CNC-DEDICATED CPU

Mitsubishi Electric’s first CNC-dedicated CPU, the sum of our industry-leading technologies.

Development of convention-breaking CNCs

Leading the way in today’s industrial globalization, the innovative products of Mitsubishi Electric continue to exceed the expectations of users around the world. The outstanding performance of our CNC lineup consistently wins praise from users for their high levels of productivity, intuitive usability, and superior functionality. However, to develop the new M800/M80 Series, we went back to the drawing board and completely reexamined our cutting-edge control technologies. The result is a breakthrough in the control of high-speed, high-precision machining.

User performance requirements demand a commitment to development

The story of the new M800/M80 Series began with conventional development to produce incremental evolutionary improvements. But our goal was a revolutionary leap in CNC performance. Our project team determined that the only way to significantly boost processing performance and totally satisfy user demands would be the creation of a CPU optimized for CNC control. This insight inspired Mitsubishi Electric’s first-ever attempt to develop a CNC-dedicated CPU and opened a new chapter in CNC development.

Experience the revolutionary high-speed processing of the new CNC-dedicated CPU

Incorporating the CNC-dedicated CPU in the new series not only results in phenomenal processing speed, but also reduces the number of required parts, leading to fewer possibilities of failure and increasing product quality. Equipped with Mitsubishi Electric’s first-ever CNC-dedicated CPU, the long-awaited M800/M80 Series is the fruit of an original development process and the sum of our latest technologies. With the utmost confidence, we are proud to introduce the M800/M80 Series and invite customers to experience performance of the future today.

In-depth analysis and simulations achieve one volition

Pursuit of a dedicated CNC CPU began with design validation on an unprecedented scale as well as high-precision simulations to verify processing performance. Achieving a leap in processing performance demanded the integration of innovative technologies beyond optimizing processor manufacturing processes. Overcoming numerous hurdles and maximizing the potential of the processor, we succeeded in producing a CNC-dedicated CPU that achieves unprecedented high-speed processing performance.

Fine segment processing capacity

High capability in program processing enables a shorter cycle time.

PLC process capability (PCMIX value)

High processing capability of the PLC enables large-scale ladder logic to be processed at high speed.

CNC-to-drive communication capability

Optical Communication speed between the CNC Control and Drive system has been increased. This improves the system responsiveness, leading to more accurate machining.

The Mitsubishi Electric CNC Development Project Team
Display and keyboard designs have been updated. The advanced construction and sophisticated flat profile take machine design to the next level. The display incorporates a touchscreen as a standard option providing intuitive smart phone like operational features for 10.4" type and wider display units.

A 19" vertical display has been added to the M800W/M80W Series platform. The display provides a split multiple window that can be customized by arranging a keyboard, operation panel, document viewer or other applications that can be added to the display.

19-type vertical display unit provides two-split multiple windows for various applications

A 19" vertical display has been added to the M800W/M80W Series platform. The display provides a split multiple window that can be customized by arranging a keyboard, operation panel, document viewer or other applications that can be added to the display.

The slim personal computer unit enables greater flexibility in operation panel design

M800W/M80W Series personal computer unit boasts 50mm thick (excluding protrusions). This provides a higher degree of flexibility in operation panel design.

19-type touchscreen provides easy operability (for M800W/M80W Series only)

The display and keyboard have been redesigned. Measuring only 9.5mm thick (excluding protrusions), the possibilities of machine tool design have been expanded. In addition, their gray-scale colors can be easily harmonized with machines in different colors.

The surfaces of display and keyboard are flush, providing beauty and usability as well as increased operability. 10.4-type and larger displays have touchscreen made of beautiful, long-life glass, which allows you easy day-to-day maintenance.

M700V/M70V M800W/M80W

The M800/M80 Series can use a standard SD card which is an easily sourced device. The SD card can be inserted or removed independently of USB memory. The flip-up door provides greater durability.

Possible to be mounted not only from the front side of machine tools but also from the inner side of cabinets.
The display features a capacitive touchscreen that is commonly used in smartphones and tablets, allowing for intuitive and easy operation. With a simple flick of the finger, for instance, you can monitor the desired part of program, or view and select a menu key on the next page without the need for tedious key operation.

In 3D graphic check, you can view a 3D model at any desired size, in any desired position.

Smartphone-like intuitive touch operation

Touch operation provides you unprecedented ease of use.

Drag

Program edit (flick)

Pinch-in/Pinch-out

Menu scroll (flick)

Tools displayed by icons

8.4-type/10.4-type

15-type/19-type

Various features and operation menus are indicated using easy-to-recognize icons. Tool icons tell you the tool type, left- or right-hand, lifetime and other information at a glance.

Example G code guidance of G101 (G code macro definition)

(Example of creating HTML file)

Example)

G code guidance of G101

(JPEG files can also be registered to display figures and photos)

Touch operation provides you unprecedented ease of use.

A click of the menu button navigates you to 3D graphic check of the currently edited program. For lathe system, the 3D check supports for both milling and turning.

Lathe system

Machining center system

Up to 8 levels of access permission helps to prevent you from dispatching defective works. Permissible operation can be set individually for each access level.

Usability in a lathe application has been improved through tool icons, 3D work simulation for turning and other dedicated features

One of the highlights in M800/M80 Series is improved usability in a lathe. The tool icons indicate the tool shape and bit direction in an easy manner, which can satisfy both inexperienced and experienced operators. The 3D graphic check supports both turning and milling, so even a complex program can easily be checked through the 3D simulation.

Reduction of defects parts caused by human errors

M800/M80 Series has a feature called “User level-based data protection”, which allows you to set multiple levels of access permission. Permissible operation range can be set for each operator according to their roles in production. This feature can effectively prevent operation errors and other human errors, resulting in less defective production parts from being made.

Advanced universal design with a focus on ease of use

The easy-to-use interface inherited from M700/M70V Series has been upgraded to provide greater visibility and usability for the operators. Icons and operational menus are easily recognized and are available for anyone to use.

The Simple Monitor screen displays the information required for lathes and machining centers respectively in an enlarged view. The icons on the screen tell you the status of tools and spindles. All of these interface features are worth a try.

Improved user-friendliness through enriched guidance function

Guidance functions (parameter, G code and alarm) provide you with the necessary information immediately at the time of setup, programming and maintenance.

The G code guidance function on Edit screen is now able to display custom G codes made by a machine builder, leading to even greater user-friendliness.

Usability in a lathe application

A simple flick of the finger provides you with the necessary information at the time of setup, programming and maintenance.

Example) G code guidance of G101

(G code macro definition)

(Example of creating HTML file)

· JPEG files can also be registered to display figures and photos
CNC LINEUP

Premium CNC provides expandability and flexibility
- Separated type, a control unit separated from display
- Windows-based display is included in the lineup, which provides excellent expandability
- Four expansion slots are provided as standard specifications, allowing for expansion using option card slot

High-grade CNC well suited to high-speed high-accuracy machining and multi-axis multi-part system control
- Panel-in type, a control unit with integrated display
- Multi-CPU architecture allows for high performance and high functional graphics
- Windows-less display provides easy operability

Standard CNC with expandability and flexibility
- Separated type, a control unit separated from display
- Windows-based display is included in the lineup, which provides excellent expandability
- Packaged type for selecting a machine type easily
- Two expansion slots are provided as standard specifications, allowing for expansion using option cards slot

Standard CNC provides high productivity and easy operability
- Panel-in type, a control unit with integrated display
- Provided in package (TypeA/TypeB) for easier selection
- Windows-less display provides easy operability

Display unit size
- 19-type
- 15-type
- 10.4-type
- Touchscreen (Windows-based)

Main Specifications
- Max. number of axes (NC axes + Spindles + PLC axes)
- Max. number of spindles
- Max. number of part systems (main+sub)
- Fine segment processing capacity [kilo-blocks/min]

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<tr>
<th>Type</th>
<th>Lathe system</th>
<th>Machining center system</th>
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<tbody>
<tr>
<td>M800W</td>
<td>Lathe: 16</td>
<td>Machining: 32</td>
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<tr>
<td>M800S</td>
<td>Lathe: 4</td>
<td>Machining: 8</td>
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<tr>
<td>M80W</td>
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<td>M80</td>
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<td>11</td>
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<tr>
<td>TypeB</td>
<td>4</td>
<td>2</td>
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</tbody>
</table>

| TypeA | 67.5 | 135 |
| TypeB | 67.5 | 2 |

(Additional information on display unit sizes and main specifications provided in the document.)
SYSTEM CONFIGURATIONS

Ethernet

- M800S/M80 Series
  - Display-integrated control unit & Keyboard
  - Manual pulse generator
  - Machine operation panel
  - Tool spindle motor
    - HG Series
    - HG-JR Series

- M800W/M80W Series
  - Display & Keyboard
  - Control unit
  - Servo motors
    - HG Series
    - LM-F Series
    - TM-RB Series

Software
- NC Analyzer2
- NC Configurator2
- NC Visualizer
- MITSUBISHI CNC communication software (FCSB1224W000)
- NC Explorer
- NC Monitor2

Field Network
- CC-Link
- PROFIBUS-DP
- EtherNet/IP
- CC-Link IE Field

Drive unit
- MDS-E/EH Series
- MDS-EJ/EJH Series
- MDS-EM/EMH Series

Remote I/O unit
  - Thermistor input unit
  - EcoMonitorLight

Power supply unit
- MC
- AC reactor
- PC server
- Production control system

Hardware
- AC power supply
- User-prepared: Optional parts are not provided as accessories for NC equipment. Please purchase desired components from a Mitsubishi Electric dealership, etc.
**ENHANCED LATHE SYSTEM**

Milling features and multi-axis, multi-part system control features have been significantly improved. Progress has been made in operability, enabling operators to implement even more complex machining in an easy and efficient manner.

**Feature Overview**
- **Milling features**
  - High-speed high-accuracy control
  - Super Smooth Surface (SSS) control
  - Spindle-mode servo motor control
- **Multi-axis, multi-part system control features**
  - Supports up to 8 part systems, 32 axes and 8 spindles
  - Loader control via sub-part system control
  - Spindle superimposition control
- **User operability**
  - Workpiece coordinate system shift
  - Easy setup of barrier check parameters
  - Simple monitor screen showing narrow-down information
- **Conversational programming**
  - Interactive cycle insertion
  - 3D program check
- **Features for large-sized lathes**
  - Re-thread cutting
  - Thread cutting override
  - Real-time tuning
  - Large-sized display
- **Multi-axis indexing while holding the workpiece.**

**Improved machining features**

- High-speed high-accuracy control features, including SSS control, are available for milling using lathe system. A servo motor driven by a servo drive unit can be controlled as a tool spindle.

- Tool spindle superimposition control can be implemented at high speeds on a lathe system.

- Improved milling features and multi-axis, multi-part system control features, including loader control using sub-part system, spindle superimposition and synchronization of multiple spindle sets.

- Significant progress has also been made in frequently used operation, such as tool offset and workpiece coordinate system shift, which allows operators to easily implement even more complex machining.

**Significantly easier programming**

Operators can set machining cycles easily in an interactive manner while monitoring the finished work shape. In addition to the input of normal shape data, you can also extract drawing elements from CAD data in DXF format, and set them as shape data, which makes programming easier. Programmed shape can be checked in 3D graphic check before machining to check for any program error.

**High-speed turning**

High-speed high-accuracy control features, including SSS control, can be implemented at high speeds on a lathe system. Fine milling can be implemented at high speeds on a lathe.

- This CNC enables a servo motor, instead of a spindle, to act as a tool spindle. Any of the servo control axes driven by multi-hybrid drive can be used as a tool spindle. This contributes to the downsizing of machine tools.

**Multi-axis multi-part system control features help to reduce cycle time and maintain synchronization between part systems**

- M800/M80 Series provides “Spindle superimposition control,” a feature that enables simultaneous execution of turning and center tapping, although they need to be executed individually. These features are effective in eliminating idle time, resulting in a significant reduction in tact time.

- This CNC also offers features that maintain synchronization between part systems, which is required for automatic lathes, in particular. These enable operators to implement even more complex machining safely and securely.

**Real-time tuning helps maintain machine stability by adjusting the control gain automatically**

This function estimates the work inertia and changes the speed control gain or time constant automatically according to the estimation results to suppress mechanical vibration.
**ENHANCED MACHINING CENTER SYSTEM**

SSS control has further evolved, realizing high-speed, high-accuracy, high-quality machining. In addition, this CNC offers features that bring out the full potential of each axis and minimize non-cutting time, leading to higher productivity.

**High-speed, high-accuracy, high-quality cutting through SSS-4G control**

M800/M80 Series offers SSS 4th-generation (SSS-4G) control, enabling high-speed, high-accuracy, high-quality machining. SSS-4G control provides features that are effective in reducing tact time, including optimal acceleration/deceleration suited to each axis’ characteristics. In addition, SSS-4G is capable of reducing machine vibration during high-speed cutting. SSS-4G control allows for greater cutting accuracy in the same length of time, or shorter cutting time with the same degree of accuracy when compared to our previous models.

**Necessary features are available on your machine. M800 Series includes SSS control and inclined surface machining features.**

The SSS control function provides smoother surfaces at higher speeds and the inclined surface machining control function makes it possible to issue normal program commands to an arbitrary plane (inclined surface) in space. The tool center point control supports a system with four simultaneous contour control axes. These and various other features are incorporated in the M80 Series.

**M800/M80 Series brings out the full potential of machine tools**

M800/M80 Series provides new features that can maximize the full potential of machine tools, including:

1. Variable-acceleration pre-interpolation acceleration/deceleration provides optimized acceleration, with each axis’ characteristics fully exercised. For example, allowing a linear axis to accelerate irrespective of rotary axis responsiveness.
2. "OMR-FF control" allows for optimal position loop gain adjustment suited to each axis, leading to smoother and more accurate cutting.
3. Other than the above, this CNC has new functionality effective for higher productivity, including “Rapid traverse block override function” that helps reduce non-cutting time by overlapping feed blocks.

**High productivity and high quality are our primary focus**

CNC-dedicated CPU is incorporated in the M800/M80 Series, providing significantly improved short segment processing capability. The benefits are not limited to improvements in basic performance alone. The Tolerance Control function enables operators to achieve high-quality surfaces simply by specifying the desired dimensional accuracy. This feature takes machining to a whole new level.

**Tolerance control function provides a smooth motion within specified error tolerances. Desired machining results can be achieved using simple parameter adjustment.**

**OMR-FF control** makes servo control smoother and more accurate, enabling optimal position loop gain adjustment suited to each axis.

- **M800W**
  - Large tolerance: 5min 34sec
  - Medium tolerance: 6min 46sec
  - Small tolerance: 6min 34sec

- **M800S**
  - Large tolerance: 6min 34sec
  - Medium tolerance: 7min 46sec
  - Small tolerance: 6min 34sec

- **M80W**
  - Large tolerance: 6min 34sec
  - Medium tolerance: 7min 46sec
  - Small tolerance: 6min 34sec

**Desired machining results can be achieved using simple parameter adjustment.**

**Tolerance control function provides a smooth motion within specified error tolerances.**

**Position command**

- Feed forward generation
- Speed control
- Current control
- Mechanical system
- 1.1㎛
- 0.7㎛

**Rapid traverse block overlap function makes it possible to reduce non-cutting time. The overlap varies according to the path to keep the tolerance constant.**

**Other features of M800/M80 Series**

- Fast interpolation of linear axes
- Variable acceleration pre-interpolation acceleration/deceleration
- "OMR-FF control"

**Machining results can be achieved using simple parameter adjustment.**

- **M800W**
  - 32min 48sec
  - 29min 30sec

- **M800S**
  - 26min 54sec
  - 23min 46sec

- **M80W**
  - 26min 54sec
  - 23min 46sec

**Tolerance control function provides a smooth motion within specified error tolerances.**
**UNIQUE CUSTOMIZATION**

A high level of screen customization is attainable more easily in a shorter period of time. Highly scalable hardware and advanced drawing application make it possible to increase the added value of machine tools.

19-type vertical display boosts the added value of machine tools

The display shows the standard CNC screen on the upper half, while offering the lower half (home application) to be freely customized. It is also possible to add some originality to machines to increase their added value. However, it is difficult to design the whole screen at the same time. This screen layout can satisfy such needs. Combined with customers’ ideas, the possibilities are infinite.

Support for large-capacity custom data using the SD memory on the back of display

The panel-in type CNC with integrated display has the SD card interface on the back of the display. By installing an SD memory card, large-capacity machining programs can be stored.

Customize the standard screens as per the preference of operators

Each operator has their own set of frequently used menus. This CNC allows operators to rearrange their menus and hide any unused ones so they can easily navigate to their desired screen. This CNC has a function called Selective Display, which enables partial customization of the Monitor screen. Selectable Display allows you to constantly display tool offsets, common variables, or a custom screen made by a machine builder.

Enhanced tool management screen

The CNC provides new tool management screen, where you can gather and manage tool-related information with greater convenience. A wide range of setting items such as tool name and tool ID are readily available. You can read or write tool data or add custom data via ladder or machining program.

**MAINTENANCE**

At the time of alarm occurrence, the detailed information of alarm history is output in a separate file from the existing alarm history. Understanding detailed information such as modal and coordinates at the time of occurrence enables you to perform early troubleshooting.

**REINFORCED FUNCTIONAL SAFETY**

M800/M80 Series provides a range of safety features collectively called the Smart Safety Observation Function. This function has achieved full conformity with the safety standards that cover the entire system including CNC, drive, I/O, sensors and communication.

**Smart safety observation function**

Safety-related I/O observation

Safety-Limited Position (SLP)

Safe Operating Stop (SOS)

Safely-Limited Speed (SLS)

Safe Brake Control/Safe Brake Test (SBC/SBT)

Safe Stop (SS1/SS2)

Safe Torque Off (STO)

**Functional safety system can be configured easily.**

Use of Safety I/O unit

Door signal

Remote I/O unit

Operation panel I/O unit

Drive unit

Power supply unit

Not required

Safety communication enables the use of wire-saving configurations

Safety I/O

Safety communication

Safe I/O

Safeguarding function

Drive

Motor

Not required

Capable of monitoring redundant door and emergency stop signals with no need for dedicated safety circuit

Redundant two-channel STO is built into the drive, making it possible to use less wiring

【Not required】

Alarm occurrence

Alarm history file

Detailed alarm history information file

Alarm history file

Detailed alarm history information file

Alarm occurrence

Alarm history file

Detailed alarm history information file

Alarm occurrence

Alarm history file

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Alarm occurrence

Alarm history file

Detailed alarm history information file
MTConnect Data Collector

The data collected from MTConnect compatible device can be imported into Edgecross and used for edge applications etc. MTConnect is an open protocol for machine tools. By using the MTConnect Adapter which is compatible with MITSUBISHI CNC M800/M80 Series and M700/M70 Series, you can easily collect and utilize various data of the machine tool which works with MITSUBISHI CNC.

Utilization of open software platform “Edgecross” which realizes FA-IT coordination in the edge computing level enhances Edge computing and e-F@ctory.

*1 Edgecross is a product of Edgecross Consortium

MTConnect Data Collector can import machine tool data into Edgecross

Compatible with a range of field networks that facilitate connection to peripherals

With the aim of configuring factory automation systems, compatibility with a range of field networks has been implemented, enabling connection to peripherals.

Insert the option card into the standard expansion slot of the M800W/M80W Series CNC or on the back of the display for the M800S/M80 Series.

MTConnect Data Collector imports machine tool data into Edgecross.

The data collected from MTConnect compatible device can be imported into Edgecross and used for edge applications etc. MTConnect is an open protocol for machine tools. By using the MTConnect Adapter which is compatible with MITSUBISHI CNC M800/M80 Series and M700/M70 Series, you can easily collect and utilize various data of the machine tool which works with MITSUBISHI CNC.

The NC screens can be displayed on an external PC/tablet PC. Operator can monitor the machine tool’s status and operate the NC screen without going to the factory floor, which helps to improve the operation efficiency. (The function is enabled on a non-Windows-based NC display. No external computer is required.)

Operator mail notification lets you know the machine status at anytime and anywhere

This sends you an e-mail about machine condition automatically at the specified timing to a computer, tablet or smartphone. No dedicated line is needed, so you can set up easily. Machine condition can be monitored at anytime, anywhere. This helps you to deal with emergent situations timely, leading to shorter downtime and higher productivity.

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Machining is not interrupted when an alarm occurs on peripheral equipment (e.g., loader). During an alarm, operation of individual machine groups can be stopped. This feature allows continuation of machining even when an alarm occurs on a loader, magazine or other peripheral equipment.

Renewed I/O units allow the control of a number of peripherals

I/O units have been redesigned. The renewed I/O communication method makes it possible to significantly increase the maximum number of contact points per channel, enabling a number of peripheral equipment and devices to be controlled by CNC alone.

Built-in PLC makes it easier to control and manage peripheral equipment and units

Built-in PLC functionality for I/O control has been improved. The CNC supports Multi-project PLC, a feature that enables ladder logics for peripheral equipment to be managed separately from those for machine tools. This creates a more efficient environment for operators working together in developing and managing ladder logics.

New feature capable of stopping peripheral equipment incorporated

M800/M80 Series has a feature called Machine Group-based Alarm Stop, which stops operation of individual machine groups if an alarm occurs when control is combined with the MDS-E/EM/EJ Series. This feature allows continuation of machining even when an alarm occurs on a loader, magazine or other peripheral equipment.

Supports increasing automation needs. Automation can be realized more easily by simple connection and control of the peripheral devices.

Renewed I/O communication method allows for the control of up to 64 stations and 2,048 points per channel. Various peripheral equipment can be controlled by the CNC alone.

Built-in PLC for peripheral equipment

Group 1 Group 2 Loader

If an alarm occurs on the loader axis, only the loader is stopped.

Multi-project PLC enables control of ladder logic for peripheral equipment separately from that for machine tools. This leads to efficient development and management of ladder logics for peripheral equipment.

Built-in ladder logic for peripheral equipment. This leads to efficient development and management of ladder logics for peripheral equipment.
### SPECIFICATIONS

#### Lathe system

<table>
<thead>
<tr>
<th>Specification</th>
<th>M800 Series</th>
<th>M800W Series</th>
<th>M800W Series</th>
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<td>Built-in PLC capacity</td>
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#### Machining center system

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<th>M800W Series</th>
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<td>Number of simultaneous contouring control axes</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Max. number of NC axes in a part system</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Max. number of part systems (main+sub)</td>
<td>200 sets</td>
<td>200 sets</td>
<td>200 sets</td>
<td>200 sets</td>
</tr>
<tr>
<td>Max. number of main part systems</td>
<td>100 sets</td>
<td>100 sets</td>
<td>100 sets</td>
<td>100 sets</td>
</tr>
<tr>
<td>Max. number of sub part systems</td>
<td>100 sets</td>
<td>100 sets</td>
<td>100 sets</td>
<td>100 sets</td>
</tr>
<tr>
<td>Control unit-side High-speed program server mode</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Display unit-side High-speed program server mode</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Least command increment</td>
<td>0.1/μm</td>
<td>0.1/μm</td>
<td>0.1/μm</td>
<td>0.1/μm</td>
</tr>
<tr>
<td>Least control increment</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Max. number of tool offset sets</td>
<td>128 sets</td>
<td>128 sets</td>
<td>128 sets</td>
<td>128 sets</td>
</tr>
<tr>
<td>Built-in PLC capacity</td>
<td>400 sets</td>
<td>400 sets</td>
<td>400 sets</td>
<td>400 sets</td>
</tr>
</tbody>
</table>

### References
- (1) G/B-Guide Bush
- (2) The 8.4-type display unit is incompatible.
- (3) Windows-based display unit/Windows-less display unit
- (4) Limited to the simultaneous 4-axes contouring control.
DRIVE SYSTEM

MDS-E/EH Series
- High-performance Servo/Spindle Drive Units
- The servo control-dedicated core processor realizes improved control speed, leading to enhanced basic performance. When combined with a higher resolution motor sensor and advanced high-speed optical communication, this drive contributes to high-speed, high-accuracy control.
- The motor power connector is equipped with an anti-misinsertion mechanism. This helps to eliminate connection errors.
- Improved diagnostic and preventive-maintenance features.
- Safe Torque Off (STO) and Safe Brake Control (SBC) are also incorporated as additional safety features.

MG Series
- Multi-hybrid Drive Units
- The multi-hybrid drive units are capable of providing a maximum of three servo axes and one spindle. This contributes to the downsizing of machines and offers technical advantages.
- The motor power connector is equipped with an anti-misinsertion mechanism. This helps to eliminate connection errors.
- Fan unit contributes to easier fan exchange.
- Motor energy loss has been significantly reduced by optimizing the magnetic circuit.
- High-speed bearings are incorporated as standard features, helping to achieve higher speed, lower abrasion and improved durability.

All-in-one Compact Drive Units
- MDS-EJ/EJH Series
- The compact drive units with built-in power supplies contribute to smaller control panel size.
- The 2-axis type is added for further downsizing.
- The servo control-dedicated core processor realizes an increase in control speed, leading to improved basic performance. When combined with a higher resolution motor sensor and enhanced high-speed optical communication, this drive contributes to high-speed, high-accuracy control.
- Safe Torque Off (STO) and Safe Brake Control (SBC) are also incorporated as additional safety features.
- Fan unit contributes to easier fan exchange.
- Motor energy loss has been significantly reduced by optimizing the magnetic circuit.
- High-speed bearings are incorporated as standard features, helping to achieve higher speed, lower abrasion and improved durability.

Servo motors
- High-performance Spindle Motors
- SJ-D Series
- Motor energy loss has been significantly reduced by optimizing the magnetic circuit.
- High-speed bearings are incorporated as standard feature, helping to achieve higher speed, lower abrasion and improved durability.
- Range: 0.75 to 7.5 kW
- Maximum speed: 10,000 to 24,000 [rpm]

Linear Servo Motors
- LM-F Series
- Use in clean environments is possible since no ball screws are used, eliminating possible contamination from grease.
- Elimination of transmission mechanisms, including backlash, enables smooth, quiet operation even at high speeds.
- Range: Maximum thrust: 900 to 18,000 [N m]

Direct-drive Servo Motors
- TM-RB Series
- High-torque, direct-drive motors combined with high-gain control provide quick acceleration and positioning, which makes rotation smoother.
- Suitable for rotary axes that drive tables or spindle heads.
- Range: Maximum torque: 36 to 1,280 [N m]

Built-in Spindle Motors
- SJ-BG Series
- The electrical design has been optimized to increase the continuous rated torque per unit volume, contributing to the downsizing of spindle units.
- Options for mold specification and cooling jacket specification are prepared.

Tool Spindle Motors
- HG-JR Series
- Compact tool spindle motors are designed to have the small, high-output characteristics of servo motors yet offer high-speed rotation (6,000/min). These motors contribute to downsizing spindle size, like rotary tool spindles.
- Range: 0.75 to 1.5 kW
- Maximum rotation speed: 8,000 [rpm]
- Small-sized connector allows horizontal cable connection, which helps to save space in machines. (Note 2)

Drives
- DMN-PH Series
- Multi-hybrid Drive Units
- The multi-hybrid drive units are capable of providing a maximum of three servo axes and one spindle. This contributes to the downsizing of machines and offers technical advantages.
- The motor power connector is equipped with an anti-misinsertion mechanism. This helps to eliminate connection errors.
- Fan unit contributes to easier fan exchange.
- Motor energy loss has been significantly reduced by optimizing the magnetic circuit.
- High-speed bearings are incorporated as standard features, helping to achieve higher speed, lower abrasion and improved durability.

Medium-inertia, High-accuracy, High-speed Motors
- HG Series
- Sensor resolution has been significantly improved. The servo motors, which boast smooth rotation and outstanding acceleration capabilities, are well-suited to serve as tool axes of machine tools.
- Range: 0.2 to 9 [kW]
- Maximum rotation speed: 2,000 to 6,000 [r/min]
- Safety support sensors are included as standard specification. Sensor connectors are screw-locked and have enhanced vibration resistance. Three sensor resolutions (i.e., 1, 4 or 67 million pulses/rev) are available.
- This can also be used as a tool spindle motor.
- Small-sized connector allows horizontal cable connection, which helps to save space in machines. (Note 2)
Software Tools

Process flow from machine design and development to operation and maintenance

- **NC-related processes**
  - Servo/spindle adjustment
  - Parameter creation
  - Machine assembly
  - Operation and maintenance

Software Tools

**Machine design**
- Custom screen creation
- Servo/spindle adjustment
- NC Trainer2
- NC Configurator2
- Graphic check
- API

**Electrical circuitry design**
- CAD/CAM
- API
- API

**Machine assembly and adjustment**
- NC Designer2
- NC Explorer
- Operation and maintenance
- Training

**NC Servo Selection**
Input machining parameters to determine the optimum servo motor. This function automatically calculates spindle acceleration/deceleration time and selects the optimum power supply module.

**Machine design**
- Use the following instructions to set machining parameters

**Electrical circuitry design**
- Machine design
- Servo selection
- Parameter creation
- Training
- NC Trainer2

**Machine assembly and adjustment**
- NC Designer2
- NC Explorer
- Operation and maintenance
- Training

**Operation check**
- Check the contents of the parameters in the help section.

**Application development support**
- Example of application development
- Development language
- Program creation/edition
- CAD/CAM

**Mitsubishi CNC Communication Software (FCSB1224W000)**
This software provides a bunch of API functions. They facilitate development of an Windows application which requires connection and communication with Mitsubishi CNC. You can use the common interfaces for any Mitsubishi CNC model, which leads to high efficiency in development.

[*] The compatible model is Mitsubishi CNCs after M700/M70.
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WARRANTY

Please confirm the following product warranty details before using MITSUBISHI CNC.

1. Warranty Period and Coverage
   Should any fault or defect (hereafter called "failure") for which we are liable occur in this product during the warranty period, we shall provide repair services at no cost through the distributor from which the product was purchased or through a Mitsubishi Electric service provider. Note, however, that this shall not apply if the customer was informed prior to purchase of the product that the product is not covered under warranty. Also note that we are not responsible for any on-site readjustment and/or trial run that may be required after a defective unit is replaced.

[Warranty Term]
   The term of warranty for this product shall be twenty-four (24) months from the date of delivery of product to the end user, provided the product purchased from us in Japan is installed in Japan (but in no event longer than thirty (30) months, including the distribution time after shipment from Mitsubishi Electric or its distributor). Note that, for the case where the product purchased from us in or outside Japan is exported and installed in any country other than where it was purchased, please refer to "2. Service in overseas countries" as will be explained.

[Limitations]
   (1) The machine tool builder is requested to conduct an initial failure diagnosis, as a general rule. It can also be carried out by us or our service provider upon the machine tool builder’s request and the actual cost will be charged.
   (2) This warranty applies only when the conditions, method, environment, etc., of use are in compliance with the terms and conditions and instructions that are set forth in the instruction manual, user’s manual, and the caution label affixed to the product, etc.
   (3) Even during the term of warranty, repair costs shall be charged to the customer in the following cases:
      a) a failure caused by improper storage or handling, carelessness or negligence, etc., or a failure caused by the customer’s hardware or software problem
      b) a failure caused by any alteration, etc., to the product made by the customer without Mitsubishi Electric’s approval
      c) a failure which may be regarded as avoidable, if the customer’s equipment in which this product is incorporated is equipped with a safety device required by applicable laws or has any function or structure considered to be indispensable in the light of common sense in the industry
      d) a failure which may be regarded as avoidable, if consumable parts designated in the instruction manual, etc., are duly maintained and replaced
      e) any replacement of consumable parts (including slimity, relay and fuse)
      f) a failure caused by external factors such as inevitable accidents, including without limitation fire and abnormal fluctuation of voltage, and acts of God, including without limitation earthquakes, lightning, and natural disasters
      g) a failure which is unforeseeable under technologies available at the time of shipment of the product from our company
      h) any other failures which we are not responsible for or which the customer acknowledges we are not responsible for

2. Service in Overseas Countries
   If the customer installs the product purchased from us in his/her machine or equipment, and export it to any country other than where he/she bought it, the customer may sign a paid warranty contract with our local FA center. This falls under the case where the product purchased from us in or outside Japan is exported and installed in any country other than where it was purchased.
   For details please contact the distributor from which the customer purchased the product.

3. Exclusion of Responsibility for Compensation against Loss of Opportunity, Secondary Loss, etc.
   Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to:
   (1) Damages caused by any cause found not to be the responsibility of Mitsubishi.
   (2) Loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products.
   (3) Special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products.
   (4) Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

4. Changes in Product Specifications
   Specifications shown in our catalogs, manuals or technical documents are subject to change without notice.

5. Product Application
   (1) For the use of this product, its applications should be those that may not result in a serious damage even if any failure or malfunction occurs in the product, and a backup or fail-safe function should operate on an external system to the product when any failure or malfunction occurs.
   (2) Mitsubishi CNC is designed and manufactured solely for applications to machine tools to be used for industrial purposes. Do not use the product in any applications other than those specified above, especially those which are substantially influential on the public interest or which are expected to have significant influence on human lives or properties.

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   Since its beginnings in 1870, some 45 companies use the Mitsubishi name, covering a spectrum of finance, commerce and industry. The Mitsubishi brand name is recognized around the world as a symbol of premium quality.

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   This is why you can rely on Mitsubishi Electric automation solution - because we know first hand about the need for reliable, efficient, easy-to-use automation and control in our own factories.

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