lock		●	●
● Z-axis feed cancel		●	●
● Program number search		●	●
● Sequence number search and comparison stop		●	●
● Program comparison		●	●
● Manual absolute 「ON」 fixed		●	●
● Custom macro	Common variable 100pcs.	●	●
● Coordinate rotation		●	●
● Screen guide special canned cycle		○	○
Deep hole drilling	G73 G83		
Drilling pattern cycle	G70~ G72 G77		
Square side surface outer cutting	G322 G323		
Square lateral cutting	G324~G326		
Pocket cutting cycle	G327~G333		
Right circular interpolation	G302~G305		
● Fixed cycle	G73 G74 G76 G80~G89	●	●
● Drilling pattern cycle	G70~G72 G77	●	●
● Right circular interpolation	(incl. spiral)	●	●
● Mirror image	Setting via screen	●	●
● Chamfering/corner R any angle		●	●
● Radius designation on arc		●	●
● Exact stop	G09 G61 G64	●	●
● Programmable data input	G10	●	●
● Backlash compensation		●	●
● Stored pich error compensation		●	●
● Run hour display	(on screen)	●	●
● Cycle completion pre-call	(on screen)	●	●
● Cycle time display	(on screen)	●	●
● Work counter	(on screen)	●	●
● Clock function		●	●
● Following up		●	●
● Stored stroke limit 1		●	●
● Stroke check before move		●	●
● NC self diagnostics		●	●

Optional specifications	S-Σ18M	S-Σ16M
●F1 digit function	○	○
●Direct tapping w/Pecking cycle	○	○
●Manual pulse generator 3 pcs.	○	○
●High resolution detection interface (0.1μ)	○	○
●Polar coordinate command	○	○
●Custom macro Commen variable 200,300,600 pcs	○	○
●Interruption type custom macro	○	○
●Seiki High Grade-2(High grade die& mold mach.)	○	●
High precision contouring control(With 64 bit RISC engine)		
Linear accel./decel.before pre-read interpolation		
Multi-buffer Pre-read 180 blocks		
Feedrate control by circular acceleration		
Automatic feed control		
DNC connection circuit or Data server		
Graphic guidance adjustment software		
●Seiki High Grade-1(High speed machining)	○	○
Helical interpolation		
Advanced control		
Graphic guidance high speed machining software		
·High speed side milling cycle		
·Z feed grooving cycle ·Trochoid cycle		
·Square pocket cycle ·Helical boring cycle		
·Corner pocket cycle		
●Flash data sever(160MB Flash card)(Need UUP) (N/A with DNC connection circuit)	○	○
●Hard disk data server(2.1GB hard disk)(Need UUP) (N/A with DNC connection circuit)	○	○
●DNC connection circuit RS232C (Incl. remote buffer, need technical siscussion) (N/A with data server)	○	●
●DNC connection circuit RS422 (Incl. remote buffer, need technical discussion) (N/A with data server)	○	○
●Programmable mirror image	○	○
●Advanced control(High speed machining)	○	○
Advanced feed forward		
Linear accel./decel.before cutting feedrate		
Automatic corner deceleration		
Block overlap function		
Feedrate clamp by circular radius		
●Scaling function	○	○
●Automatic corner override	○	○
●Programmable parameter input	○	○
●Macro print func.(Need printer w/RS232C I/F)*1	○	○
●Part program storage (Main) total 160m 320m	○	○
●Part program storage (Sub) total 1000m 2000m 4000m 10000m(Need UUP)	○	○
●Add.registerable prog. total 200 pcs.(Need Main160m) 400 pcs.(Need Main 320m)	○	○
※ Add.registerable prog. Sub total 2000pcs. / 10 directory Main+Sub 1000pcs. /1 directory	○	○
●2nd auxiliary function	○	○
●3-dimensional tool compensation G40 G41	○	○
●Tool offsets total 64, 100,200,400 pcs.	○	○
●Work coordinate system total 60 sets	○	○
●Retract to machining interrupted point(retract and return)	○	○
●Retrace	○	○
●48-character program name	○	○
●Block skip total 9 pcs.	○	○
●Block restart	○	○
●Program restart	○	○
●Manual interruption in handle mode	○	○
●Single direction positioning	○	○
●Helical interpolation (Incl.add.axis)	○	○
●Cylindrical interpolation	○	○
●Hypothentical axis interpolation	○	○
●Involute interpolation	○	○
●Smooth interpolation (Need high precision contouring control with 64 bit RISC engine)	—	○
●NURBS interpolation (Need high precision contouring control with 64 bit RISC engine)	—	○
●DNC 2 control (only system machine)	○	○
●UUP (Universal user port)	○	○
●External data input (Need technical discussion)	○	○
●External I/O device control (Need technical discussion)	○	○
●Skip function (High speed)	○	○
●Tool life management / Spare tool call	○	○
●Each program,cycle time display 10pcs.(on screen)	○	○
●Each program cycle time display 50pcs.(on screen)	○	○
●Cutting monitor(Incl.tool life management/spare tool call)	○	○
●Stored stroke limit 2	○	○
●Rotary axis control	○	○
●Add.1 axis (Incl.simultaneous control)	○	○
●Add.2 axes (N/A more than 4 axes simultaneous control)	○	—
●Add.2 axes (N/A more than 6 axes simultaneous control)	—	○

*Interface only. Not include cable.