FH800SX-i: Machine Overview

FANUC 31iMB CNC Machine Control

FCD600 Cast Column for Unsurpassed Vibration Dampening

Oil-Chilled Ball Screws in X, Y, and Z Machining Axes

Dual Z-Axis and Y-Axis Ball Screws to Support Heavy Cutting Conditions

Six Spindle Carriage Guide Trucks Provide Unsurpassed Cutting Support

Industry Best 4” Z Axis Dead Band Allows for Tool Length Reduction

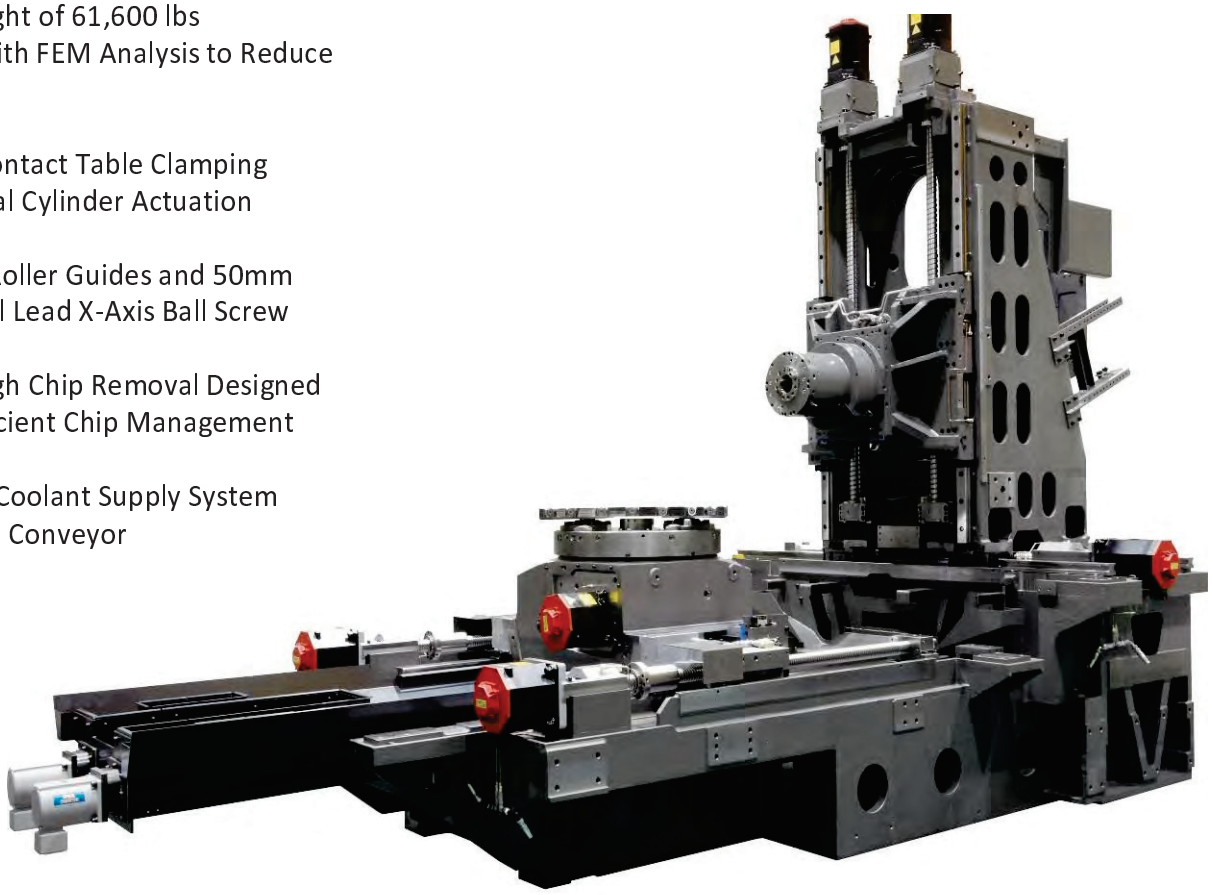
Machine Weight of 61,600 lbs Engineered with FEM Analysis to Reduce Vibration

Robust Full Contact Table Clamping Plate with Dual Cylinder Actuation

55mm Wide Roller Guides and 50mm Diameter Dual Lead X-Axis Ball Screw

Center Through Chip Removal Designed for Highly Efficient Chip Management

Recirculating Coolant Supply System including Chip Conveyor



Machine Envelope and Travels

Column Cross Travel (X Axis)	57.08" (1,450 mm)
Spindle Head Vertical Travel (Y Axis)	49.21" (1,250 mm)
Work Table Travel (Z Axis)	61.02" (1,550 mm)
Max Workpiece Swing	Ø59.05 X 59.05" (ø1,500mm X 1,500mm)
Rapid Traverses (X, Y and Z Axes)	2,127 ipm (54 M / min)
Spindle Nose to Rotary Table Center	3.94" ~ 64.96" (100 ~ 1,650 mm)
Spindle Center to Top Face of Pallet	3.94" ~ 53.14" (100 ~ 1,350 mm)

Machine Pallet

Pallet Size	31.5" x 31.5" (800 x 800 mm)
NC Table (4th Axis)	360,000 Positions
Maximum Work Load on the Pallet	5,500 lbs. (2,500 kg)
Pallet Height from Floor	51.18" (1,300 mm)

Spindle Specifications

Spindle Speed	50 ~ 8,000 RPM
Spindle Speed (Optional)	50 ~ 15,000 RPM
Spindle Bearing ID 8,000 RPM (Roller Type)	4.33" (110 mm)
Spindle Bearing ID 15,000 RPM (Ceramic Type)	4.72" (120 mm)

Tooling and Magazine

Spindle Nose Taper	CAT 50
Type of Stored Tool	Holder: CAT #50 V-Flange / Pullstud: MAS Type I P50T
Standard Tool Storage Capacity	Sixty (60)
Maximum Tool Size (Diameter x Length)	ø11.8" Cylindrical / 12.6" Boring Tool x 31.5" (ø300 / 320 x 800 mm)
Maximum Tool Weight	77 lbs. (35 kg)
Chip to Chip Change Cycle Time	4.4 sec

Machine Accuracy

Linear Position Accuracy (w/out scales)	± .00012" (.003 mm) full stroke
Linear Repeatability (w/out scales)	± .00008" (.002 mm)
Rotary Table Index Accuracy (w/out scales)	± 7 arc Seconds, ± 3.5 arc Seconds Repeatability

Machine Dimensions and Requirements

Power Capacity (208V)	52 kVA
Standard Floor Space	330.7" x 185" (8,400 x 4,700 mm)
Standard Net Weight	61,600 lbs. (28,000 kg)

Spindle Options

50HP - 8,000 RPM - 744ft.lbs High Torque Direct Drive

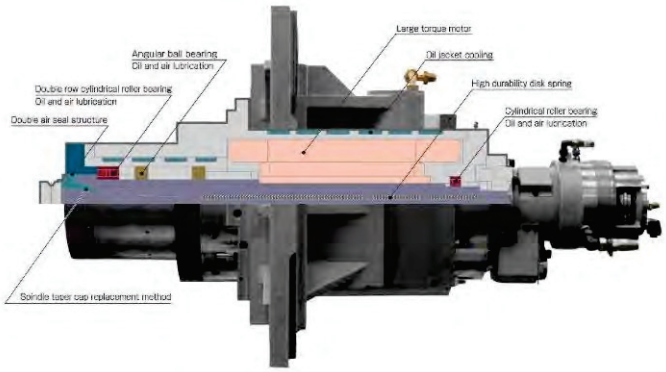
50HP - 15,000 RPM - 395ft.lbs High Torque Direct Drive

HSKA100 Spindle Conversion (for 60 tool magazine)

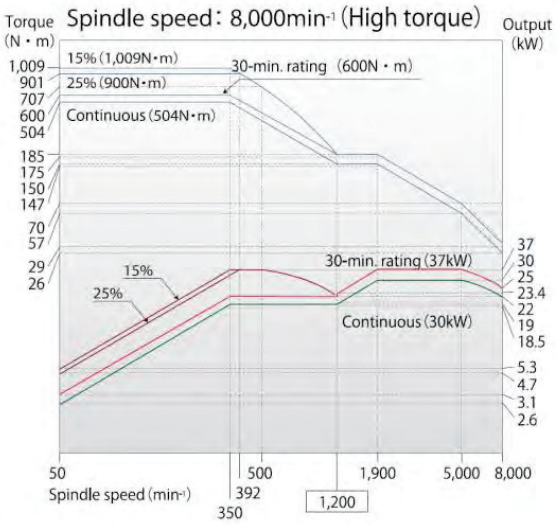
Toyoda Removable Spindle Taper

Big Plus Modification

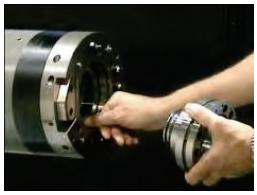
Toyoda 8,000RPM 50HP High Torque Spindle



- Dual Cylindrical Roller Bearing
- Industry Leading 76in³ MRR
- 110mm Bearing Inner Diameter
- Removable Spindle Taper Design
- Six Spindle Carriage Guide Trucks



Toyoda 15,000RPM 50HP High Torque Spindle



- Four Front Spindle Bearings
- Variable Hydraulic Preload
- 120mm Bearing Inner Diameter
- Removable Spindle Taper Design
- Six Spindle Carriage Guide Trucks

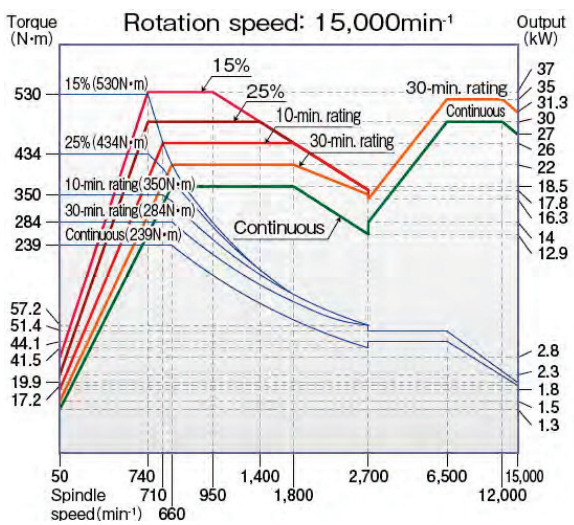


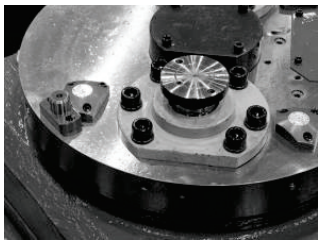
Table & Pallet Options

Full NC B-Axis Table

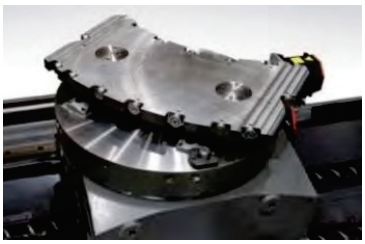
One Degree (1°) Positioning Rotary Indexing Table

One (1) Spare Bolt Hole Pattern Pallet

One (1) T-Slotted Pallet Specification, Upcharge per Pallet



Toyoda Pallet Locating



Toyoda Full Plate Clamping

Toyoda Table Carriage

Tool Storage and Retrieval

Sixty (60) Chain Type Tool Storage Magazine (50 Taper)

One Hundred Twenty-One (121) Chain Type Tool Storage Magazine (50 Taper)

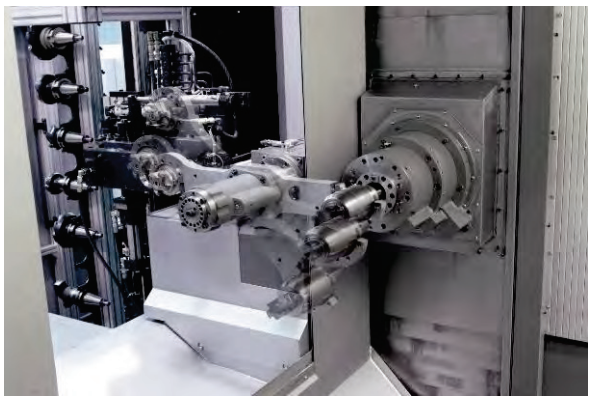
240 Simple Matrix Type Tool Storage Magazine (50 Taper)

330 Simple Matrix Type Tool Storage Magazine (50 Taper)

Tool ID System with Read / Write Head for Matrix Magazine (Requires OP20T Option)

Tool ID System with Read / Write Head for Chain Magazine (Requires OP20T Option)

330 Position Tool Matrix Magazine



Toyoda Tool Change Design

Coolant System Included

Machine Coolant Tank and Chip Conveyor: (290) Gallon Isolated Recirculating Coolant Supply Unit with Take Up Chip Conveyor, and Two (2) Coolant Pumps. Standard Supplied unit is a Scraper Type Conveyor with a Drum & Cyclonic Filter. Includes 300 PSI Pump (9 Gal per Min @ 300 PSI). Includes all Machine Side Components (Drawbar, Rotary Coupling, Valve and Piping Arrangement)

Coolant System Options

High Pressure Coolant-Thru-Spindle (Up To 1,000 PSI) 8.5 GPM Pump with Relief Valve Calibrated for 500 ~ 1,000 PSI, In Lieu of 300 PSI Pump. Manually Adjustable. A Relief Valve for 200 - 500 PSI is Available Upon Request at Time of Order. The System Includes High Pressure Coolant Lines, Fittings and a Nitrogen Charged Pulsation Suppressor to Dampen Vibration.

Overhead Coolant Shower
Magnetic Chip Conveyor Package
Combined CTS Flow and Pressure Monitor
Customized High Volume Chip Removal
Hand Held Splash Gun at APC Door
Air Blow by Nozzle – 125 PSI Max

Probing Options

Renishaw OMP60:

OMP60 Kit, Probe and Styli w/ Inspection Plus Software

Renishaw RMP60:

RMP60 Kit, Probe and Styli w/ Inspection Plus Software

Renishaw TRS2 Laser Broken Tool Detection

BK Micro In Magazine Broken Tool Detection

Toyoda Gap Elimination / Broken Tool Detection

Renishaw NC4 Laser System

Automatic Measurement of Tool Length, Diameter, and Broken Tool Detection Probe Head Mounted in the Lower Right Hand Corner of Work Envelope. Some Axis Stroke is Effected with this Option.

Multi Step Skip Function

Required when more than one of the following; Toyoda Conductive System, Spindle Probe, Tool Measure System Installations is Ordered

High Accuracy Options

Toyoda Oil Chilled Ball Screws (All Five Machine Ball Screws)

Encoder Linear Positioning Accuracy without Scales (± 00012”)

Encoder Linear Repeatability without Scales (± 00006”)

Linear Scale Feedback for X, Y and Z Axes (± 00006” Accuracy, ± .00004” Repeatability)

Encoder Positioning and Repeatability NC B Axis Table (± 7 Arc Sec, ± 3.5 Arc Sec)

Rotary Scale Feedback for B Axis Table (± 3.5 Arc Sec Positioning, ± 2.0 Arc Sec Repeatability)

Toyoda Operation Ergonomics

Toyoda Machines are designed with the operator in mind. Operation ergonomics and ease of maintenance are carefully considered during the machine design and testing phase.

Center Through Chip Evacuation

The Dual Z-Axis Ball Screw machine design allows for efficient chip evacuation through the machine center-line. Chips fall directly on to the chip conveyor without piling up on the way covers. The chips are quickly removed from the machining envelope to avoid any chip related thermal distortion.

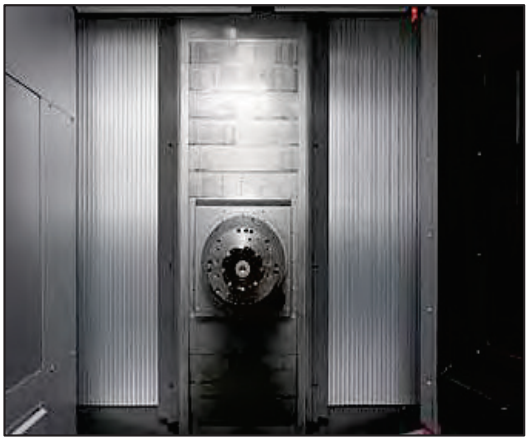
Single Piece X – Axis Cover

The X-Axis way cover system has been simplified in an effort to eliminate the maintenance issues of telescoping covers. The flexible pre-tensioned single piece system moves along with the machine column during machine operation.

Fixed Table Mounted Z – Axis Chip Covers

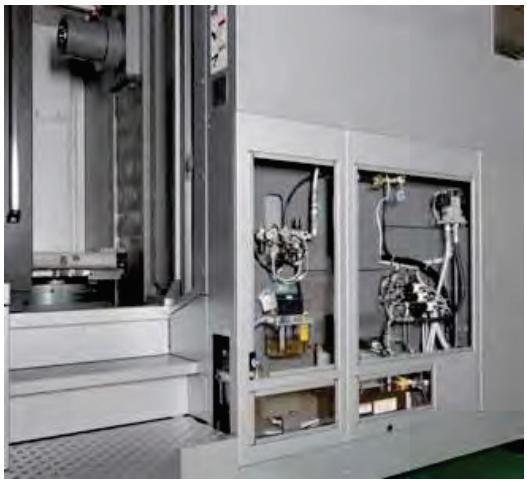
The Z-Axis way covers are permanently mounted to the machine table carriage. The covers travel along with the carriage during Z-Axis movement. This design allows for the elimination of troublesome telescoping and/or wiper style way covers.

Toyoda Overhead Machine Access



Toyoda Single Piece X-Axis Cover

Toyoda Center Trough Chip Evacuation Design



Toyoda Maintenance Accessibility

Toyoda Metalcutting Cells

Automating the metal cutting process can bring production to a whole new level of efficiency and profitability. Run multiple machines from a central PC to automate production scheduling, slash set-up times, reduce labor costs and improve throughput. Depending on your production requirements, numerous combinations of loading stations, machining centers and pallet storage styles are possible. Toyoda software and hardware can easily be upgraded or expanded at any time.

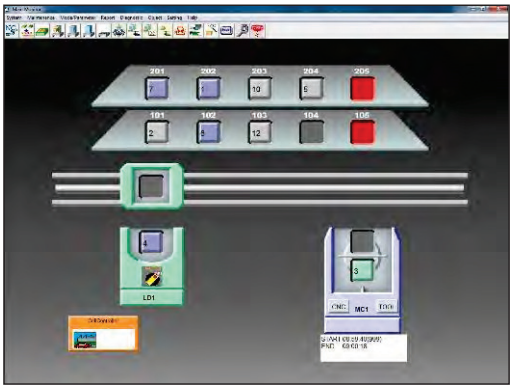
Toyoda Flexible Pallet Automation

Multi Level Flexible Pallet Automation (FPA)

This modular design has the same features as FMS (above) with either two or three levels to add more pallet storage in the same floor space. A two-level FPA can even be expanded to three levels should future production volumes require it. The welded construction, linear guideways and high-speed RGV support high rates of acceleration.

Modular, Expandable, Upgradeable

Using pre-engineered, modular components, an initial cell installation can be modest–even a single machine–so you can profit from increased production right away. As production grows, so can the system with more machines and greater handling capacity.



Toyoda FPA Software Status Screen

Powerful Cell Management

The basic function of a cell controller is to select and execute the part program, then return the pallet and finished workpiece back to the operator's loading station or storage rack. Toyoda's Mach-III Cell Controller goes beyond these basics to make the system both user-friendly and extremely powerful. Mach-III has DNC capabilities, tool management, production monitoring, production scheduling, performance diagnostics, maintenance support, and more.

Standard Training Provided with Machine Purchase

Basic Programmer Training

Basic Programming Training Class which is intended for the first time programmer with basic machining knowledge. Teaching of the machine axes, all codes, block format and program composition are covered by writing sample programs.

Per Machine:	Two (2) Persons Included per Machine
Class Length:	Five (5) Days / Eight (8) Hours per Day

Maintenance Training

Toyoda Maintenance Training Classes offer the maintenance man intensive instruction of theory of operation, troubleshooting, and preventive maintenance.

Per Machine:	Two (2) Persons Included per Machine
Class Length:	Four (4) Days / Eight (8) Hours per Day

Special Options Training

Toyoda Options Class offering specific instruction on OP Supporter, Adaptive Control, Auto Tool Length Measurement, Rigid Tap and 8-Digit Tool Code.

Per Machine:	Two (2) Persons Included per Machine
Class Length:	One (1) to Two (2) Days / Eight (8) Hours per Day

Standard Documentation Provided with Machine Purchase

MANUAL NAME	MEDIA	QTY
Maintenance	TMU - CD	1
Programming	TMU - CD	1
Tooling	TMU - CD	1
Operation	TMU - CD	1
Hydraulic / Pneumatic	TMU - CD	1
Parts	TMU - CD	1
Touch Sensor (If Option Purchased)	TMU - CD	1
Fanuc Operation and Programming	GE INFOLINK - CD	1
Parameters	GE INFOLINK - CD	1
Spindle Manual	GE INFOLINK - CD	1
Digital AC Servo Maintenance	GE INFOLINK - CD	1
Conveyor Operation	TMU - CD	1
Electrical Drawings	TMU - CD & Hard Copy	1
31i Ladder	TMU - CD & Hard Copy	1

FANUC Control Options

Part Program Storage Options

Part Program Storage Capacity 128 Kbyte (Includes 250 Registerable Programs)
Part Program Storage Capacity 256 Kbyte (Includes 500 Registerable Programs)
Part Program Storage Capacity 512 Kbyte (Includes 1000 Registerable Programs)
Part Program Storage Capacity 1,024 Kbyte (Includes 1000 Registerable Programs)
Part Program Storage Capacity 2,048 Kbyte (Includes 1000 Registerable Programs)
Part Program Storage Capacity 4,096 Kbyte (Includes 1000 Registerable Programs)
Part Program Storage Capacity 8,192 Kbyte (Includes 1000 Registerable Programs)

Tool Offsets and Management

Tool Offset Pairs – 99 Sets
Tool Offset Pairs – 200 Sets
Tool Offset Pairs – 400 Sets
Tool Offset Pairs – 499 Sets
Tool Offset Pairs – 999 Sets
Tool Offset Pairs – 2,000 Sets
Tool Life Management - 128 Sets
Tool Life Management - 512 Sets
3-Dimensional Tool Compensation
Operation Supporter – OP20P
(See OP Supporter Supplement for Additional Options)
Operation Supporter – OP20T
(See OP Supporter Supplement for Additional Options)
Operation Supporter – OP20A
(See OP Supporter Supplement for Additional Options)

Workpiece Coordinate Systems

Rotary Dynamic Fixture Offsets
Workpiece Coordinate System – 48 Sets
Workpiece Coordinate System – 300 Sets

High Speed Machining Options

AI Precision Control II
(Reduces Block Processing Time to 2ms, Increases Buffer to 200 blocks)
High Speed Processor - Requires AI Precision Control II.
(Reduces Block Processing Time to .4ms, Increases Buffer to 600 blocks)
1,000 Block Look-Ahead Upgrade
Requires AI Precision Contour Control II with High Speed Processor
Nano Smoothing
Smooth Interpolation
NURBS Interpolation

FANUC Control Options

I/O Devices

- 1,024 Meg (1 Gig) Data Server
- Data Server Buffer Mode (Requires Data Server)
- High Speed Serial Bus (Requires Customer Supplied PC)
- High Speed Serial Bus (Includes PC and Industrial Enclosure)
- Remote Buffer with Serial Board
- External Reader/ Puncher Connection / 25 Pin RS232 Port

Interpolation Options

- Cylindrical Interpolation
- Involute Interpolation
- Conical / Spiral Interpolation
- Polar Coordinate Interpolation
- Hypothetical Axis Interpolation

Operation Support Functions

- Manual Handle Interruption
- Machining Time Stamp
- Optional Block Skip Addition by Push Button Switch (2 - 9 by Push Button)
- Sequence Number Comparison and Stop
- Graphic Display

Programming Support Functions

- Automatic Corner Override
- Chamfering Corner R
- Polar Coordinate Command
- Programmable Mirror Image
- F1 - Digit Feedrate
- Scaling Via G50 / G51
- Single Direction Positioning
- Inverse Time Feed
- Inclination Compensation
- Adaptive Control Function (Macro, not a Function of OP Supporter)
- Adaptive Control Function (Requires OP20T)
- Adaptive Control Function with Condition Management (Requires OP20T)

FANUC 31i CNC Standard CONTROL FEATURES

160m / 64k (Memory)
2nd Reference Position Return
63 Registerable Programs
Absolute / Incremental Programming
Actual Cutting Feedrate Display
Alarm Display
Automatic Acceleration / Deceleration
Automatic Coordinate System Setting
Automatic Operation (Memory)
Automatic Tape Code EIA / ISO Recognition
Auxiliary Function Lock
Axes Names (X, Y, Z, U, V, W, A, B, C)
Backlash Compensation
Backlash Compensation for Each Rapid Traverse and Cutting Feed
Basic Function
Buffer Register
Circular Interpolation
Circular Interpolation by R Programming
Clock Function
Control In / Control Out
Coordinate System Setting
Current Position Display
Cutting Feedrate Clamp
Cutting Mode
Data Protection Key
Decimal point programming / Calculator Type Decimal Point Programming
Diameter / Radius Programming
Digital Servo Function
Display of Hardware and Software Configuration
DNC Operation by Memory Card
Dry Run
Dwell
Emergency Stop
Erase CRT Screen Display
Exact Stop
Exact Stop Mode
Expanded Axes Name
Extended Part Program Editing
External Key Input
External Work Piece Number Search
Failure Diagnosis
Feed for Reference Position Setting
Feed Per Minute
Feedrate Override
Flexible Feed Gear
Follow-Up
Help Function
High Speed M / S / T Interface
HRV Control
Incremental Feed
Input Unit 10 Time Multiply
Integrated Ethernet
Interlock
Jog Feed
Jog Override
Label Skip
Least Input Increment
Linear Acceleration / Deceleration after Cutting Feeding Interpolation
Linear Interpolation
Machine Condition Selection Function (Selection 1-10 of Precision Settings)
Machine Lock
Maintenance Information Screen
Manual Absolute On and Off
Manual Intervention and Return
Manual Reference Position Return
Maximum Programmable Dimension (+/- 9 digit, R, J, K: +/- 12 digit)
MDI Operation
MDI Unit
Memory Card Input / Output
Multiple Command of Auxiliary Function
Operating Monitor Display
Operation History Display
Optional Block Skip 1
Over Travel
Override Cancel
Parameter Setting and Display
Parameter Setting Support Display
Parity Check
Part Program Editing
Periodic Maintenance Screen
Plane Selection
PMC Function
Positioning
Program Display
Program File Name (32 Letters)
Program Number Search
Program Protect
Programmable Data Input
Programmable Parameter Input
Rapid Traverse Override
Rapid Traverse Rate (Least Input Increment B)
Reference Position Return (G28)
Reference Position Return Check (G27)
Reference Position Setting without Dog
Reference Position Shift
Rotary Axis Designation
Rotary Axis Roll-over
Screen Hard Copy
Self-diagnosis Function
Semi Automatic Tool Length Measurement
Sequence Number
Sequence Number Search
Servo Information Display
Servo Off / Mechanical Handle Feed
Servo Waveform Display
Single Block
Spindle Speed Function
Status Display
Status Output Signal
Stored Stroke Check 1
Sub Program Call
Tangential Speed Constant Control
Tool Function (T8-Digit): Limited to Max. Pocket #
Tool Length Compensation
Torque Limit Skip
Touch Panel Control
Waiting Function
Wrong Operation Prevention Function