

What is plug & play?

The "Plug & Play" as its name reveals, is "plug in the power & play". To meet this idea, we set up a totally new management system. Our design concept is to make sure all parts are standardized and zero-defective. We upgraded machining standards and eliminated the use of conventional manufacturing processes. Assembly processes fully comply with SOP standards. To ensure the goal of zero defects, we introduced 6 Sigma quality management systems. All parts, before entering into the production line, are guaranteed 100% zero-defective to ensure a smooth assembly process. In addition, rigorous in-process inspection, quality auditing, and final product inspection are conducted throughout the entire manufacturing process.

“ The design concepts behind Plug & Play:
The Hartford new Plug & Play, a world class vertical machining center, is designed and engineered featuring the greatest value of any VMC in the world. It is really cost-effective, popularized and zero-defective. ”



Plug & play



The most valuable product in the world.

"Plug and play" was designed with very many processes, and greater efforts were spent than ever before. Our goal is to produce a real zero-defect machine - a most valuable world-class machining center. So, whenever you find any quality defect, even if it is so slight, or if another brand is better than ours, just tell us, we will improve and do the same.



What is " most valuable product " ?

*It means Hartford's new MVP Machining Center.
Why? Because we have a strong commitment to
providing a cost-cutting edge for total solutions.*

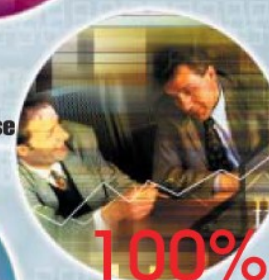
When comparing costs with competitive models, including machine cost, machine working force, operational efficiency and applied technology, etc., you get an approximate 30 - 50% cost saving compared with competitive models from Europe and America. What we do is to provide a cost-cutting investment for you - and reduce your operational costs while increasing your working efficiency and fast payback.

6. Quick Return-On-Investment



5. Quality, No Compromise

P15~P16



100%

Hartrol

4. Hartford Enhanced CNC Controller

P13~P14



3. Full lineup of Equipment

P11~P12

500% up



30% up



1. Optimum Structure

P5~P8

40% up



1. Optimum Structure 40%

- Unmatched column size
- 1100mm wide column base
- 32 M/min (X,Y) rapid traverse (option)
- Superior feed acceleration/deceleration reduces machining time dramatically.

2. Machining Efficiency 30%

- Cycle time reduced by 24.4% (5 tools operation)
- Cycle time reduced by 8% (3 tools operation)
- Daily production volume increased by 31% (5 tools operation)
- Daily production volume increased by 8% (3 tools operation)

3. Full lineup of Equipment 500%

- 70 bar high pressure coolant system (option)
- 20 bar coolant through spindle (option)
- Front mounted screw type chip conveyor
- Scale feedback (option)

4. Hartrol: Hartford Enhanced CNC Controller

- State-of-the-art CNC control developed by Hartford
- Remote diagnosis of CNC/PMC using the internet (option)
 - Customize function keys for simple programming
 - Abnormal load detection
 - Contour error reduced by 50% through servo HRV control
 - Load monitor

5. Quality, No Compromise

- 100% inspection by coordinate measurement machine
- 100% parts inspection
 - 100% laser inspection
 - 100% ball bar testing
 - 100% spindle balance testing

6. Quick Return-On-Investment

Purchasing a product with a good price is pleasant, but purchasing a valuable product with a good price is more significant. Normally, high quality always costs more because it represents the value of the product. Today, our customers agree that Hartford machining centers have matched European and Japanese machines standards in quality, machining accuracy and technological levels. However, when considering to purchase a European or Japanese machine with the same specifications as a Hartford machine, then you need to pay much higher, even double the price. Now, there are more and more Japanese and European machinery customers who have turned to Hartford machining centers. They have done so because they know that they will not only pay less, but they can also get more value.

Optimum Structure

Superb Machine Stiffness

If you need a real performer that's lighter but just as tough as MVP-8/MVP-10, the Plug & Play series is sure to make your day. We're sure the closer you look at the MVP-8 or MVP-10 the more you'll like what you see. We also know, when you put one on the floor, you'll feel just like our other satisfied, money-making Hartford owners. You'll feel Hartford good !

Ø 40 ballscrew on 3 axes

High torque servo motors are directly coupled to the ball screws. With no gears there is no risk of backlash or servo drag. All the ball screws are center mounted and supported on both ends by high precision angular contact thrust bearings.

Servo motor with Absolute encoder. Absolute detection for three axes servo motors eliminates home point return and limit switch for increasing efficiency and dependability. (Meldas, Fanuc only)

32 M/min (X, Y) Rapid Traverse (option)

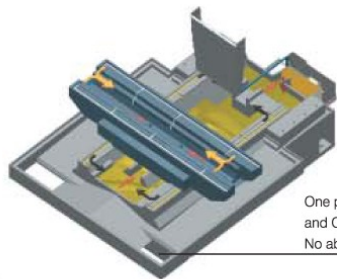
The feed mechanism adopts high stiffness linear motion guideways and large diameter ball screws with double ball nuts that provide superior acceleration/deceleration performance to drastically reduce the machining time in cutting complex surfaces without any accuracy trade-off.

Working table with drain through

Drain through built-in on working table

Incorporated oil fluid separation on casting design

Eco-friendly design. Efficient oil and fluid separation incorporated on casting design prevents cutting fluid deterioration.



One piece casting design incorporate Chassis and Chip disposal openings with base. No abutment on chassis. Leakage free design.

40% up

Z-axis servo motor connected directly to ball screw:

No more Z-axis timing belt, the servomotor is connected directly to the ball screw. There is no more need to maintain or replace the timing belt.

Greater Column:

1100 mm wide column base. The column on the Plug & Play features heavier structure than competing models to upgrade stability. The column, base are oversized and fully ribbed to support heavy loads without table deflection.

Widest Base:

1600 mm oversized base. One piece Meehanite casting, which is stable, rigid, rugged. To ensure maximum rigidity, the MVP-8 and MVP-10 are built on heavy duty Meehanite castings. They support heavy loads easily without table deflection. Also, all axes are reinforced to provide upper most rigidity and stability.





MVP-8 size:
unit:mm

The MVP-8 is much more rigidly constructed than competitive models.



Competitive models size:
unit:mm

Superb Machine Stiffness

The features make the best performance for the next-generation machine

Front

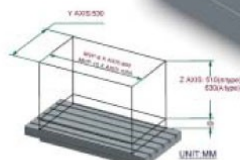


Spindle air curtain:
Prevent chips jumping into spindle.

Coolants jets around spindle:
Improve cooling efficiency on workpiece.

Fluorescent working lamp

The machine employs a pendent fluorescent light for a better lighting area and effect.



Working table:
MVP-8 1000x560 (mm), MVP-10 1200x560 (mm)
table with 5 T-slots

Adjustable operation panel:
The easy-to-use operating panel swivels up to 80 degrees. Improved visibility during operation.

Concealed Z axis flexible hose:
Flexible hose is replaced by a junction box and all the cables and pipes are arranged between the electrical cabinet and column. It improves reliability and quality.

Rear

ATC:



A type (option): Tool change unit detector is by limit switch. It has longer service life and is free from electrical jamming. Mechanical mechanism indexing.



S type (standard): Cam-rod mechanism for faster tool change. An additional door on tool magazine gives full guard effect and prevents damage from metal fragments jumping into ATC.

Patent No: 164317

Spindle oil cooler (option):
Fixed on chassis the to reduce floor space.

Submerged type coolant and flushing device pumps:
Less pipe, better efficiency and leakage free comparing to self-draining pumps.

Lubricant distributor, pneumatic units and pneumatic valve:
All units in one place, making it easier to maintain.

No black conduit inside cabinet:
Conduit concealed beneath the way-cover. It is maintenance free and the interior cabinet is tidy.

Electrical cabinet:
The electrical cabinet is not directly in contact the with column, making the heat isolated. Heat exchanger inside the cabinet is a standard feature.

Y-axis motor:
Y-axis motor placed at back for easy maintenance and preventing motor damage from coolant and chips.

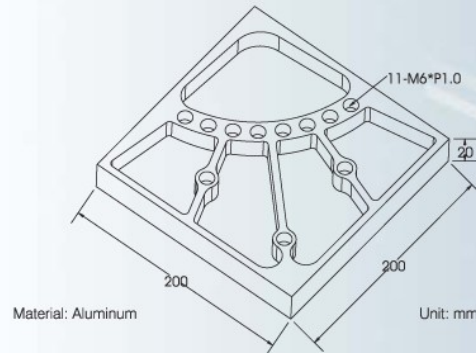
Side windows:
Better illumination makes work inside the machine easier. When necessary, the operator can access the workpiece through side windows.

1 piece Y rear way-cover:
Reliable and compact design.

Machining Efficiency

30% up

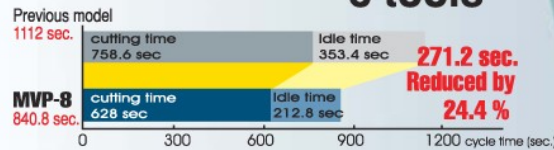
Example A



Cycle time comparison

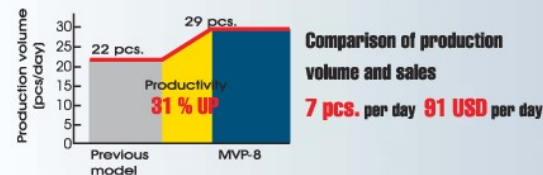
Number of tools used

5 tools



Comparison of production volume and sales (13 USD per workpiece)

Running time (one day) : 8 hours x 85% = 3,600 sec. x 0.85 = 24,480 sec.
 Number of days operating in 1 year : 21 days x 12 month = 252 days
 Production volume per day (pcs./day) : 24,480 sec ÷ Cycle time (sec.)



5-year sales simulation

Previous model:

MVP-8:

Unit: USD



Manufacturing is About Money

Every manufacturer is in the business of making money. The job is to maximize profits while reducing costs.

In today's manufacturing marathon, it is too easy to lose sight of that fundamental goal. We would like you to take the time now to review the Hartford story.

Yes, take the time now, because it may save you time and money while increasing your productivity...and profits.

Hartford's story is about cutting time...not corners.

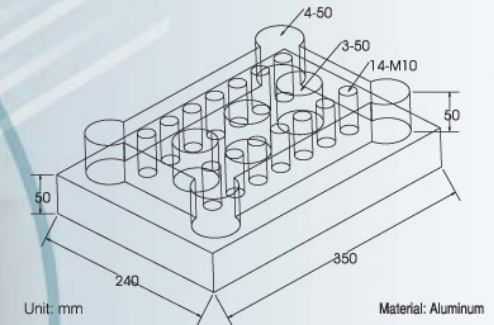
Cutting the time it takes you to machine parts.

Saving time, because you have reliable equipment that just keeps on working.

Because we have the widest range of VMCs in the industry, it makes one stop shopping for machine tools a virtual reality. And we maintain a service staff that can respond when and where you need assistance.

All in all, you will find the time spent looking at Hartford interesting ...as well as profitable.

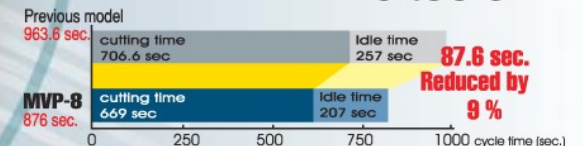
Example B



Cycle time comparison

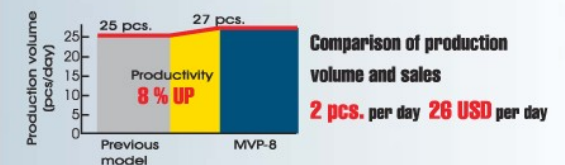
Number of tools used

3 tools



Comparison of production volume and sales (13 USD per workpiece)

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5-year sales simulation

Previous model:

MVP-8:

Unit: USD



Full lineup of Equipment

Hartford Tough But Hartford Efficiency.

500% up

Coolant gun:

Replaces previous air gun, effectively prevents chips jumping into spindle and causing damage



Flushing device

(Package A standard)

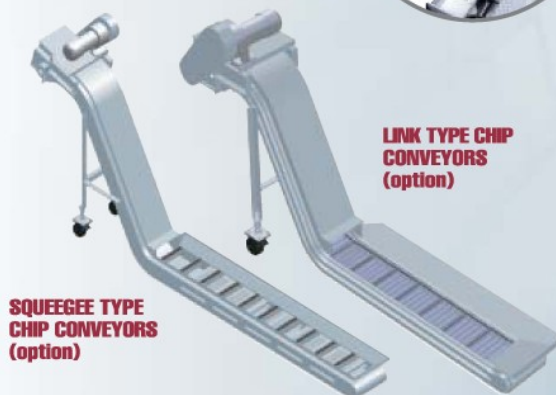


Front mounted screw type chip conveyor

(Package A standard)



LINK TYPE CHIP CONVEYORS (option)



SQUEEGEE TYPE CHIP CONVEYORS (option)

Recommended Types of Chip Conveyors

	Steel Squeegee-type Front mounted Screw type
	Cast iron Link-type
	Non-ferrous Metal Link-type
	Other Materials Link-type

70 Bar* High Pressure Coolant System (option)

The High Pressure Coolant (HPC) system has long been utilized in specialized machining operations. Huge productivity gains and cost savings can be realized from utilizing the high pressure coolant system. Today, with the advances in coolant feed tooling and HPC technology, practical and machining applications can benefit from high pressure coolant.

The use of the Hartford high pressure coolant system has multi-staged filtration system and high pressure pump to deliver up to 70 bar. It has produced numerous examples where machining efficiency has been increased by up to 500 percent, tool life has increased significantly, often by a factor of twenty five times, and substantial other productivity benefits recorded.

In practice, applying high pressure coolant to a machining process yields several desirable results. They include:

- ▲ Eliminating tool failure from heat damage and chip recutting. This also results in more consistent and predictable tool life.
- ▲ Chip ejection from the cutting zone becomes consistent and significantly improved.
- ▲ Cycle times are often drastically reduced due to increased cutting speeds and feed rates.
- ▲ Surface finishes can be greatly improved.
- ▲ Improved capability to cut exotic materials.
- ▲ Formerly "specialized" processes, such as deep hole drilling, can now be performed on standard machines.
- ▲ Machining operations and set ups can often be combined and extra operations eliminated.



Rotary Table (option)

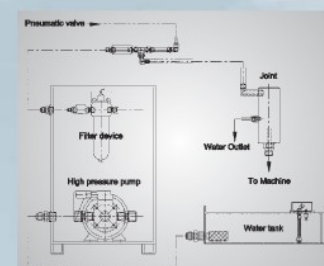
Programmable coolant nozzle (option)

Fast nozzle position adjustment in only 3 seconds. 24 steps programmable operation permits for automatic adjustment for flushing point to meet various tool lengths. The cooling nozzle can be adjusted without opening the splash guard for convenience and adjustment time saving.

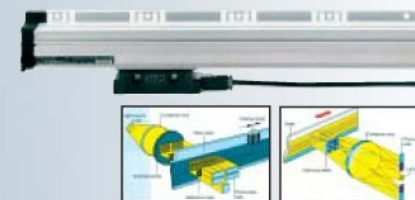
Patent No: 160723



20 bar* Coolant Through Spindle (option)



The 20 bar coolant through spindle system integrate a filter and 20 bar coolant pump in a compact structure. It delivers coolant at 20 bar to the cutting edge to improve tool life and permits higher speeds, deep hole drilling and pocket milling.



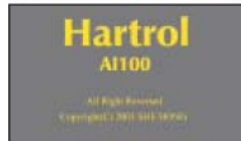
Scale feedback (option)

* The coolant pressure is the max. output at the coolant pump outlet.

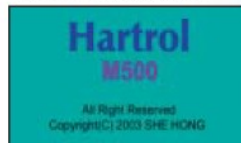
Hartrol Hartford Enhanced CNC Controller

Various functions developed by HARTFORD.

Title Screens

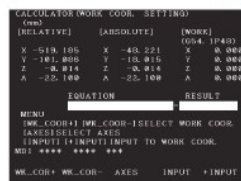


HARTROL AI100 Title Screen

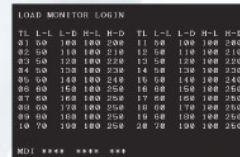


HARTROL M500 Title Screen

Calculator



Load monitor



The operator can set 2 target spindle loads as a percentage of the spindle load to be maintained. When the spindle load equals or exceeds the first target spindle load, the load monitor will automatically send a warning to the operator. If the spindle load continuously raises and reaches the 2nd target spindle load, it will feedhold the process.

1. Two Alarm levels can be programmed according to actual conditions and customers' demand.
2. Increase cutting efficiency and tool life.

AICC Parameter Setting Screen (FANUC) (option)

AICC PARAM SET	ROUGH	MEDIUM	FINE
MAX F-FEEDRATE	3200	5100	7270
ARC R	5000	5000	5000
MIN F-FEEDRATE	100	100	100
T-ADT-STEP	24	15	15
MAX F-RF-ITP	10000	10000	10000
T1-DF-ITP	100	50	24
T2-DF-ITP	64	40	40
ALLOW F-DIFF	500	500	5000
ALLOW ACC	200	110	50

HPC Paramter Setting Screen (Mitsubishi) (option)

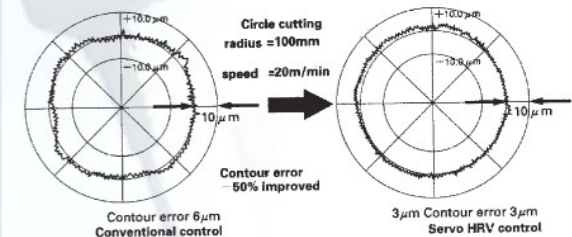
SET-UP/PARAMETER SETTING	ROUGH	MEDIUM	FINE
MAX F	3200	5100	7270
ARC R	5000	5000	5000
MIN F	100	100	100
T-ADT-STEP	24	15	15
MAX F-RF-ITP	10000	10000	10000
T1-DF-ITP	100	50	24
T2-DF-ITP	64	40	40
ALLOW F-DIFF	500	500	5000
ALLOW ACC	200	110	50

To optimize cutting efficiency from different workpieces, different parameters are required for the best speed and precision.

- On the setting screen, 3 pairs of adjustable parameters are provided for customers.
- Suitable parameters can be specified directly by G-code in the CNC program.

SERVO HRV Control

The current control of the motor is optimized at high speed by SERVO HRV Control, thereby motor heat is minimized. High speed and high precision machining can be realized by reduction of servo delay.



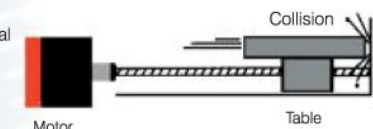
Customize function keys



Four programmable function keys according to customers' requirements.

When a tool collides with the machine or workpiece or when a tool is faulty or damaged, a load torque greater than that experienced during normal feed is imposed.

ABNORMAL LOAD DETECTION FUNCTION



FANUC MANUAL GUIDE 0i (option)



ISO code part programming

"MANUAL GUIDE 0i" has adopted ISO code program for its part program language. Simple motion such as line and arc are entered by G-code directly, and complex motions such as pocket machining and drilling patterns can be entered easily by cycle machining blocks.

G-code and M-code assistance

"MANUAL GUIDE 0i" has a G-code assistance screen and a M-code assistance screen. G-code assistance screen has 2 types of display- textual information screen and graphical information screen. Use the M-code assistance screen, in order to fit it to a actual machine configuration,

Contour programming

"MANUAL GUIDE 0i" utilizes contour programming, by which the user can enter contour figures made with lines and circles. In this "contour programming" high performance contour calculating such as 10 blocks pending, auxiliary calculation with 11 patterns and so on are available.

Advanced canned cycles

"MANUAL GUIDE 0i" utilizes various canned cycles which are exclusively designed for the use on a machining center / milling machine or lathe. By entering necessary data for machining following to messages displayed on a screen, complex machining motions can be carried out automatically.

Milling cycles



Hole position (Circle) Hole position (Grid) Surfacing Pocketing (Circle) Pocketing (Square) Side cutting

Remote diagnosis of CNC/PMC using internet (option)



Remote operation of basic CNC screens

Position, offsets, custom macro variables, NC program, NC parameter, system configuration, waveform diagnosis data, operation history, alarm history, etc.

Quality, No Compromise

Guaranteed Performance Through

Rigorous Quality Inspections

100% Inspection by coordinated measuring machine.

Critical components: machine head/spindle/ATC unit....

100% Inspection before entering assembly line --all components.

100% Laser inspection before shipment.

100% Ball bar inspection before shipment.

100%

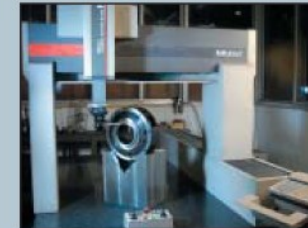


Quadrant protrusion correction



Spindle Balance Testing

Eliminate vibration on rotating parts to improve spindle rotational accuracy.



3D Coordinate Measurement Testing

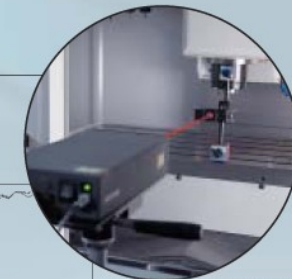
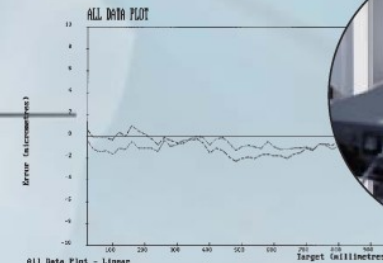
Precision measurement to assure component accuracy and machine quality.

Plug & play

The "Plug & Play" is built ensuring perfection - not only at the end of pre-shipment QC inspection, but also all the way through production. We place a strong emphasis on every detail of every step. Only qualified components or parts can be employed in the production line.

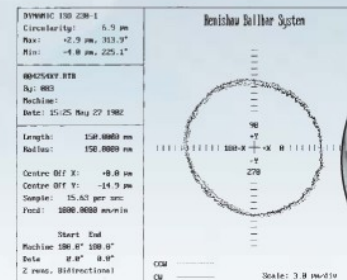
Rigid quality control procedures by coordinated measuring machines during production, high-tech laser measurement systems and many other sophisticated inspection instruments are utilized again and again all the way through production to delivery.

It is absolute that Hartford does not spare any effort in assuring that the "Plug & Play" machine you are ordering has passed through the most critical and rigorous inspection through our constant interior auditing process. The purpose of this unprecedented care and effort is to deliver to you a quality, drawback-free VMC - the best VMC in the world.



HIGH-TECH LASER MANAGEMENT SYSTEM FOR PRECISION INSPECTION.

Laser tested for surface accuracy before shipment. It can measure all the standard geometric properties of a machine (linear positioning accuracy, pitch error, etc.)



CIRCULAR ACCURACY IS INSPECTED WITH A HIGH-PRECISION BALL BAR TESTER.

Ball bar testing - identification of accuracy, servo and geometric errors statistically and dynamically.

Machine Specifications

MVP-8 S/A

860 mm	X-Axis Travel
530 mm	Y-Axis Travel
510 / 630 mm	Z-Axis Travel
85~595 / 715 mm	Distance from spindle end to table
600 mm	Distance from spindle center to column

Table

1000 x 560 mm	Working surface
18 x 5 x 100 mm	T slot (size x number x pitch)
500 kg	Max. table load

Spindle

# 40	Spindle nose taper
Standard: 8000 rpm	Spindle speed (Pulley)
Package A/B: 10000 rpm	

Feedrate

1~12 M/min	Rapid traverse rate
24 / 32 (opt.) M/min	Cutting feedrate (X, Y)
20 / 24 (opt.) M/min	Cutting feedrate (Z)
Ø 40 mm	Ballscrew size (X, Y, Z)

ATC

20 / 24 pcs	Tool storage capacity
7 kg	Max. tool mass
Ø90 x 250 / Ø80 x 250 mm	Max. tool size (dia. x length)
BT 40	Type of tool shank
MAT-P40T-1	Type of tool stud bolt

Motor

10 HP (30 min)	Spindle drive motor
15 HP (30 min) (opt.)	
X, Y, Z: 2.0 kw	X, Y, Z axis drive motor (FANUC)
X, Y, Z: 2.0 kw	X, Y, Z axis drive motor (Mitsubishi)

Other

6.5 kg/cm	Air source
29 kva	Electric power consumption
S: 6400 kg A: 6600 kg	Machine weight
2500 x 2260 mm	Floor space
2900 mm	Machine Height

MVP-10 S/A

1050 mm	X-Axis Travel
530 mm	Y-Axis Travel
510 / 630 mm	Z-Axis Travel
85~595 / 715 mm	Distance from spindle end to table
600 mm	Distance from spindle center to column

1200 x 560 mm	Working surface
18 x 5 x 100 mm	T slot (size x number x pitch)
700 kg	Max. table load

# 40	Spindle nose taper
Standard: 8000 rpm	Spindle speed (Pulley)
Package A/B: 10000 rpm	

1~12 M/min	Rapid traverse rate
24 / 32 (opt.) M/min	Cutting feedrate (X, Y)
20 / 24 (opt.) M/min	Cutting feedrate (Z)
Ø 40 mm	Ballscrew size (X, Y, Z)

20 / 24 pcs	Tool storage capacity
7 kg	Max. tool mass
Ø90 x 250 / Ø80 x 250 mm	Max. tool size (dia. x length)
BT 40	Type of tool shank
MAT-P40T-1	Type of tool stud bolt

10 HP (30 min)	Spindle drive motor
15 HP (30 min) (opt.)	
X, Y, Z: 2.0 kw	X, Y, Z axis drive motor (FANUC)
X, Y, Z: 2.0 kw	X, Y, Z axis drive motor (Mitsubishi)

6.5 kg/cm	Air source
29 kva	Electric power consumption
S: 7400 kg A: 7600 kg	Machine weight
2900 x 2260 mm	Floor space
2900 mm	Machine Height

Standard features

Standard

Full enclosed splash guard
Coolant jets around spindle
Centralized automatic lubrication system
Spindle air curtain
Oil fluid separator
Work lamp (Fluorescent)
Air blast through spindle
Table side air blast (1 tube)
Handy coolant gun
Operation finish lamp
#40 Armless ATC
#40 8000 rpm Pulley head
Remote manual pulse generator

Package A

Full enclosed splash guard
Coolant jets around spindle
Centralized automatic lubrication system
Spindle air curtain
Oil fluid separator
Work lamp (Fluorescent)
Air blast through spindle
Table side air blast (1 tube)
Handy coolant gun
Operation finish lamp
#40 Armless ATC
Flushing device
Spindle Oil cooler
Front screw chip conveyor
#40 10000 rpm Pulley head
Remote manual pulse generator

Package B

Full enclosed splash guard
Coolant jets around spindle
Centralized automatic lubrication system
Spindle air curtain
Oil fluid separator
Work lamp (Fluorescent)
Air blast through spindle
Table side air blast (1 tube)
Handy coolant gun
Operation finish lamp
#40 Armless ATC
Flushing device
Spindle Oil cooler
#40 10000 rpm Pulley head
Preloaded ballscrew on 3 axes
Remote manual pulse generator

Optional features

Standard

Flushing device
NC Rotary table
Scale feedback
#40 Arm type ATC

Package A

Link type chip conveyor
#40 12000 rpm Pulley head
Rapid traverse 32x32x24 m/min
#40 Arm type ATC
NC Rotary table
Scale feedback
20 bar standard type CTS
70 bar high pressure coolant system

Package B

Link type chip conveyor
#40 12000 rpm Pulley head
Rapid traverse 32x32x24 m/min
#40 Arm type ATC
NC Rotary table
Scale feedback
20 bar standard type CTS
70 bar high pressure coolant system

Suggested CNC Controller Packages - Other controllers are available on request.

Standard:

For general machining or non-3D curved surface machining.

Suitable Controllers:

- FANUC Oi Mate-B
- Hartrol-M400
- Heidenhain TNC-410

Package A:

For highly-efficient production demand or 16-hour continual production.

Suitable Controllers:

- FANUC Oi Mate-B
- Hartrol-M400
- Heidenhain TNC-410

Package B:

When high precision die/mould machining or less than 0.1 mm dynamic thermal displacement on die/mould machining is requested.

Suitable Controllers:

- If Pitch < 0.2 mm (F<2000mm/min) is requested: Hartrol-AI100 / Hartrol-M400 / Heidenhain TNC-410
- If Pitch < 0.08 mm (F<2000mm/min) is requested: Hartrol-AI200 / Hartrol-M400 / Heidenhain TNC-410
- If Pitch < 0.02 mm (F<2000mm/min) is requested: Hartrol-AI300 / Hartrol-M500 / Heidenhain TNC-426

Remarks:

1. Pitch: Vector value of 3-axis Shift Movement in each block.
2. Interface and retrofit of 4th axis is not available on FANUC Oi Mate-B

- Design and specifications are subject to change without prior notice.
- Pictures are for reference only. The look of the actual machine may vary.