

NUMERICAL CONTROL (CNC) M800V/M80V Series



M800V/M80V Series
COMPUTERIZED NUMERICAL CONTROLLERS

GLOBAL IMPACT OF MITSUBISHI ELECTRIC



Through Mitsubishi Electric's vision, "Changes for the Better" are possible for a brighter future.

Changes for the Better

"Changes for the Better" represents the Mitsubishi Electric Group's attitude to "always strive to achieve something better", as we continue to change and grow. Each one of us shares a strong will and passion to continuously aim for change, reinforcing our commitment to creating "an even better tomorrow".

Mitsubishi Electric is involved in many areas including the following:

Energy and Electric Systems

A wide range of power and electrical products from generators to large-scale displays.

Electronic Devices

A wide portfolio of cutting-edge semiconductor devices for systems and products.

Home Appliance

Dependable consumer products like air conditioners and home entertainment systems.

Information and Communication Systems

Commercial and consumer-centric equipment, products and systems.

Industrial Automation Systems

Maximizing productivity and efficiency with cutting-edge automation technology.

Our advances in AI and IoT are adding new value to society in diverse areas from automation to information systems. The creation of game-changing solutions is helping to transform the world, which is why we are honored to be recognized in the 2019 "Forbes Digital 100" as one of world's most influential digital corporations.



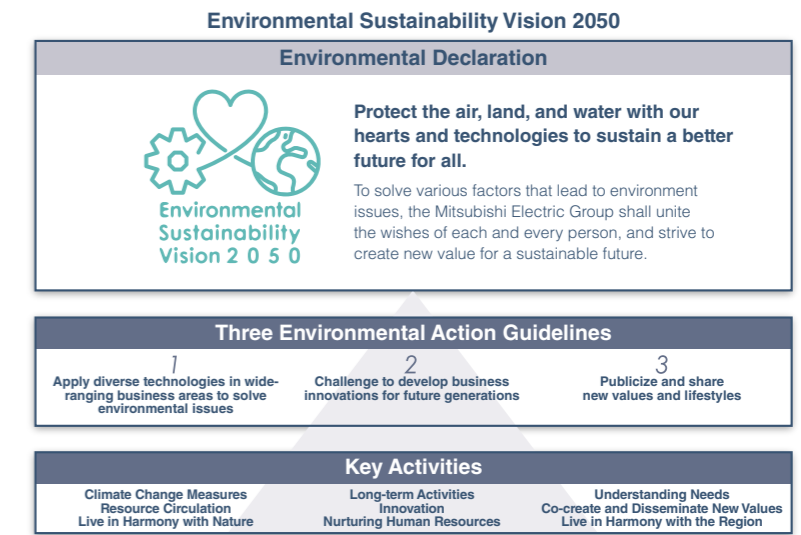
INITIATIVES THAT CONTRIBUTE TO ADDRESSING SOCIAL ISSUES

The Mitsubishi Electric Group will pursue value creation by addressing social challenges and will contribute to achieving the 17 goals of the SDGs*1 through all corporate activities.

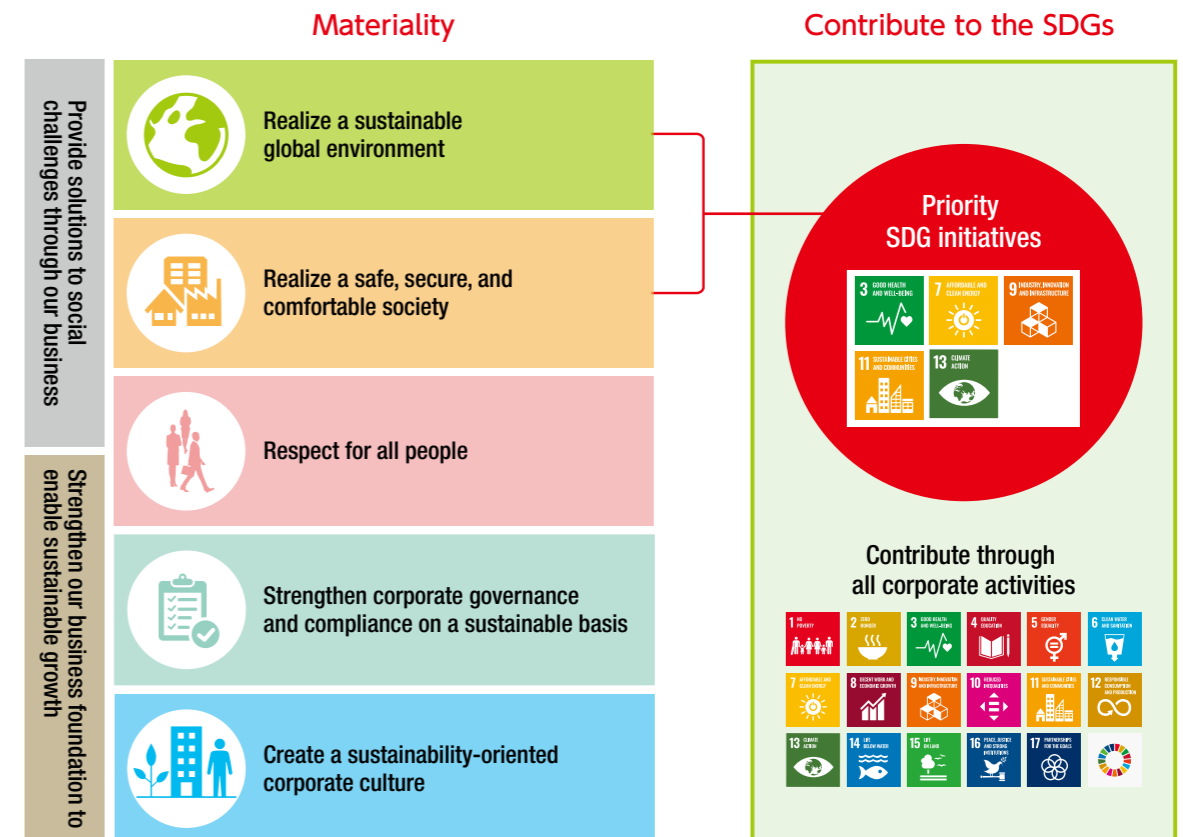
Environmental Initiatives

The Mitsubishi Electric Group has set forth Environmental Sustainability Vision 2050 to clarify the company's stance on addressing long-term environmental issues and creating new value for a sustainable future toward 2050.

The new vision identifies environmental protection as a top corporate priority and stipulates increased initiatives toward this end. It defines Mitsubishi Electric's future course toward 2050 for implementing key initiatives in the form of the Environmental Declaration and Three Environmental Action Guidelines.



The Mitsubishi Electric Group's Materiality



*1. Sustainable Development Goals adopted by the United Nations as goals to achieve by 2030.



MITSUBISHI ELECTRIC CNC
M800V/M80V Series
Concept video



M800V/M80V Series COMPUTERIZED NUMERICAL CONTROLLERS

The Evolution in Smart Manufacturing

Seven years after its development, the M800/M80 Series ushers in a new dimension.

A variety of innovative control functions help machine various 'things' at high speed and with high accuracy.

The industry's first*1 built-in wireless LAN, which reduces wiring and operators' movement, high-definition 3D machining simulation, which minimizes trial cutting, and advanced user-friendly and intuitive operations streamline overall manufacturing processes and create 'time' as never before envisioned.

Our new CNC, keeping abreast of manufacturers' needs and the advancement of the times, efficiently optimizes manufacturing from the perspective of 'things' and 'time'.

Introducing the all new M800V/M80V Series.



High-speed
high-accuracy functions
that further improve
productivity
on the shop floor

Connectivity and
usability that further
streamline the shop floor

Functions that contribute
to sustainability

OVERVIEW

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*1. As of August 2021. According to research by Mitsubishi Electric Corporation.

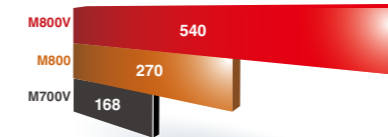
FEATURES OF THE M800V/M80V SERIES

The M800V/M80V Series makes an effective difference in each phase of the engineering chain.

Mechanical and electrical design	Setup	Machining	Production maintenance
<ul style="list-style-type: none"> Differentiation of machines through customization Easier PLC programming Expanded control area (sheet metal laser cutting machines, special mechanisms, etc.) 	<ul style="list-style-type: none"> Enhanced usability Efficient programming and parameter adjustment High-definition simulation to reduce faulty machining and scrap 	<ul style="list-style-type: none"> Enhanced machining quality New function to reduce cycle time and extend tool life 	<ul style="list-style-type: none"> Support for automation and traceability More features and improvements for operation monitoring and remote monitoring applications Support for security measures
Image input interface Image input expansion Camera connection  ▶ See P.13	Multi-touch gestures  ▶ See P.6	Spline interpolation 2 improvement Function OFF Function ON No mark  ▶ See P.15	Two-dimensional barcode (QR code) engraving cycle  ▶ See P.16
MELSEC development tool (GX Works2) PLC on-board: Circuit monitor screen GX Works2 project file Read Write  ▶ See P.13	Parameter adjustment screen for high-accuracy control  ▶ See P.14	OMR-CC (Optimum machine response-contour control)  Improved cutting in arcs and free-form surfaces ▶ See P.15	NC Machine Tool Optimizer  Displays an overview of the status of machine operations in a plant ▶ See P.16
Laser processing control  ▶ See P.8	Rotation center error measurement Apply the measurement result to the screen  ▶ See P.14	Tool cutting point control Compensation  ▶ See P.15	Built-in remote service gateway unit functionality M800V/M80V Series Remote 4U server  ▶ See P.7
Motion control release (coordinate transformation) Coming soon  Coordinate transformation process can be embedded in machines with special mechanism ▶ See P.8	3D machining simulation  ▶ See P.14, 17	Cutting load control Reduction in rough cutting time of an evaluation workpiece Cutting load control OFF 38m27s Cutting load control ON 32m55s 14.4% * R10mm F4000 circular interpolation Evaluation workpiece (image)  ▶ See P.15	Security feature for Windows display Security software Authorized applications  ▶ See P.16

BASIC PERFORMANCE IMPROVEMENTS

Increased fine segment processing capability further reduces cycle time



* The above is the maximum value. The maximum value differs depending on the function.

With improved hardware optimized for CNC, the dedicated CPU significantly improves fine segment processing capability. High machining program processing capability translates to a shorter cycle time.

Increased number of control axes

■Machining center system (M system)

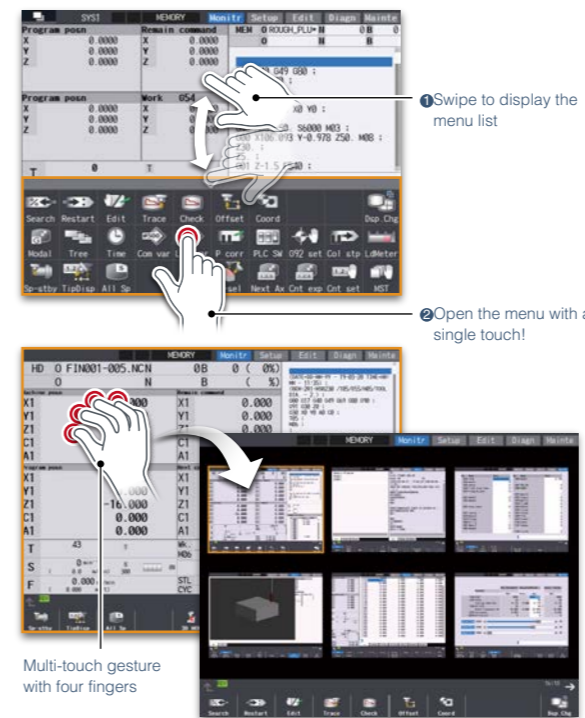
	M800VS M800VW	M80V (TypeA)	M80V (TypeB)
Max. number of axes	32	11	9
Number of spindles	4 ▶ 6	2 ▶ 4	2

■Lathe system (L system)

	M800VS M800VW	M80V (TypeA)	M80V (TypeB)
Max. number of axes	32	12 ▶ 13	9
Number of spindles	8	5 ▶ 6	4

The number of some control axes has been increased from the conventional M800/M80 Series, allowing control of more complex mechanisms.

Multi-touch function provides superior usability



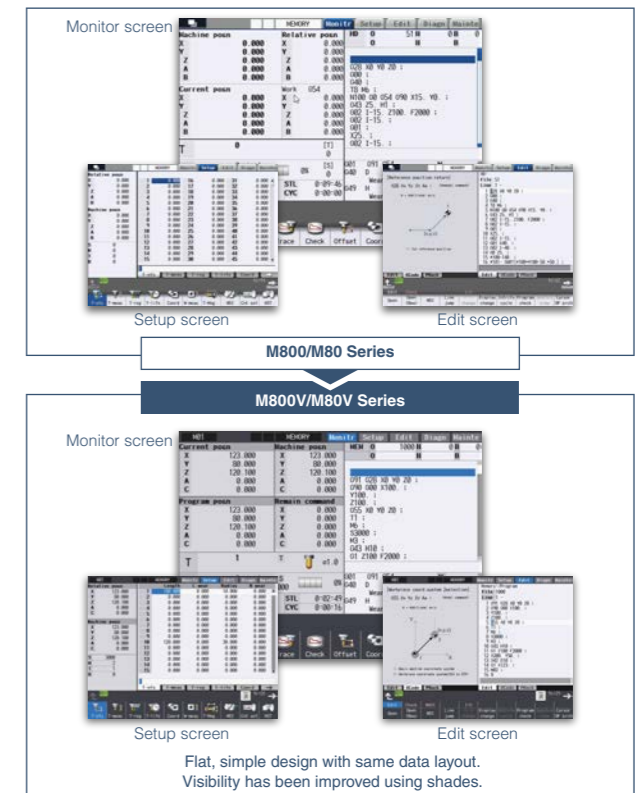
1 Swipe to display the menu list

2 Open the menu with a single touch!

Multi-touch gesture with four fingers

Usability of the M800/M80 Series has further evolved! Multi-touch gestures enable smarter operations, such as: Drag/flick the menu upward to open the menu list • Use grab operation with four or more points to open the list of recently selected screens.

Screen design that ensures visibility



Monitor screen
Setup screen Edit screen

M800/M80 Series

Monitor screen
Setup screen Edit screen

M800V/M80V Series

Flat, simple design with same data layout. Visibility has been improved using shades.

Screen design and colors are optimized for readability considering information content. Better visibility leads to increased work efficiency.

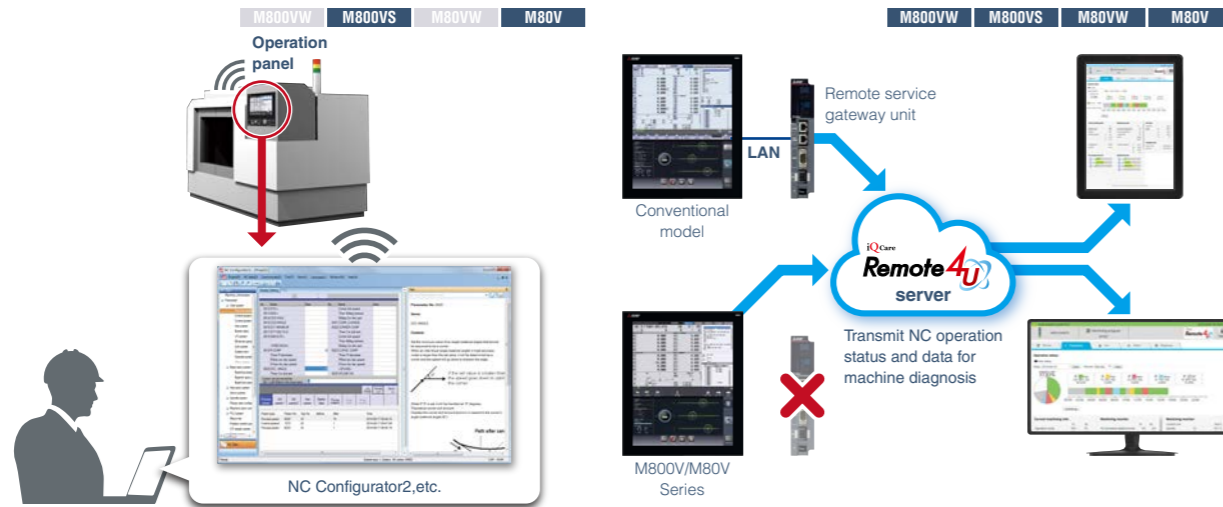
View the introduction video here. ▶



EVOLUTION OF THE CONTROL UNIT AND DISPLAY UNIT

Built-in wireless LAN increases work efficiency

A gateway unit functionality for remote service is built into the NC



Our industry-first*1 NC control unit with built-in wireless LAN frees operation from the constraints of time and space. It can be connected to software tools on a PC to exchange data using wireless communication.

The functionality of a remote service gateway unit required for remote service iQ Care Remote4U is built into the NC control unit*1, leading to less wiring and easier remote diagnostics.

*1. As of August 2021. According to research by Mitsubishi Electric Corporation.
*2. The available legal wireless frequency bands and channels vary from country to country due to varying regulations governing use of radio waves. Ensure that the country code that matches the country of operation is configured before using the wireless LAN functionality.

*1. For regular data retrieval, different interval applies to the built-in capability (Remote gateway unit, one second; built-in capability in NC control unit, 30 seconds). If the data needs to be retrieved at a one-second interval, use the remote gateway unit like the earlier models.

View the introduction video here. ▶



Addition of a 19-inch display to the lineup of display-integrated control units (M800VS/M80V Series)



A 19-type display has been added to the lineup of 8.4, 10.4 and 15 types. A large screen improves visibility and provides greater flexibility in designing an operation panel.

Evolution of the control unit and display unit (M800VW/M80VW Series)



■ Evolved Windows display

Advanced design inherited from the M800/M80 Series with double storage capacity. Equipped with a new PC unit supporting Windows 10.

■ New control unit with enhanced field network support

The added LAN connector on the control unit offers connectivity with a wider variety of networks. Expandability is maintained by the expansion slots while also ensuring installation compatibility with the M800VW/M80V Series.

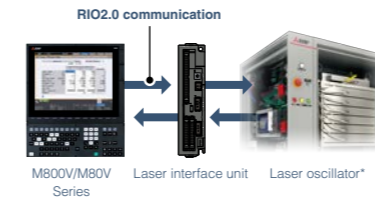
EXPANSION AND EVOLUTION OF CONTROL FUNCTIONS

Sheet metal laser cutting machines can also be controlled

Laser processing control

M800VW M800VS M80VW M80V

The introduction of laser processing functionality expands the areas of control.



No	Laser processing functionality	Description
1	Laser oscillator power control	The NC outputs to the laser oscillator the processing conditions (laser power value, etc.) it creates for each interpolation cycle when the M code for laser ON is enabled
2	Laser oscillator digital I/O control	The NC device controls the digital I/O of the laser oscillator
3	Selection of laser processing conditions	Laser processing conditions are set in a dedicated screen (each condition can be selected using an M code) (The selection of conditions appropriate to the processing situation leads to high-quality processing)
4	DR (dross reduction) control	Laser processing conditions are automatically adjusted according to the processing speed (The effect of heating at acute corners is reduced, minimizing dross and increasing processing accuracy)
5	F-CUT (flycutting) control	The timing of turning on/off the beam is controlled by checking the feedback position obtained from the motor-side encoder against the programmed position
6	Height control	The height from the workpiece surface is held constant based on the height sensor (Copying the workpiece, leading to high-quality processing)
7	Power calibration control	Laser power is adjusted based on the laser power measured from the laser head (Actual laser power is made consistent with the programmed value, contributing to oscillator protection)

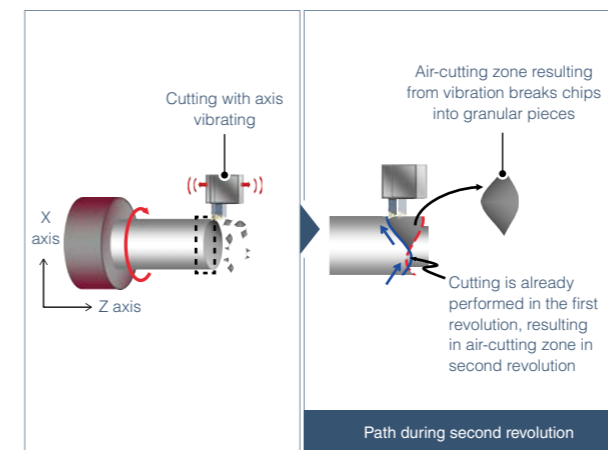
* The laser oscillator must be prepared by the customer.

Vibration cutting shortens the time required to remove chips and improve machine utilization

Vibration cutting

M800VW M800VS M80VW M80V

Vibration cutting, in which machining is performed with the feed axis vibrating to break up chips, reduces the time it takes to remove the chips and increases machine utilization.

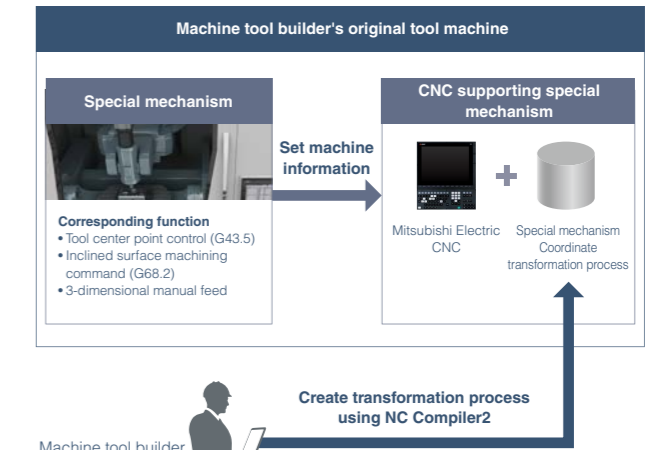


Motion control release enables control of special mechanisms (Coming soon)

Motion control release (coordinate transformation)

M800VW M800VS M80VW M80V

Motion control release allows transformation of coordinates that differ from the NC's rectangular coordinate system, making it possible to control special mechanisms such as parallel links.



View the introduction video here. ▶



CNC LINEUP

High performance



M800VW



Premium CNC provides expandability and flexibility

- Separated type with the control unit separate from the display
- A Windows-based display is included in the lineup, providing excellent expandability
- Four expansion slots are provided as a standard specification, and further expansion is realized by an optional card slot

M800VS



High-grade CNC well suited to high-speed high-accuracy machining and multi-axis multi-part system control

- Panel-in type with an integrated control unit and display
- Multi-CPU architecture allows for high performance and high functional graphics
- A non-Windows-based display provides easy operability

M80VW



Standard CNC with expandability and flexibility

- Separated type with the control unit separate from the display
- A Windows-based display is included in the lineup, providing excellent expandability
- Packaged type for easy selection of machine type
- Two expansion slots are provided as a standard specification, and further expansion is realized by an optional card slot

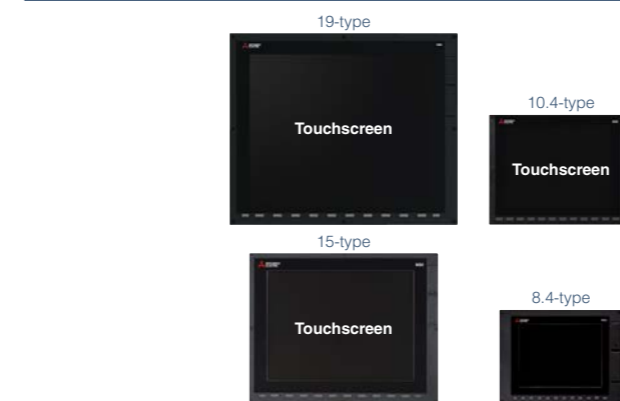
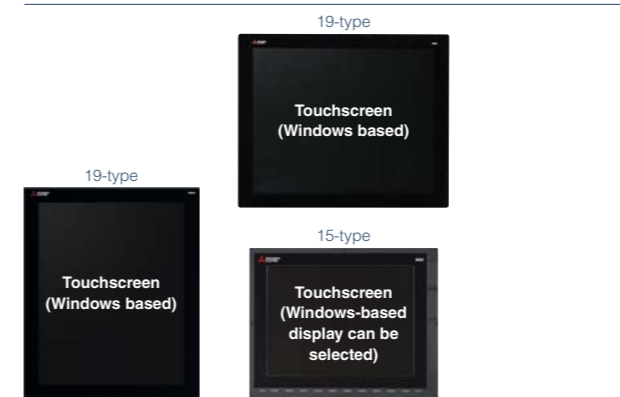
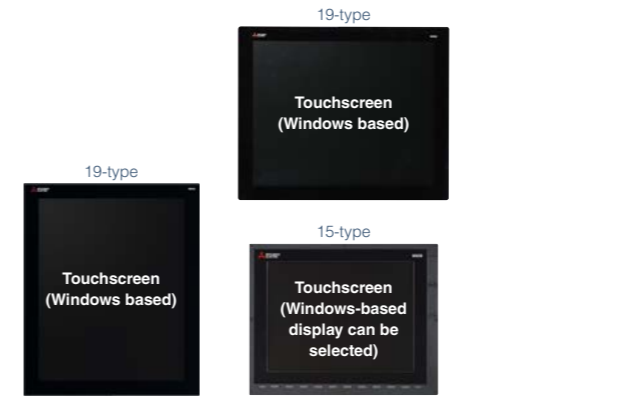
M80V



Standard CNC provides high productivity and easy operability

- Panel-in type, with an integrated control unit and display
- Pre-packaged (TypeA/TypeB) for easier selection
- A non-Windows-based display provides easy operability

Display unit size



Main specifications

	Lathe system	Machining center system
Max. number of axes (NC axes + spindles + PLC axes)	Standard: 16	Optional: 32
Max. number of spindles	8	6
Max. number of part systems (main+sub)	Standard: 4 Optional: 8	2
Fine segment processing capability [kilo-blocks/min]	168	540

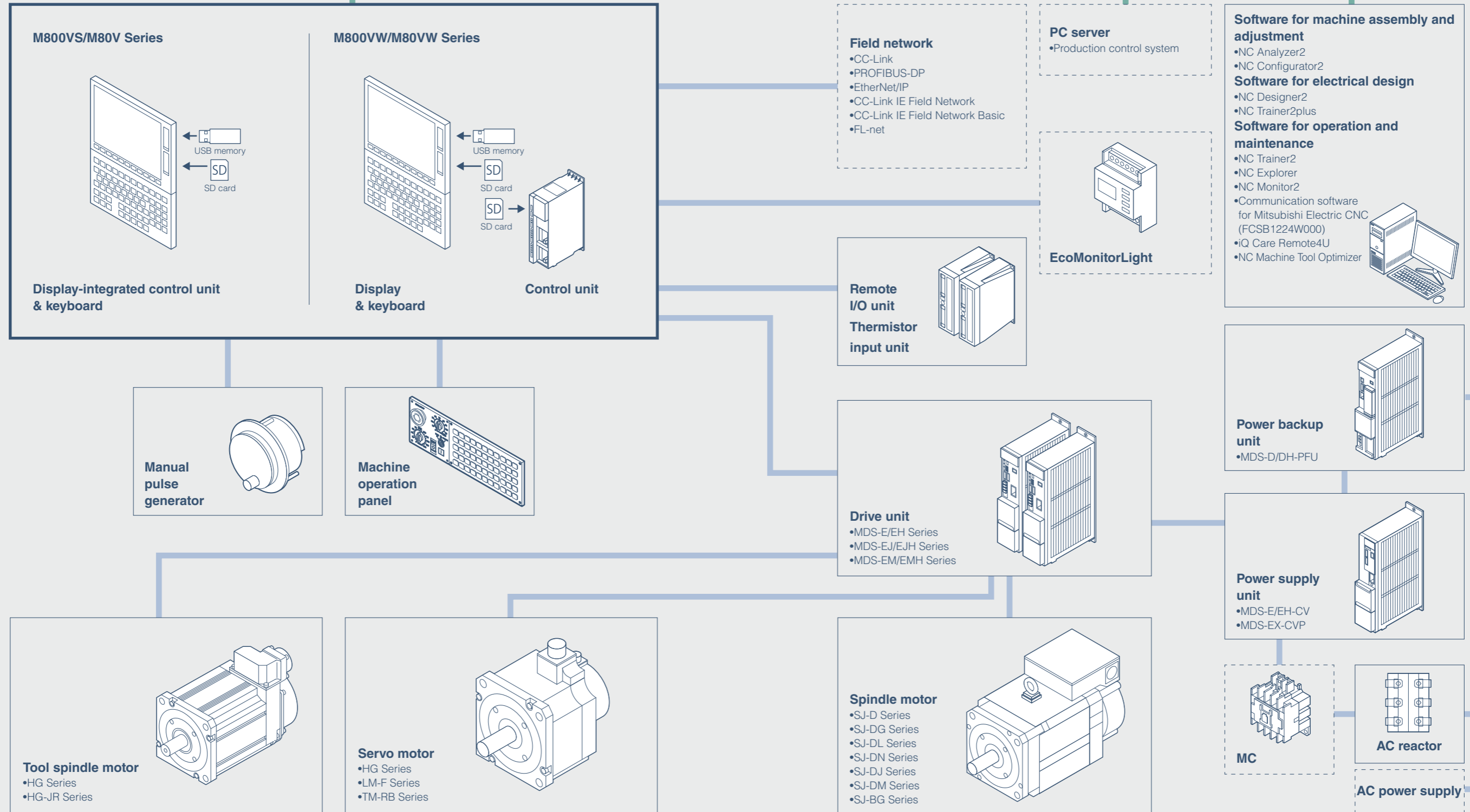
	Lathe system	Machining center system
Max. number of axes (NC axes + spindles + PLC axes)	Standard: 16	Optional: 32
Max. number of spindles	8	6
Max. number of part systems (main+sub)	Standard: 4 Optional: 8	2
Fine segment processing capability [kilo-blocks/min]	168	540

	Lathe system	Machining center system
Max. number of axes (NC axes + spindles + PLC axes)	13	11
Max. number of spindles	6	4
Max. number of part systems (main+sub)	4	2
Fine segment processing capability [kilo-blocks/min]	101	202

	Lathe system	Machining center system
Max. number of axes (NC axes + spindles + PLC axes)	TypeA: 13 TypeB: 9	TypeA: 11 TypeB: 9
Max. number of spindles	TypeA: 6 TypeB: 4	TypeA: 4 TypeB: 2
Max. number of part systems (main+sub)	TypeA: 4 TypeB: 2	TypeA: 2 TypeB: 1
Fine segment processing capability [kilo-blocks/min]	TypeA: 101 TypeB: -	TypeA: 202 TypeB: 67.5

SYSTEM CONFIGURATIONS

Ethernet



Optional parts are not provided as accessories for NC equipment.
 Please purchase desired components from a Mitsubishi Electric dealership, etc.

INTRODUCTION OF FUNCTIONS

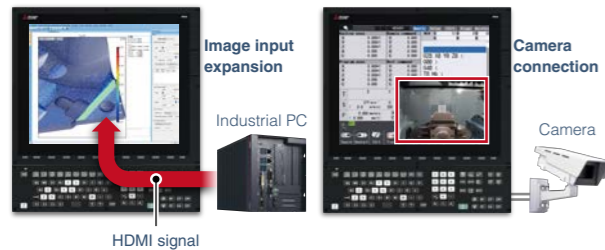


“Image input interface” enables flexible customization of NC screens and applications to differentiate machine tools, creating added value.

Image input interface

M800VW M800VS M80VW M80V

By displaying applications that are installed in an industrial PC and camera images stored inside the machine, the NC screen provides added value to machine tools. Applications in an industrial PC can be operated from the NC screen.



View the introduction video here. ▶



“Direct robot control” enables the NC to directly control a robot, allowing more flexible machine design including workpiece transportation.

Direct robot control

M800VW M800VS M80VW M80V

Guidance on the dedicated screen and special G codes allow easy programming and operation without requiring knowledge of robot language. The teaching and operation of a robot can be done using the NC screen on the tablet when using screen mirroring to tablet (see P.7).



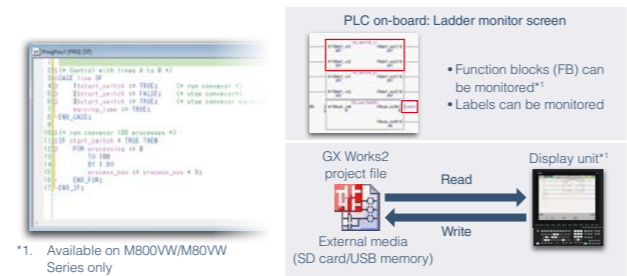
Handle operation is also available

ST language is supported in addition to ladder language. This allows PLC programs to be created and edited efficiently using the syntax resembling that of conventional programming languages.

MELSEC development tool (GX Works2)

M800VW M800VS M80VW M80V

Unlike ladder language, ST language allows flexible text-based programming and compact operation processing. The use of function blocks (FB) also makes PLC programming more flexible. Monitoring function blocks using PLC on-board*1 makes development easier and more efficient.



*1. Available on M800VW/M80VW Series only

View the introduction video here. ▶

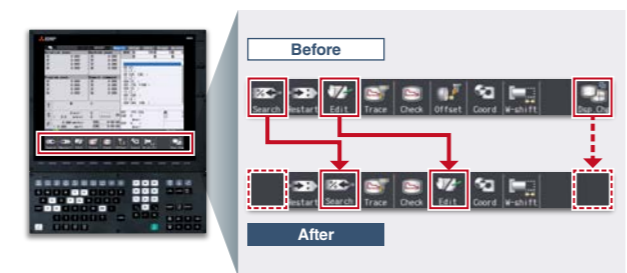


“Menu key customization” allows the screen menu to be moved or hidden to meet machine specifications and the needs of machine tool users.

Menu key customization

M800VW M800VS M80VW M80V

The optional functions of the machine tool can also be hidden from the menu key. Gathering frequently used menu keys streamlines setup work.



Parameter setting guidance on the dedicated screen makes it easy for anyone to improve machining quality.

Parameter adjustment screen for high-accuracy control

M800VW M800VS M80VW M80V

The parameters for high-accuracy control can be adjusted through intuitive operation using three machining indexes (cycle time, accuracy, quality) displayed in the guidance. This makes it unnecessary for operators to be highly skilled at making adjustments for optimal machining.

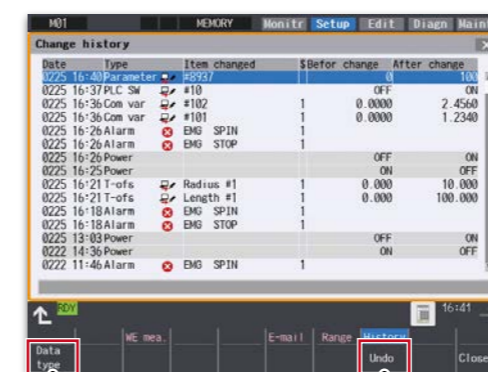


All operational history for setup is displayed on one screen to prevent errors and missed settings, facilitating setup work.

Setup change history display

M800VW M800VS M80VW M80V

When the settings like tool data and coordinate system offset are changed, all operations are displayed as a change history on one screen. This helps to easily identify errors and missed settings and allows erroneous settings, if found, to be undone with a single touch. It shortens the time for setup work.



Whether to display or hide data can be set for each data type.

Settings can be undone if an error is found

Sophisticated simulations help to shorten work period and reduce material losses.

3D Machining simulation

M800VW M800VS M80VW M80V

Machine interference and machining quality can be checked before actual machining, preventing collision and faulty machining, which leads to a shorter overall work period. High-definition simulations, which make even the streaks by cutters visible, allows the machining results to be checked on the NC screen.



Machine interference is highlighted in color to be spotted easily.

Streaks by ball end milling cutters

View the introduction video here. ▶

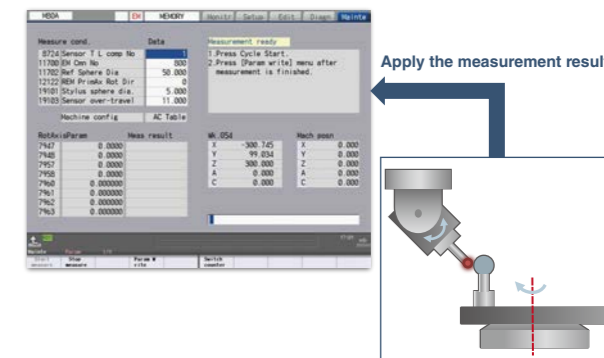


“Rotation center error measurement” can be used to instantly set the error compensation amount for rotation center error of the machine.

Rotation center error measurement

M800VW M800VS M80VW M80V

This function allows rotation center errors to be measured using the reference sphere and touch probe. It also allows compensation values to be applied effortlessly from the screen. The measurement result can be reflected in the rotary axis configuration parameters. The machine configurations that support the function now includes not only table-tilt type but also combined type in the M800V/M80V Series.



Apply the measurement result



“OMR-CC (Optimum machine response-contour control)” efficiently reduces cycle time while maintaining machining accuracy.

OMR-CC (Optimum machine response-contour control)
M800VW M800VS M80VW M80V

Cycle time is reduced without compromising accuracy by outputting movement commands considering position error resulting from servo response delay.

The red circle indicates areas where OMR-CC is particularly effective.

OMR-FF (Conventional control)	OMR-CC (New control technology)
34m22s	Cycle time 11%▼ 30m21s
9.7um	Path error*1 15%▼ 8.2um
2447mm/min	Arc passing speed*1 41%▲ 3465mm/min

*1. R10mm F4000 arc command

View the introduction video here. ▶



“Cutting load control” automatically controls cutting load, leading to longer tool life and shorter cycle time.

Cutting load control
M800VW M800VS M80VW M80V

Feedrate is automatically adjusted so that the actual load rate matches the predefined target load rate during machining. The parameters appropriate for the tool and workpiece can be selected from eight parameter groups.

Extending tool life
Target load, High load, Speed DOWN

Reducing time
Target load, Speed UP

Reduction in rough cutting time of an evaluation workpiece
Cutting load control OFF 38m27s 14.4%▼
Cutting load control ON 32m55s

* R10mm F4000 circular interpolation

Evaluation workpiece (image)

Legend: FB speed, Cutting load

View the introduction video here. ▶



“Spline interpolation 2” delivers high-quality fine surfaces by making adjacent machining paths globally smooth.

Spline interpolation 2
M800VW M800VS M80VW M80V

This function solves the problem of uneven (marked) surfaces resulting from the variance of programmed points that occur when a machining program is generated by a CAM tool, improving machining quality.

Variance reduction control OFF

Variance reduction control ON

No mark from machining. High quality with less variance with adjacent paths.

View the introduction video here. ▶



“Tool cutting point control” enables optimum machining without modifying the machining program even when the tool shape changes.

Tool cutting point control
M800VW M800VS M80VW M80V

In five-axis machining, it was necessary to modify the machining program as tool wear occurs to keep the cutting point constant. Now tool wear is automatically compensated for by simply setting the tool length and tool shape (tool radius, corner radius).

Example of tool wear: The cutting point shifts

Tool cutting point control: Automatically compensated without setting

View the introduction video here. ▶



A QR Code engraved directly on a workpiece allows automatic selection of programs and tools and helps to implement traceability easily.

Two-dimensional barcode (QR code) engraving cycle
M800VW M800VS M80VW M80V

A program for engraving a QR code can be created easily using a fixed cycle. A QR Code engraved on a workpiece helps automation of high-mix low-volume production and traceability of workpieces.

G136[<Machining date> <Workpiece no.> <Any string>]

Machining result (simulation)

The NC engraves an internally generated QR Code.

View the introduction video here. ▶



Remote service “iQ Care Remote4U” has evolved. Remote diagnostics through a cloud server help to reduce machine downtime.

iQ Care Remote4U

Machine downtime is reduced by automatic email notifications sent upon occurrence of an alarm and alarm diagnostics, in addition to the built-in remote service gateway unit functionality in the NC control unit (see P.7).

* Connection with Mitsubishi Electric CNC M700(V)/M70(V) Series is also supported

Alarm screen: Click on alarm date. Data before and after alarm can be displayed. Displays a list of data for a selected time.

Alarm Diagnosis screen

Email notification condition list screen: Displays a list of notification conditions that are currently set.

Notification conditions: Device, Common variable, Emergency stop, Machining completion

Email notification condition edit screen: Detect condition, Email address, Message

View the introduction video here. ▶



“Security feature for Windows display” effectively protects the NC from virus and other threats using the whitelist technique.

Security feature for Windows display
M800VW M800VS M80VW M80V

Virus attacks can be blocked by preventing software not whitelisted (unauthorized) for the NC from being run. It addresses security needs posed by the growth of IoT.

Display unit (Windows display)

List of authorized applications: StandardScreen.exe, notepad.exe

Unauthorized application: XXXX.exe

Not whitelisted - Not executable

View the introduction video here. ▶



Operation monitoring software “NC Machine Tool Optimizer” visualizes the status of various equipment in multiple factories.

NC Machine Tool Optimizer

Besides connecting with a variety of controllers (maker, model) on the shop floor, it can monitor and analyze the operation of equipment in multiple factories, helping to increase productivity.

* Connection with Mitsubishi Electric CNC (old models) and third-party controllers is supported

- Displays an overview of the status of machine operations in a plant
- Visualize operational status
 - Aggregate data by plant, group, or machine
 - Real-time monitoring based on operation trends

All plant monitoring window

Operating status overview

NC Machine Tool Optimizer: Software product that collects operation data from NC machine tools and peripherals to support the visualization and analysis of operational status

Built-in wireless LAN. No wiring required.

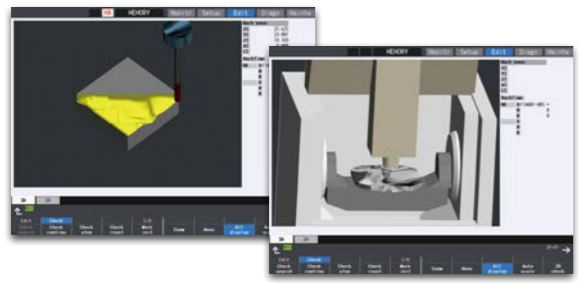
CONTRIBUTION TO SUSTAINABILITY



“3D machining simulation” contributes to reducing waste.

M800VW M800VS M80VW M80V

Machine interference and machining quality can be checked before machining, to reduce the number of workpieces that are discarded due to trial cutting and defective machining.



View the introduction video here. ▶



“Power consumption calculation” enables visualization of power consumption.

M800VW M800VS M80VW M80V

Visualization of machine power consumption enables users to see which process has higher power consumption, contributing to power savings in factories.



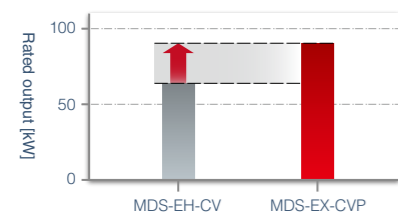
PWM converter MDS-EX-CVP Series

M800VW M800VS M80VW M80V

PWM converter MDS-EX-CP Series controls the boost and stabilization of DC link voltage, for increased output and shorter acceleration and deceleration times in the below combination. Reduced supply current harmonics and improved power factor help to lower power supply equipment capacity.

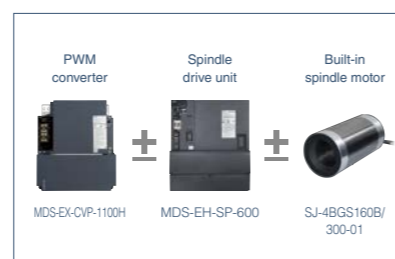
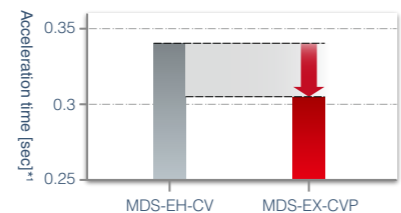
Comparison of rated output

Approx. 28% UP



Comparison of acceleration time (0→30,000 r/min)

Approx. 9% DOWN



*1. Varies with inertia

HARDWARE

[mm]

Control unit		Machine operation panel	
M800VW/M80VW Series (Separated type)	M800VS/M80VS Series (Integrated type)	FCU8-KB921 FCU8-KB923 Standard specification A	Key switch: 55 points, LED: 55 points Mitsubishi Electric standard key layout
Separated from display	Integrated on back of display	FCU8-KB925 FCU8-KB926 Standard specification B	Key switch: 55 points, LED: 55 points Custom specification key layout
M800VW : 90×180×380 (W×D×H) M80VW : 60×180×380 (W×D×H)		FCU8-KB922 FCU8-KB924 Standard specification A	Rotary switch (Spindle override, cutting override)
		FCU8-KB931 Standard specification A	Selective switch (memory protection)
		FCU8-KB941 Standard specification B	Emergency stop button

Display	Keyboard	M800VW Series	M800VS Series	M80VW Series	M80V Series
19-type touchscreen	—	365 440 Windows based	—	365 440 Windows based	—
19-type, horizontal touchscreen	—	440 365 Windows based	—	440 365 Windows based	—
19-type touchscreen	FCU8-KB091 Clear key Full keyboard	—	475 400 120	—	475 400 120
15-type touchscreen	FCU8-KB083 Clear key Full keyboard	400 320 140 Windows based display can be selected	400 320 140	400 320 140 Windows based display can be selected	400 320 140
10.4-type touchscreen	FCU8-KB047 Clear key Full keyboard	—	290 220 160	—	290 220 160
10.4-type touchscreen	FCU8-KB041 Clear key ONG (XZF) layout for L system FCU8-KB046 Clear key ONG (XYZ) layout	—	290 140 220	—	290 140 220
10.4-type touchscreen	FCU8-KB048 Clear key ABC layout	—	290 230 220	—	290 230 220
8.4-type	FCU8-KB026 Clear key ONG (XYZ) layout FCU8-KB028 Clear key ONG (XZF) layout for L system	—	—	—	260 140 200
8.4-type	FCU8-KB029 Clear key ONG layout	—	—	—	260 200 140

SPECIFICATIONS

M: Machining center system L: Lathe system / ○ Standard △ Optional □ Selection

Class	M800VW				M80VW		M800VS				M80V			
	M		L		M	L	M		L		M		L	
	M850	M830	M850	M830	M850	M830	M850	M830	M850	M830	TypeA	TypeB	TypeA	TypeB
Max. number of axes (NC axes + Spindles + PLC axes)	○16 △32	○16 △32	○16 △32	○16 △32	11	13	○16 △32	○16 △32	○16 △32	○16 △32	11	9	13	9
Max. number of NC axes (in total for all the part systems)	○16	○16	○16 △32	○16 △32	9	10	○16	○16	○16 △32	○16 △32	9	5	10	7
Max. number of spindles	6	6	8	8	4	6	6	6	8	8	4	2	6	4
Max. number of PLC axes	8	8	8	8	6	6	8	8	8	8	6	6	6	6
Max. number of PLC indexing axes	8	8	8	8	4	4	8	8	8	8	4	4	4	4
Number of simultaneous contouring control axes	8	4	8	4	4	4	8	4	8	4	4	4	4	4
Max. number of NC axes in a part system	○8 △12 △16	○8 △12 △16	○8 △12 △16	○8 △12 △16	8	8	○8 △12 △16	○8 △12 △16	○8 △12 △16	○8 △12 △16	8	5	8	5
Axis name extension*1	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Max. number of part systems (main + sub)	○2	○2	○4 △8	○4 △8	○2	○4	○2	○2	○4 △8	○4 △8	○2	○1	○4	○2
Max. number of main part systems	○2	○2	○4 △8	○4 △8	○2	○2	○2	○2	○4 △8	○4 △8	○2	○1	○2	○2
Max. number of sub part systems	○2	○2	○4 △8	○4 △8	-	○2	○2	○2	○4 △8	○4 △8	-	-	○2	○1
Control unit-side High-speed program server mode	△	△	△	△	○	○	-	-	-	-	-	-	-	-
Display unit-side High-speed program server mode	△	△	△	△	○	○	△	△	△	△	○	○	○	○
Data increment														
Least command increment	○0.1μm △1nm	○0.1μm △1nm	○0.1μm △1nm	○0.1μm △1nm	○0.1μm	○0.1μm	○0.1μm △1nm	○0.1μm △1nm	○0.1μm △1nm	○0.1μm △1nm	○0.1μm	○0.1μm	○0.1μm	○0.1μm
Least control increment	○1nm	○1nm	○1nm	○1nm	○1nm	○1nm	○1nm	○1nm	○1nm	○1nm	○1nm	○1nm	○1nm	○1nm
Linear interpolation	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Circular interpolation (Center/Radius designation)	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Helical interpolation	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Spiral/Conical interpolation	△	△	-	-	○	-	△	△	-	-	○	-	-	-
Cylindrical interpolation	△	△	△	△	○	○	△	△	△	△	○	○	○	○
Polar coordinate interpolation	△	△	△	△	-	○	△	△	△	△	-	-	○	○
Milling interpolation	-	-	△	△	-	○	-	-	△	△	-	-	○	○
Hypothetical axis interpolation	△	△	-	-	-	-	△	△	-	-	-	-	-	-
Involute interpolation	△	△	-	-	○	-	△	△	-	-	○	-	-	-
Exponential interpolation	△	△	△	△	-	-	△	△	△	△	-	-	-	-
Spline interpolation (G05.1Q2/G61.2)	△	△	-	-	○	-	△	△	-	-	○	-	-	-
NURBS interpolation	△	△	-	-	-	-	△	△	-	-	-	-	-	-
3-dimensional circular interpolation	△	△	-	-	○	-	△	△	-	-	○	-	-	-
Spline interpolation 2 (G61.4)	△	△	-	-	○	-	△	△	-	-	○	-	-	-
Memory capacity (number of programs stored)														
500KB [1280m] (1000 programs)	○	○	○	○	○	○	○	○	○	○	○	○	○	○
1000KB [2560m] (1000 programs)	△	△	△	△	-	-	△	△	△	△	-	-	-	-
2000KB [5120m] (1000 programs)	△	△	△	△	-	-	△	△	△	△	-	-	-	-
Extended Memory (NC memory 2)														
2000KB [5120m] (1000 programs)	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Multi-part system simultaneous program editing	○	○	○	○	-	○	○	○	○	○	-	-	○	○
Special program editing display for synchronization between part systems	△	△	△	△	○	○	△	△	△	△	○	-	○	○
Finish shape view programming	△	△	△	△	○	○	△	△	△	△	○	○	○	○
Remote desktop connection	-	-	-	-	-	-	△	△	△	△	○	○	○	○
VNC server	-	-	-	-	-	-	△	△	△	△	○	○	○	○
Image input interface*2	-	-	-	-	-	-	□	□	□	□	□	□	□	□
Spindle-mode servo motor control	△	△	△	△	○	○	△	△	△	△	○	○	○	○
Spindle-mode rotary axis control	△	△	-	-	○	-	△	△	-	-	○	-	-	-
Turret gear change control	-	-	△	△	-	○	-	-	△	△	-	-	○	○
Spindle position control (Spindle/C axis control)	○	○	○	○	○	○	○	○	○	○	○	○	○	○
C axis control during Spindle synchronization	△	△	△	△	-	○	△	△	△	△	-	-	○	○
Spindle synchronization I	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Spindle synchronization II	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Guide bushing spindle synchronization	-	-	△	△	-	○	-	-	△	△	-	-	○	-
Spindle superimposition control	-	-	△	△	-	○	-	-	△	△	-	-	○	-
Multiple spindle synchronization set control	-	-	○	○	-	○	-	-	○	○	-	-	○	○
Number of tool offset sets	○200 △400/999	○200 △400/999	○128 △400/999	○128 △400/999	○400	○256	○200 △400/999	○200 △400/999	○128 △400/999	○128 △400/999	○400	○400	○256	○99
Graphic check	○	○	○	○	○	○	○	○	○	○	○	○	○	○
3D solid program check	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Graphic check rotary axis drawing	-	-	△	△	-	-	-	-	△	△	-	-	○	○
3D machining simulation	△	△	-	-	-	-	-	-	△	△	-	-	-	-
Variable command														
600 sets	-	-	-	-	-	-	-	-	-	-	-	-	-	○
700 sets	○	○	○	○	○	○	○	○	○	○	○	○	○	-
8000 sets	△	△	△	△	○	○	△	△	△	△	○	○	-	-
(600 + 100 × number of part systems) sets	○	○	○	○	○	○	○	○	○	○	○	○	-	-
(7900 + 100 × number of part systems) sets	△	△	△	△	○	○	△	△	△	△	○	○	-	-
Two-dimensional barcode engraving cycle	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Vibration cutting control*3	-	-	□	□	-	□	-	-	□	□	-	-	□	□
Rapid traverse block overlap	△	△	△	△	○	○	△	△	△	△	○	○	○	○
High-speed machining mode I (G05P1) maximum [kBPM]	△33.7	△33.7	△33.7	△33.7	○33.7	○33.7	△33.7	△33.7	△33.7	△33.7	○33.7	○16.8	○33.7	-
High-speed machining mode II (G05P2) maximum [kBPM]	△168	△168	△168	△168	○101	○101	△168	△168	△168	△168	○101	○101	○67.5	-
High-accuracy control (G61.1/G08)	△	△	△	△	○	○	△	△	△	△	○	○	○	○
Multi-part system simultaneous high-accuracy control*4	△	△	△	△	○	○	△	△	△	△	○	○	-	-
SSS control	△	△	△	△	○	○	△	△	△	△	○	○	○	○
Tolerance control	△	△	△	△	○	○	△	△	△	△	○	○	○	○
High-speed high-accuracy control I (G05.1Q1) maximum [kBPM]	△67.5	△67.5	△67.5	△67.5	○33.7	○33.7	△67.5	△67.5	△67.5	△67.5	○33.7	○33.7	○33.7	-
High-speed high-accuracy control II (G05P10000) maximum [kBPM]	△168	△168	△168	△168	○101	○101	△168	△168	△168	△168	○101	○101	○67.5	-
High-speed high-accuracy control III (G05P20000) maximum [kBPM]	△540	△540	-	-	○202	-	△540	△540	-	-	○202	-	-	-
Smooth fairing	△	△	-	-	○	-	△	△	-	-	○	-	-	-

Class	M800VW				M80VW		M800VS				M80V			
	M		L		M	L	M		L		M		L	
	M850	M830	M850	M830	M850	M830	M850	M830	M850	M830	TypeA	TypeB	TypeA	TypeB
Interactive cycle insertion	△	△	△	△	○	○	△	△	△	△	○	○	○	○
Simple programming (NAVI MILL/LATHE)	△	△	△	△	○	○	△	△	△	△	○	○	○	○
G code guidance	○	○	○	○	○	○	○	○	○	○	○	○	○	○
DXF data input	△	△	△	△	○	○	△	△	△	△	○	-	○	-
OMR II (Backlash with filter)	△	△	△	△	○	○	△	△	△	△	○	○	○	○
OMR III (Continuous variable backlash)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OMR-FF	△	△	△	△	○	○	△	△	△	△	○	○	○	○
OMR-CC (Optimum Machine Response-Contour Control)	△	△	△	△	○	○	△	△	△	△	○	○	○	○
Rotation center error measurement	△	△	-	-	○	-	△	△	-	-	○	-	-	-
Number of tool life management sets	○200 △400/999	○200 △400/999	○128 △400/999	○128 △400/999	○200	○256	○200 △400/999	○200 △400/999	○128 △400/999	○128 △400/999	○200	○200	○256	○99
Direct robot control	□	□	□	□	□	□	□	□	□	□	□	□	□	□
Cutting load control	△	△	-	-	○	-	△	△	-	-	○	-	-	-
Data protection by user's level	△	△	△	△	○	○	△	△	△	△	○	○	○	○
Machine group-based alarm stop	△	△	△	△	○	○	△	△	△	△	○	○	○	○
Email notification to operator	△	△	△	△	○	○	△	△	△	△	○	○	○	○
Security feature for Windows display	△	△	△	△	-	-	-	-	-	-	-	-	-	-
Safety observation	△	△	△	△	○	○	△	△	△	△	○	○	○	○
Smart Safety observation														
Safety-related I/O observation	△	△	△	△	○	○	△	△	△	△	□*6	□*6	□*6	□*6
Emergency stop observation	△	△	△	△	○	○	△	△	△	△	□*6	□*6	□*6	□*6
SLS (Safety-Limited Speed)	△	△	△	△	○	○	△	△	△	△</				

DRIVE SYSTEM

•Drive units



High-performance Servo/ Spindle Drive Units MDS-E/EH Series

- The servo control-dedicated core processor realizes improved control speed, leading to enhanced 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.
- 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.

Multi-hybrid Drive Units MDS-EM/EMH Series

- Multi-hybrid drive units are capable of driving a maximum of three servo axes and one spindle. This contributes to downsizing machines and offers technical advantages.
- The motor power connector is equipped with an anti-misinsertion mechanism. This helps to eliminate connection errors.
- Safe Torque Off (STO) and Safe Brake Control (SBC) are also incorporated as additional safety features.
- The fan unit facilitates fan exchange.
- An MDS-EMH drive unit is available for 400V systems.

All-in-one Compact Drive Units MDS-EJ/EJH Series

- Ultra-compact drive units with built-in power supply contribute to smaller control panel size.
- A 2-axis type has been added for further downsizing.
- The servo control-dedicated core processor realizes improved 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.
- An MDS-EJH drive unit is available for 400V systems. (Note 1)

PWM Converter MDS-EX-CVP Series

- Products of the PWM converter series which provides a stabilizing DC voltage function and boost function. The MDS-EX-CVP Series reduces the output deceleration of the spindle motor and improves output in the high-speed range.
- Available for 400V system power supply units only.

•Servo motors



Medium-inertia, High-accuracy, High-speed Motors HG Series

- Sensor resolution has been significantly improved. These servo motors, which boast smooth rotation and outstanding acceleration capabilities, are well-suited as feed axes of machine tools.
- Range: 0.2 to 11 [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 provide enhanced vibration resistance. Three sensor resolutions (i.e., 1, 4 or 67 million pulses/rev) are available.
- These motors can also be used as a tool spindle motor.
- The small-sized connector allows horizontal cable connection to save space in machines. (Note 2)

Linear Servo Motors LM-F Series

- These motors can be used in clean environments, since no ball screws are used, eliminating possible grease contamination.
- 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, making rotation smoother.
- Suitable for rotary axes that drive tables or spindle heads
- Range: Maximum torque: 36 to 1,280 [N·m]

•Spindle motors



High-output, High-speed Spindle Motors SJ-DG Series

- The addition of S3 rating (%ED rating) has improved output and torque acceleration/deceleration characteristics.
- A balance adjustment ring added to the counter-load side allows for fine tuning.
- Range: S3 rating: 5.5 to 15 [kW]
- Maximum speed: 10,000 to 12,000 [r/min]

Low-inertia, High-speed Spindle Motors SJ-DL Series

- This series of spindle motors is dedicated for use in tapping machines that require faster drilling and tapping.
- The latest design technologies make it possible to attain lower vibration and greater rigidity even with lighter weight.
- Range: 0.75 to 7.5 [kW]
- Maximum speed: 10,000 to 24,000 [r/min]

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 a standard feature, helping to achieve higher speed, lower vibration and improved durability.
- Range: 3.7 to 26 [kW]
- Maximum speed: 8,000 to 12,000 [r/min]

High-torque Spindle Motors SJ-DN Series

- Higher torque characteristics than those of the SJ-D Series with the same output. This series can be driven with a small-capacity multi-hybrid drive unit.
- Suitable for heavy cutting. Helps to improve productivity.
- Range: 7.5 to 18.5 [kW]
- Maximum speed: 8,000 [r/min]

Compact, Lightweight Spindle Motors SJ-DJ Series

- Spindle motors that are smaller and lighter than the SJ-D Series with the same output. This helps to further downsize machines.
- Range: 5.5 to 15 [kW]
- Maximum speed: 8,000 to 12,000 [r/min]

High-output High-torque IPM Spindle Motors SJ-DM Series

- The use of magnets allows for higher output and torque, leading to reduced cycle time.
- The SJ-DM Series can provide torque characteristics comparable to the former SJ-D Series of the next frame number.
- Maximum rotation speed: 12,000 [r/min]



Built-in Spindle Motors SJ-BG Series

- The electrical design has been optimized to increase the continuous rated torque per unit volume, contributing to downsizing spindle units.
- Options for mold and cooling jacket specifications are available.

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 (8,000r/min). These motors contribute to downsizing spindle size, like rotary tool spindles.
- Range: 0.75 to 1.5 [kW]
- Maximum rotation speed: 8,000 [r/min]
- Small-sized connector allows horizontal cable connection to save space in machines. (Note 2)

(Note 1) For servo motors only
(Note 2) Options supported (Flange size 90SQ only)
* Use Mitsubishi Electric CNC's dedicated drive unit and motor.

SOFTWARE TOOLS

Process flow from machine design and development to operation and maintenance



NC-related processes

Servo selection	Custom screen creation	Parameter creation	Training
NC Servo Selection	NC Designer2	NC Configurator2	NC Trainer2
	NC Compiler2	Servo/spindle adjustment	Operation and maintenance
	Debug	Machine adjustment	NC Explorer
NC Trainer2 plus	NC Analyzer2		NC Monitor2
			Operation monitoring and remote diagnostics
			NC Machine Tool Optimizer*
			iQ Care Remote 4U*

* For more information, see P.16.

Machine design

[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.

Electrical circuitry design

[NC Designer2]
NC Designer2 provides a development environment where machine tool builders can customize screens easily. Two types of screen development methods are available: the interpreter method (programming without C++) for simple screen development and the compilation method with a complex controller (programming with C++).

[NC Compiler2]
NC Compiler2 is required when the compilation method is used.

[NC Trainer2 Plus]
NC Trainer2 plus supports customization development. It helps to program and debug the ladder programming of the user PLC that is developed by machine tool builders and to check the operations of customized screens.

Combine the parts to customize the screen without programming.

Customize buttons with original pictures.

Edit PLC program with the PLC development tool of NC Trainer2 plus.

Customize the screen using NC Designer2 and check its operation using NC Trainer2 plus.

Machine assembly and adjustment

[NC Configurator2]
NC parameters required for NC control or machine operation can be edited on a computer. It is also possible to create initial parameters simply by inputting the machine configuration.

For details on each software tool, refer to the software tools catalog (BNP-A1246).

Machine assembly and adjustment

[NC Analyzer2]
Servo parameters can be adjusted automatically by measuring and analyzing machine characteristics. Measurement and analysis can be performed by running a servo motor using the machining program for adjustment, or using the vibration signal. This function can sample various types of data.

Operation and maintenance

[NC Trainer2]
This is an application for operating the CNC screen and machining programs on a computer without a CNC control unit or special display unit. It can also be used for learning CNC operations and checking machining programs. The machining programs created on NC Trainer2/ NC Trainer2 plus can be used in actual CNCs.

[NC Explorer]
CNC machining data can be managed using Windows Explorer when the computer is connected to multiple CNCs via Ethernet.

[NC Monitor2]
Taking advantage of the connection with a factory network, CNC operation status can be monitored from remote locations. Several CNCs can be connected and monitored simultaneously.

Application development support

[Mitsubishi Electric CNC Communication Software (FCSB1224W000)]
This software provides a host of API functions. It facilitates the development of Windows applications that require connection and communication with Mitsubishi Electric CNC*. Its interface is common to all Mitsubishi Electric CNC models, for high development efficiency.

* Compatible with Mitsubishi Electric CNCs after M700/M70.

Example of application	Development language: VC++/VB
Data collection/monitoring	Operation monitoring
Display/operation panel function	Program creation/edit
Production control	CAD/CAM

Example of communication with CNC

- Start/stop the machining program
- Upload/download files
- Acquire coordinate values, alarm/diagnosis information
- Read/write NC data such as tools and variables
- Read/write device information

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WARRANTY

Please confirm the following product warranty details before using MITSUBISHI ELECTRIC 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, repair services shall be provided at no cost through the distributor from which the product was purchased or through a Mitsubishi Electric service provider. Note, however, that this does not apply if the customer was informed prior to purchasing 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 the product to the end user, provided the product purchased from Mitsubishi Electric or a distributor in Japan is installed in Japan (but in no event longer than thirty (30) months, including distribution time after shipment from Mitsubishi Electric or a distributor).

Note that, in the case where the product purchased from Mitsubishi Electric or a distributor 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" below.

[Limitations]

- (1)The machine tool builder is requested to conduct an initial failure diagnosis, as a general rule. The diagnosis may also be carried out by Mitsubishi Electric or our service provider for a fee at the machine tool builder's request.
- (2)This warranty applies only when the conditions, method, environment, etc., of use are in compliance with the terms, 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 will 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 a problem with the customer's hardware or software

- (b) a failure caused by any alteration, etc., to the product made by the customer without Mitsubishi Electric's approval
- (c) a failure which could have been avoided if the customer's equipment in which this product is incorporated had been equipped with a safety device required by applicable laws or has any function or structure considered indispensable in the light of industrial common sense
- (d) a failure which could have been avoided if consumable parts designated in the instruction manual, etc. had been duly maintained and replaced
- (e) any replacement of consumable parts (including the battery, 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 could not have been foreseen under technologies available at the time of shipment of this product from Mitsubishi Electric
- (h) any other failures which are not attributable to Mitsubishi Electric or which the customer acknowledges are not attributable to Mitsubishi Electric

2. Service in Overseas Countries

If the customer installs a product purchased from Mitsubishi Electric in a machine or equipment and exports it to any country other than where it was purchased, the customer may sign a paid warranty contract with our local FA center.

This applies in 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 product was purchased.

3. Exclusion of Responsibility for Compensation against Loss of Opportunity, Secondary Loss, etc.

Regardless of the gratis warranty term, Mitsubishi Electric shall not be liable for compensation for:

- (1)Damage arising from any cause found not to

- be the responsibility of Mitsubishi Electric.
- (2)Lost opportunity or lost profit incurred by the user due to a failure of a Mitsubishi Electric product.
 - (3)Special damage or secondary damage, whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi Electric products.
 - (4)Replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

4. Changes in Product Specifications

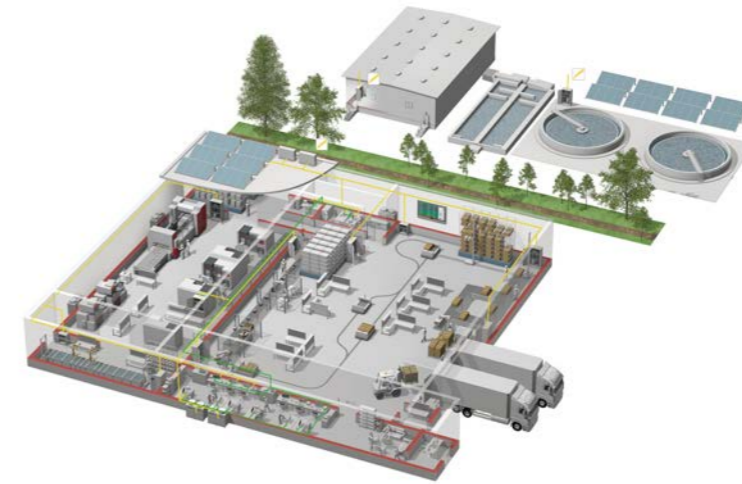
Specifications shown in our catalogs, manuals or technical documents are subject to change without notice.

5. Product Application

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

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Safety Warning

To ensure proper use of the products listed in this catalog, please be sure to read the instruction manual prior to use.

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