

# Machine specifications

Item		SH-403
Travel	X-axis travel <longitudinal movement of column>	mm (in.) 560 (22.0)
	Y-axis travel <vertical movement of spindle head>	mm (in.) 510 (20.1)
	Z-axis travel <cross movement of table>	mm (in.) 510 (20.1)
	Distance from pallet surface to spindle center	mm (in.) 50-560 (2.0-22.0)
	Distance from table center to spindle gage plane	mm (in.) 100-610 (3.9-24.0)
Table	Pallet working surface	mm (in.) 400×400 (15.7×15.7)
	Max. workpiece swing diameter	mm (in.) 610 (24.0) [580 (22.8): 3-station turn type APC]
	Pallet loading capacity	kg (lb.) 300 (660)**, 500 (1,100)**
	Max. workpiece height	mm (in.) 650 (25.6)
	Pallet surface configuration	M16 (1/2-13 UNC) Tap: 24 Holes. Pitch 80 mm (3.1 in.)
	Minimum table indexing angle	1° [Full 4th axis rotary table: 0.001°]
	Table indexing time	s 2.5 <90°>
Spindle	Max. spindle speed**	min <sup>-1</sup> 12,000 [20,000]
	Number of spindle speed ranges	1
	Type of spindle taper hole	No. 40
	Spindle bearing inner diameter	mm (in.) 70 (2.8)
Feedrate	Rapid traverse rate	mm/min (ipm) 42,000 (1,653.5) [60,000 (2,362.2)]
	Feedrate**	mm/min (ipm) 1-42,000 (0.01-1,653.5) [1-60,000 (0.01-2,362.2)]
	Jog feedrate	mm/min (ipm) 0-1,280 (0-49.6)<15 steps>
ATC	Type of tool shank	MAS BT-40 [CAT-40]
	Type of retention knob	For Mori Seiki 90° type [MAS I, II]
	Tool storage capacity	40 (60/120)
	Max. tool diameter <without adjacent tools>	mm (in.) 80 (3.1) <125 (4.9)>
	Max. tool length	mm (in.) 300 (11.8)
	Max. tool mass	kg (lb.) 8 (17.6)
	Max. tool mass moment	N·m (ft·lbf) 7.8 (5.8)
	Method of tool selection	Technical memory random (40-tool), Fixed address, shorter route access (60-/120-tool)
	Tool changing time (tool-to-tool)** <MAS>	s 1.5
	Tool changing time (chip-to-chip)** <MAS>	s 3.7 (40-tool)
APC	Number of pallets	2 [3]
	Method of pallet change	Turn-type
	Pallet changing time	s 5***, 7**
Motor	Spindle drive motor <15 min/cont>	kW (HP) 22/18.5 (30/24.7) [18.5/15 (24.7/20) <30 min/cont> ]
	Feed motor <X/Y/Z/B>	kW (HP) 2.8/4.4/2.8/1.0 (3.7/5.9/3.7/1.3) [3.8/3.8/3.8/1.4 (5.1/5.1/5.1/1.9)**]
	Coolant pump motor	kW (HP) 1.1+1.1 (1.5+1.5)
Power source	Electrical power supply	kVA 55.2 [Full 4th axis rotary table: 56.3]
	Compressed air supply	MPa (psi), L/min (gpm) 0.5 (72.5), 400 (105.6) <ANR**>
Tank capacity	Coolant tank capacity	L (gal.) 385 (101.6) [420 (110.9)**10]
Machine size	Machine height <from floor>	mm (in.) 2,517 (99.1)
	Floor space	mm (in.) 2,861×4,070 (112.6×160.2)
	Mass of machine	kg (lb.) 8,700 (19,140)

[ ] : Option

\*1 APC time 5 sec.

\*2 APC time 7 sec.

\*3 Depending on restrictions imposed by the workpiece clamping device, fixture and tool used, it may not be possible to rotate at the maximum spindle speed.

\*4 For look-ahead control, 5,000 mm/min (196.8 ipm) in non-look-ahead control. Maximum feedrate will vary depending on cutting conditions.

\*5 At 60 Hz.

\*6 Table load capacity 300 kg (660 lb.).

\*7 Table load capacity 500 kg (1,100 lb.).

\*8 For 60,000 mm/min (2,362.2 ipm) rapid traversing.

\*9 ANR refers to a standard atmospheric state; i.e., temperature at 20 °C (68 °F); absolute pressure at 101.3 kPa (14.7 psi), and relative humidity at 65 %.

\*10 For 60-/120-tool specification.

◆ The information in this catalog is valid as of August 2000. Design and specifications subject to change without notice.

◆ Mori Seiki is not responsible for differences between the information in the catalog and the actual machine.

Web site: <http://www.moriseiki.co.jp>

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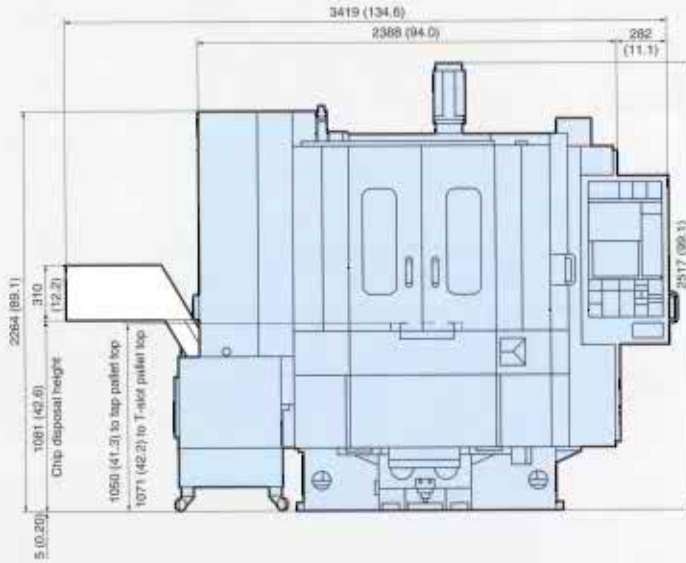
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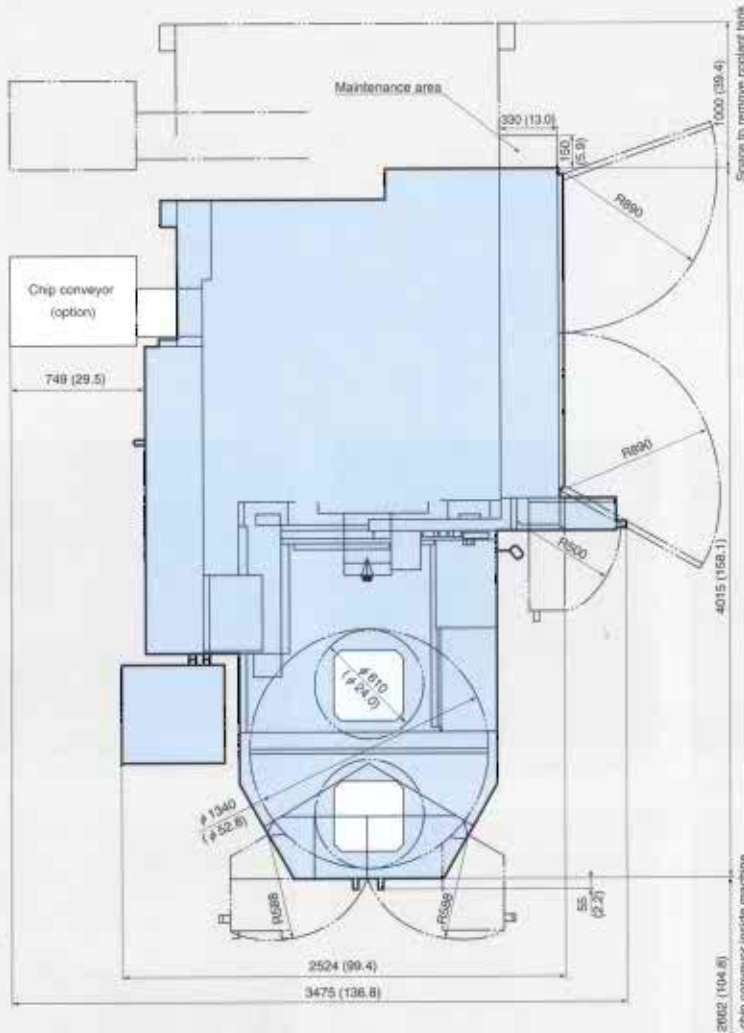
SH403-EA01 Printed in Japan  
0008 D55.3000

# Installation drawing

mm (in.)

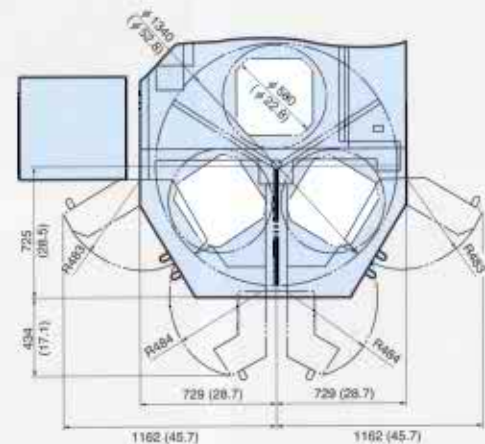


**Front view**



**Plan view**

**2-station turn-type APC**



**3-station turn-type APC (option)**

• The figure shows the 40-tool specification.

051406008, 051455804





## Conversational automatic programming

As a standard feature, machining programs are automatically created by entering data in response to on-screen prompts. By inputting the final shape of the workpiece, the MSG can automatically select the necessary tools, cutting conditions and the most efficient machining sequence, thus minimizing the amount of input.

## Data Input/Output

CNC data can be freely uploaded to or downloaded from memory cards or sent over networks with the optional RS-232-C feature.

## Time study

The estimated cycle time is displayed after running a simulation of the machining program.



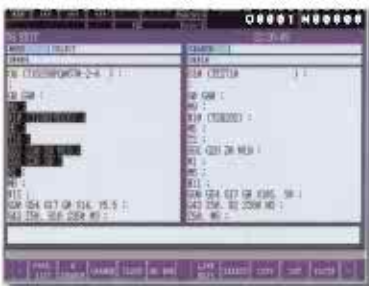
## 3D graphic simulation

From the input data, the system draws a 3-dimensional view of the finished workpiece.



## Setup support

Working with customer feedback, Mori Seiki has greatly improved setup support and operability. Setup is quick and precise providing operators the support they want and need to confidently begin machining.



## Program editing

Two programs can be opened at the same time and data copied & pasted between them.



## Periodic maintenance management

Customers can set maintenance schedules and consumable service-life. When it's time to check or replace an item, an alarm is generated for notification.



## Tool registration

Tool numbers can be input by referring to the tool file. Unregistered tools can be displayed using program number.



## Network (option)

The MSG makes it possible for customers to build a production floor network of multiple lathes and machining centers. Networking allows customers to centralize and efficiently manage machine utilization and production planning.

# NC unit specifications (MSG-501 • MSG-502)

## Standard

### Controlled axes

Controlled axes	X, Y, Z, B
Simultaneously controllable axes	Positioning/linear interpolation/circular interpolation (3/3/2)

### Programmable methods

Least input increment	0.001 mm (0.0001 in.)
Least command increment	0.001 mm (0.0001 in.)
Max. commanded value	±99,999.999 mm (±9,999.9999 in.)
Absolute/incremental programming	G90/G91
Decimal point programming	
Inch/metric conversion	G20/G21
Tape code	EIA/ISO code automatic discrimination

### Interpolation

Positioning	G00
Linear interpolation	G01
Circular interpolation	G02/G03
Helical interpolation	
Linear acceleration/deceleration before cutting feedrate	

### Feed

Cutting feedrate	1—42,000 mm/min** (0.01—1,653.5 ipm)
Dwell	G04
Pulse handle feed	Manual pulse generator: 1 unit ×1, ×10, ×100 (per pulse)
Automatic acceleration/deceleration	Linear type (rapid traverse)/ exponential function type (cutting feed)
Rapid traverse rate override	F0 (fine feed), 25/100 %
Feedrate override	0—150 % (10 % increments)
Feedrate override cancel	M48, M49
Spindle orientation	
Manual jog feed	0—1,260 mm/min (0—50 ipm) (15 steps)
Feed per minute	

### Program storage and editing

Part program storage	320 m (1,050 ft) <10 m (33 ft) ±4 kB in tape length>
Part program edit	Deletion, insertion, and alteration
Search function	Sequence number search, Program number search, Address search
Number of stored programs	125 programs
Program number/program name	Program number: 4 digits program name: 31 characters

### Operation and display

Operation panel, Display section	10.4-inch TFT color LCD
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### I/O Functions and units

I/O interface	RS-232-C/PCMCIA (Type I, II)
Tape operation with RS-232-C**	

### STM functions

Spindle speed function (S function)	5-digit S code
Spindle speed override	50—120 % (10 % increments)
Tool function (T function)	4-digit T code
Miscellaneous function (M function)	3-digit M code
High speed M/S/T/B interface	

### Tool offset

Tool length offset	G43, G44, G49
Tool position offset	G45—G48
Cutter radius offset C	G40—G42
Number of tool offsets	64 sets
Tool offset data memory C	D/H code, geometry and wear offset data
Offset amount program input	G10

### Coordinate system

Manual zero return	
Automatic zero return	G28
2nd zero return	G30
Zero return check**	G27
Return from zero point	G29
Automatic coordinate system setting	
Coordinate system setting	G92
Work coordinate system selection	G54—G59
Local coordinate system setting	G52
Machine coordinate system	G53

### Operation support functions

Single block	
Optional stop	
Optional block skip	
Dry run	
Machine lock	
Auxiliary function lock	
Mirror image	
Manual absolute	PC parameter

### Operation support functions

Z-axis neglect	
Program restart	
Running time display/No. of parts display	
Tape editing (expansion)	1 kB copy buffer
Background editing	
Load meter display	
Clock function	Screen display
Tool length measurement	

### Programming support functions

Circular arc radius command	
Canned cycle	G73, G74, G76, G80—G89, G98, G99
Sub-program	Up to 4 nestings
Custom macro B**	
Exact stop check	G09
Exact stop check mode	G61/G64
F15 format	
Synchronized tapping	
NC statement output**	Conversational automatic programming function
Look ahead control function	
Conversational automatic programming (CAPS-M)	

### Mechanical accuracy compensation

Backlash compensation	±9.999 pulses
Pitch error compensation	
Uni-directional positioning	
Follow-up	
Rapid traverse/cutting feed backlash compensation	

### Machine control support functions

Axis interlock	By external input, option
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### Automatic support functions

Skip function	G31
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### Safety and maintenance

Stored stroke check 1	
Self-diagnosis	Includes alarm display, I/O signal diagnosis, and ladder diagram
Door interlock	
Alarm history display	NC and PC alarm
Operation history display	
Operator's message history display	
Software damper	Abnormal load detection

### Option

Additional part program storage capacity (in total)	MSG-501: 640/1,280/2,560 m (2,100/4,200/8,399 ft)
	MSG-502: 640/1,280/2,560/5,120 m (2,100/4,200/8,399/16,799 ft)

Additional number of stored programs (in total)	200/400/1,000 programs
Additional number of tool offsets (in total)	99/200/400/499/999 sets

- Programming resolution multiplied by 1/10
- Hypothetical axis interpolation
- Polar coordinate interpolation
- Cylindrical interpolation
- Exponential function interpolation
- Involute interpolation
- Bell-shaped acceleration/deceleration after cutting feed interpolation
- Spiral/conical interpolation
- F1-digit feed (F1 to F9)
- Thread cutting
- Inverse time feed
- Feedrate 1—60,000 mm/min\*\*\*
- Feed stop
- Feed per revolution
- Remote buffer (DNC)\*\*
- High-speed remote buffer (A: Binary input, B: NC statement input)\*\*
- Data server (ATA card)
- Constant surface speed control
- 3D tool offset
- Straightness offset
- Cutter radius offset B
- 3D coordinate conversion
- Additional number of work coordinate systems (in total) (40 sets, 300 sets)
- 3rd and 4th zero return
- Floating zero return
- Handle feed interruption
- Sequence number collation and stop
- Addition of optional block skip functions (B0T2 to B0T9)
- Arbitrary angle, chamfer, corner R designation
- Interruption type custom macro
- Programmable mirror image
- Automatic corner override
- Playback
- Additional custom macro common variables (in total) (600 variables)
- Scaling
- Coordinate system rotation
- Polar coordinate command
- Multiple M commands in a block
- Normal directional control
- High accuracy contouring control function (RISC processor)
- AI contouring control function
- Small diameter deep hole drilling cycle
- High-speed skip
- Tool life management
- Additional number of tool life management functions (in total) (512 sets)
- Stored stroke check 2

\* 1 For look-ahead control, 5,000 mm/min (196.9 ipm) in non-look-ahead control. Maximum feedrate will vary depending on cutting conditions.

\* 2 Work number search function is required; consultation is necessary for details.

\* 3 Used with ATC/APC.

\* 4 Touch sensor specification.

\* 5 Output to NC memory is possible. Output to an external device is not possible.

\* 6 When 60,000 mm/min (2,362.2 ipm) rapid traversing selected.