High Productivity Vertical Machining Center

VC 430

Belt driven std.
10000 r/min

Direct-couple driven
12000 r/min

Swiveling
operator's panel

Dual contact spindle
(BBT40)

Pallet
Large pallet dimensions

Work light std.
for set-up

Spindle head
cooling system std.

Roller type LMG
Improved rapid traverse
with roller type LMG.

Large capacity coolant tank
with chip pan and box filter

CAM type ATC
ISO #40, 7/24 TAPER
ATC time : 1.3s (T-T-T)
- 30 Tools
- 40 Tools opt.

Improved screen filter

03

High Speed VC 430

High speed spindle of high quality and rigidity increases the machine's efficiency and performance.

Spindle Head

The spindle is mounted directly to the Fanuc spindle motor for faster acceleration and deceleration, and to reduce vibration during high speed operation. The powerful 18.5kW (24.8Hp) spindle motor drives the 40 taper tools at speeds up to 10,000 r/min.
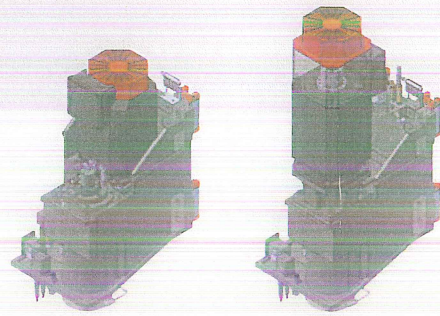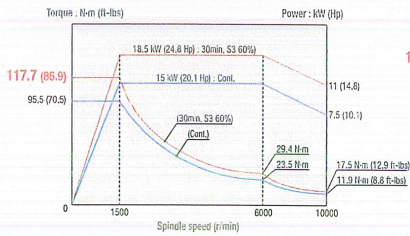
Belt Driven std.
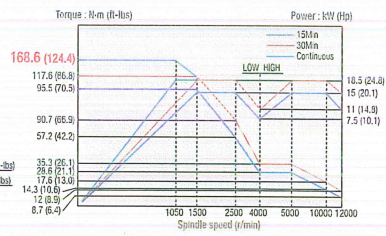**10000** r/min

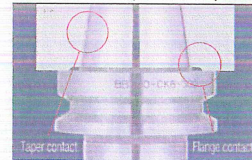**Direct-Coupled Driven** opt.
12000 r/min

Spindle Power-Torque Diagram

10000 r/min : 15/18.5 kW (20.1/24.8 Hp)

Torque : N-m (ft-lbs)   Power : kW (Hp)

117.7 (86.9)
95.5 (70.5)

18.5 kW (24.8 Hp) : 30min, S3 60%)
15 kW (20.1 Hp) : Conl.
11 (14.8)
7.5 (10.1)

(30min, S3 60%)
(Cont.)

29.4 N-m
23.5 N-m
17.5 N-m (12.9 ft-lbs)
11.9 N-m (8.8 ft-lbs)

0   1500   6000   10000
Spindle speed (r/min)

12000 r/min : 15/18.5 kW (20.1/24.8 Hp)

Torque : N-m (ft-lbs)   Power : kW (Hp)

—— 15Min
—— 30Min
—— Continuous

LOW HIGH

168.6 (124.4)
117.6 (86.8)
95.5 (70.5)

90.7 (66.9)
57.2 (42.2)

35.3 (26.1)
29.6 (21.1)
17.6 (13.0)
14.3 (10.6)
12 (8.9)
8.7 (6.4)

18.5 (24.8)
15 (20.1)
11 (14.8)
7.5 (10.1)

1050 1500   2500 4000   5000   10000 12000
Spindle speed (r/min)

Dual Contact (BIG PLUS) std.

The dual contact system offers simultaneous dual contact between the machine spindle face and tool holder flange face.

Spindle Head Cooling System std.

The refrigerated spindle cooling system circulates cooling oil to maintain a constant temperature for high accuracy, regardless of the ambient temperature or cutting conditions.
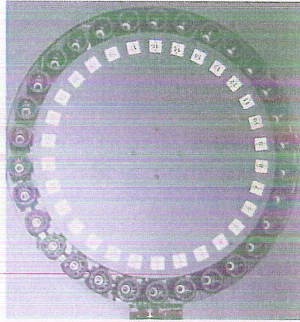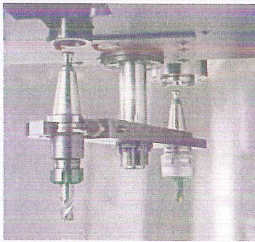
Minimized Non Cutting Time

Suitable for high productivity.

Tool Magazine

The 30 station, automatic tool changer accepts 40 taper tooling. Its reliable double arm system provides a 1.3 second tool-to-tool times. ATC has a bi-directional magazine that automatically takes the shortest path.
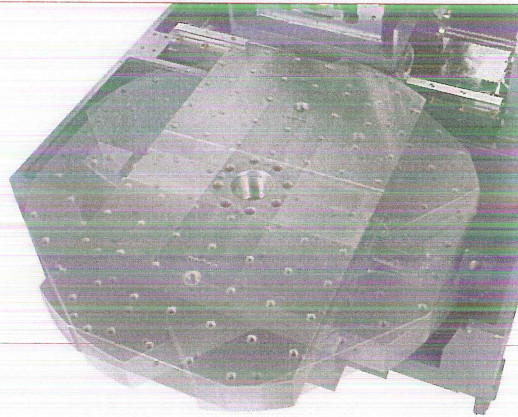
30 station std.
40 station opt.

Automatic Tool Changer

Tool change time (C-T-C) **4.3** s
Tool change time (T-T-T) **1.3** s

Sophisticated mechanisms that significantly reduce non-cutting time.
Tool-to-tool: 1.3 s, Chip-to-chip: 4.3 s

Dual Indexing Pallet (APC)

Pallet change time   **5** s
Pallet loading capacity   **2-300** kg (2-661.4 lb)
Pallet size   **2-712 x 475** mm (2-28.0 x 18.7 inch)

The automatic 180 degree indexing pallet table is an integral part of the VC 430. The table mechanism is mounted directly to the bed of the machine on a horizontal plane to enhance the table rigidity. Because the table is stationary during machining, the non-cutting side of the indexing table can be set-up while the workpiece is being machined on the machine side. The maximum workpiece weight is 300 kg per table side. The indexing table rotation time, including clamp and unclamp, is only 5 seconds. As an added feature, rotary table cables and work holding hoses can be run down from the sheet metal wall.
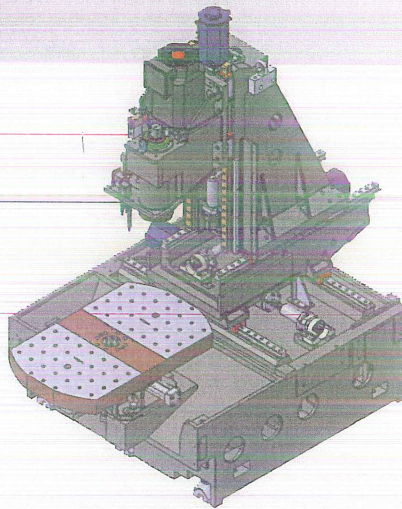
05

High Rigidity   VC 430

Stable bed and column assemblies are designed for high speed and heavy duty machining.

Rigid Body

Travel Axes (X/Y/Z)

560 / 430 / 570 mm
(22.0 / 16.7 / 22.4 inch)

The one piece bed is a rigid, heavily ribbed, Meehanite casting that remains stable under the heaviest cutting conditions. Fine grained Meehanite cast iron is used for its excellent vibration absorbing characteristics. The VC430 features a superior traveling column design. The table, and therefore the workpieces, remains stationary during machining. This design provides a uniform load to the guideways, ball screws and motors.

Axis Drivers & Ball Screw

X and Y axes, featuring linear motion guide ways with six rows of heavy-duty balls, provide stable cutting capabilities, even during heavy and interrupted cuts.

Oversized AC servo drives power through the toughest cuts in the toughest metal. The high torque servos are coupled directly to the ball screws. The ball screws are center mounted and supported on both ends by high precision angular contact thrust bearings. This single pretension design provides outstanding positioning repeatability with minimized thermal growth.
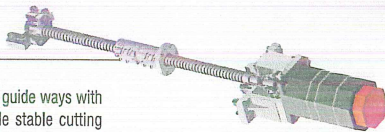
Rapid Traverse

Linear motion guideways and high speed servo motors apply high rapid axis movement. This reduces non-cutting time and machining time for greater productivity.
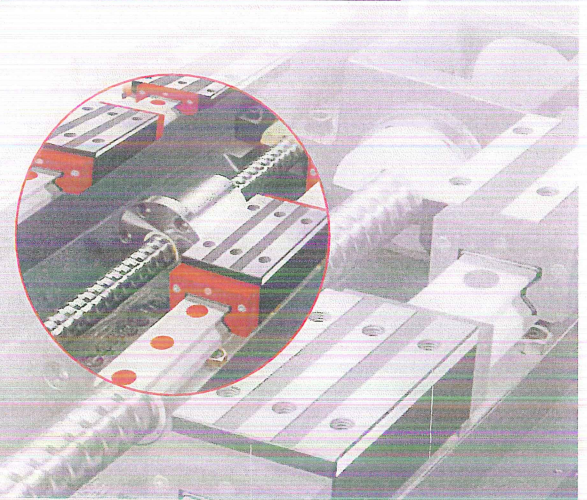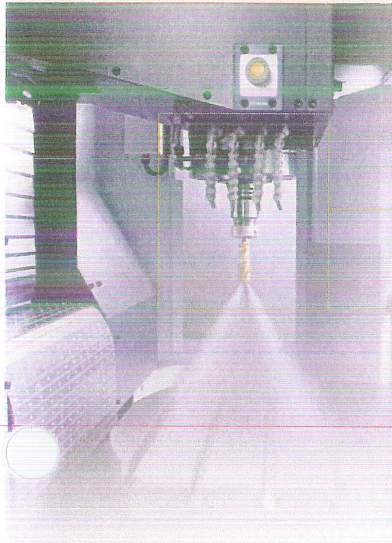
		Rapid traverse
X-axis	m/min (ipm)	40 (1574.8)
Y-axis	m/min (ipm)	40 (1574.8)
Z-axis	m/min (ipm)	36 (1417.3)

Advanced Performance & Units

Coolant System

The large capacity coolant tank is located on rollers. The coolant tank is isolated from the machine bed to prevent heat transfer and associated thermal distortion. Providing high volume flood coolant as a standard feature.
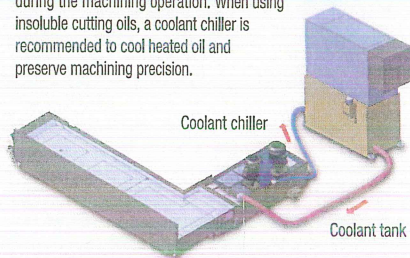
Through Spindle Coolant opt.

The large-scale cutting oil pump and tank are located away from the machine's main body to prevent heat transfer. The pump generates 60 HZ power when measured at the pump outlet. The main axis cutting oil device (T-S-C) is available as an option.

Flood Coolant std.

Operating Panel

1. Swivelling operating console
   An easy-to-use operation panel which can swivel from 0-90°

90°

2. The ATC operating button is accessible from the main panel.

   Magazine : CW

   Magazine : CCW

   This can give much easier operation and maintenance for ATC.

3. Portable MPG
   Portable MPG makes a workpiece setting easier for the operator.

Coolant Chiller opt.

The coolant chiller lowers coolant temperature, helping to cool both the workpiece and tool during the machining operation. When using insoluble cutting oils, a coolant chiller is recommended to cool heated oil and preserve machining precision.
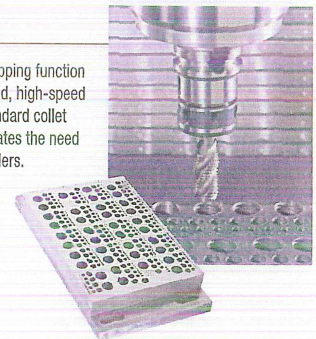
Coolant chiller

Coolant tank

Lubrication

A lubrication system provides automatic lubrication to all guideways and ball screws. The way oil is delivered by piston distributors which precisely meter the volume. A low level alarm prevents the machine from restarting.
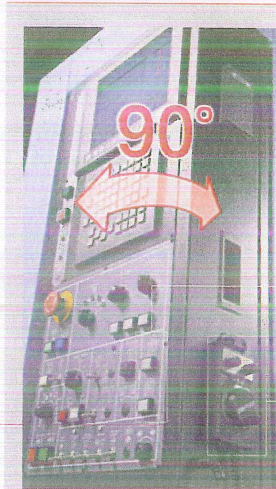
Rigid Tapping

A standard rigid tapping function allows synchronized, high-speed tapping with a standard collet chuck. This eliminates the need for special tap holders. The tapping depth can be accurately controlled.

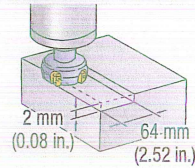# Machining Capacity

Provides high productivity and high accuracy in a variety of machining operations

Face mill — Carbon steel (SM45C)

- ø80mm (3.15 in.) Face mill (6Z)

2 mm (0.08 in.)
64 mm (2.52 in.)

Machining rate
432 cm³/min (26.4 in³/min)

Spindle speed
1500 r/min

Feedrate
2700 mm/min (106.3 ipm)

End mill — Carbon steel (SM45C)

- ø30mm (1.2 in.) Endmill (6Z)

15 mm (0.59 in.)
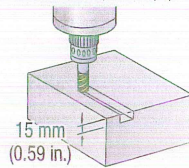
Machining rate
36 cm³/min (2.2 in³/min)

Spindle speed
222 r/min

Feedrate
80 mm/min (3.1 ipm)

Face mill — Gray casting (GC25)

- ø80mm (3.15 in.) Face mill (6Z)

3 mm (0.12 in.)
64 mm (2.52 in.)
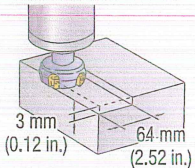
Machining rate
691 cm³/min (42.2 in³/min)

Spindle speed
1500 r/min

Feedrate
3600 mm/min (141.7 ipm)

U-drill — Carbon steel (SM45C)

Ø51 mm (2 in.)
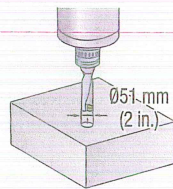
Machining rate
172 cm³/min (10.5 in³/min)

Spindle speed
750 r/min

Feedrate
84 mm/min (3.3 ipm)

Face mill — Aluminum (AL6061)

- ø80mm (3.15 in.) Face mill (6Z)

5 mm (0.2 in.)
64 mm (2.52 in.)
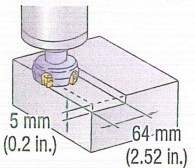
Machining rate
1785 cm³/min (109 in³/min)

Spindle speed
1500 r/min

Feedrate
5580 mm/min (219.7 ipm)
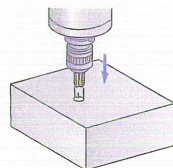
Tap — Carbon steel (SM45C)

Tool
M30 x P3.5

Spindle speed
212 r/min

Feedrate
742 mm/min (29.2 ipm)

Machining Accuracy

For increased repeatability and reliability

Designed for exceptionally high accuracy and minimal thermal displacement and vibration.
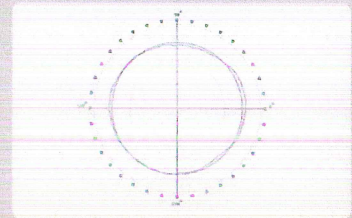
Roundness

6.0 μm

- Model : VC 430
- Material : A7075F
- Tool : Endmill ø12mm (ø0.5 in.) (4 blades)
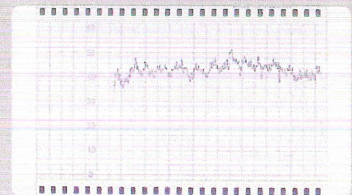
Roughness

Ra 0.2 μm

- Spindle speed : 10000 r/min
- Feedrate : 1500 mm/min (59.1 ipm)

• Machining results may differ from those shown here, reflecting differences in environmental and machining conditions.

Optional Equipment   VC 430

Operator's convenience and operability
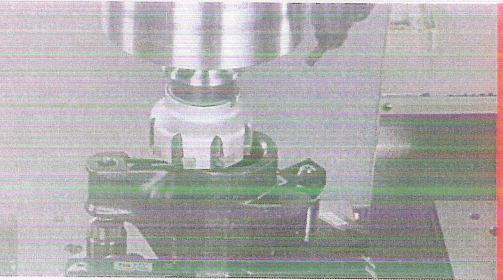
Interface for Additional Equipment

Connection Example of Additional Axis Interface
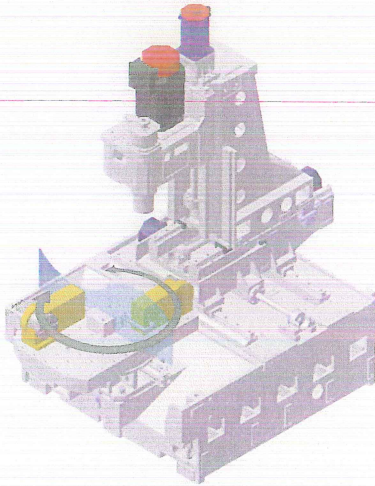
- An additional hydraulic unit may be required according to rotary table specifications.
- Recommended rotary table size : ø170mm (6.7 inch)

Connection Example of Fixture Interface

Hydraulic

Pneumauic
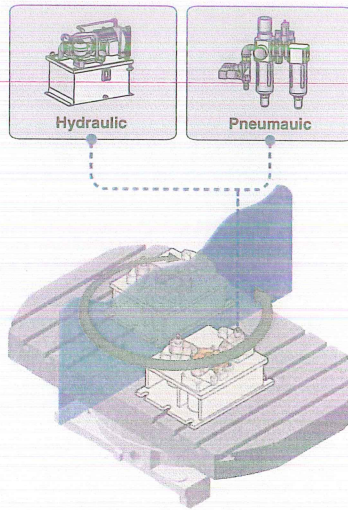
Fixture check list
(for hydraulic / pneumatic fixtures)

Pressure source

Hydraulic	☐ P/T	☐ A/B
Pneumatic	☐ P/T	☐ A/B

Number of ports

☐ 1pair (2-PT 3/8" port)
☐ 2pair (4-PT 3/8" port)
☐ 3pair (6-PT 3/8" port)
☐ 4pair (8-PT 1/4" port)
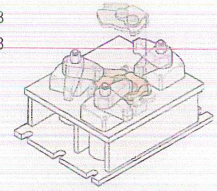
• Contact Doosan for more information

Hydraulic power unit

- Supply scope : ☐ User ☐ Doosan
  (Please check the below detail specification, if you want Doosan to supply.)

☐ Use Doosan standard unit
  24 L/min (6.3 gal/min) / 50 bar
☐ Special requirement
  _____ L/min (gal/min) at _____ MPa (psi)

Machine Specifications

	Features		VC 430
Travel	X-axis (longitudinal movement of table)	mm (inch)	560 (22.0)
	Y-axis (cross movement of saddle)	mm (inch)	430 (16.9)
	Z-axis (vertical movement of spindle head)	mm (inch)	570 (22.4)
	Distance from spindle nose to table top	mm (inch)	150~720 (5.9 ~ 28.3)
	Distance from spindle center to column guideway	mm (inch)	495 (19.5)
Table	Pallet size	mm (inch)	2-712 x 475 (2-28.0 x 18.7)
	Pallet loading capacity	kg (lb)	2-300 (2-661.4)
	Max. workpiece height	mm (inch)	460 (18.1)*
	Pallet surface		2-29-M16 x P2.0
Spindle	Max. spindle speed	r/min	10000 (12000)
	Spindle taper		ISO #40 7/24 Taper
	Max. spindle torque	N.m (ft-lb)	117.7 (86.9) (177.7 (86.9), 167.6 (123.6))
Feedrate	Rapid traverse rate (X / Y / Z)	m/min (ipm)	40 / 40 / 36 (1574.8 / 1574.8 / 1417.3)
	Cutting feedrate	mm/min (ipm)	18000 (708.7)
Automatic tool changer	Type of tool shank		MAS403 BT40
	Tool storage capacity		30 (40)
	Max. tool diameter	mm (inch)	80 (3.2) (76 (3.0))
	Max. tool diameter without adjacent tools	mm (inch)	125 (4.9)
	Max. tool length	mm (inch)	220 (8.7)** / 300 (11.8)***
	Max. tool weight	kg (lb)	8 (17.6)
	Tool change time (tool-to-tool)	s	1.3
	Tool change time (chip-to-chip)	s	4.3
Automatic pallet changer	Number of pallet	ea	2
	Pallet change time	s	5
Motor	Spindle motor (30min)	KW (Hp)	18.5 (24.8)
	Feed motor (X / Y / Z)	kW (Hp)	4.0 / 4.0 / 4.0 (5.4 / 5.4 / 5.4)
Power source	Electric power supply (rated capacity)	kVA	40.3
	Compressed air supply	MPa	0.54
Tank capacity	Coolant tank capacity	L (galon)	300 (79)
	Lubrication tank capacity (available)	L (galon)	1.8 (0.5)
Machine size	Machine height	mm (inch)	3030 (119.3)
	Machine dimensions (L x W)	mm (inch)	2960 x 2370 (116.5 x 93.3)
	Machine weight	kg (lb)	7800 (17196)
NC system			DOOSAN-Fanuc i series

- Design and specifications are subject to change without notice.
- Slight variations in performance may occasionally be detected.

* : For large scale structure installation and tool interference, please consult with the technical department of Doosan
** : Available in pallet changer,   *** : Available in tool magazine,
Note : ( ) are optional.

Standard Feature

- APC guard for safety
- ATC guard for safety
- Assembly & operation tools
- Coolant tank & chip pan
- Door interlock
- Full enclosure splash guard
- Installation parts
- Operator call lamp (red, yellow, green)
- Spindle head cooling system
- Rigid tapping
- Work light

Optional Feature

- 4th axis preparation
- Automatic front door
- Automatic measuring system
- Automatic power off
- Automatic tool measurement
- Chip conveyor & chip bucket
- Hydraulic line for work fixture system
- Oil skimmer
- Pneumatic line for work fixture system
- Rotary table
- Shower coolant
- Test bar
- Through spindle coolant

NC Unit Specifications DOOSAN-Fanuc i series

AXES CONTROL

- Controlled axes	3 (X,Y,Z)
- Simultaneously controllable axes	
Positioning (G00) / Linear interpolation (G01) : 3 axes	
Circular interpolation (G02, G03) : 2 axes	
- Backlash compensation	
- Follow up	
- Least command increment	0.001mm (0.0001 inch)
- Least input increment	0.001mm (0.0001 inch)
- Machine lock	all axes / Z axis
- Mirror image	Reverse axis movement
	(setting screen and M - function)
- Stored pitch error compensation	
Pitch error offset compensation for each axis	
- Stored stroke check 1	Overtraval controlled by software
- Absolute pulse coder	
- Position switch	

INTERPOLATION & FEED FUNCTION

- 2nd reference point return	G30
- Circular interpolation	G02, G03
- Cylinderical interpolation	G07.1
- Dwell	G04
- Exact stop check	G09, G61 (mode)
- Feed per minute	
- Feedrate override (10% increments)	0 - 200 %
- Helical interpolation	
- Jog override (10% increments)	0 - 200 %
- Linear interpolation	G01
- Manual handle feed	1 unit
- Manual handle feedrate	0.1 / 0.01 / 0.001 mm
- Override cancel	M48 / M49
- Positioning	G00

SPINDLE & M-CODE FUNCTION

- Rapid traverse override	F0 (fine feed), 25 / 50 / 100 %
- Reference point return	G27, G28, G29
- Skip function	G31

- M- code function	M 3 digits
- Spindle orientation	
- Spindle serial output	
- Spindle speed command	S5 digits
- Spindle speed override (10% increments)	10 - 150 %

TOOL FUNCTION

- Tool nose radius compensation	G40, G41, G42
- Number of tool offsets	400 ea
- Tool length compensation	G43, G44, G49
- Tool life management	
- Tool number command	T2 digits
- Tool offset memory C	
Geometry / Wear and Length / Radius offset memory	
- Tool position offset	G45 - G48

PROGRAMMING & EDITING FUNCTION

- Absolute / Incremental programming	G90 / G91
- Automatic Coordinate system setting	
- Background editing	
- Canned cycle	G73, G74, G76, G80 - G89, G99
- Circular interpolation by radius programming	
- Custom macro B	
- Addition of custom macro common variables	
	#100 - #199, #500 - #999
- Decimal point input	
- Extended part program editing	

- Reader / puncher interface	RS - 232C
- Inch / metric conversion	G20 / G21
- Label skip	
- Local / Machine coordinate system	G52 / G53
- Maximum commandable value	
±99,999.999 mm (±9,999.9999 inch)	
- No. of Registered programs	400 ea
- Optional block skip	
- Optional stop	M01
- Part program storage	1280m (512 kB)
- Palyback	
- Program number	O4-digits
- Program protect	
- Program stop / end	M00 / M02,M30
- Rigid tapping	G84, G74
- Sub program	Up to 4 nesting
- Tape code	ISO / EIA Automatic discrimination
- Thread cutting	
- Work coordinate system	G54 - G59

OTHERS FUNCTIONS (Operation, setting & Display, etc)

- 3rd / 4th reference return	
- Additional work coordinate system	G54.1 P1 - 48 (48 pairs)
- AICC1 (AI Contour Control 1) with Hardware : 40 block preview	
- Alarm display	
- Alarm history display	
- Automatic corner override	G62
- Clock function	
- Coordinate rotation	G68,G69
- Cycle start / Feed hold	
- Display of PMC alarm message	
Message display when PMC alarm occurred	

- Machine condition selection function	
- Embeded ethernet	
- Dry run	
- Graphic display	Tool path drawing
- Help function	
- High speed skip function	
- Loadmeter display	
- Look ahead control	G08
- MDI / DISPLAY unit	
8.4" Color TFT LCD, keyboard for data input (small), soft-keys	
- Memory card interface	
- Operation functions	Tape / Memory / MDI / Manual
- Operation history display	
- Optional angle chamfering / corner R	
- Polar coordinate command	G15 / G16
- Programmable data input	
Tool offset and work offset are entered by G10, G11	
- Programmable mirror image	G50.1 / G51.1
- Run hour and part number display	
- Scaling	G50, G51
- Search function	Sequence NO. / Program NO.
- Sell - diagnostic function	
- Servo setting screen	
- Single block	
- Single direction positioning	G60
- Stored stroke check 2	

OPTIONAL SPECIFICATIONS

- Additional controlled axes	4 axes in total
- AICC II (AI Contour Control II) with Hardware : 200 block preview	
- Fast Data server	
- Fast Ethernet	

External Dimensions

Unit : mm (inch)

Top View

Front View

Side View

Table Dimensions

Unit : mm (inch)

Tool Shank

BT40 Unit : mm

CAT40 Unit : in.

(DIN shape)

DIN40 Unit : mm

Design and specifications are subject to change without prior notice.

EX1101SP