

CNCmakers Limited

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983MA-H/V MACHINING CENTER CNC SYSTEM

Brief Introduction



983Ma-H/V Machining Center CNC System is a product of great-lead-forward development based on the previous GSK983M series CNC products. Its installation is compatible with GSK 983M-H. It is improved by various designs, such as integrated structure design, and more USB interfaces. A new non-volatile component (without battery), Wince operation system with multi-language are applied. It uses the multi-level password protection function, and the USB to import/export the user's ladder. Its software USB has been upgraded and its interpolation speed has been increased. Compared to the previous GSK983 series system, its usability, reliability and Performance have been fully improved and upgraded to achieve excellent cost-performance.



983Ma-H



983Ma-V

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Newly added and improved functions for GSK983Ma



- New design for user interface with richer colors and easier operation;
- New design for the display page of PLC dynamic diagnosis;
- U disk function: parameters, PLC parameters, import and export of machining programs, upgrade for software and PLC;
- Addition of DNC memory area with 163MB memory capacity;
- Addition of parameter switch and time setting page;
- Addition of display for diagnosis annotation and version information;
- Improvement for the graphic display function;
- Smaller and more compact I/O units for convenient installation and connection; whether high/low level of I/O input point is valid is selected by user;
- Directly display the detailed information of NC alarm and external alarm, convenient for trouble judgment.
- Support multiple-language by software setting (only support Chinese and English currently);
- Three authority levels, including user, machine tool builder and system factory. Corresponding password is set to each level for convenient management and maintenance;
- On-line explanation for system parameters for convenient debugging and maintenance without Any manual.

Product features



◆ High-precision machining

High-performance control chip of position closed loop and high-precision position detecting components are applied to realize high-precision and fast-response position control. Drive-chain mechanical errors (e.g., ballscrew pitch error) can be offset by stored pitch error compensation, and feedrate override can be adjusted automatically when machining corner contour.

◆ High-speed machining

System resolution: 1 μ m, maximum rapid traverse speed: 60,000mm/min, feed rate: 30,000mm/min. It is applicable for the control of milling machine and machining center. Continuous high-speed machining to small blocks is realized due to the distributed process by multiple high-speed CPUs. Up to 500 blocks can be processed per second.

◆ Multiple control functions

Max. 5 feeding axes and one spindle control, scaling up and down, mirror image, coordinate system rotation, compound canned cycle, background editing, graphic display and Type B macro program. Some special mechanical machining can be performed easily by using these functions.

◆ Ultra mini and ultra thin integrated CNC

The mainframe unit is integrated into the MDI unit as the NC unit to improve the integrated level and the reliability of the system, which facilitates and simplifies installation and connection.

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◆ Modularized I/O unit

Max. 64/40 I/O point. I/O unit is connected to CNC with high-speed serial link. Input signal can realize high/low level selection while output signal can directly drive a relay and other loads. Therefore, simple circuit design as well as rapid and convenient troubleshooting is realized, meanwhile, the space and wires are saved.

◆ Machine operator's panel

Max. 56 buttons and 2 band switches, each button corresponding to one LED indicator can be defined by PLC program compiling. In addition, its connection to external hand wheel is available. It uses the separate structure, and is connected to the CNC system by the high-speed serial communication interface. There is no need for user to assemble another operator's panel, so the cost is greatly saved.

◆ Wince operation system

The IT performance of the system has been greatly improved by applying Wince operation system (e.g., USB function, FAT 32 file system, multi-language support, windows type user interfaces and various display functions).

Technical Specification

NC function	
Controlled axis	Control axes and universal drive shafts: 5 feed axes at most plus one spindle control Standard configuration: three-axis linkage. Configuration selection: four axes with three-axis linkage, four-axis linkage, five axes with three-axis linkage or five axes with four-axis linkage can be selected according to order requirement.
	interpolation mode: linear(G01), circular(G02,G03), sine(G07)
	Maximum command value: metric: 99,999.999mm; inch: 9,999.999inch
	Least input unit: 0.001mm/metric 0.0001inch/inch
	Least motion unit: X axis: 0.001mm(metric) 0.0001inch(inch) Y axis: 0.001mm(metric) 0.0001inch(inch) Z axis: 0.001mm(metric) 0.0001inch(inch) 4 th axis: 0.001deg(rotary axis) 0.001mm/0.0001inch(linear axis) 5 th axis: 0.001deg(rotary axis) 0.001mm/0.0001inch(linear axis)
	Rapid feedrate: 60,000mm/min or 24,000 inch/min
	Cutting feedrate: G94: 30,000mm/min or 1,200.00inch /min G95: 500.00mm/rev or 50.0000inch/rev
	Automatic acceleration/deceleration: linear acceleration/deceleration is automatically performed during rapid feed in manual or auto operation to shorten positioning time.
	Automatic acceleration and deceleration in cutting feed: The time constant of exponential acceleration/deceleration function in cutting feed and manual feed is set by parameter within the range from 2ms to 4000ms.
	Flexible tapping function; rigid tapping function, time adjustment for acceleration/ deceleration of rigid tapping: the stability of rigid tapping is improved.
Buffer register: commands of the next two blocks are pre-read to prevent NC command action from being interrupted by command reading, which raises working efficiency. Industrial Ethernet bus control technology: the connection between CNC and servo is simplified and the system reliability is enhanced. (also provided in 983 Me)	
MSTB function	Tool function: ●T2 bit /T4 bit ●200 groups of tool offset ●tool position offset ●tool length compensation ●tool radius compensation B/C●tool offset value communication input ●tool length measurement

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MSTB function	Spindle function: ● S2 bit ● S4 bit A (12 bits BCD output/analog output) ● S4 bit B (12 bits BCD output/analog output) (four-level gear input) ● upper limit of spindle speed ● spindle speed real-time display ● automatic shift between high gear and low gear.
	Miscellaneous function: specified by address M with 2 digits. Program end: M02, M30, program stop: M00, optional stop: M01, subprogram call: M98, subprogram end: M99. Other M functions are defined by user with PLC provided by the system.
	The secondary auxiliary function: specified by address B with three digits. The BCD code signals of the digits are sent to machine side. This function is used for the positioning of index table.
Precision compensation	Stored pitch error compensation: errors caused by machine position, for example, pitch error of feed screw, are offset to improve machining precision. Compensation data is saved into memorizer as parameters.
	Backlash compensation: the loss of momentum of the machine is offset.
	Tool length compensation and tool radius compensation: tool length compensation (G43, G44, G49) and tool radius compensation (G43, G44, G49) can be performed by specified G codes and the compensation value of each tool is saved into memorizer. Maximum compensation value is 999.999mm or 99.9999inch
Reliability and safety	emergency stop; ● overtravel; ● stored stroke limit; ● NC Ready signal; ● Servo Ready signal; ● MST Function Completion signal; ● Auto Operation Start Indicator signal; ● Auto Operation in Progress signal; ● Feed Hold Indicator signal; ● door interlock;
	NC alarm: ● program error and operation error; ● overtravel error; ● servo system error; ● IO communication error; ● PLC error; ● memorizer (ROM and RAM) error; Nearly 1000 alarm numbers in 5 categories to ensure reliable system operation and rapid system troubleshooting.
	Self-diagnosis function: the diagnoses below can be performed: ● system abnormality checking ● position control part abnormality ● servo system abnormality ● CPU abnormality ● ROM abnormality ● RAM abnormality ● connection to IO unit and machine operator's panel abnormality ● RS232 read-in abnormality ● PC data transmission abnormality etc.
Operation function	● Dry run ● interlock ● single block ● optional block skip ● manual absolute value ON/OFF ● auxiliary function lock ● machine lock ● feed hold ● cycle start ● override cancel ● emergency stop ● external reset signal ● external power supply ON/OFF ● manual continuous feed ● incremental feed ● manual pulse generator ● skip function ● Additional skipping over selected blocks ● rapid feed override ● manual insertion function ● sequence number search ● program number search ● external workpiece number search ● external data input ● sequence number comparison and stop ● program restart ● menu switch ● graphic display ● external position display ● Workpiece coordinate system measurement ● 1/2 coordinates ● coordinate clearance
Display	● Horizontal installation H/vertical installation V: 8.4inch / 10.4inch 800×600 color LCD screen, no need to adjust contrast ratio. ● machine coordinates, absolute coordinates, relative coordinates ● current operation mode ● System parameter, diagnosis number, alarm number, macro variable value, tool offset setting, MDI command, MST state ● actual feedrate, spindle rotation ● graphic display for machining path ● system running time and other information about NC commands and state ● Various help information: NC parameter, PC parameter, diagnosis information, NC alarm information, etc. ● Current time display
PLC function	Control mode: cyclical motion; processing speed: 15us/step basic command; input/output: maximum 192/128; capacity: 5,000 steps (having display function for the information of Chinese and English external alarm as well as user operation)
	Development method: PLC; user PLC is written into the system directly with U disk (programming); user PLC can be dynamically displayed in the system; user PLC can be edited and debugged directly in the system (developing)
	36 commands: 12 basic commands; 24 functional commands (functional commands for displaying DISP information and DISPB Chinese and English information are newly added)
DNC function	The first method (recommended): copy the program to be machined to system DNC volume with U disk, choose corresponding NC file in the DNC volume, then start machining by pressing Cycle Start button. DNC volume capacity is 160 Mb without limiting the number of files. The second method (traditional): perform DNC machining to the files transmitted from PC with RS232 interface. Transmission baudrate: 38.4k
USB function	● Input and output of parameter, PLC parameter and machining program; ● software and PLC upgrade;

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List of G codes



G code	Group	Function	G code	Group	Function
G00	01	Positioning	G56	12	Workpiece coordinate system 3 selection
G01		Linear interpolation	G57		Workpiece coordinate system 4 selection
G02		CW circular interpolation	G58		Workpiece coordinate system 5 selection
G03		CCW circular interpolation	G59		Workpiece coordinate system 6 selection
G04	00	Dwell	G60	00	Unidirectional positioning
G07		Sine-curve interpolation (imaginary axis is specified)	G61		Accurate positioning detecting mode
G09	00	Accurate positioning verifying	G62	13	Automatic corner adjustment
G10		Offset value and workpiece origin offset value setting	G64		Continuous cutting mode
G17	02	XY plane selection	G65	00	Simple recall of custom macro program
G18	06	ZX plane selection	G66	14	Modal recall of custom macro program
G19		YZ plane selection	G67		modal recall of custom macro program cancel
G20	04	Input in inch	G68	16	Coordinate system rotation ON
G21		Input in mm	G69		Coordinate system rotation OFF
G22	00	Stored stroke limit ON	G73	09	Peck drilling cycle
G23		Stored stroke limit OFF	G74		Left-hand tapping cycle
G27		Reference position return check	G76		Finish boring
G28		Reference position return	G80		Canned cycle cancel
G29		Return from reference position	G81		Drilling cycle, center hole drilling
G30		Return to 2nd, 3rd and 4th reference position	G82		Drilling cycle, reverse boring
G31	01	Cutting skip	G83		Peck drilling cycle
G33		Thread cutting	G84		Tapping cycle
G40		Tool radius compensation cancel	G85		Boring cycle
G41	08	Tool radius left compensation	G86		Boring cycle
G42		Tool radius right compensation	G87		Reverse boring
G43		Tool length positive compensation	G88		Boring cycle
G44	07	Tool length negative compensation	G89	Boring cycle	
G49		Tool length compensation cancel	G90	Absolute programming	
G45		Increase tool position offset (+)	G91	Incremental programming	
G46	00	Reduce tool position offset (-)	G92	00	Coordinate system setting
G47		Increase tool position offset by twice	G94	05	Feed per minute
G48		Reduce tool position offset by twice	G95		Feed per revolution
G50	11	Scaling OFF	G98	10	Return to initial point in canned cycle
G51		Scaling ON	G99		Return to point R In Canned cycle
G54	12	Workpiece coordinate system 1 selection	G180	17	Rigid tapping cycle cancel
G55		Workpiece coordinate system 2 selection	G184		Rigid tapping cycle

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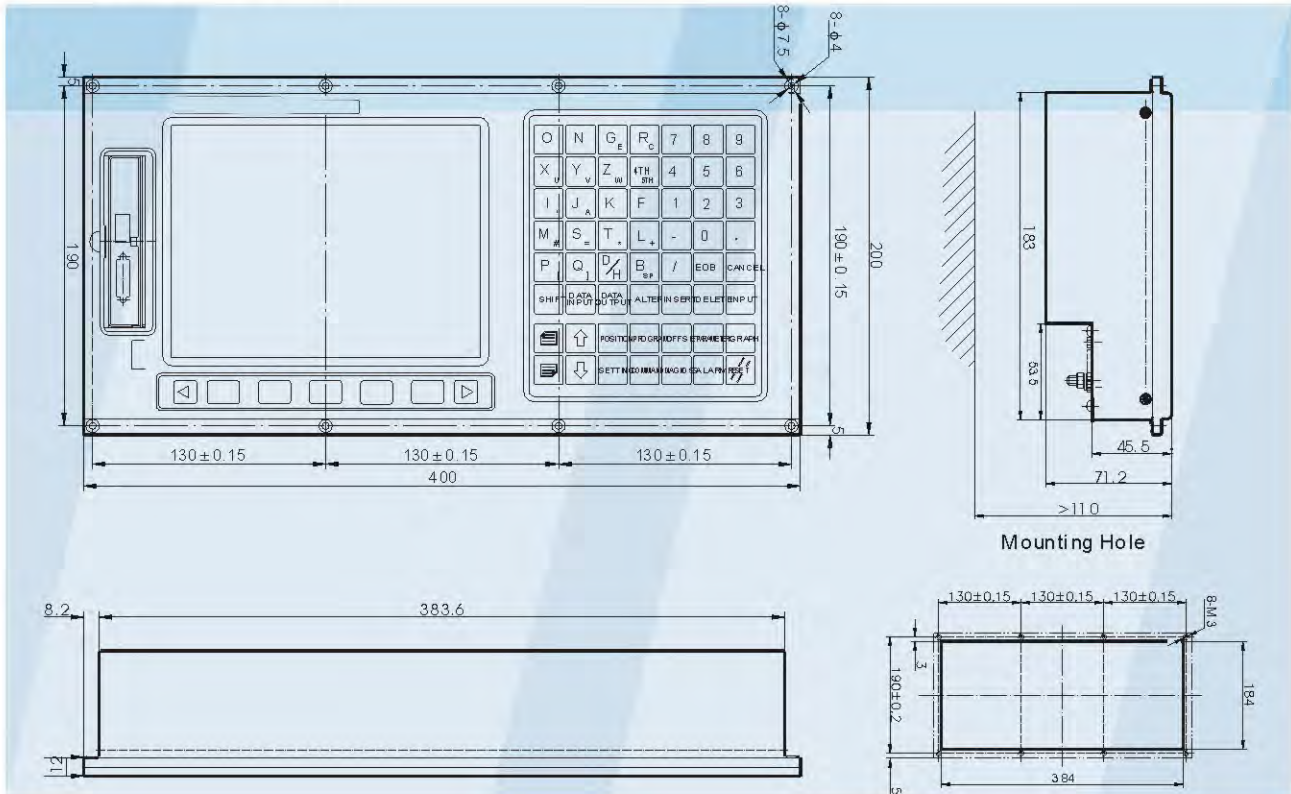
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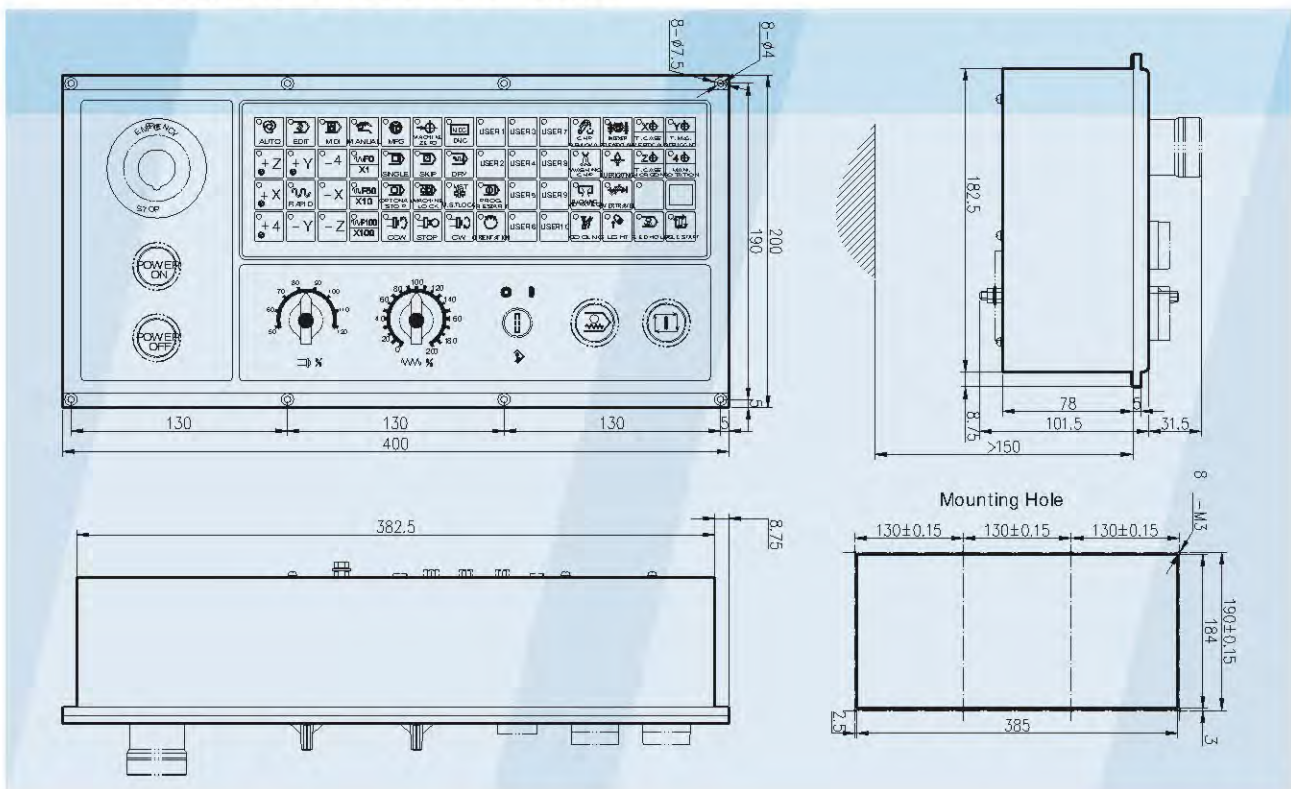
Overall Installation Dimension



983Ma-H NC Unit



983Ma-H Operation Panel



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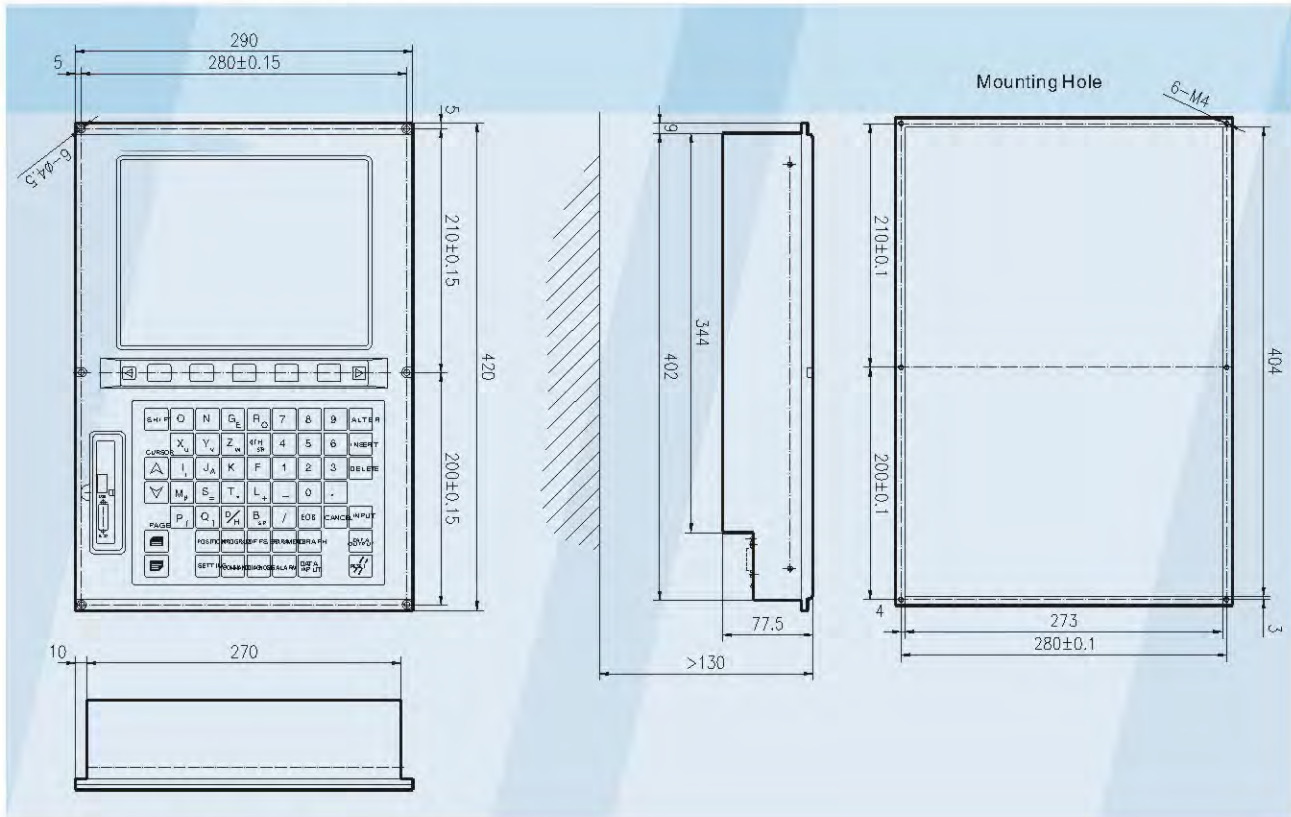
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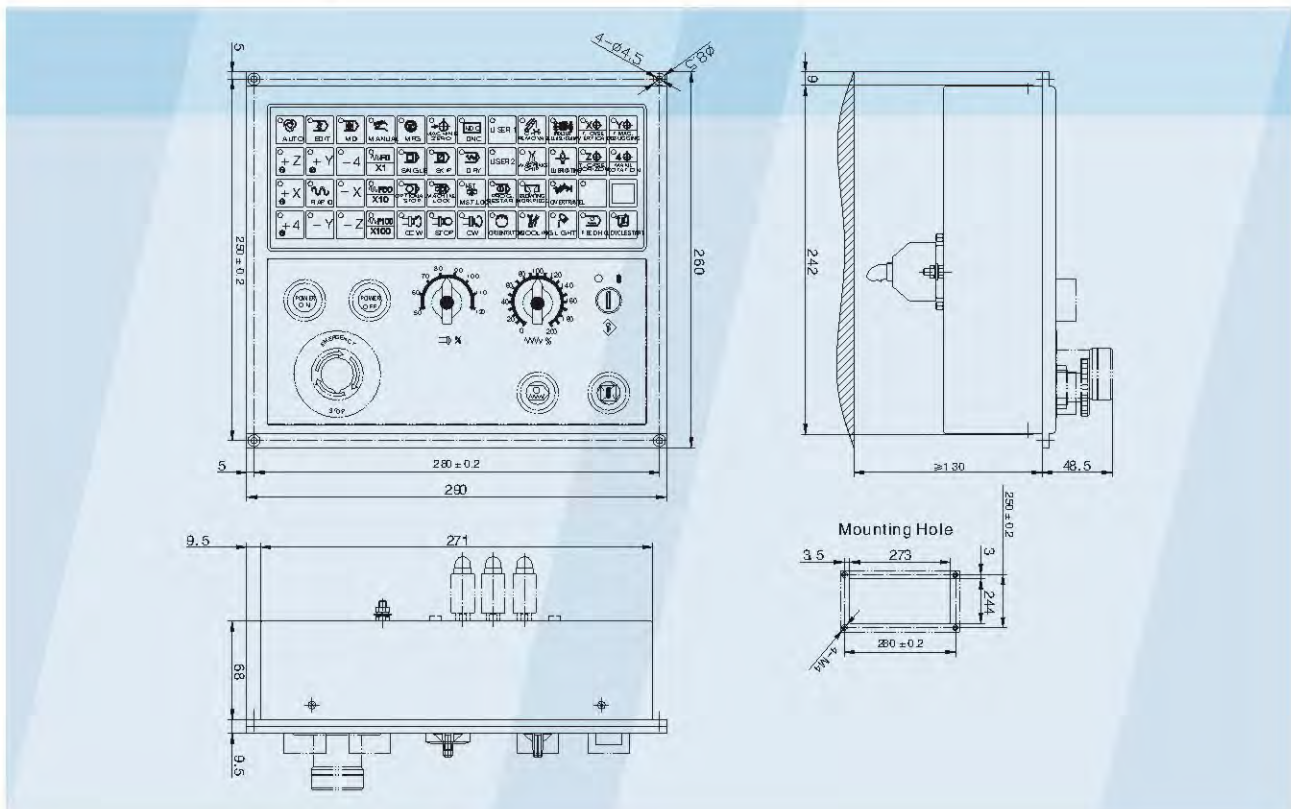
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983Ma-V NC UNIT



983Ma-V Operation Panel



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983Ma-H/V I/O UNIT

