

INSTRUCTION MANUAL

SINKER EDM

OPERATION



PRECAUTIONS

1. Functions not covered by this manual, in general, cannot be executed.
2. The notes provided in this manual must be observed.
(Otherwise, the function may not be executed correctly or the system could be adversely affected.)
3. Specifications are subject to change for improvement without notice.
4. Please contact us if you have any uncertainty about the manual.

1. Description of Parts

1.1 Main Switch

A main switch as shown in Figure 1-1 is on the machine side. Power is supplied to the machine when the main switch is turned to the ON side, and the SOURCE lamp on the top of the main operation panel will light up.



Figure 1-1 Main Switch

1.2 Main Operation Panel

The composition of the Main Operation Panel is shown in Figure 1-2.

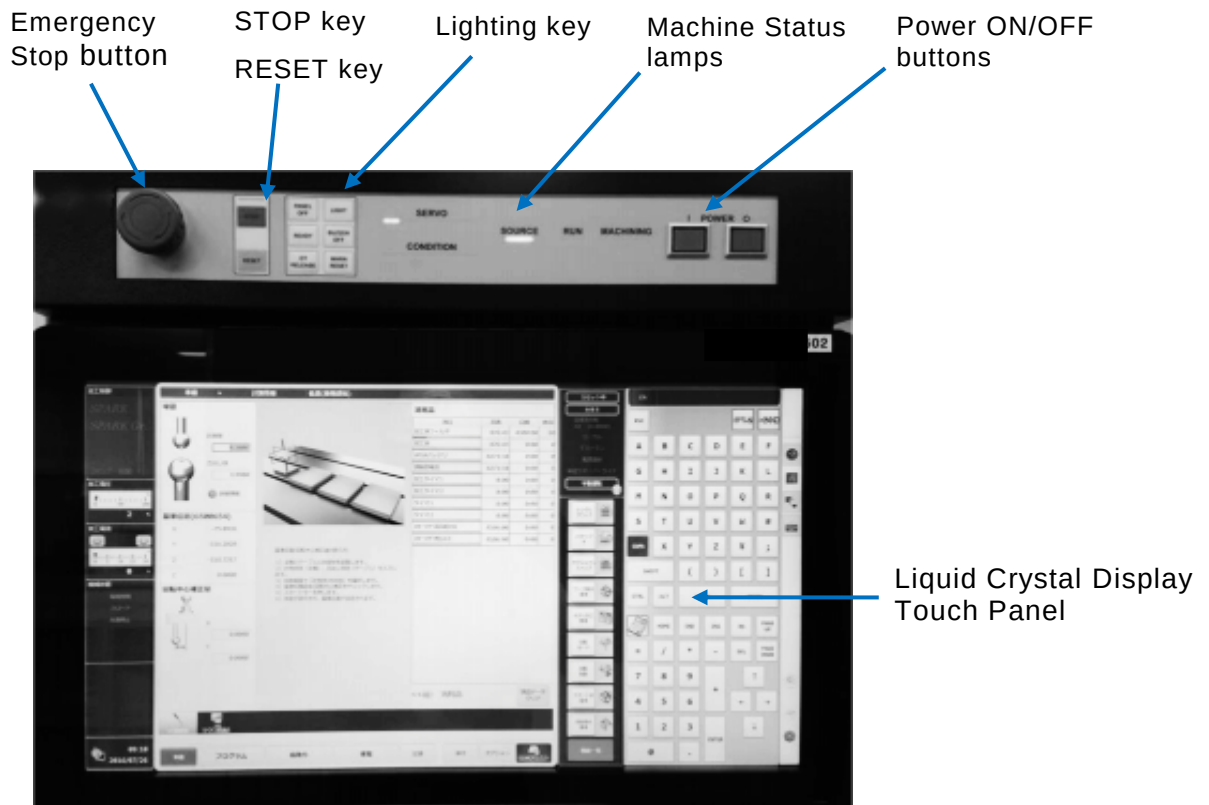


Figure 1-2 Main Operation Panel

Table 1-1 Keys on Main Operation Panel Board

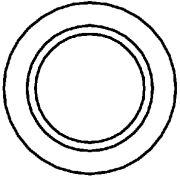
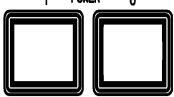
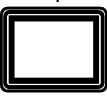
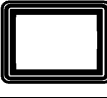
No.	Name / Label	Operation and Function Description
1	 Emergency stop button	The emergency stop button is pressed when abnormalities are discovered in a processing machine, or when a machining machine needs to be stopped urgently. ① Operation of the entire machine will stop and it will be in an alarmed condition. ② Once pressed, the Emergency Stop Button will remain active even if it is released from hand. ③ When canceling this button, first remove the cause of abnormality, and release the turning lock in the direction of the arrow. Then, press the reset key. * 1. After cancellation of Emergency Stop, a zero return must be performed. * 2. Please use the STOP key for a usual temporary stop.
2	Power ON / OFF button 	 Green button: Power supply ON-button.  Red button: Power supply OFF-button.
3	Input power indicator SOURCE	The light will be lit when the main switch is turned ON. When this lamp is on, Power supply can be ON.
4	Automatic operation lamp RUN	The light is switched on while starting program operation (under automatic operation). Please do not put hands or feet in the range of movement of the machine while the lamp is lit.
5	Machining lamp MACHINING	The lamp lights up when turning on the machining power supply. Please do not touch the electrode or the work during lighting of this lamp.
6	Servo indicator lamp SERVO	The servo state (electrical discharge interval) of the electrode and the work during machining is displayed. When there are few fluctuations of lightings on the lamp in the lighting area corresponding to machining conditions, the machining is said to be stable. There is no fixed limit of fluctuations of lightings for the machining being stable.
7	Electrical discharge status indicator lamp CONDITION	The ratio of the effective electrical discharge to the machining is shown. Although it differs depending on machining conditions, the number of usually lit-up lamps can be used to judge for stability meaning "it is in a good electrical discharge state".

Table 1-2 Keys on Main Operation Panel Board

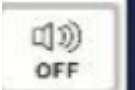
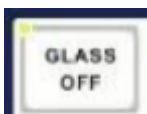
No.	Name / Label	Operation and Function Description
8	Liquid crystal display Touch panel	The cursor and focus can be controlled by touching the touch panel. When the finger is lifted from the touch panel, the button of the screen usually turns on in order to reduce operational error. For best results, approach and touch the screen vertically. A pencil back (with eraser attached to) etc. can be used to point and operate the LCD more effectively when finger is not used.
9	Lighting key 	Lighting is turned ON / OFF.
10	Buzzer OFF key 	Buzzer is stopped.
11	Alarm warning reset key 	1. Stops buzzer. 2. Eliminates a warning message. A message displayed by failure is not eliminable. Please remove or correct the cause of failure.
12	Panel switch-off key 	Validity/invalidity of touch panel and on/off of screen display are switched. 1. When it is pushed for a short time, touch panel functional validity / invalidity is toggled. When the switch is turned on, the lamp is lit up, and the function of touch panel becomes invalid. Please invalidate the touch panel when the machine is left unattended. 2. Pushing the button for 3 seconds or more when the lamp is off will cause the display of the screen to disappear and the lamp to blink. When the key is pushed again while lighting or at the state of blinking, the screen is displayed again, and the touch panel becomes effective as well.
13	Preparation key (Ready key) 	After the main switch is turned on, pressing this key turns ON the power supply. (Note) This key only applies to machines with CE specification.

Table 1-3 Keys on Main Operation Panel Board

14	OT Release key 	When an axis stops and hits a stroke limit by over-travelling, press the reset key while pressing this key, the axis can be moved by the jog key of the portable operation panel. (Operating procedure)  ① While this key is being pressed, press the  key. ② After alarm is canceled, press the jog key while pressing this key, the machine will move to the inner side of the stroke. If the moving direction of the machine is not correct, there is a possibility of damaging the machine. Please operate with extreme care.
15	Stop key 	Automatic operation is stopped and the Stop lamp lights up.
16	Reset key 	It is used for automatic operation and cancellation of an alarm.

1.3 Portable Control Panel (FPB2)

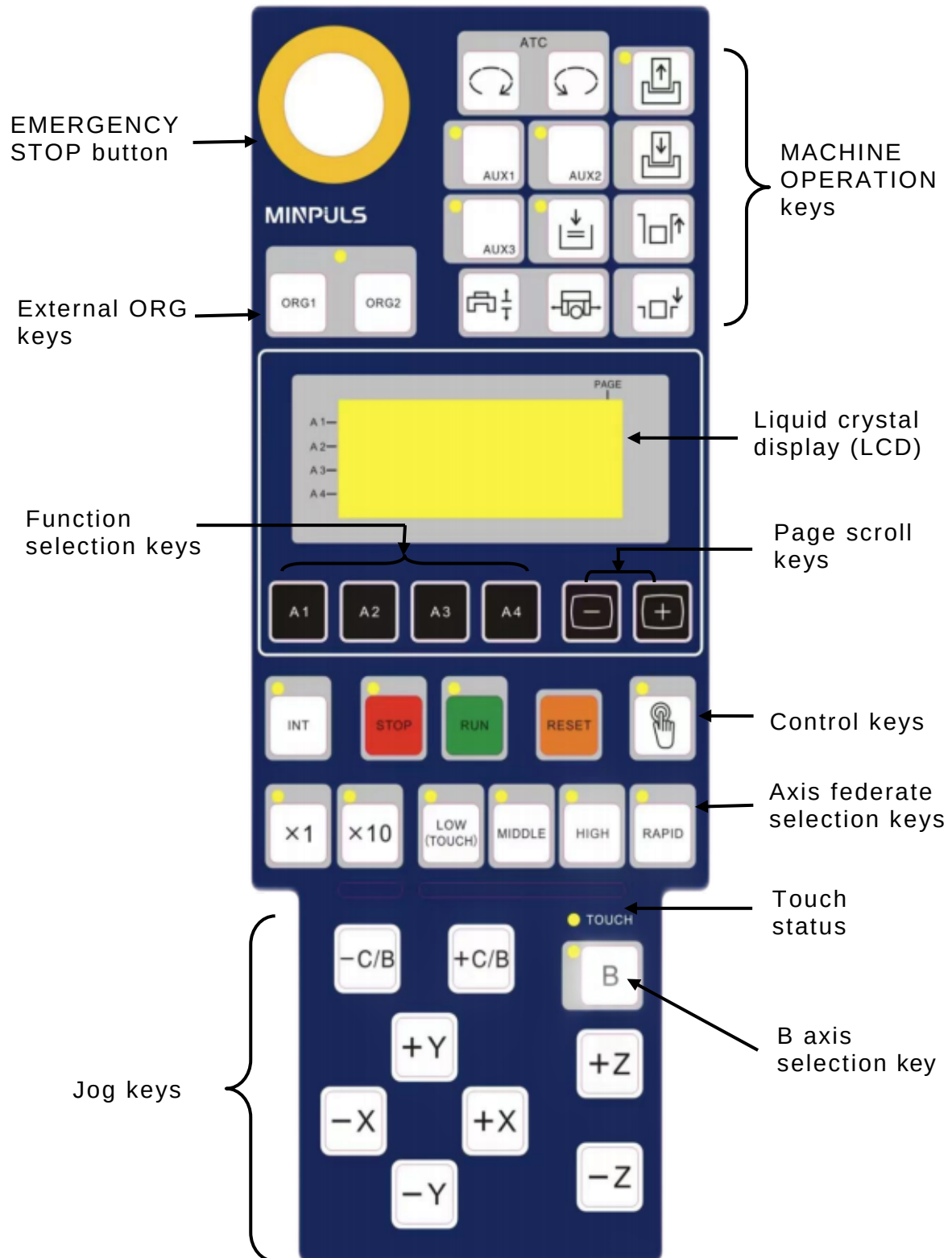


Figure 1-3 Portable Operation Panel

Table 1-4 Keys on Portable Operation Panel

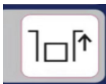
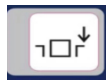
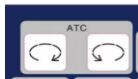
No.	Name / Label	Operation and Function Description
1	Emergency stop button 	The emergency stop button is pressed when abnormalities are discovered in a machine, or when a machine needs to be stopped urgently. The operation and function are the same as that on the main operation panel.
2	RETRACT key 	Executes retract operation when pressed in automatic operation mode (either during operation or stop) and then places the system in stop status. The lamp lights up during retract operation.
3	RETURN key 	When the return key is pressed, the head returns to the point where the  key was pressed and the operation restarts.
4	Work tank up key 	Moves the work tank up while the key is pressed.
5	Work tank down key 	Moves the work tank down while the key is pressed.
6	ATC MAGAZINE index keys 	Index the ATC magazine.
7	FLUID key 	Starts the motor for dielectric fluid feed pump and the lamp lights up. When pressed again, the lamp turns OFF and the motor for the dielectric fluid feed pump stops.
8	(Auxiliary keys) 	※ Reserved for function extension. Not active at present.

Table 1-5 Keys on Portable Operation Panel

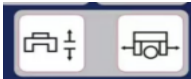
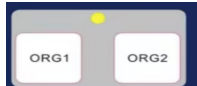
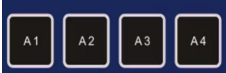
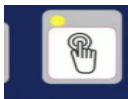
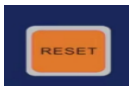
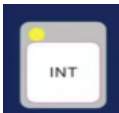
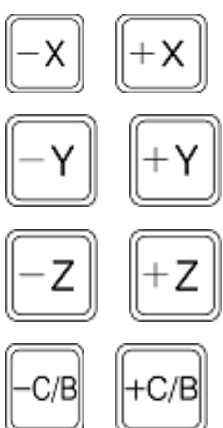
No.	Name / Label	Operation and Function Description
9	HOLDER UNCLAMP keys 	Unclamps the holder. Note: No unclamping is executed unless both the keys are pressed simultaneously.
10	Work coordinate reset keys 	The ORG lamp turns on when EXT ORG key on the NC FUNC screen is valid. Under this condition, when the RESET key is pressed and about 1 second later the ORG1 or ORG2 key is also pressed, the coordinate value of the workpiece coordinate system displayed on the LCD is reset. When external ORG becomes valid, a "*" mark is indicated on the left side of coordinate display (two coordinate systems). The coordinate system with the first "*" mark is reset with the ORG1 key, and that with the second "*" mark is reset with the ORG2 key.
11	Page scroll keys 	Used for scrolling the LCD screen pages. Total number of pages is 8.
12	Function select keys 	Selects and executes one of the four functions displayed on the LCD. These keys are associated with each LCD display on page 4 to page 8.
13	Manual run key 	Selects the MANUAL RUN mode, and the lamp turns on. The previous mode does not return even if this key is pressed again.
14	START key 	Starts the automatic operation. The lamp lights up during this process. Also, use this key to restart the operation after stop.
15	STOP key 	Stops the automatic operation, and the lamp turns on.
16	RESET key 	Resets the automatic operation and alarm.

Table 1-6 Keys on Portable Operation Panel

No.	Name / Label	Operation and Function Description
17	INTERRUPT key 	Valid while the lamp is ON. Interruption can be turned on or off even during the operation. 1. During manual operation, manual feed is possible irrespective of touch between electrode and workpiece. (Touch is neglected) 2. During machining, the inching interruption is valid.
18	Feed rate change keys 	Selects the jogs federate. The selected key lamp lights up.
19	B axis selection 	When the key is pressed, the lamp lights up and the jog keys  ,  are activated for the B axis. When the key is pressed again, the lamp turns off and the C axis is selected.
20	JOG keys 	In the manual operation mode, manual feed is possible in the axis and direction selected by the key pressed. During automatic operation, the inching feed is valid if the INTERRUPT key lamp is ON. If two keys are pressed at the same time, linear interpolation composed in the selected two directions will be executed. However, you cannot press positive and negative keys of the same axis simultaneously.

* Please perform the operation and confirm the function one by one carefully when operating each one of the main operation panel, the screen touch panel and the portable operation panel (FPB2).

* Simultaneous operation of two or more keys would cause malfunctions, except for the jog keys.

2. Start-up of Machine Operation

2.1 Before Power ON

(1) Understanding the Operation Method

Before starting to operate the machine, read the attached manuals carefully and understand the operation method. Do not attempt to operate the machine while trying to understand the manuals.

(2) Check the Main Operation Panel Lamps

Please check the Machine Status lamps, STOP lamp, and PANEL SW OFF Key, and check whether the power supply is on, the automatic operation is starting, and the screen display is off.

(3) Check surrounding of the machine

Check the machine and the area surrounding it before beginning operation. Before turning on the power, confirm that there are no people working behind the machine and that all the covers for the dielectric fluid supply unit, fluid filters, and power supply are closed. Tools should not be left in the work tank.

(4) Check the Position of the Emergency Stop Button

Please check the position of the emergency stop button in order to be able to push it immediately in case of any emergency.

2.2 Power ON

After the Main switch is on, press the green [power on] button on the main operation panel and the machine will begin to power-up. The Load of the NC system program is completed in 3 - 5 minutes; The initial screen will be shown as Figure 2-1.



Figure 2-1 Initial Screen

2.3 Machine Home

After powering-up the machine, it is necessary to do Machine Home to set the machine coordinate.

Procedures should be executed as the following.

- 1) Switch [Machine Home] button to ON, from the [Start] tab on the "EDM Assist" dialog.

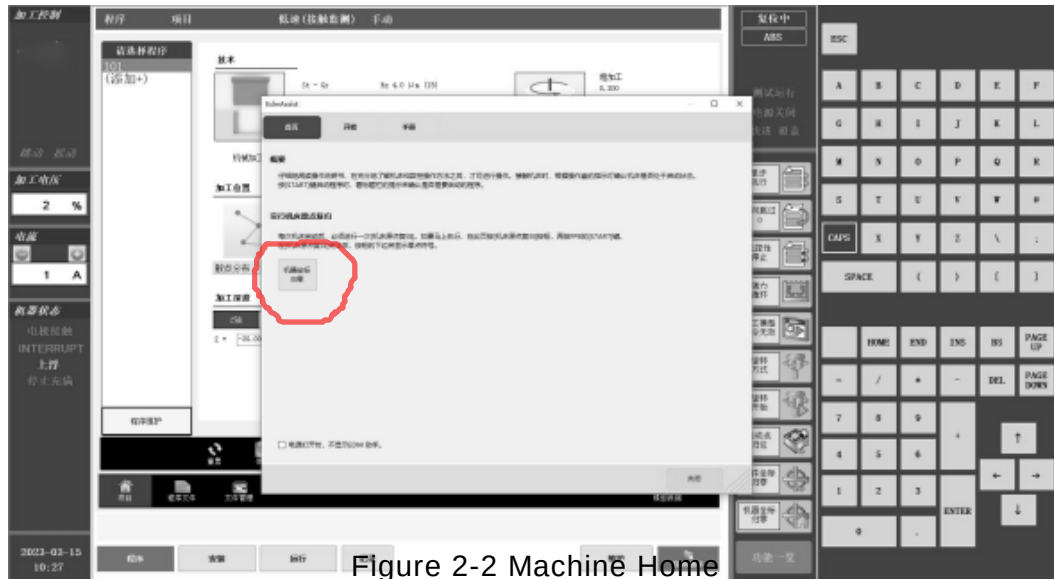


Figure 2-2 Machine Home

When the mode of operation is not a manual mode, the dialog is displayed. To switch the mode, push the [OK] button.

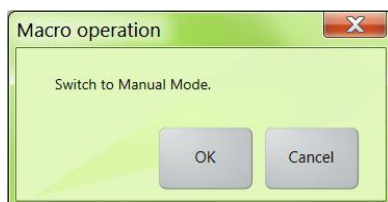


Figure 2-3 Mode Switch Confirmation

- 2) Press [START] key on the portable operation panel (FPB).
By this operation, each axis moves to the machine home. When the axis moves to the machine home completely, the machine home mark is displayed under the [Machine Home] button.



Figure 2-4 Machine Home Mark

Hint: If [Start] window is not displayed, it can be displayed by pressing the [EDM Assist] button at the lower right of the screen. The [Machine Home] button is also found on the [Others] dialog.

2.4 Addition of the Function Selection (Model Plan settings) dialog box

The [Function Selection] dialog box has been added in EDM Assist for customizing the setting used with the machining procedure and/or program format.

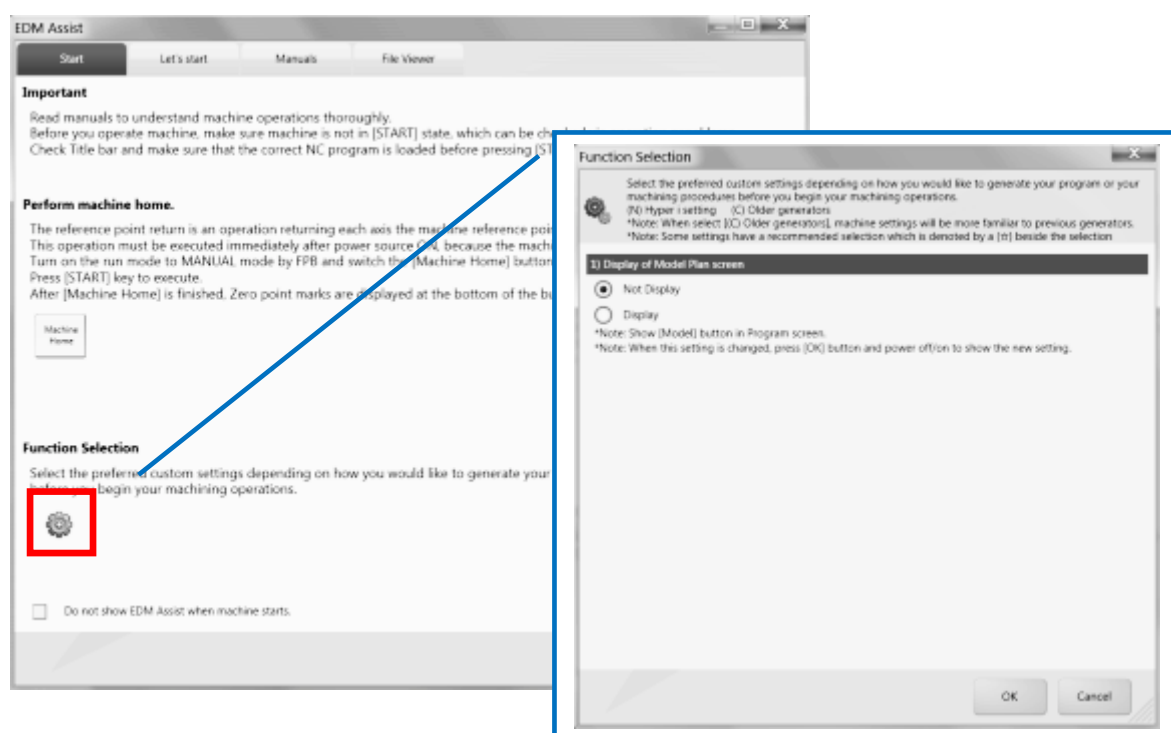


Figure 2-5 Function Selection

Display of the Model Plan screen can be selected.

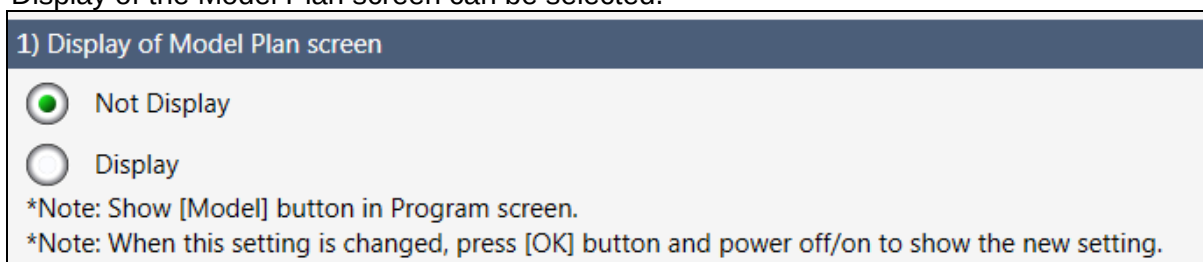


Figure 2-6 Select Model Plan screen display

2.5 Operation Mode Change

When the lamp is turned ON by pressing the Manual Mode Key on the portable operation panel (FPB), it's called "Manual Operation Mode." In this mode it's possible to the axis feed on manually with the Jog keys.

Table 2-1 Mode of operation

Manual Mode LED indicator Operation	ON Manual Operation mode	OFF Automatic Operation Mode
Jog keys	Effective	Ineffective
[START] key	Macro Run • Macro functions button • Rapid move menu	Memory Run • O/N number MDI Run Schedule Run

When the manual operation lamp on the portable operation panel (FPB) is OFF, the machine is in Automatic Operation Mode, and then the NC Program can be started by pressing the [START] key.

There are three operation methods for Automatic Operation Mode: [Memory Run] starts the NC program registered on the Program screen; [MDI Run] starts the NC program that is typed in directly on the operation screen. [Schedule Run] starts continuously NC programs that are listed on the Schedule screen. Also, in [Memory Run] it is possible to specify the program to be started by using the O/N number.

The operation mode switching button on the top of the operation screen is used to select whichever method is used to start a program.



Figure 2-7 Mode of Operation Switch Button on the Operation Screen

When either of [MDI], [O], [N], or [Schedule] button is pushed, it is an Automatic Operation Mode.

It changes into the Manual Operation Mode if the  button is pushed. Frequently used functions, such as Machine Home, Start Point Return and etc. are available in the screen for fast and convenient usage. Pickup functions such as plate/column and corner measuring and positioning can be performed without inputting NC programs. These functions are called [macro functions] and can be performed by selecting the function button while in manual mode and pressing the [START] key.

Hint: The manual mode LED indicator represents the effective/ineffective of the jog keys in fact.

Since the macro function itself is performed in automatic operation mode, after the [START] key is pushed, the manual LED indicator goes out after starting the macro functions until the reset.

2.6 Axial Movement by Manual Operation

In order to move axes manually, press the manual mode key on the portable operation panel (FPB) to turn on manual mode and press the jog key(s).

The feed rate of the axes can be changed by the [LOW], [MIDDLE], [HIGH], and [RAPID] keys. Although the feed rate also depends on the model and the axis number, it is approximate to the values in Table 2-2.

Table 2-2 Axis Feed Rate

Mode	Axis Feed rate
RAPID	2000~5000 mm/min
HIGH	1500 mm/min
MIDDLE	250 mm/min
LOW	50mm/min

If the buttons $\times 1$ or $\times 10$ are pressed, the machine movement changes to step feed mode and a fixed length will be moved when the key is pressed.

Based on the standard, the feed length of $\times 1$ key is 0.001 mm (0.0001 inch) and $\times 10$ key is 0.010 mm (0.001 inch).

Hint: If you want to move by 0.0001 mm by $\times 1$ change, Parameter 337 (set) is changed.

2.7 Start, Stop, and Reset of NC Programs

The following steps are the procedure to start running an NC program;

- 1) Press the Manual Mode Key on the portable operation panel (FPB) or click the switch button of operation mode on the screen to switch from manual mode to Automatic Operation Mode
- 2) On the operation screen, Type in the starting program number (O/N number), MDI, or Schedule specified.
- 3) Press the [START] key on the portable operation panel (FPB).

To execute the macro-function, like Quick button on the right edge of screen and positioning menu in the setup screen etc., the steps are as follows:

- 1) Press the Manual Mode Key portable operation panel (FPB), or the [Manual] button on the operation screen to switch to manual mode.
- 2) Turn on a function from Others dialog, or open the Rapid move screen of Setup and select a function.
- 3) Press the [START] key on the portable operation panel (FPB).

In either operation, the automatic operation run can be suspended with the [STOP] key. After that if the [START] key is pressed again the automatic operation run will resume from the point where run was suspended. Press the [RESET] key to force termination of the automatic operation run and to release alarms.

2.8 Power OFF

To power down the machine, press the red [power off] button located on the main operation panel. Power-off processing is completed in 30 to 60 seconds.

Please be sure to close the editing NC program before powering off. Do not turn off the power until the open/close process of the NC program and the input/output process for the USB memory or network files have completed.

Turning power off while files are being processed may cause data to be lost.

After pressing the [power off] button, switch the main switch off. After power off, wait for approximately 5 seconds or more before the next power on. It may cause breakdown and error when switching on at once.

In the following cases, hold down the [Force Quit] switch for five seconds or more to forcibly exit the NC screen, and then press the [Power ON] switch again to restart the NC unit.

- If nothing is displayed on the NC screen when the [Power ON] switch is pressed:
- If the display on the NC screen does not disappear when the [Power OFF] switch is pressed:

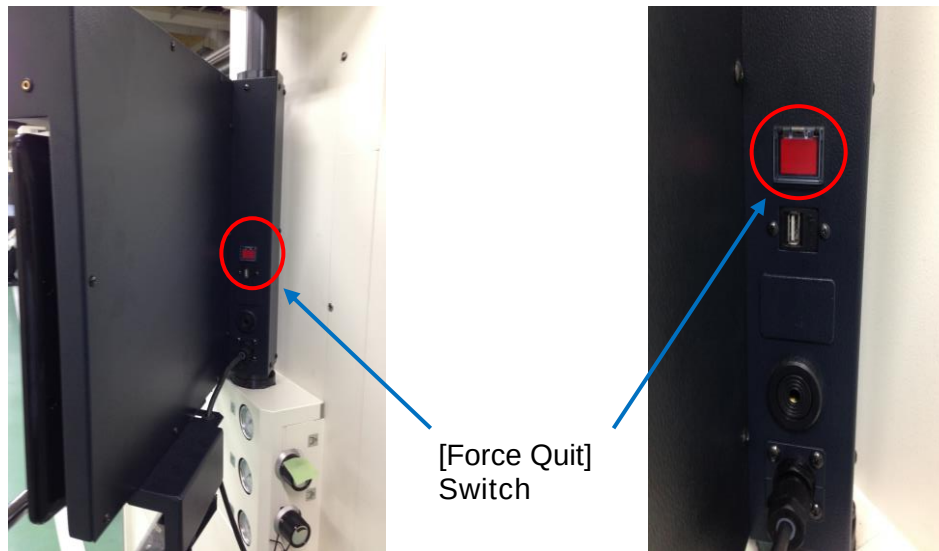


Figure 2-8 Force Quit switch

2.9 Re-Logon

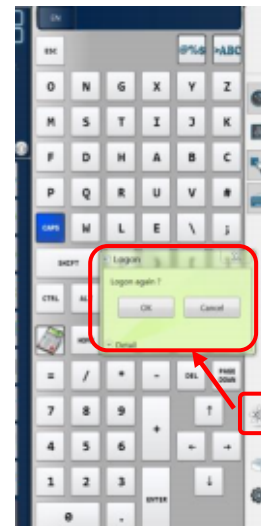
If the machine has been used over an extended period of time without turning off the power, the response to operations performed on the screen may deteriorate due to memory defragmentation, for instance.

In such a case, by Re-Logon to reallocate memory, the response to operations on the screen can be improved.

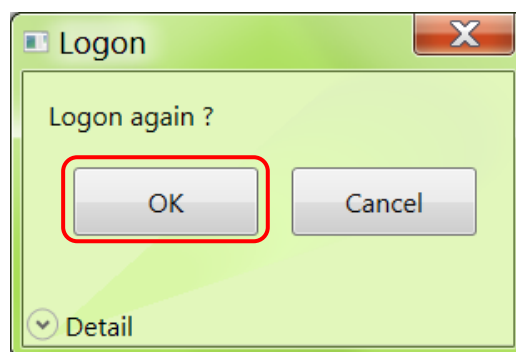
Returning to the Machine Home (reference position return) is required after regular power off; however, it is not required after relogging.

You can re-logon while machining is being carried out. (Machining is normally continued while logon again.)

- (A) Touch the [Logon] button on the layout bar to open the Logon dialog box.



- (B) Touch the [OK] button.



- (C) The screen display comes up again automatically.

Figure 2-9 Re-Logon

3. Screen Operation

3.1 Composition of Main Screen

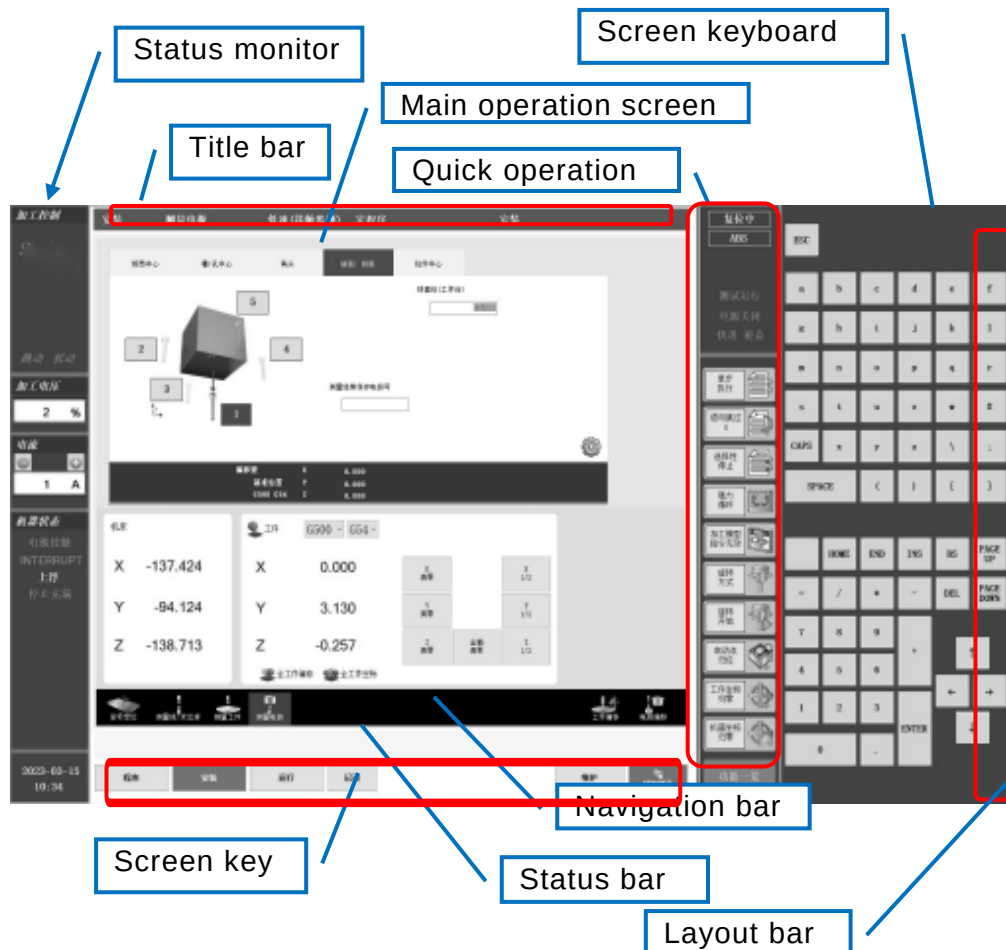


Figure 3-1 ES100A/ES200A Screen

The operation screen for the device consists of nine major areas.

(1) Title Bar

The title bar is displayed on the top of the screen and is divided into the following six areas.

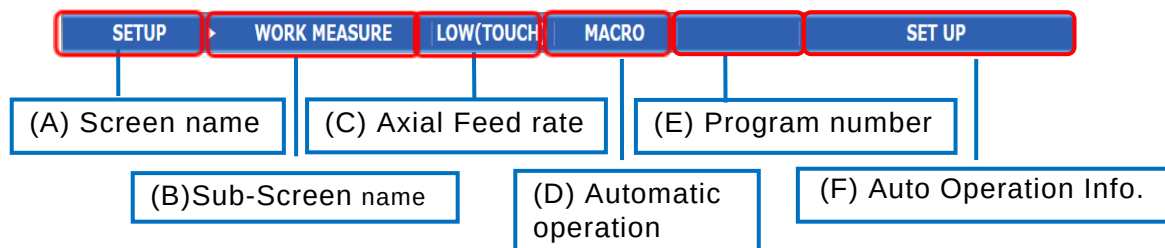


Figure 3-2 Title Bar

(A) Screen Name

The screen name for the main operation screen selected with the screen keys is displayed.

(B) Sub-Screen Name

The currently shown sub-screen name selected on the navigation bar is displayed.

(C) Axial Feed rate

The axial feed rate or step feed mode of the JOG key being pressed is displayed here as [RAPID], [JOG HIGH], [JOG MIDDLE], [JOG LOW], STEP × 10, or STEP × 1.

When this column is blank, it means that jog key function is invalid.

(D) Automatic Operation

The type of automatic operation performed when the [START] key is pressed at reset status, e.g.[Memory] or [Macro] is displayed here.

[Memory] is when the NC program set in Operation screen is executed and [Macro] is when the macro function on Setup screen or quick button is executed.

When this column is a blank, it means that the [START] key is invalid.

(E) Program Number

The O/N number executed when Start O/N number is executed by pressing [START] key during reset status is displayed here. When this column is an empty column, it is either in manual operation mode or the program that is being executed is in write protection mode.

(F) Automatic Operation Info.

This column displays the comment of the active O/N number during memory mode. When macro function is selected, then the function name is displayed here.

(2) Main Operation Screen

Data for each screen is displayed and setup. Screens for each function can be opened by touching the screen keys.

(3) Navigation Bar

Displayed on the bottom of the main operation screen. Switches to the sub-screen for the appropriate function by touching the navigation buttons.

(4) Status Bar

Guidance messages, warning messages, alarm messages, startup status, number of alarms (ALM) and number of warnings (WRN) are displayed on the status bar.

(5) Screen Keys

Touching the screen keys that show the screen titles will switch the displays on the main operation screen. (The selected screen key is reversely displayed.)

(6) Status Monitor

Display the machining status and NC status.
Switch display by using the layout bar operations.

(7) Quick Operation

Consists of NC Status Display and Quick Buttons.
Quick buttons are used to Others (Touch buttons on Others) or NC Functions and machine operation buttons.
Switch display by using the layout bar operations.

(8) Screen Keyboard

Text/Numbers can be entered from the screen keyboard when the cursor is on the data entry column.
Switch display by using the layout bar operations.

(9) Layout Bar

Screen layout can be changed by operating the each icon.

3.2 Changing the Screen Layout

Screen layout can be changed with the operations on the [Layout Bar].

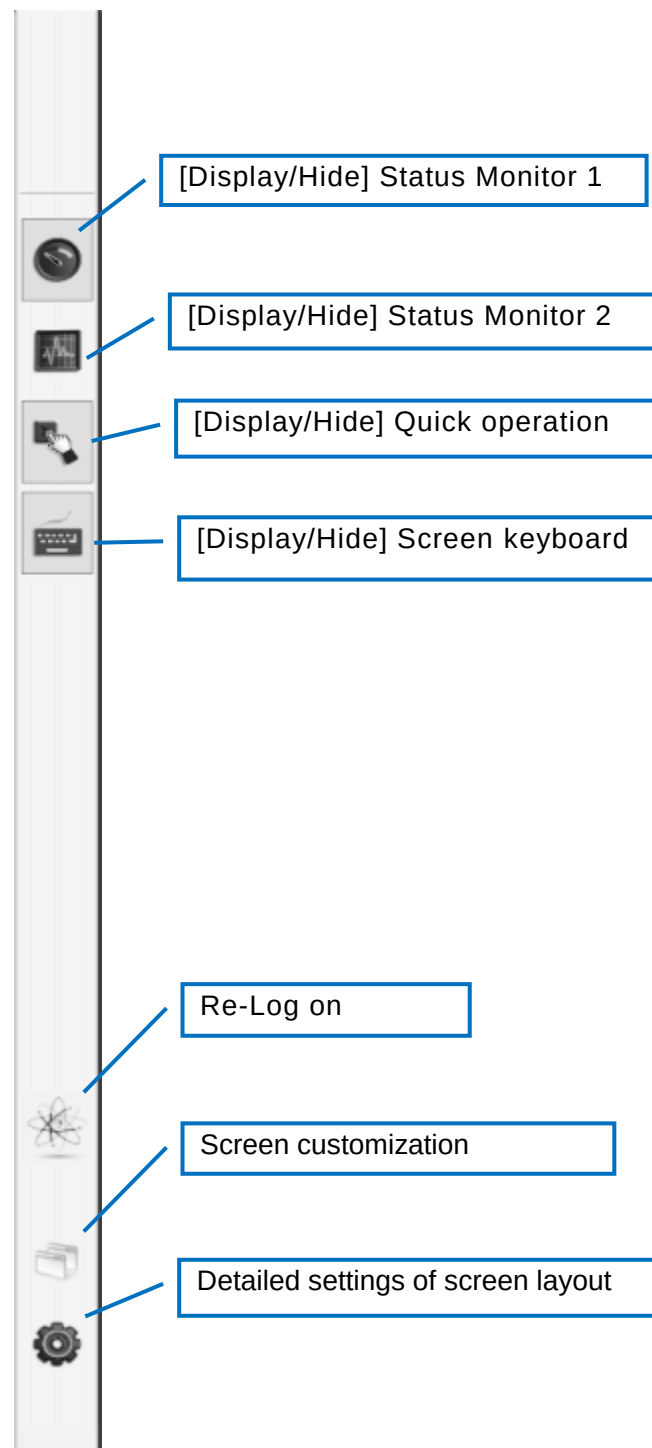


Figure 3-3 Layout Bar

3.2.1 Display/Hide Status Monitor

Allows switching between display/hide for Status Monitor 1 (machine status display) and Status Monitor 2 (NC status display) by touching the following icons on the [Layout Bar].

If hidden, and [Dock Operation Window] is selected on the layout detailed setting window, that area will be expanded on the [main operation screen].

Figure 3-4 Status Monitor 1 Display Icon

Figure 3-5 Status Monitor 2 Display Icon



Figure 3-7 Status Monitor 2

3.2.2 Display/Hide Quick Operations

Allows switching to display/hide [Quick Operations] by touching the following icons on the [Layout Bar].

If hidden, and [Dock Operation Window] is selected on the layout detailed setting window, that area will be expanded on the [main operation screen].



Figure 3-9 Quick Operation Display

3.2.3 Active function content select

You can customize the display items of [Active function] in [Quick operation].

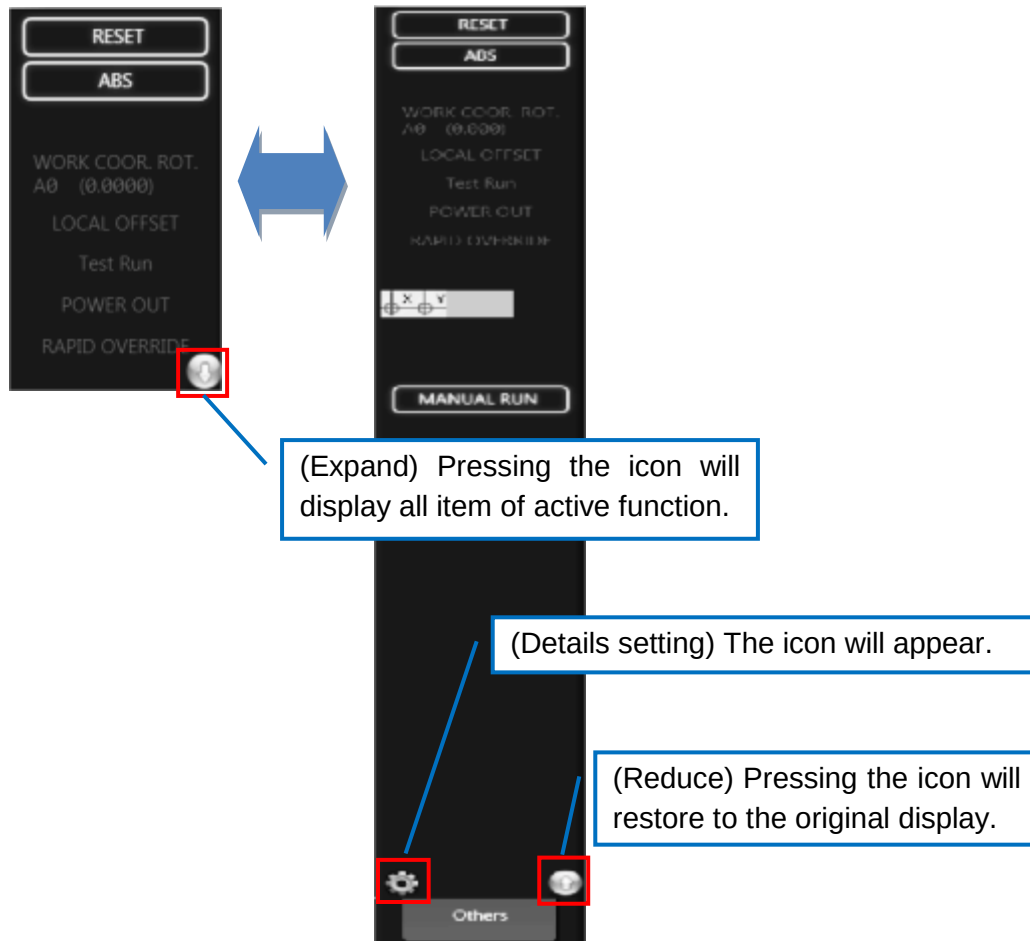


Figure 3-10 Customizing of display item

Before customizes	After customizes

Figure 3-11 [Machine Home Mark] is displayed instead of [Power out]

(1) Details setting



Pressing the icon will show the [Details Setting] dialog window.
You can customize the order of items.

3.2.4 Display/Hide Screen Keyboard

Allows switching to display/hide [Screen Keyboard] by touching the following icons on the [Layout Bar].

If hidden, and [Dock Operation Window] is selected on the layout detailed setting window, that area will be expanded on the [main operation screen].



Figure 3-13 Screen Keyboard Display Icon



Figure 3-14 Screen Keyboard

3.3 Operation of Each Screen

3.3.1 Screen Keyboard

The keyboard is shown on top of the screen and text can be entered with the touch operations.

(1) Keyboard Layout Switching

Touching the key layout switching key will switch between [alphabetical order] and the [NC Keyboard Layout].

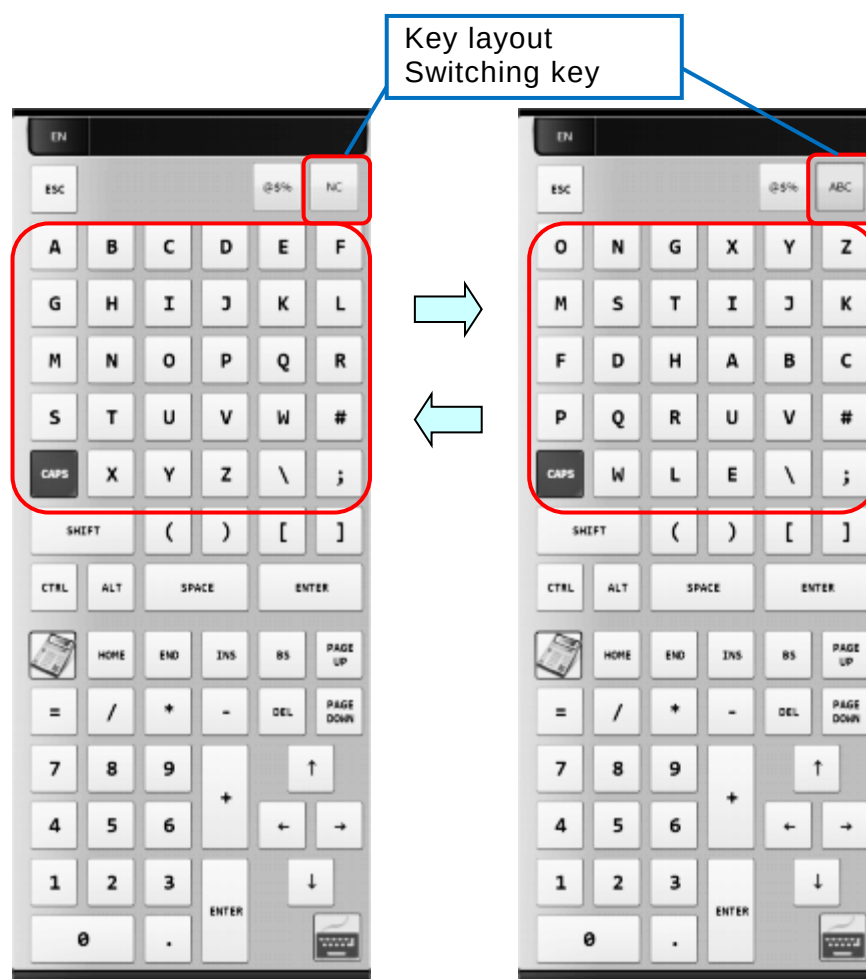


Figure 3-19 Alphabetical Order Layouts

Figure 3-20 NC Keyboard Layouts

(2) Display of Symbol Keys

Touch the symbol keys display switching key to switch them between Display and Hide.

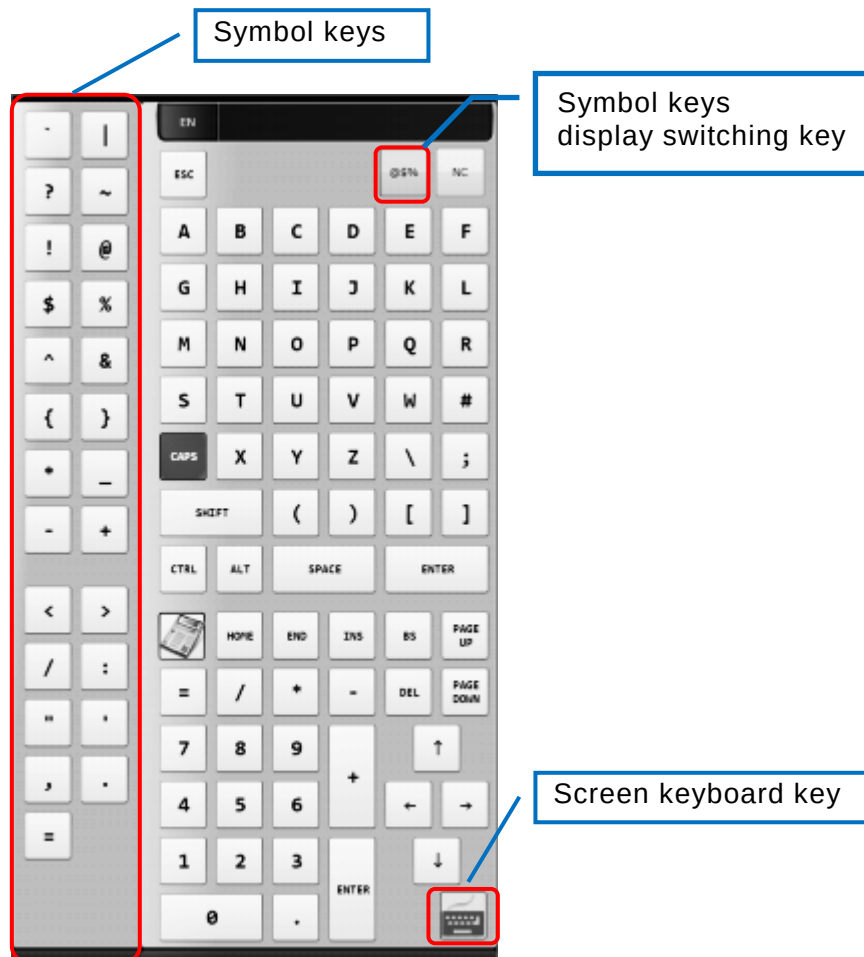


Figure 3-21 Symbol Keys Display

Also, Switch Screen keyboard to hidden by touching the [Screen keyboard] key. (Touch the screen keyboard key icon on the layout bar to display it again.)

(3) Input language switch

The switch of the input language does the JP Key by touch.



Figure 3-22 Input language switch

(4) Calculator

Touch the calculator icon to open the calculator.

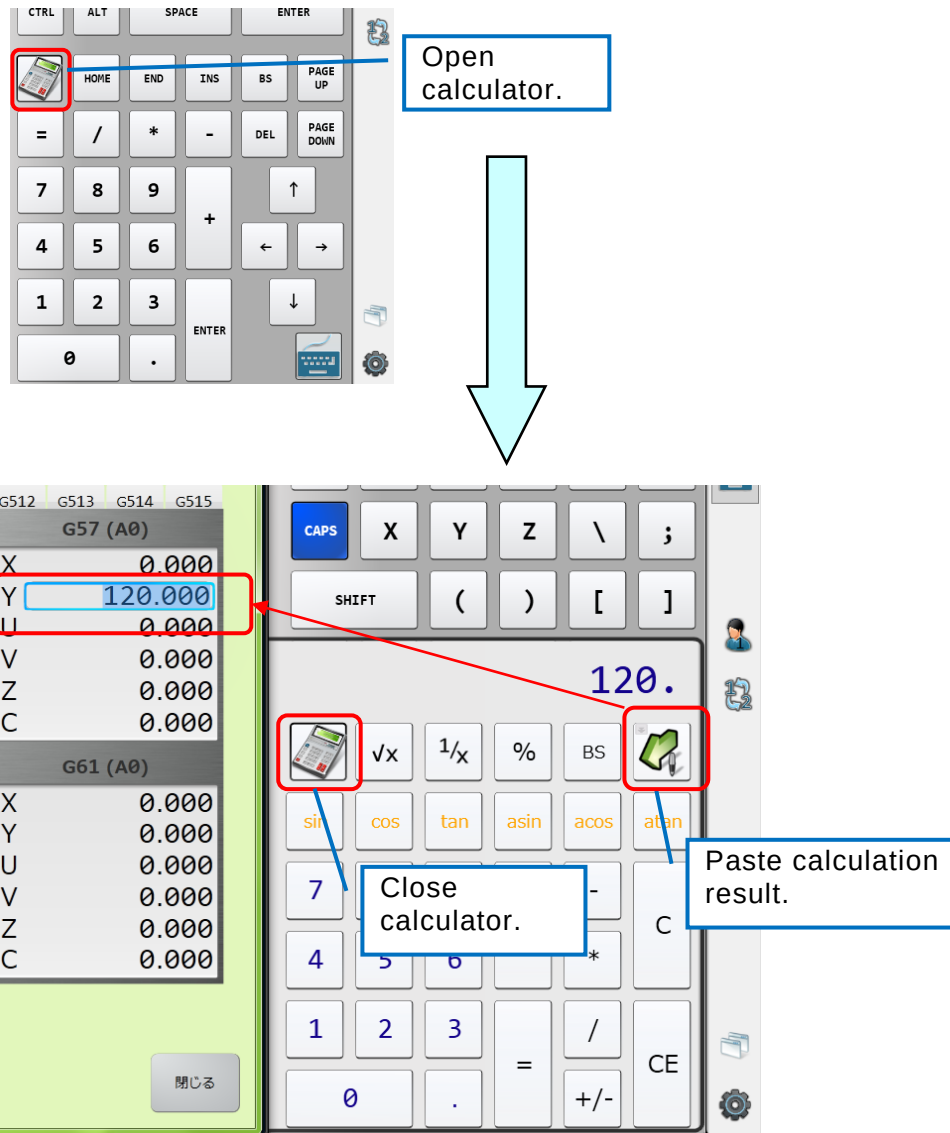


Figure 3-23 Calculators

3.3.2 Screen Switching

Touch the screen keys to switch the main operation screens.



Figure 3-24 Screen Keys

3.3.3 Sub-Screen Switching

Normally, one main operation screen consists of multiple sub-screens with differing functions, which are used by switching the display by touching the icons on the [Navigation Bar].



Figure 3-25 Navigation Bar of the [Setup Screen]

3.3.4 Scrolling the Screen

Change pages by scrolling or flicking when screen contents cannot be displayed on the visible area of the screen.

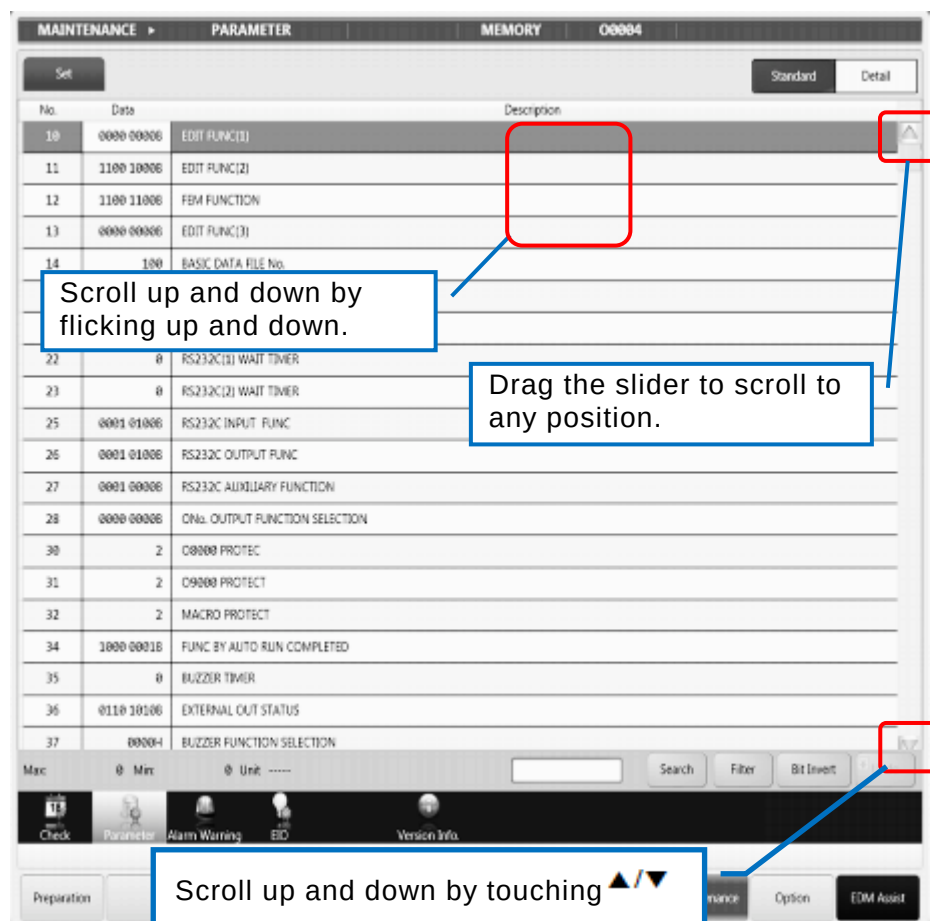


Figure 3-26 Scrolling the screen

3.3.5 Window Operations

Besides switching pages on the screen, it's also possible to open and perform operations to a window. Windows are called out by on-screen buttons, and are classified into the following four types by function.

(1) Dialog Box

After calling a window, perform data entry and view or write onto files by pressing [OK] or [Apply] at the end.

Pressing the [Cancel] button will discard all changes and close the window. These can also simply be called dialogs.

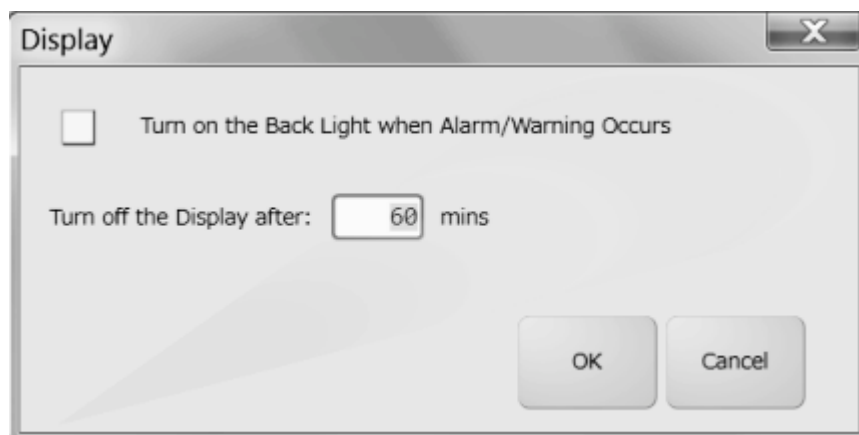


Figure 3-27 Dialog Box

(2) Sub Window

In Sub windows, data input or button operations take effect immediately.
An example of this is the Others Dialog.

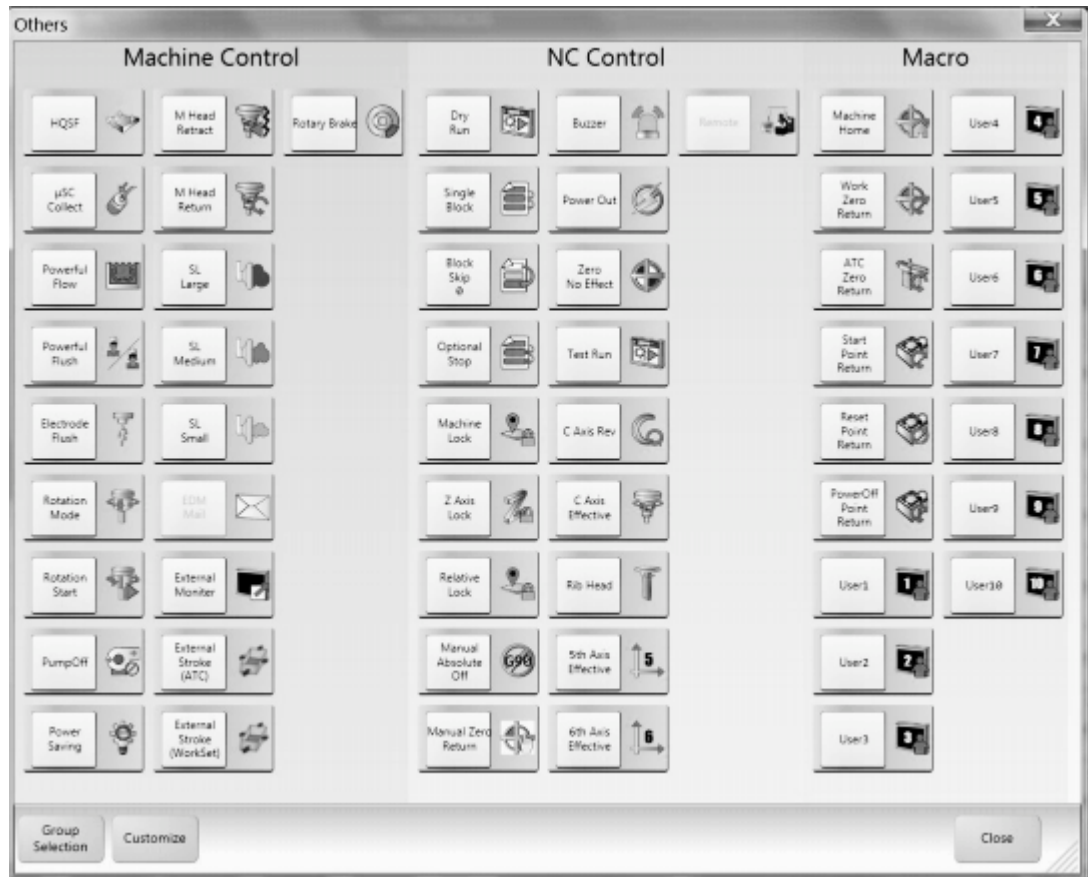


Figure 3-28 Sub Window

To change an operation to another window, close the window by pressing [OK] or [CLOSE] buttons.

(3) Message Box

A Message box is displayed to warn or confirm that an operational error or an input error has occurred.

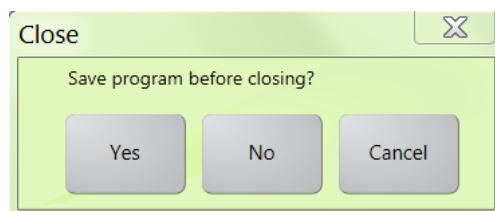


Figure 3-29 Message Box

(4) Modeless Dialog Box

The above three windows are called [Modal dialog]. Operation on the area outside of the modal dialog is not possible. It is therefore necessary to close the dialog before opening the next window or operating the functions on the view behind it.

In contrast, the window that can be operated in parallel with other window, such as [EDM Assist] and control the base section, is called [Modeless Dialog Box].

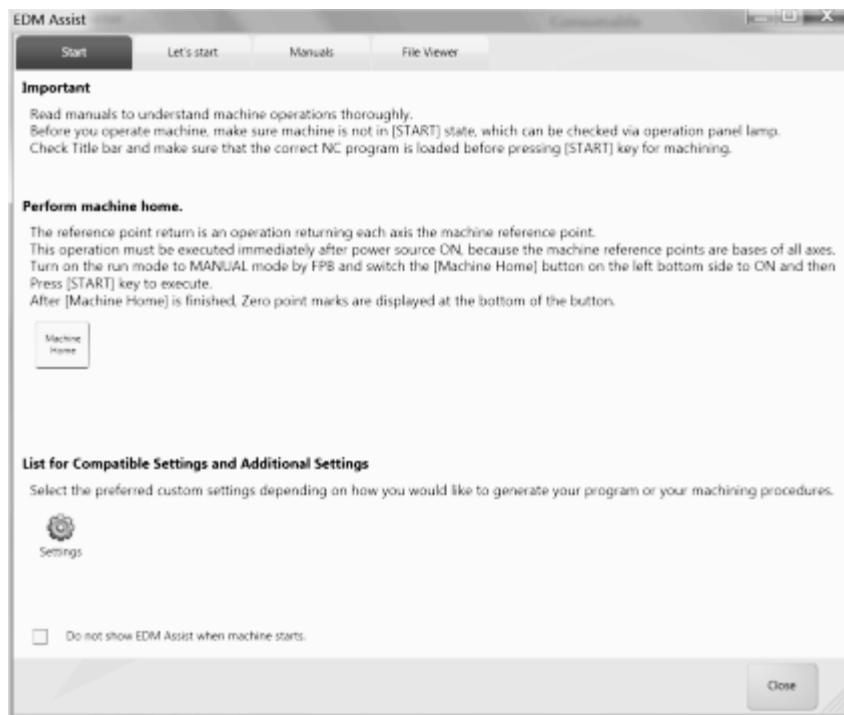


Figure 3-30 Modeless dialog box

3.3.6 Operation of Controls

Each screen consists of many parts or controls for the purpose of input and editing of data.

(1) Button

There are two kinds of buttons and they are classified according to their method of usage.

(A) Command Button

Switching of screen display or data operation is performed when the button (or icon) is pressed. To prevent operational mistake, the button actually only reacts when the finger is lifted from the area of the button. It will not react if you drag your finger while the button is being pressed. The trick is to lift your finger above the area you pressed.

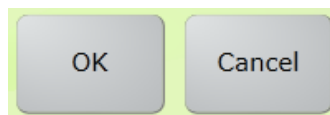


Figure 3-31 Command Button

(B) On-Off Button (toggle button)

ON-OFF state of the button will change when the button is pressed. Some buttons may have 4 level state e.g. 0/1/2/3. The color of the buttons usually changes into blue when ON.

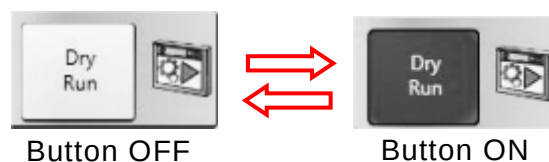


Figure 3-32 On-Off Buttons

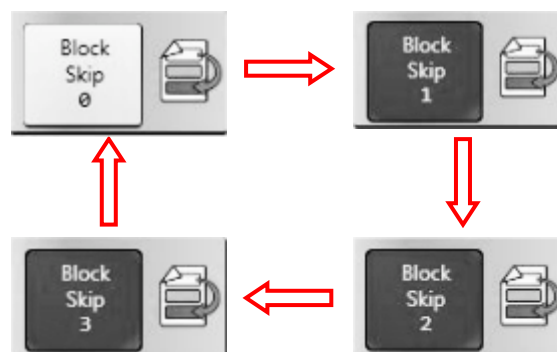


Figure 3-33 On-Off Buttons (4 level state)

In order to prevent operational mistakes, some buttons need to be pressed for more than three seconds before the function is activated. These are called [Long Press Button] and it is denoted with a downward arrow icon at the upper left corner.



(2) Edit Box

The rectangular shaped box used for data input is called Edit Box. The one displayed in white color denotes that data input is possible, while the one in gray color denotes that data input is not possible.

☒ Specific IP Address

IP Address	169.254.100.101
Subnet Mask	255.255.0.0

Figure 3-34 Edit Box (Input available)

MAC Address

00-E0-27-12-9F-E4

Figure 3-35 Edit Box (Input disabled)

(3) List Box

Entry columns where one choice is selected from pre-arranged choices are called list box. Touching the ▼ mark will display the choices.

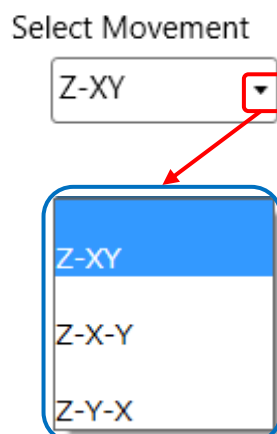


Figure 3-36 List Box

(4) Check Box and Radio Button

Square or round shape control where a check mark can be inserted into it is called [check boxes]. A checked item indicates that the selection or the input data will take effect.

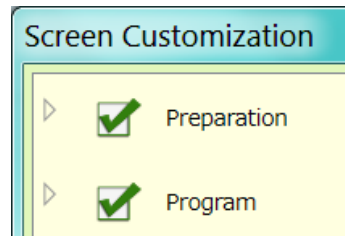


Figure 3-37 Check Box

Radio Button is a type of control that is used to select one selection from two or more check boxes.

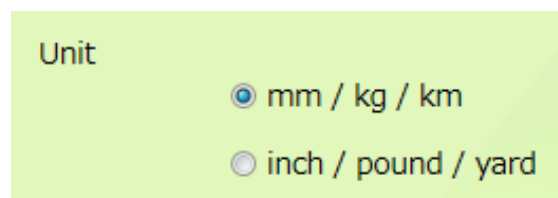


Figure 3-38 Radio Button

(5) Tab

Windows with indexes are called tab window. If tab part of the window is clicked, the displayed page will be switched.

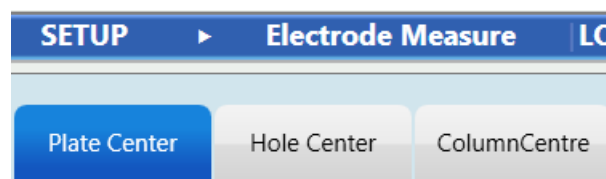


Figure 3-39 Tabs

4. Operation Status Display, Quick Operation & Others Dialog

4.1 Status Display Monitor

The current NC and machine situation such as operation run mode, alarm/warnings, the machining voltage and current is displayed.

4.1.1. Status Display Monitor 1



Figure 4-1 Status Display Monitor 1

(1) EDM TECH ACTIVITY (Machine Control)

Show activity during machining control.

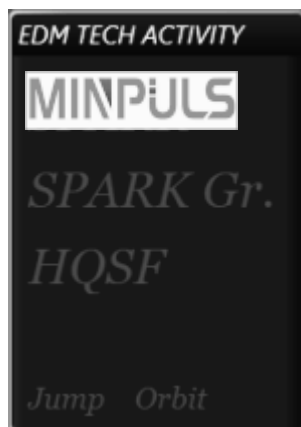


Figure 4-2 EDM TECH ACTIVITY (Machine Control)

Table 4-1 EDM TECH ACTIVITY (Machine Control)

MINPULS		Super Spark On
SPARK Gr.		Super Spark Graphite On
HQSF		HQSF On
Jump		Jump On
Orbit		Orbit On

(2) MACHINING Voltage

Display voltage during machining.

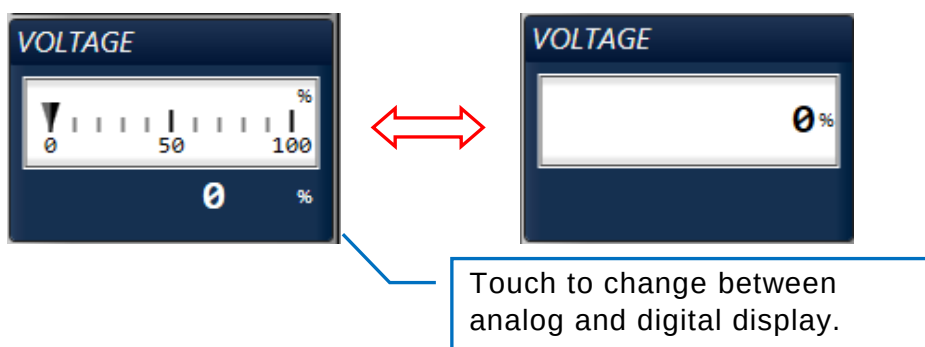


Figure 4-3 MACHINING Voltage

(3) MACHINING Current

Display current of machining.

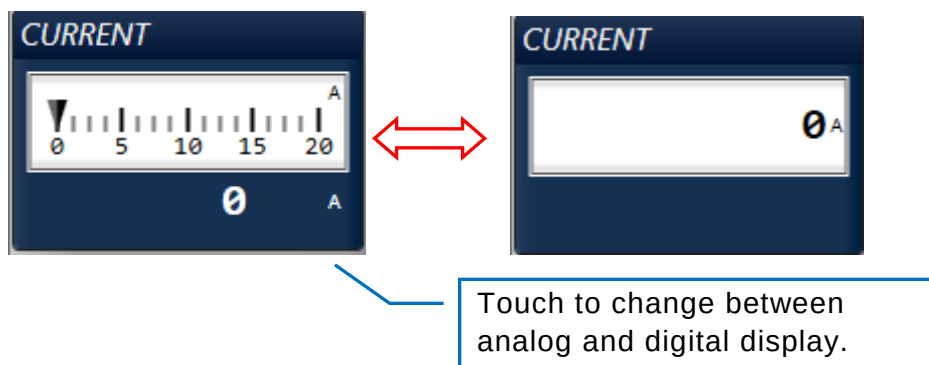
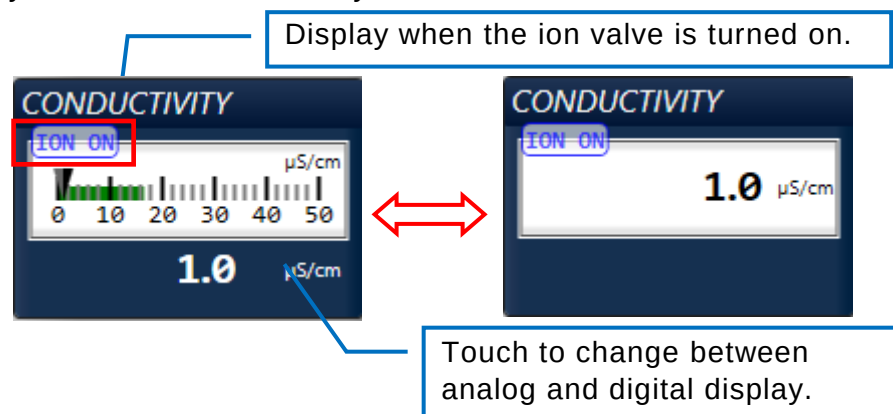


Figure 4-4 MACHINING Current

(4) CONDUCTIVITY

[Machine: EDBV3/EDBV8/BX3]

Display the electric conductivity of dielectric fluid.



The color is changed at a ratio of the current value and the target value.

Display	Ratio
	Below 110%
	110% - 149%
	150% or above

(5) MACHINE STATUS

Display status of machine.

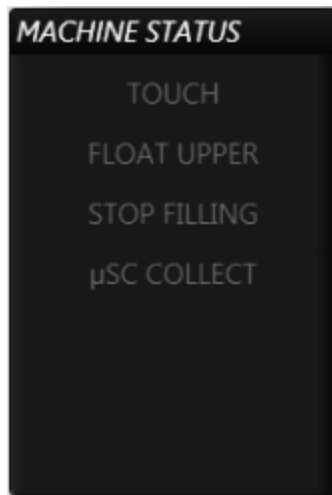


Figure 4-5 MACHINE STATUS

Table 4-2 Machine Status

	Display	Description of Content
1	TOUCH	Displayed when the electrode touches the work piece by a white character.
2	FLOAT UPPER	Displayed during floating by a white character.
3	STOP FILLING	Displayed when filling the fluid stops by a white character.

(6) Flush / Suction / Filter pressure meter

[Machine: ES200A, EDAF2/EDAF3]

Display Flushing / Suction / Filter pressures.



Figure 4-6 Change pressure meter

4.1.2. Status Display Monitor 2

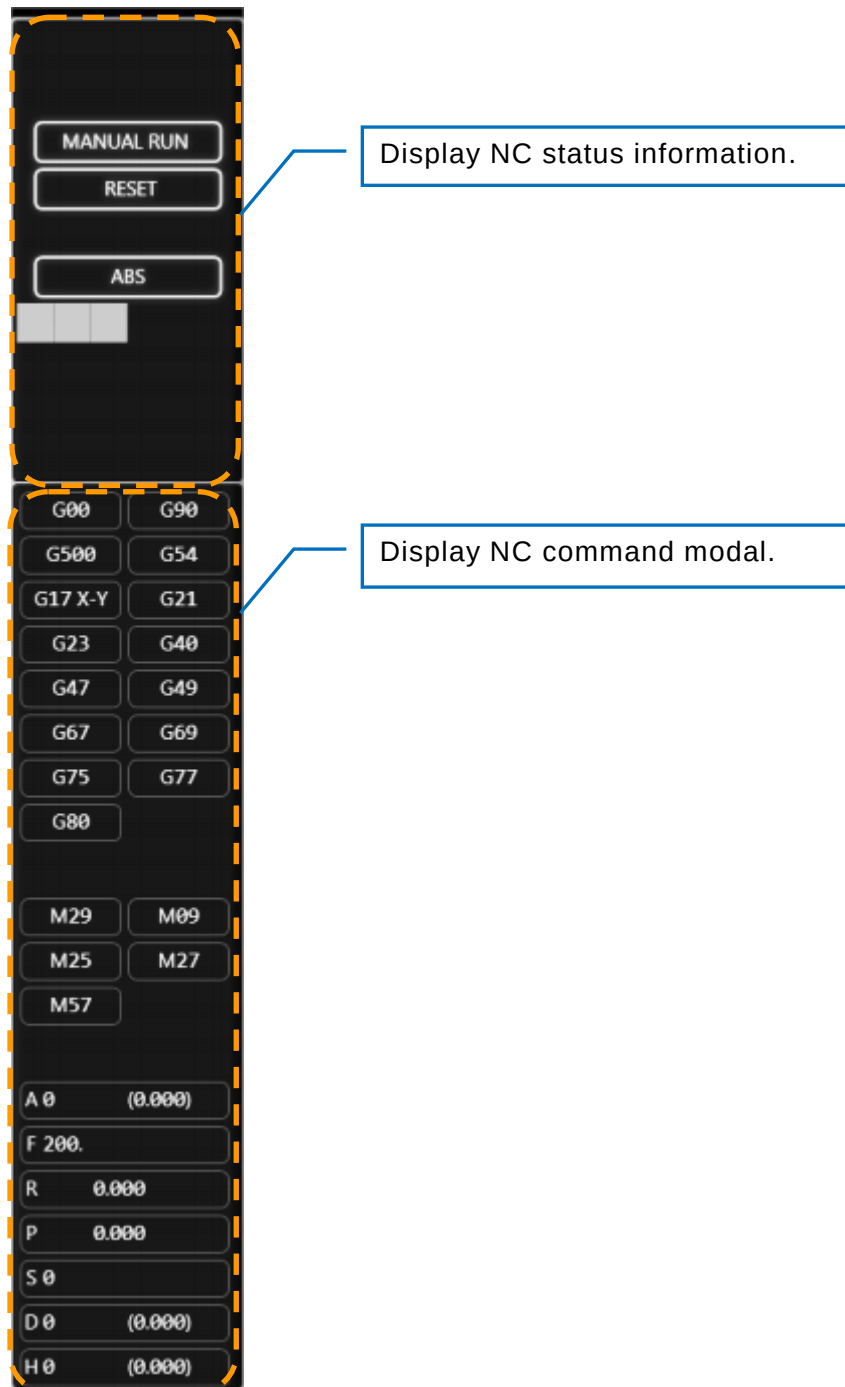


Figure 4-9 Status Display Monitor 2

Table 4-3 NC Status Information

	Display	Description of Content
1	[ALARM]	If an alarm occurs, displayed.
2	[WARNING]	If a warning occurs, displayed.
3	[MANUAL RUN] [MDI RUN] [TAPE RUN] [MEMORY RUN] [SCHE. WAIT] [SCHE. RUN] [SCHE.LAST]	The mode of operation which was selected in RESET status will display. Display will not change even if mode is switched during machine start or stop status. Please check current execution's operation mode from the title bar. In addition, SCHE. RUN will be displayed when the machine is running a scheduled operation.
4	[START STS (Status)] [RESET] [STOP STS] [SBK STOP STS] [M00/M01 STOP STS]	Displayed while auto run is start-up. Displayed during auto run reset. Displayed while auto run is stopped. Displayed during stop after running single block. Displayed during stop after running M00 or M01.
5	[ABS] [INC]	ABS (Absolute Movement) is displayed when the machine is running G90. INC (Incremental Movement) is displayed when the machine is running G91.
6	[Zero Point : XYZC 5 th 6 th]	The axis name on a reference point is displayed as a symbol. An axis which is not on the reference point will be blank.

Table 4-4 NC Command Modal

	Display	Description of Content
1	[G00] [G01] [G02] [G03]	Displayed during rapid traverse interpolation. Displayed during machining linear interpolation. Displayed during machining arc interpolation.(CW) Displayed during machining arc interpolation.(CCW)
2	[G90] [G91]	Displayed during absolute Command. Displayed during incremental Command.
3	[G500] ~ [G515]	Displayed modal work coordinate group.
4	[G54] ~ [G61]	Displayed modal work coordinate system.
5	[G17 X-Y] [G18 Z-X] [G19 Y-Z]	Displayed during X-Y plane designation. Displayed during Z-X plane designation. Displayed during Y-Z plane designation.
6	[G22] [G23]	Displayed during Inhibit area designation. Displayed during Inhibit area designation cancel.
7	[G40] [G41] [G42]	Displayed during Electrode diameter compensation cancel. Displayed during Electrode diameter compensation left side. Displayed during Electrode diameter compensation right side.
8	[G47] [G48]	Displayed during Scaling cancel. Displayed during Scaling ON.
9	[G67]	Displayed during Modal calls cancel.
10	[G68] [G69]	Displayed during rotation ON. Displayed during rotation OFF.
11	[G74] [G75]	Displayed during Pattern machining ON. Displayed during Pattern machining cancel.
12	[G76] [G77]	Displayed during Jump On Displayed during Jump cancel
13	[M28] [M29]	Displayed during Dielectric fluid supply ON Displayed during Dielectric fluid supply OFF
14	[M09] [M50]	Displayed during Blowing valve OFF Displayed during Blowing ON, Low pressure blowing ON
15	[M24] [M25]	Displayed during Polarity reverse ON Displayed during Polarity reverse OFF
16	[M26] [M27]	Displayed during machining ON. Displayed during machining OFF.
17	[M56] [M57]	Displayed during MA/MR indexing mode selection Displayed during MA/MR C-axis mode selection
18	[A0] ~ [A9] (0.000)	Coordinate rotation number A1-A9 and angle are displayed.
19	[F 00.]	Displayed F4 digit feed rate.
20	[R 0.000]	Displayed Pattern radius.
21	[P 0.000]	Displayed Pattern detail.
22	[S0]~[S15] (0.000)	Rotation speed and rotation number of the rotation unit is displayed.
23	[D 0] (0.000)	The offset volume registered with the instructed D number is displayed when D is indirect. Example: D1(0.123)
24	[H 0] (0.000)	The electrode length compensation registered with the instructed H number is displayed when H is indirect. Example: H1(0.123)

4.2 Quick Operation

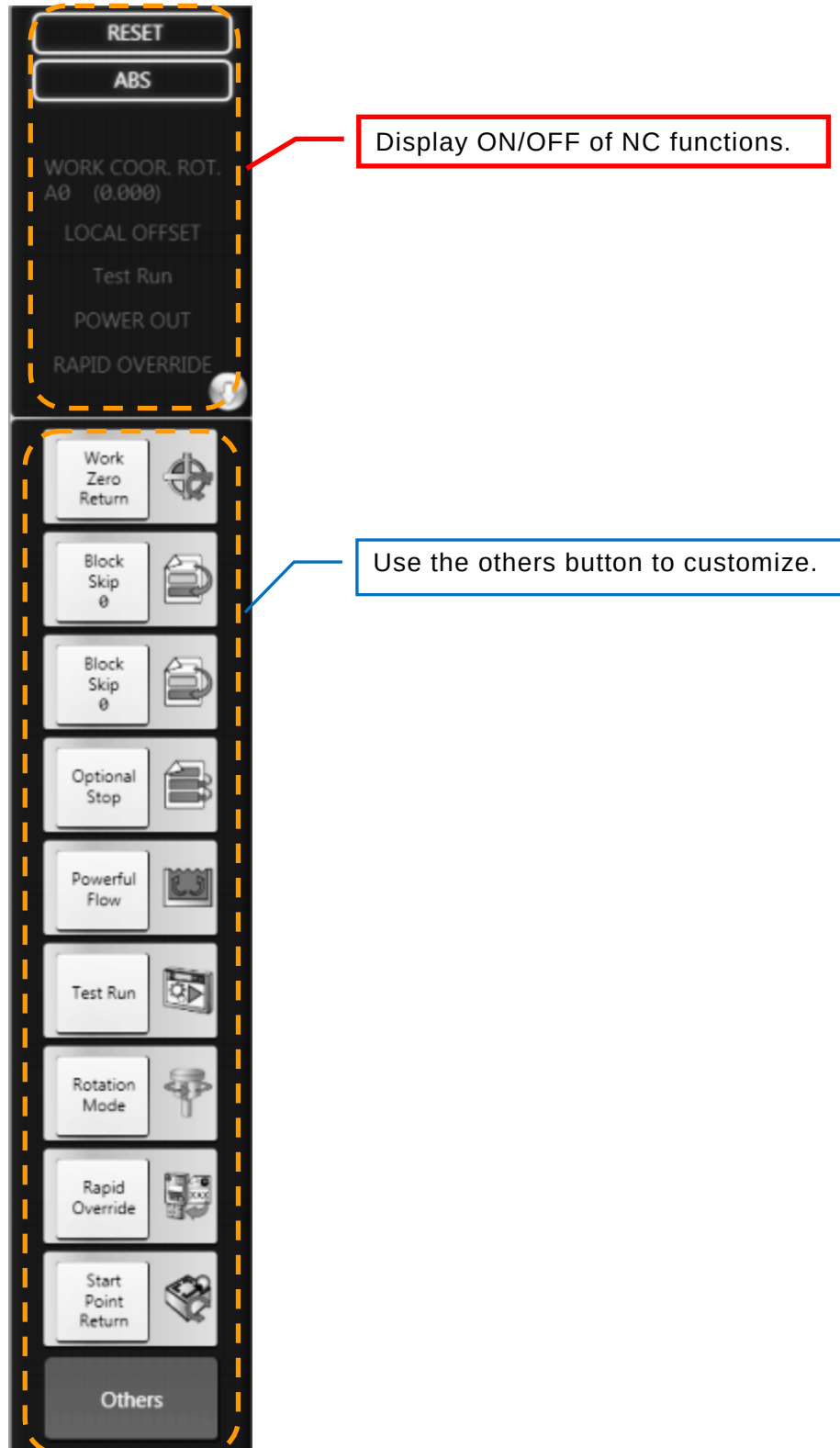


Figure 4-10 Quick Operation

4.2.1. Active Function View

On/Off status of the NC functions can be constantly monitored.

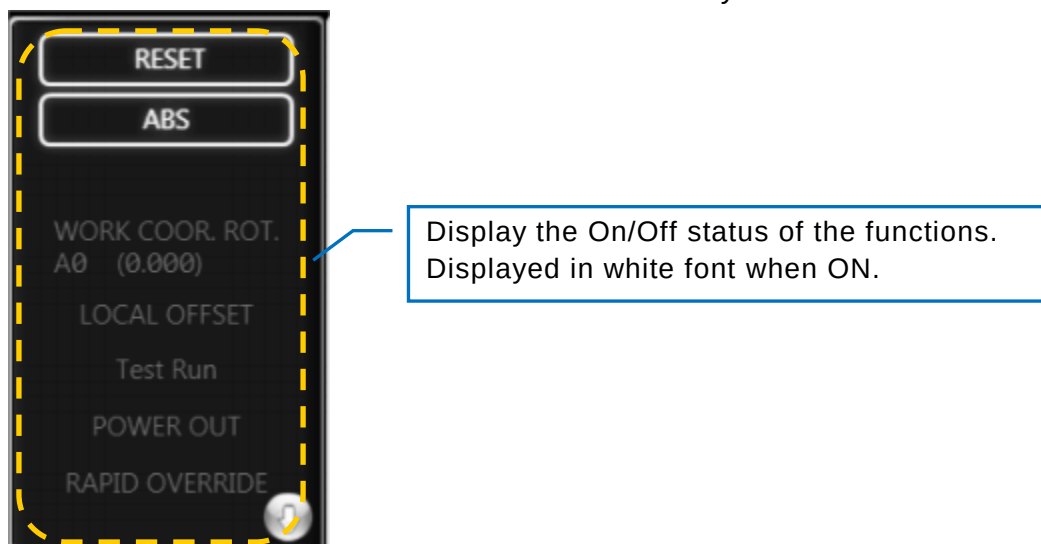


Figure 4-11 Active Function View

Table 4-5 NC Status

	Display	Description of Content
1	[START STS (Status)] [RESET] [STOP STS] [SBK STOP STS] [M00/M01 STOP STS]	Displayed while auto run is start-up. Displayed during auto run reset. Displayed while auto run is stopped. Displayed during stop after running single block. Displayed during stop after running M00 or M01.
2	[ABS] [INC]	ABS (Absolute Movement) is displayed when the machine is running G90. INC (Incremental Movement) is displayed when the machine is running G91.

Table 4-6 Active Function

	Display	Description of Content
1	WORK COORD. ROT.	Displayed during work coordination rotation by a white character.
2	[A0] ~ [A9] (0.000)	Coordinate rotation number A1-A9 and angle are displayed by a white character.
3	-	-
4	LOCAL OFFSET	Displayed when the local coordination is valid by a white character.
5	Test Run	Displayed when either one of the DRY RUN, MDL MC NOEFF is valid by a white character.
6	POWER OUT	[POWER OUT] turns ON when the [Power Off] button is ON for the NC setting.

4.2.2. Quick Button View

Frequently used functions are always displayed and can be used at any time.

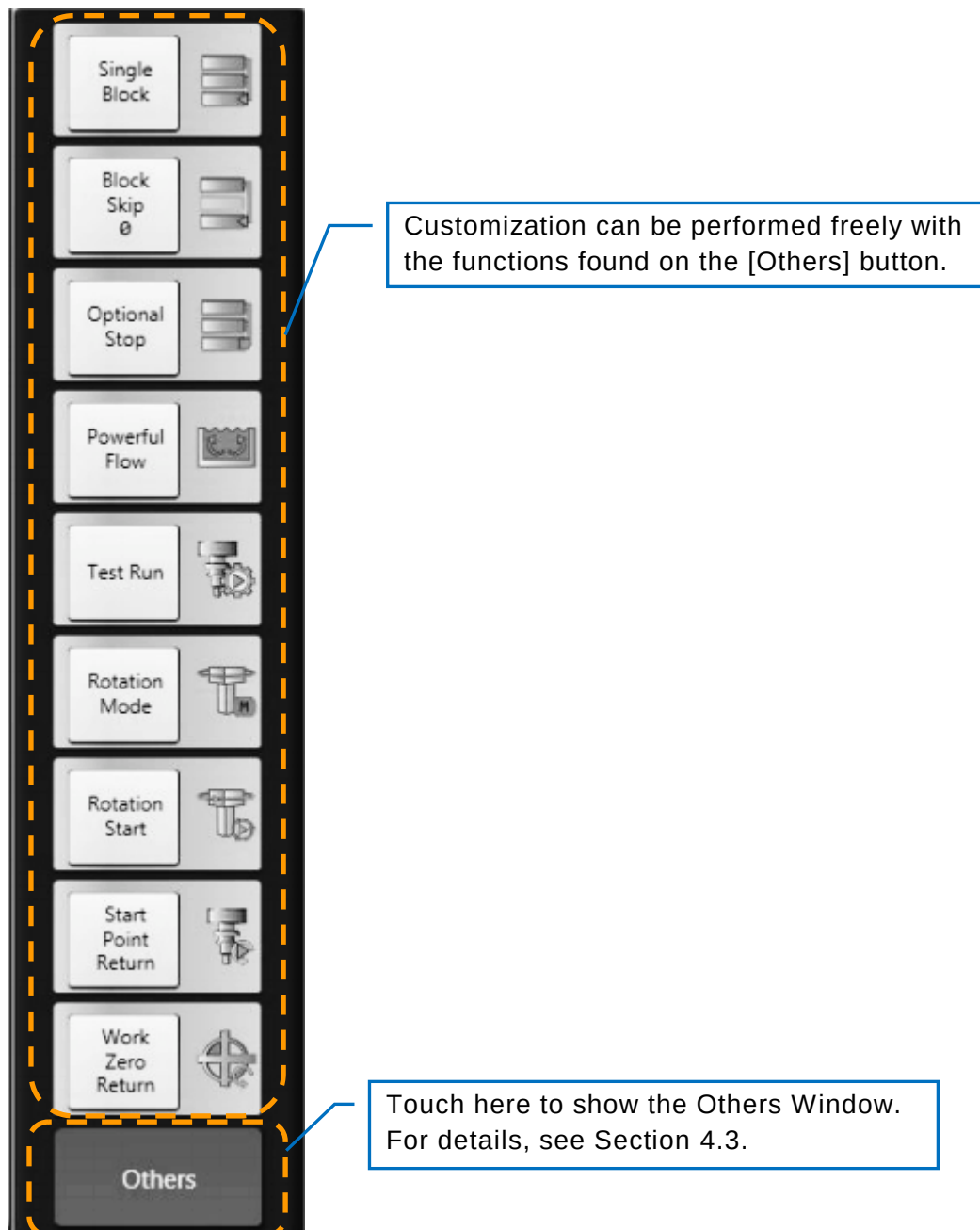


Figure 4-12 Quick Button View

4.3 Others

When the [Others] button in the quick operation menu is touched the machine operation, NC function in the [Others] window are displayed.

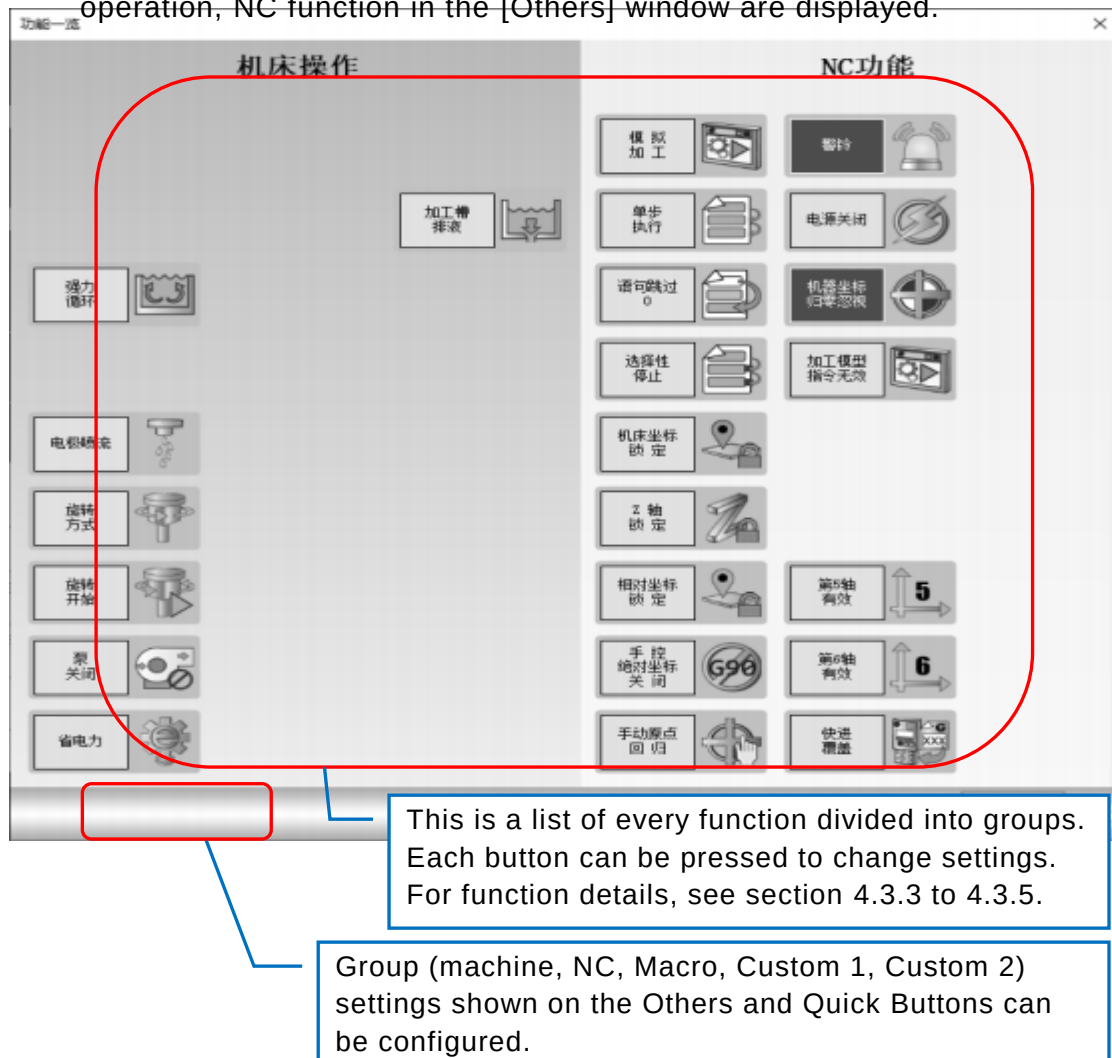
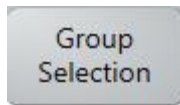


Figure 4-13 Others

4.3.1. Group Selection



Perform configuration of the panel shown in the others window.

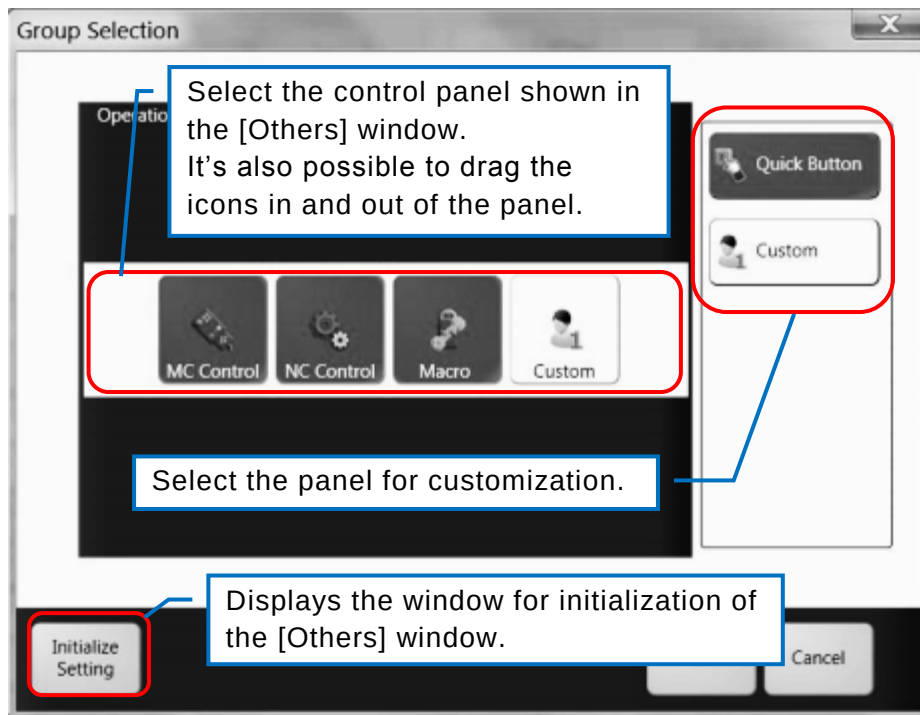


Figure 4-14 Group Selection

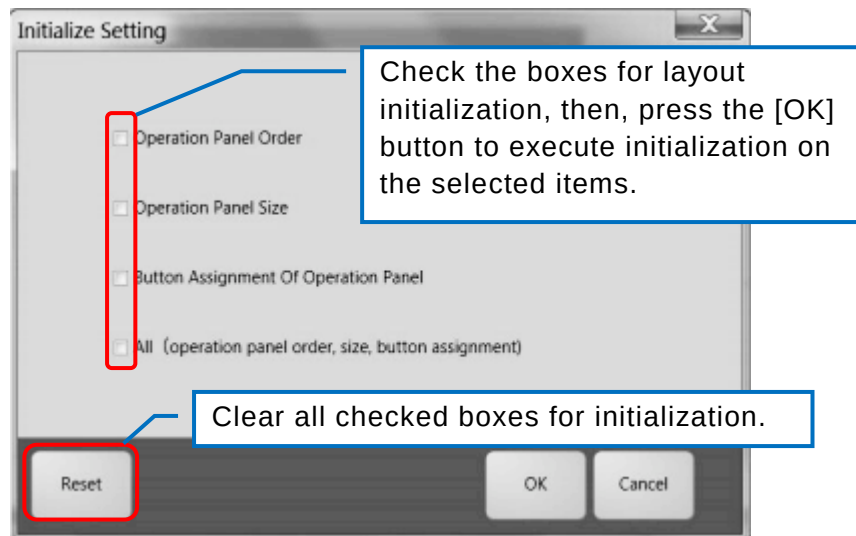
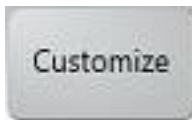


Figure 4-15 Initialize Setting

- (1) Operation Panel Order
Drag to restore the order of the group display that was changed.
- (2) Operation Panel Size
Restore the size of the Others window.
- (3) Button Assignment of Operation Panel
Reset assignment of Custom 1 and Custom 2 buttons.
- (4) All (operation panel order, size and button assignment)
Reset all items of the above, (1) ~ (3).

4.3.2. Customize



Settings of Quick Buttons, Custom 1 and Custom 2 can be changed.

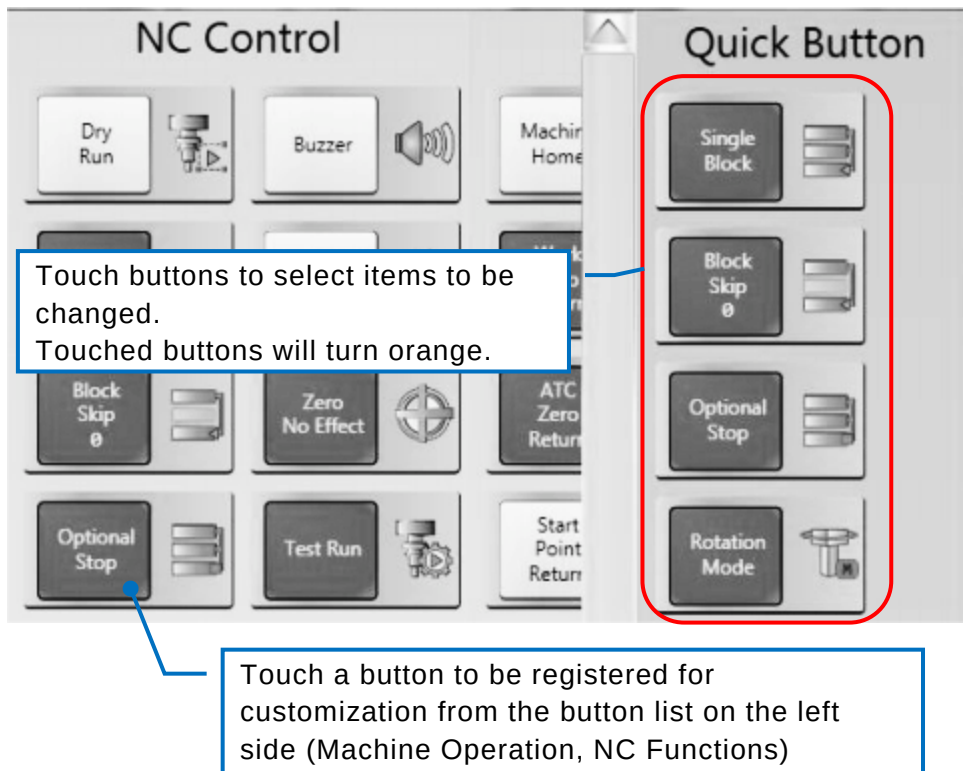


Figure 4-16 Customize

- (1) From the view on the right side, touch the buttons to be changed.
Button frames will turn orange to show they are selected.
- (2) To add a new button touch one from the list of buttons on the left side.
The button with an orange frame on the right-side view will be changed by the button selected from the left.

4.3.3. Machine Operation Buttons

First column



(Optional)

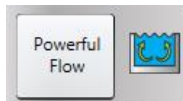
Specify the HQSF mode during the dielectric fluid circulation mode for the machine (S type) with HQSF function.



(Optional)

Specifies the μ SC Collect mode in the dielectric fluid circulation mode for the machine (S type) with HQSF function.

Use this mode when the μ SC has reached its life or when the concentration of μ SC become low.



(Optional)

Specify a strong dielectric fluid circulation in the work tank.



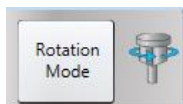
(Optional)

Turn on the blow / Suction of large flow rate.



(Optional)

Turn on the valve for flush from spindle for the machine with MA head.



(Optional)

Select the ROTATE mode. (Optional)

However, this is effective only if the rotate function is added.



(Optional)

Start the rotate.

However, this is effective only if the ROTATE mode is selected.



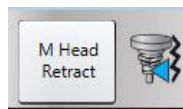
(Optional)

Turn off the pump of the dielectric fluid supply unit.

Use this at the filter change etc.

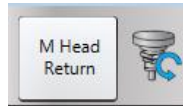


The power-saving feature is made effective.

Second column

(Machine: EDNC21)

Moves to the retract position to avoid interference of the two heads.



(Machine: EDNC21)

Return to the position (saved at the beginning of the operation) from the point of interference of the two heads.



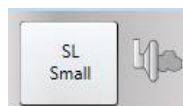
(Optional)

Specify large quantity of fluid for smokeless machining.



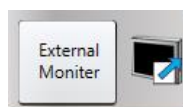
(Optional)

Specify medium quantity of fluid for smokeless machining.



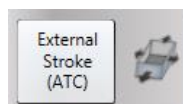
(Optional)

Specify small quantity of fluid for smokeless machining.



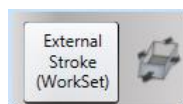
(Optional)

Effective when the position data is transmitted to the plasma display terminal or when the audio remote monitor unit is used.



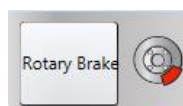
(Optional)

Become an enhancing stroke when ATC is installed.



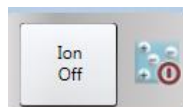
(Optional)

Become an enhancing stroke when work piece is detached.



(Optional)

Turn on/off the rotary axis brake.

Third column

(Machine: EDBV3/EDBV8/BX3)

This is turned on during ion exchange resin replacement operations.

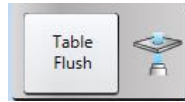


Turned on when drains fluid in the work tank.



(Optional)

Turn on when controls the tank flushing synchronizing with the jump of the machining.



(Machine: BX3)

Turned on when filling hollow work piece with dielectric fluid.

4.3.4. NC Function Buttons

First column



Used for program checks and verification of machine movements. (Movement speed of the axes is controlled by which axis feed speed's lamp that light up on the portable operation panel FPB2.)



After execution of one block, operation stops. Each time the [START] key is pressed, only the next one block is executed.



Switch Block (line) skip. (Levels 0, 1, 2, 3).

0: Block Skip OFF

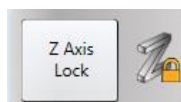
1 ~ 3: The information to the right of "/" of the specified block is ignored.



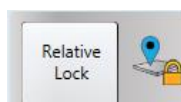
When a block which contains a M01 is executed, machine stops operation. The operation can be restarted by pressing the [START] key.



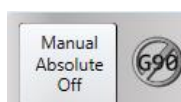
Used for program check etc. The machine (machine coordinate system) is locked. Other coordinate systems are not locked.



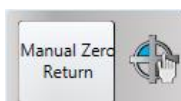
Z-axis movement (machine coordinates) is locked. Other coordinates of Z-axis may still move.



Relative coordinates remain stationary. However, other coordinate systems may still move.



When the function is selected, the absolute manual movement is not calculated or displayed.



Move the each axis to reference point by the JOG key of FPB2. The touch-sensitive is disabled in Manual Zero Return mode.

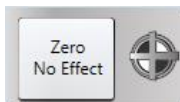
Second column

Select valid or invalid buzzer sound.

The buzzer sounds at the completion of the automatic operation, the alarm status etc. However the buzzer short sound at manual touch sensing cannot be set to "OFF" status.

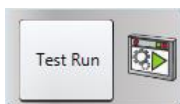


The power is turned OFF when automatic operation is ended with M02 or M30.



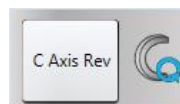
Neglect the zero return function.

This is effective for X, Y and Z axes only.



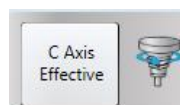
Skips the machining model blocks and performs the positioning only in the machining using the model plan.

This function is convenient for checking the positioning in a long program.



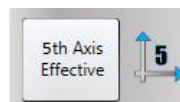
(Optional)

The setting unit of the C axis command is changed from the angle to the number of revolutions.



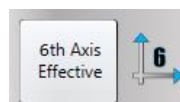
(Optional)

Set the C axis as valid or invalid.



(Optional)

Set the 5 axis as valid or invalid.



(Optional)

Set the 6 axis as valid or invalid.



The function for overriding the rapid feed rate (G00) of an axis during automatic operation is enabled.

The travel speed can be selected from the speed switch LOW, MIDDLE, HIGH, and RAPID positions on the portable operation panel (FPB).

Third column

(Optional)

E-mail transmission is enabled.



(Optional)

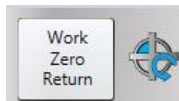
Remote mode is enabled.

4.3.5. Macro Function Buttons

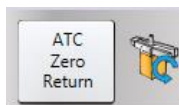
First column



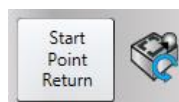
Move the each axis to machine origin.



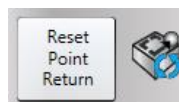
Move the each axis to machine origin.



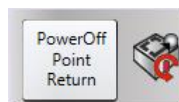
The head will move the machine axes to the ATC change position.



This will move the machine axes to the start location of the Memory Run operation.



This will move the machine axes to the reset location of the Memory Run operation.



This will move the machine axes to the power-off location of the Memory Run operation.



Allows for calling out a simple self-made program with buttons: User 1, User 2 and User 3.

|



Second column



Allows for calling out a simple self-made program with buttons: User 4, User 5, User 6, User 7, User8, User 9, and User 10.

|



4.3.6. User Macro button

For buttons of [User 1] – [User 10] of macro operation functions, user own functions can be assigned. The programs which are often used such as positioning and measurements to original point of reference are registered, which are used to carry out quickly with one button operation.

Arbitrary name can be displayed for each button.

For 6 buttons out of 10 buttons ([User 1] – [User 6]), they are also shown at the macro operation panel of Run screen.

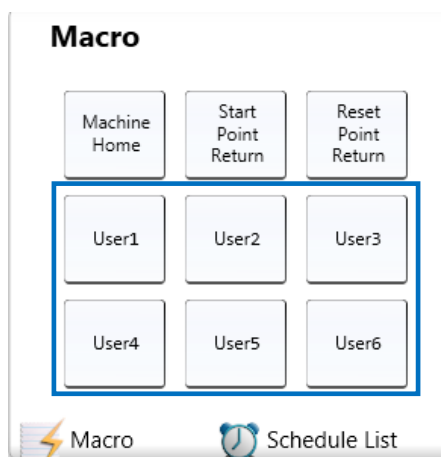


Figure 4-17 Macro function button

(1) Assignment of functions

In the [Maintenance] – [Parameter] page, set the program O numbers you want to call up to the parameters No.120 to No.129.

[User 1] button: The O number set to parameter No.120

[User 2] button: The O number set to parameter No.121

:

[User 10] button: The O number set to parameter No.129

(2)How to change button names

User macro button's name can change by following procedure.

Open "Notepad" on the PC and define the button number and the character string which to be registered.

Mark off between the button numbers and the character string using ":"(colon).

Insert "\n" to line feed.

Define one button name in one line.

Ex)

1:START¥\nPOS1

2:START¥\nPOS2

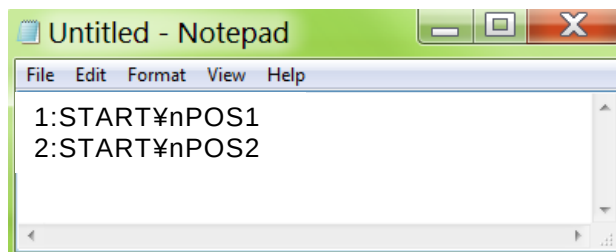


Figure 4-18 Create the file

Save file in "Text Document (.txt)" form and choose "Unicode" as the character code.

Ex: Use the Text editor.

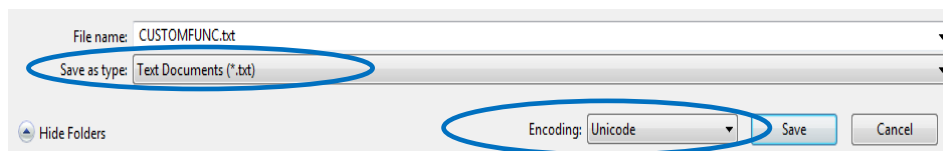


Figure 4-19 Save Text

Copy the file to USB memory.

Insert the USB memory with the copied define file into the machine.

Press the [Customize] button in the [Others] dialog.

Press the [Custom User Macro] button.

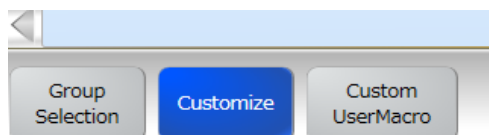


Figure 4-20 Customize

Press the [Import] button.

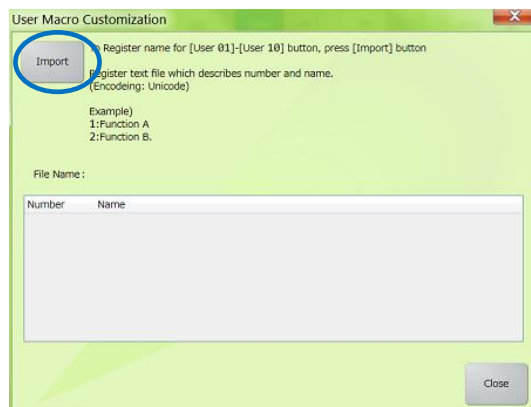


Figure 4-21 Entry the file

Select the define file in the USB and press [Start] button.

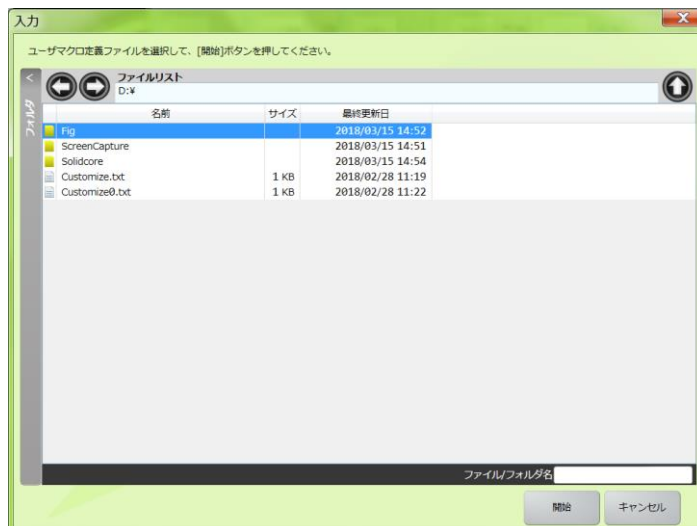


Figure 4-22 Selection file

Definition is displayed. Registration is complete.

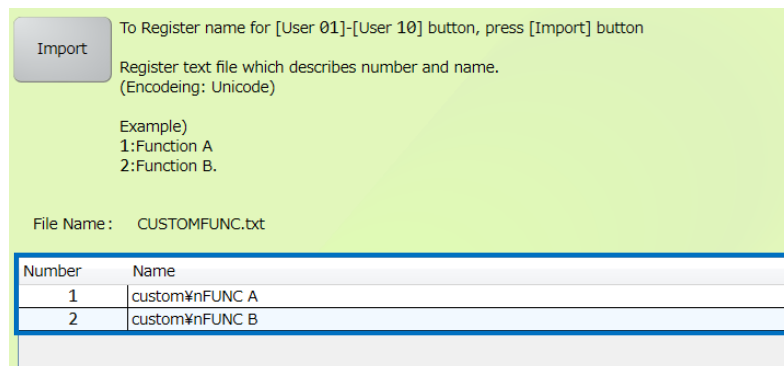


Figure 4-23 list of entry button name

5. Preparation

The preparation screen is for checking the machine status before operating, and for performing preparatory tasks.

The measurement information screen is for setting set-up parameter and checking work.

I will do the registration and verification work of the parameters required to set-up in the measurement information screen.

5.1 Measure Info.

In measure info., the ball diameter, reference position and rotation compensation to be used are checked and setting.

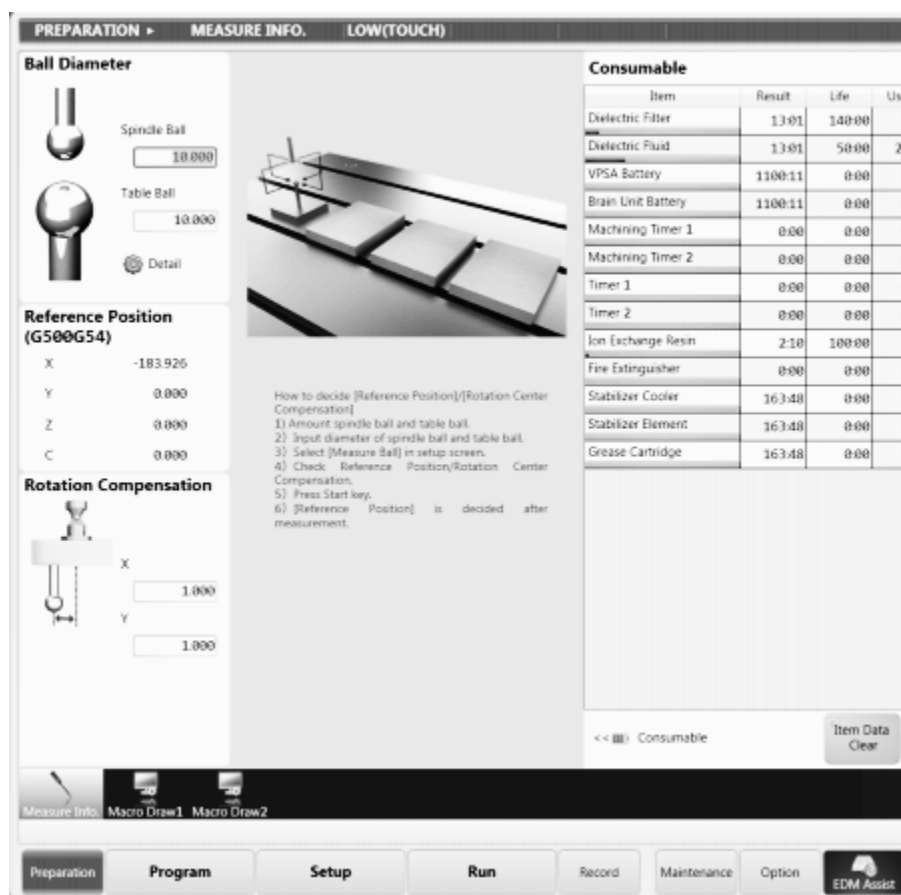


Figure 5-1 Preparation (Measurer Info.) screen

5.1.1 Ball Diameter

In ball diameter set and check the spindle ball and table ball.

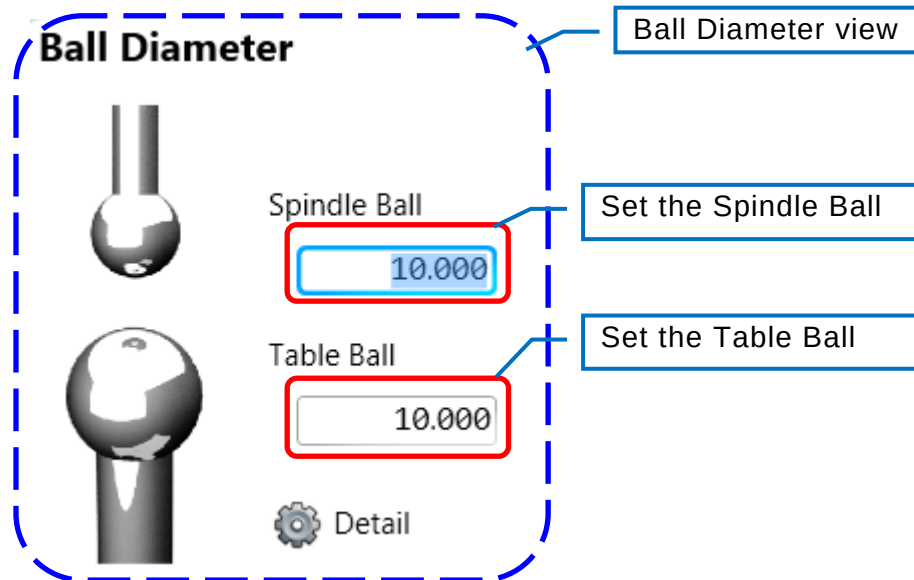


Figure 5-2 Ball Diameter

Touch the replacement [Detail information] icon to open the detail parameter view.

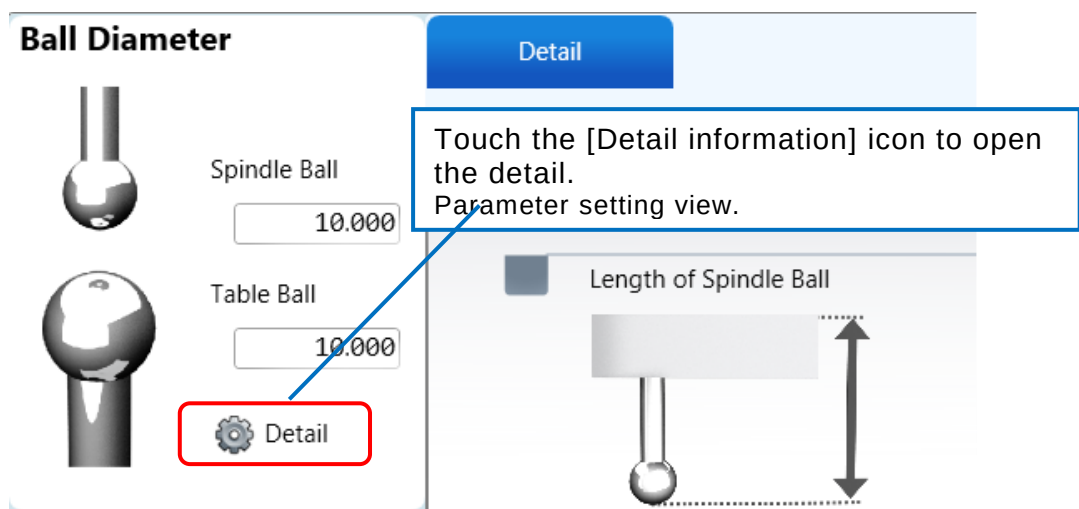
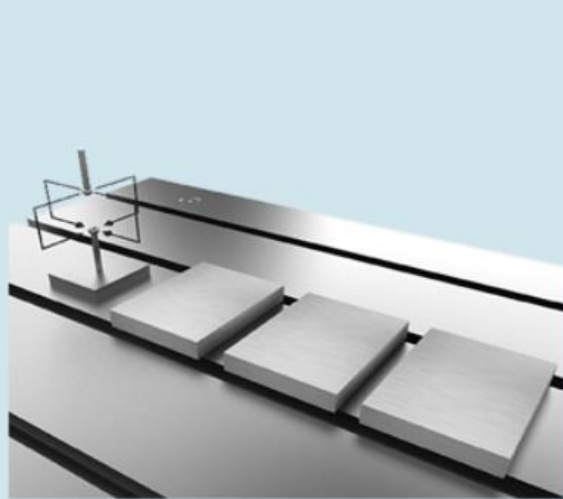


Figure 5-3 Ball Diameter ([Detail information] icon)

Advanced Options view displays how to take of the reference position / rotation center correction amount in the initial state.



How to decide [Reference Position]/[Rotation Center Compensation]

- 1) Amount spindle ball and table ball.
- 2) Input diameter of spindle ball and table ball.
- 3) Select [Measure Ball] in setup screen.
- 4) Check Reference Position/Rotation Center Compensation,
- 5) Press Start key.
- 6) [Reference Position] is decided after measurement.

Figure 5-4 Detail Option View

When you press the detail information icon , open the detailed information tab , set the setup parameters other than the information basic information .

The screenshot shows a software window titled 'Detail' with a close button (X) in the top right corner. Below the title bar is a section labeled 'Set Detail Information.' containing six parameter settings, each with a diagram and a text input field. Blue callout boxes with arrows point to each input field, providing instructions.

Parameter	Diagram Description	Value	Instruction
Length of Spindle Ball	Diagram of a spindle ball with a vertical double-headed arrow indicating its length.	0.000	Set the length of spindle ball.
Height Find Approach Distance	Diagram of a spindle ball approaching a surface from above, with a red arrow indicating the approach distance.	300.000	Set the height find approach distance.
Edge Find Approach Distance	Diagram of a spindle ball approaching a vertical edge from the side, with a red arrow indicating the approach distance.	5.000	Set the edge find approach distance.
Retract Distance	Diagram of a spindle ball retracting from a surface, with a blue arrow indicating the retract distance.	5.000	Set the retract distance after measure.
Measure Times	Diagram of a spindle ball in contact with a surface.	5	Set the measure times.
Measure Tolerance Error	Diagram of a spindle ball in contact with a surface.	0.002	Set the measure tolerance error

Figure 5-5 Detail Information Tab

5.1.2 Reference Position

Check reference position.

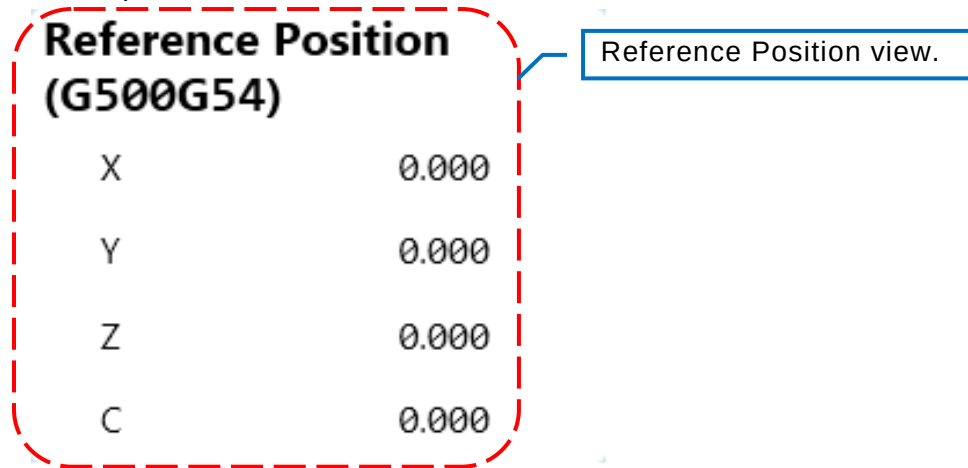


Figure 5-6 Reference Position

5.1.3 Rotation Compensation

Check and set the rotation compensation (X, Y) with the Rotation Compensation View.

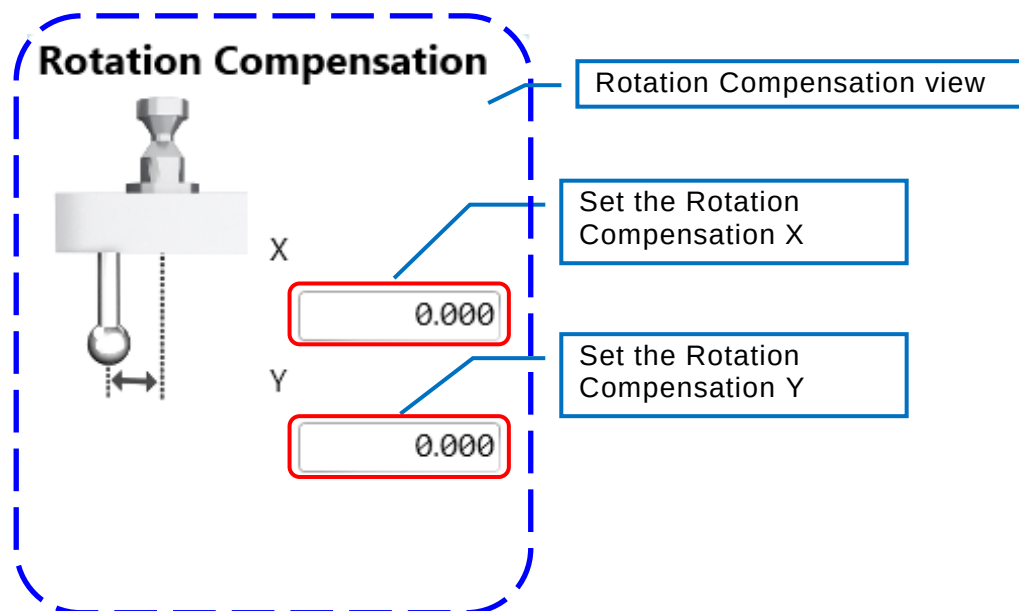


Figure 5-7 Rotation Compensation

5.1.4 Consumable

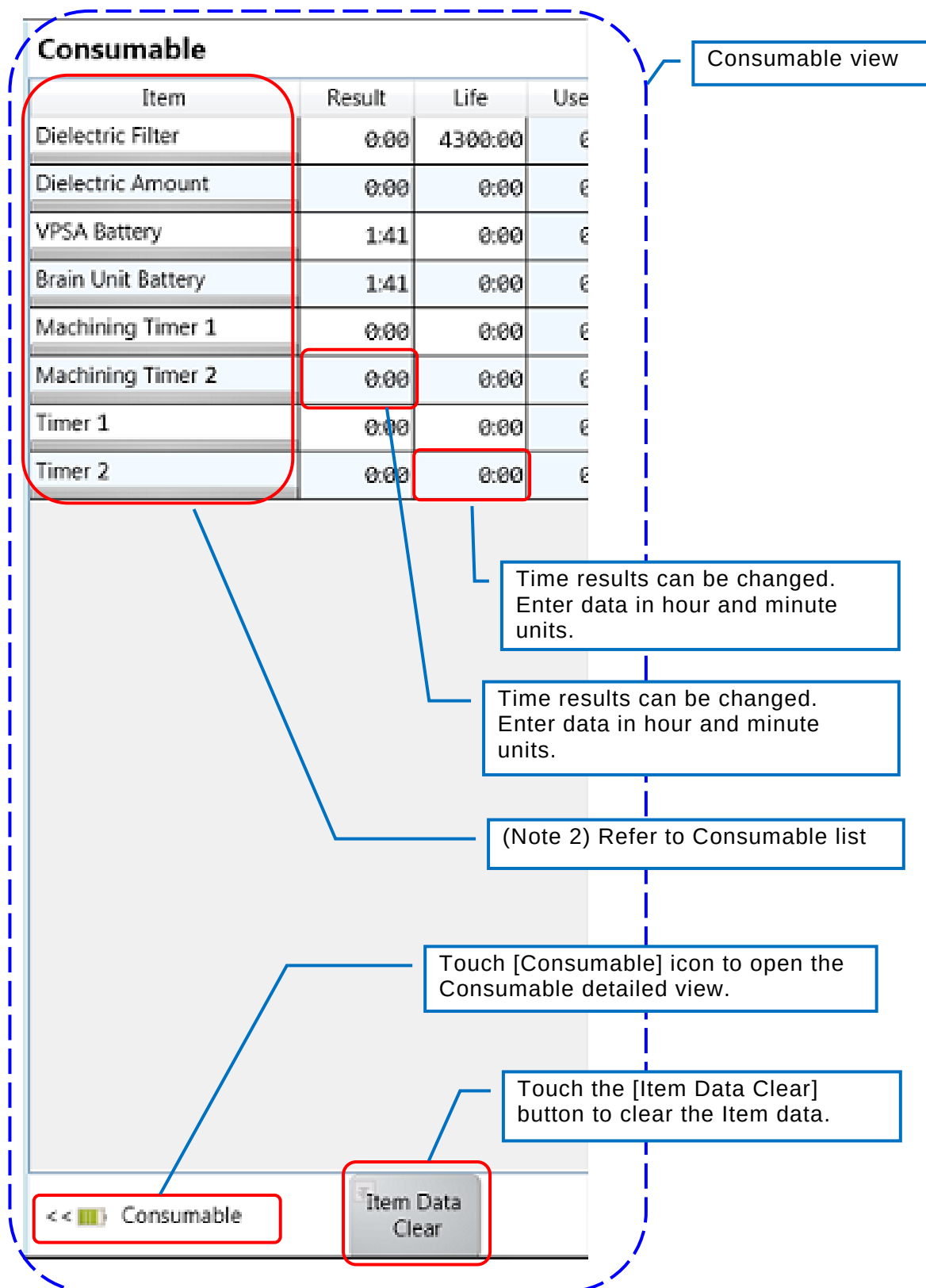


Figure 5-8 Consumable

Table 5-1 Example List of Consumables

Fluid Filter	Usage status of fluid filter for filtering machining sludge
Fluid Level	Usage status of water level in machine
VP SA Battery	Usage status of VP SA Battery
Brain part battery	Usage status of Brain part battery
Machining Timer 1	Total time machining has been ON (Can be setup independently by customer)
Machining Timer 2	Total time machining has been ON (Can be setup independently by customer)
Timer 1	Total time power has been ON (Can be setup independently by customer)
Timer 2	Total time power has been ON (Can be setup independently by customer)
Ion-exchange resin	Usage status of Ion-exchange resin
Fire extinguisher	Usage status of Fire extinguisher
Oil for stabilizer	Usage status of Oil for stabilizer
Element for stabilizer	Usage status of Element for stabilizer
Grease cartridge	Usage status of axis ball screw lubricant

- (1) On the consumables detail view, set the requirements for Result time, Life time and Last replacement date.
Press the [Estimate] button to estimate the Next replacement of consumables.

Consumable

Item	Result	Life	Use	Last	Next	Time	Estimate
Dielectric Filter	0:00	0:00	0%	04/21/2015	04/21/2016	13:21 PM	Off
Dielectric Amount	0:00	0:00	0%	04/21/2015	04/21/2020	13:21 PM	Off
VPSA Battery	1:48	0:00	0%	04/21/2015	04/21/2018	13:21 PM	Off
Brain Unit Battery	1:48	0:00	0%	04/21/2015	04/21/2018	13:21 PM	Off
Machining Timer 1	0:00	0:00	0%	04/21/2015			Off
Machining Timer 2	0:00	0:00	0%	04/21/2015			Off
Timer 1	0:00	0:00	0%	04/21/2015			Off
Timer 2	0:00	0:00	0%	04/21/2015			Off

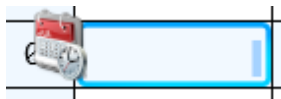
<<  Consumable

Item Data
Clear

Figure 5-9 Consumables (All Item Displayed)

(2) Calendar entry for [Last] and [Next].

Switch to entry mode for [Last] or [Next] columns to display the [Calendar Icon]



Touch the [Calendar Icon] to display the [Setting] dialog, where dates and times can easily be entered.

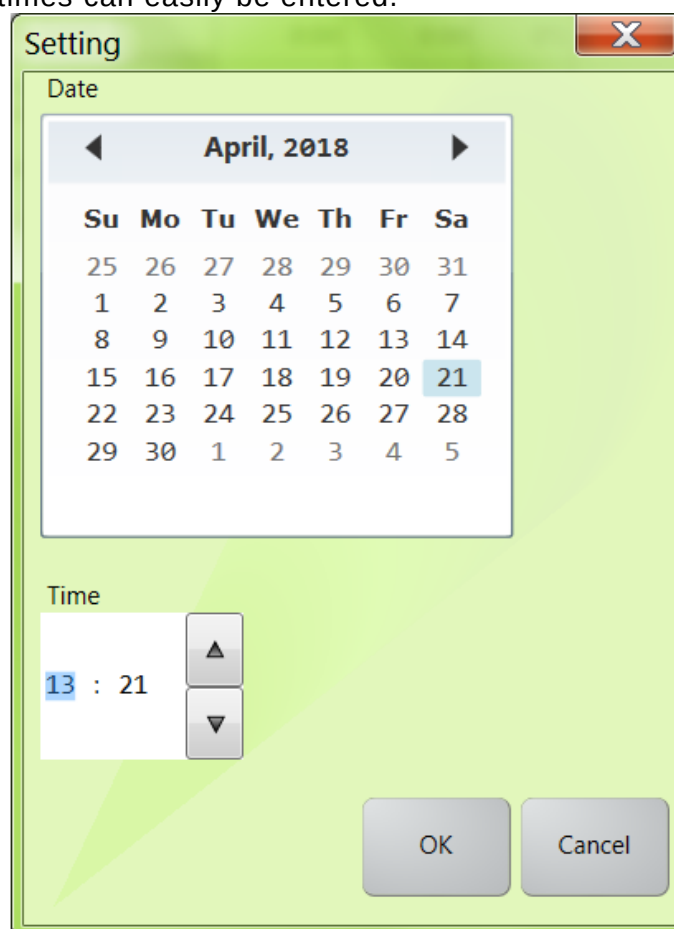


Figure 5-10 Calendar

(3) Making an Estimate

Set replacement day for the Result, Life and Last times.

Then, pressing the [Estimate] button to turn it ON will show the date and time of the next replacement in columns [Next] and [Time].

Please treat it as just a rough indicator.

Dielectric Filter	0:00	4300:00	0%	04/21/2015	10/17/2015	17:18 PM	On	
Dielectric Amount	0:00	0:00	0%	04/21/2015	04/21/2016	13:21 PM	Off	

5.2 Electrode Management

[Machine Type: BX3]

Set the diameter and length of each electrode in the [Electrode] tab.

Set the diameter and length of each guide in the [Guide Data] tab.

Pot No.	Spindle	Diameter	Length	Matter
1		0.0000	0.0000	
2		0.3000	400.0000	
3		0.0000	----	WORKPIECE SURFACE CANNOT BE DETECTED BEFC
4	✓	0.4000	301.0000	
5		0.4000	321.0000	
6		0.4000	120.1000	
7		0.3000	700.0000	
8		0.0000	0.0000	
9		0.0000	0.0000	
10		0.0000	0.0000	
11		0.0000	0.0000	
12		0.0000	0.0000	
13		0.0000	0.0000	
14		0.0000	0.0000	
15		0.0000	0.0000	
16		0.0000	0.0000	
17		0.0000	0.0000	
18		0.0000	0.0000	
19		0.0000	0.0000	
20		0.0000	0.0000	
21		0.0000	0.0000	
22		0.0000	0.0000	
23		0.0000	0.0000	
24		0.0000	0.0000	

Electrode data to be stored in the ATC magazine.

Guide No.	Current Guide	Guide Diameter	Guide Length	Measure
1		0.0000	0.0000	☐ Not Yet
2		0.0000	0.0000	☐ Not Yet
3		0.0000	0.0000	☐ Not Yet
4		0.0000	21.0000	☐ Not Yet
5		0.0000	0.0000	☐ Not Yet
6		0.1000	45.0000	☐ Not Yet
7	✓	0.9000	21.0000	☐ Not Yet
8		0.0000	0.0000	☐ Not Yet

Electrode guide data to be stored in the guide magazine

Figure 5-11 BX3 Electrode Guide Management

5.2.1 Ball Diameter

Based Guide No.: Enter the guide number to be used for centering operation.

Standard Ball Diameter: Enter the diameter of the centering sphere.

For details, refer the instruction manual “BX3 Machining”.

5.2.2 Water Conductivity

Set the conductivity of dielectric fluid. Generally, enter 15[uS/cm].

5.2.3 Machining settings

Flushing check time [sec]: Enter the time when to turn on the electrode jet function after ATC change operation.

Cutting Depth: Enter the effective cutting depth when G109 item P [TOP SHAPE MACHINING] is specified.

B.T.D TIME: Enter the time to calculate “B.T.D PEAK”.

If zero (0) is entered, "B.T.D Peak" is calculated with machining up to a half distance of "G109A: Machining Depth."

DATA OUTPUT O No.: If the skip function works during machining, data is output to the entered O number.

For details, refer the instruction manual “BX3 Machining”.

5.2.4 Electrode data

For each pot number, enter the electrode data to be stored in the ATC magazine.

Pot No.: Indicates the electrode pot number.

Spindle: When a checkmark is put, this item indicates that the electrode of the pot number is at the spindle.

Diameter: Enter the electrode diameter.

Length: Enter the measured electrode length.

When an electrode has been used for machining, the length is automatically updated to the electrode length measured during the machining.

Matter: Indicates the reason why the machining was terminated.

For details, refer the instruction manual “BX3 Machining”.

5.2.5 Guide Data

For each guide number, enter the electrode guide data to be stored in the guide magazine.

Guide No.: Indicates the guide number.

Current Guide: If a checkmark is put, this item indicates that the guide of the number is now on the spindle side.

Guide Diameter: Enter the guide diameter. Specify the value identical to the diameter of guide to be used.

Guide Length: Enter the measured guide length.

Measure: Display/input field for the situation of alignment measurement performed with G109N100.

[Guide Offset]: Displays the Guide Offset dialog.

For details, refer the instruction manual “BX3 Machining”.

5.3 Macro Draw 1 & Macro Draw 2

Loads the programs assigned to the keys.

On the Macro Drawing Screen, special use is made of optional drawing macros, adjustment functions, etc.

Normally nothing is displayed.

Two macro drawing programs, Macro Draw 1 and Macro Draw 2, can be displayed on the screen.

Each key performs the action registered with the macro drawing program.

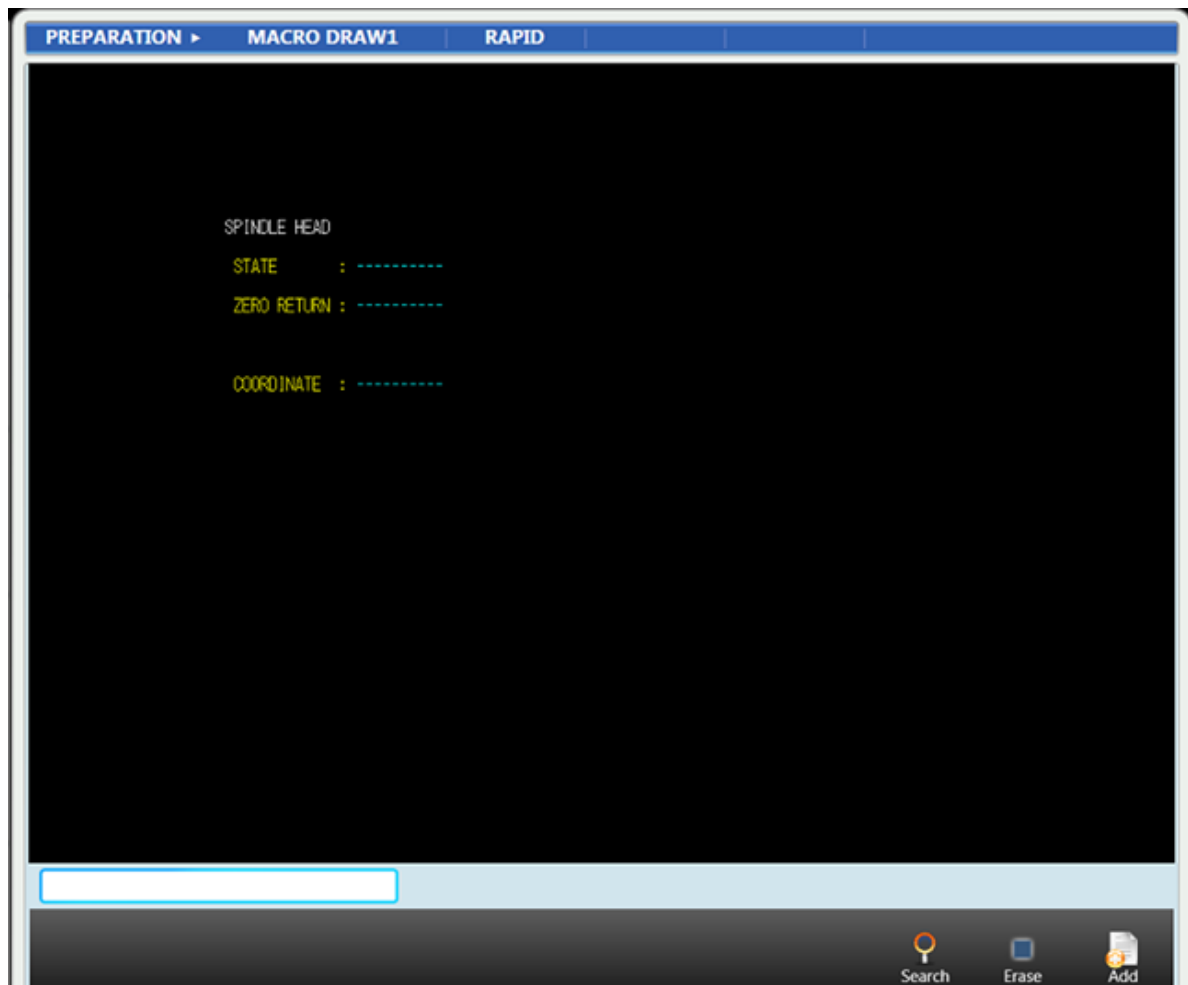


Figure 5-12 Macro draw 1, 2

6. Program

6.1 Project

A project refers to a collection of machining programs for each electrode shape. Project screen makes it easy to create machining programs. Even during operation time you can easily make program for next machining. By using the project, beginner can create machining programs and carry out the operation quickly and reliably.

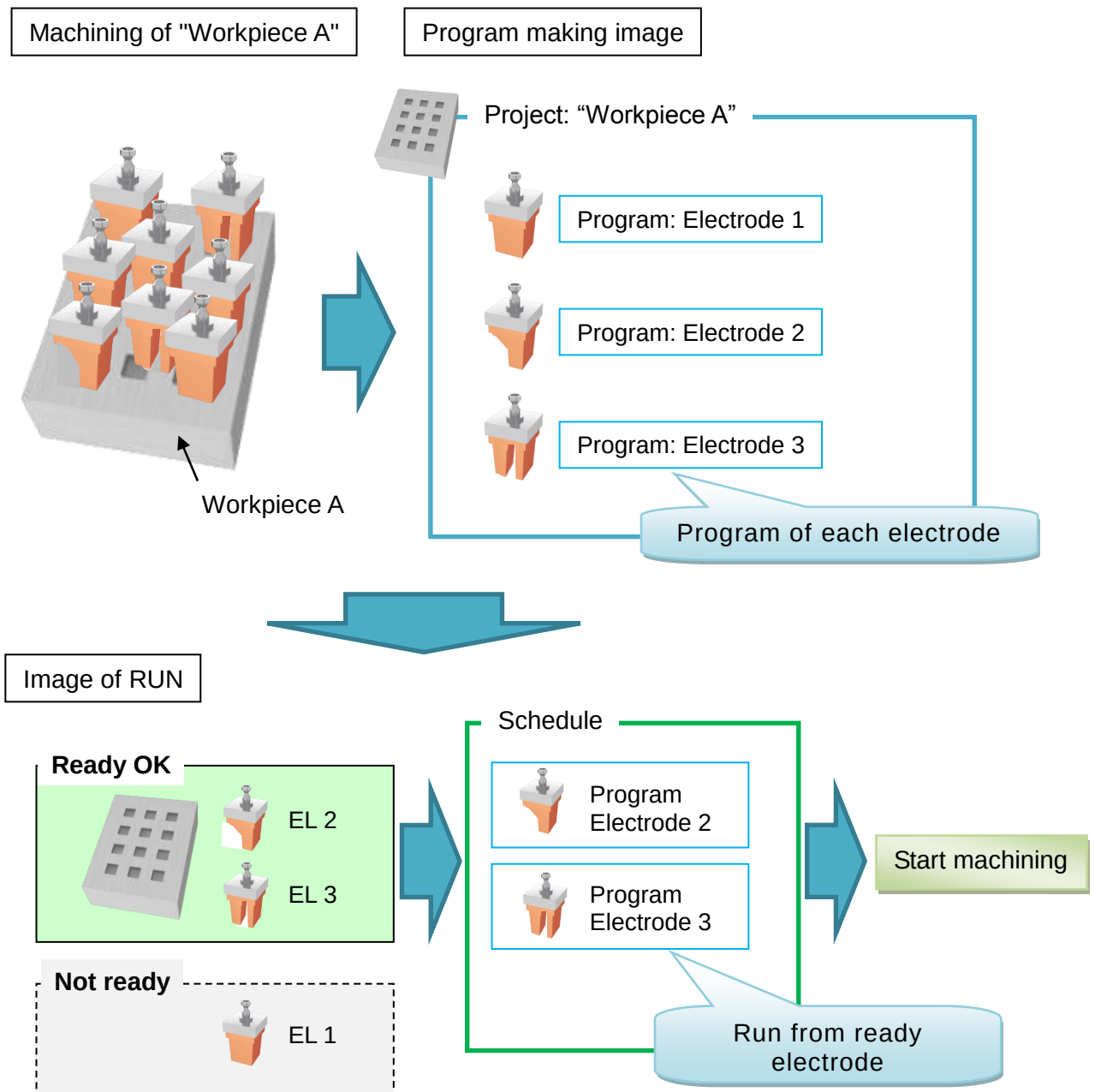


Figure 6-1 Image of project use

6.1.1 [New], [Open] and [Import EPX]

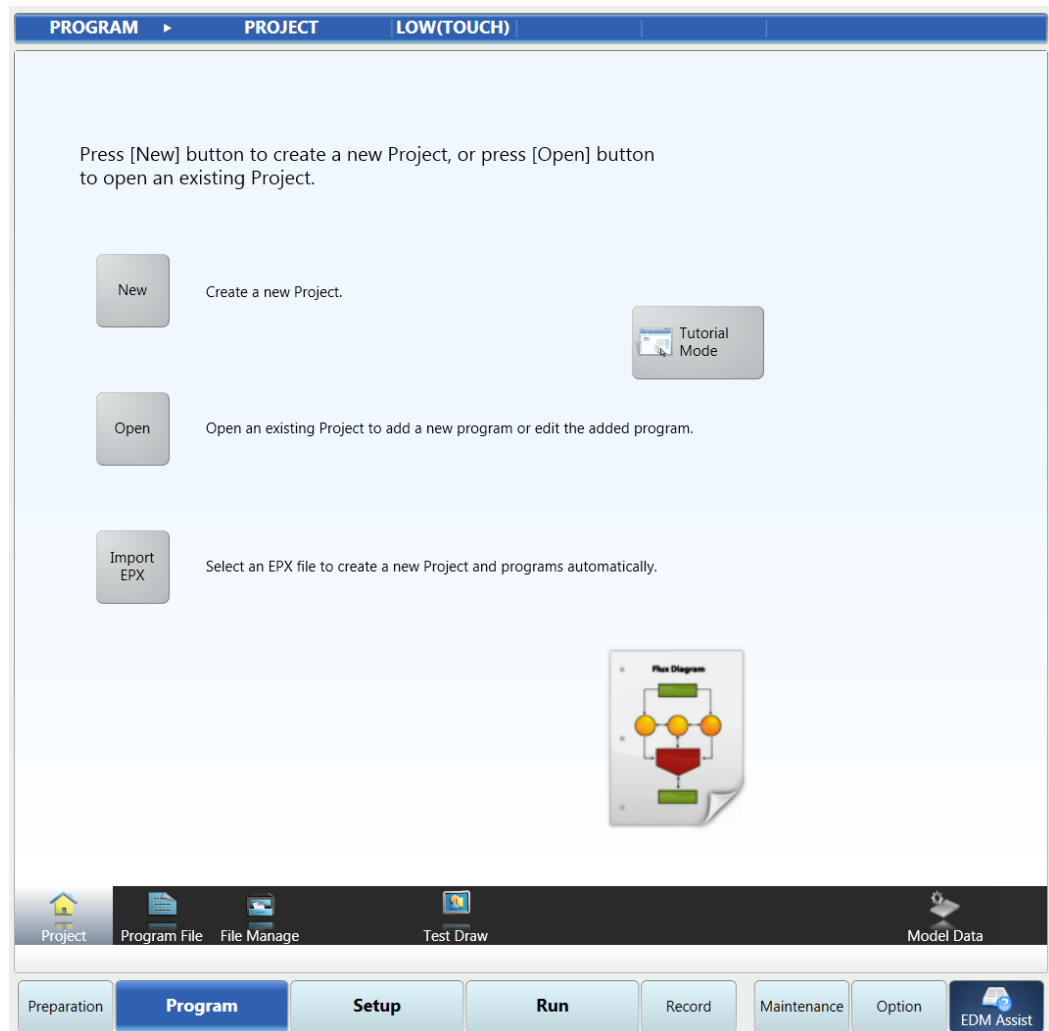
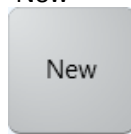


Figure 6-2 Project start screen

Press [New], [Open] or [Import EPX] button to start creating a project file.

(1) New



Newly create a project.
Press New button, an input window will be displayed.
Please enter the project name.

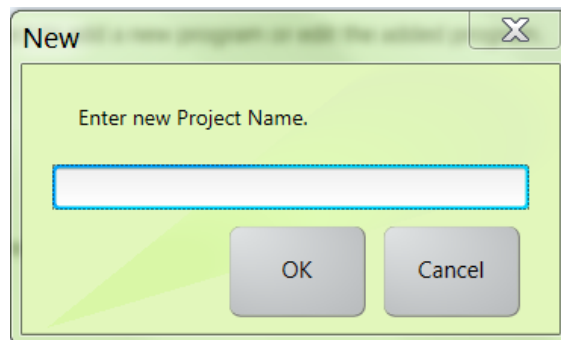
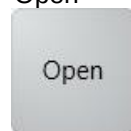


Figure 6-3 Entering a Name for the New Project

A project name is a group of machining programs used in one time setup.

(2) Open



Edit a project which has already been registered.
You can switch to another project by touching the project name from the drop-down list at the top of the screen.

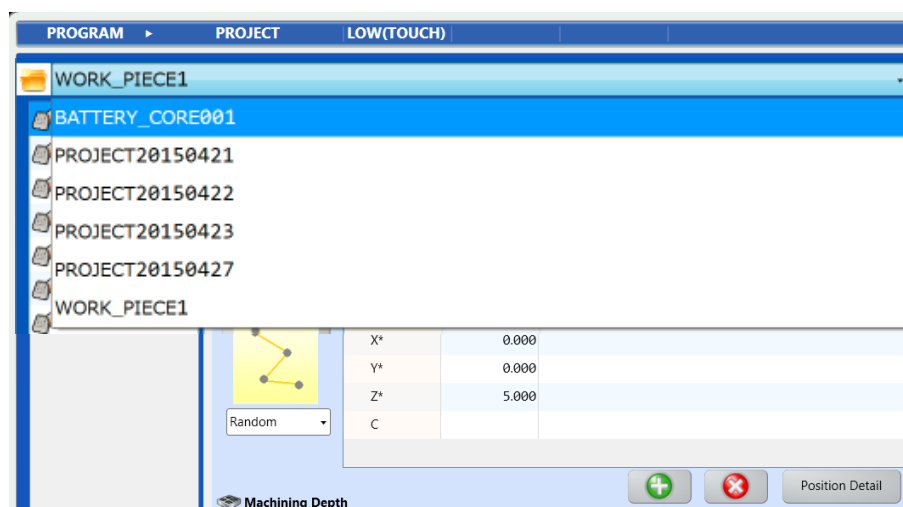


Figure 6-4 Switching to other projects

(3) Import EPX (Electrode Position eXchange format)



Newly creates a project from an **EPX** data (a format which connects the 3D CAD/CAM with the SINKER Electrical Discharge Machine).

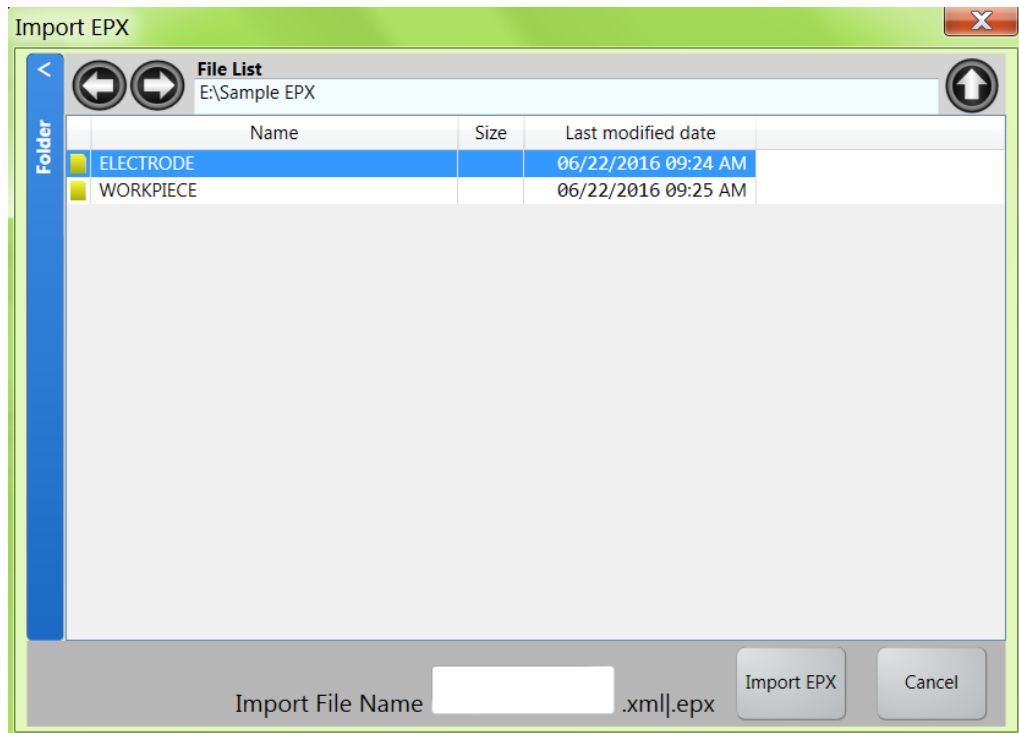


Figure 6-5 Import of the EPX data

(4) Support for Tutorial mode

In the Project screen, the [Tutorial Mode] button will activate a Tutorial mode that highlights only the sections that are operational in the panel.

A user guide will also appear to explain the usage of these operational sections.

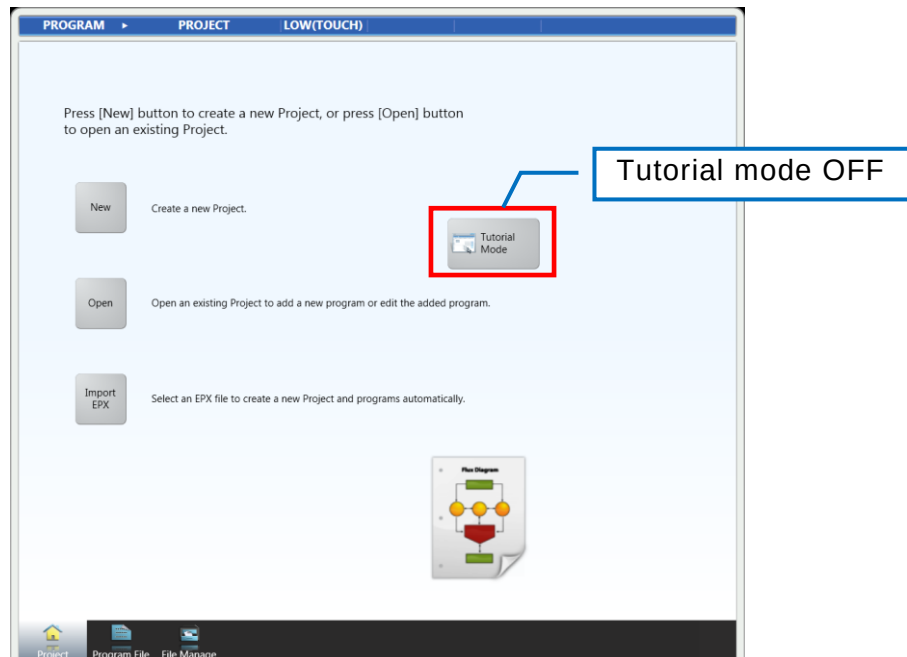


Figure 6-6 Project

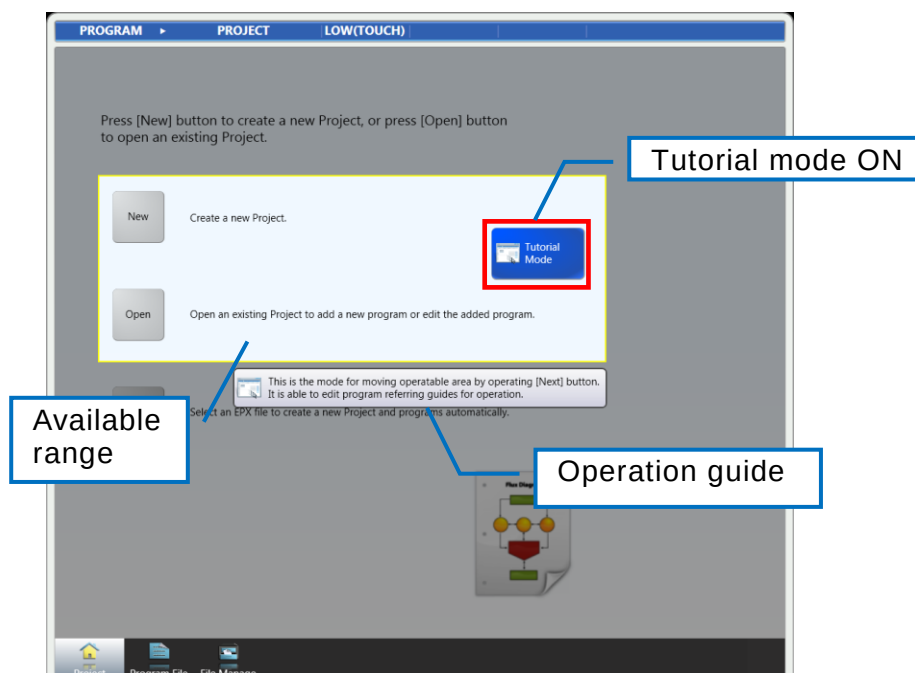


Figure 6-7 Tutorial mode ON

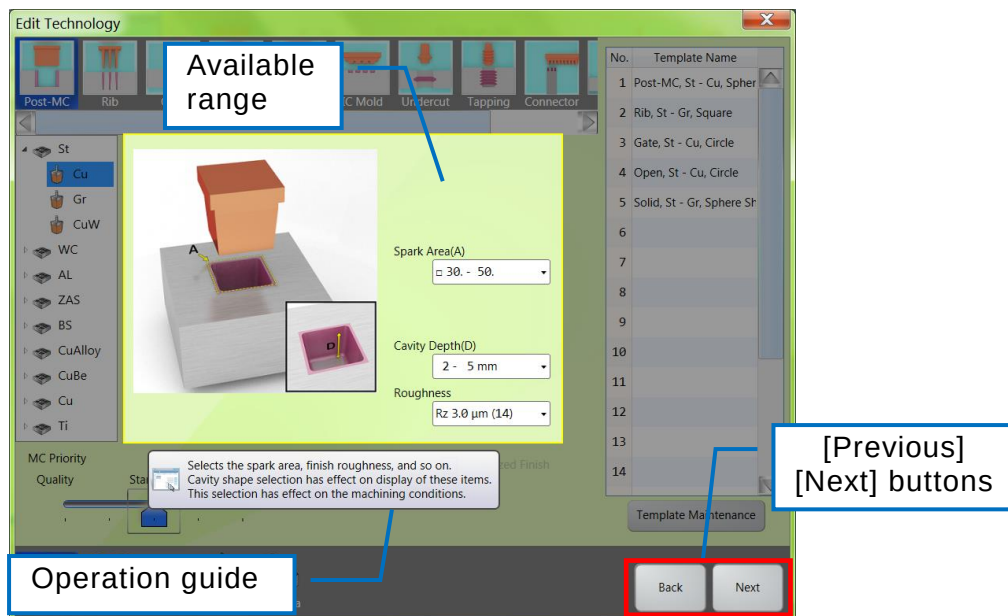


Figure 6-8 Tutorial – Conditions

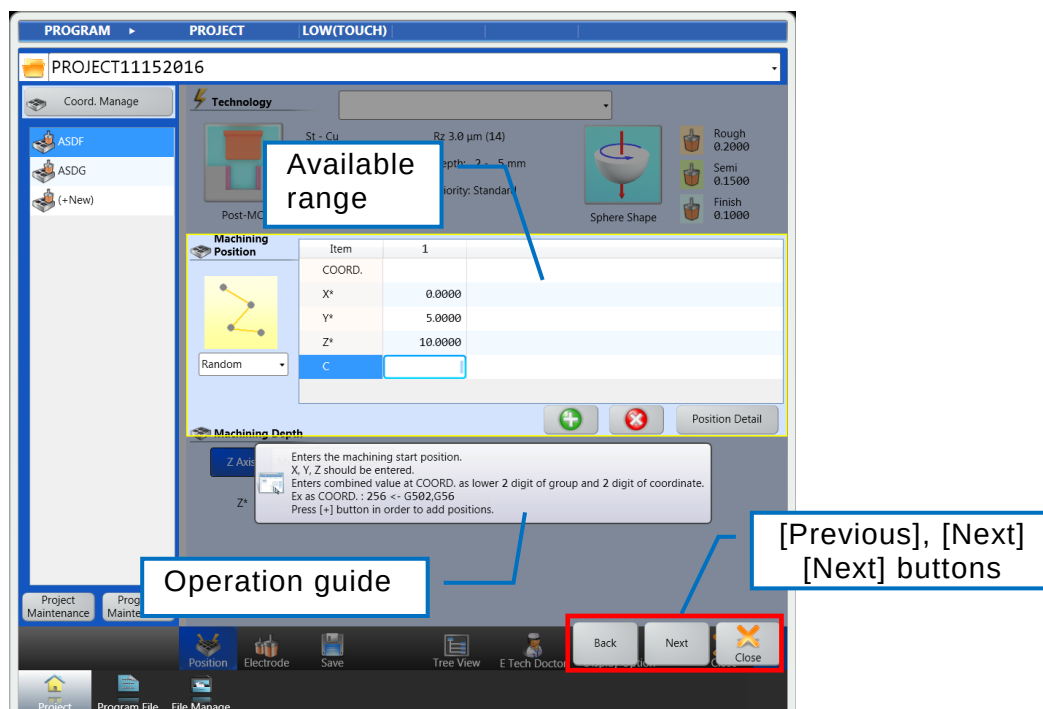


Figure 6-9 Tutorial – Position

6.1.2 Project, Program

In the Project screen, project names are displayed in the top section of the screen, and the programs contained in the project are listed on the left side of the screen.

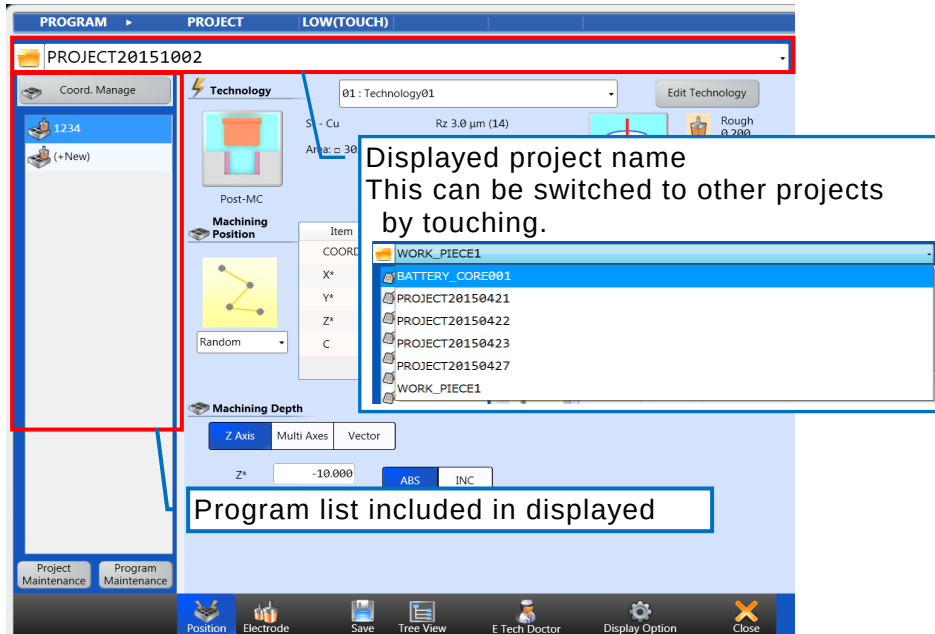


Figure 6-10 Project and Program

Content of selected program is displayed at the center of the screen. The program contents selected from the list is displayed at the right side of the screen.

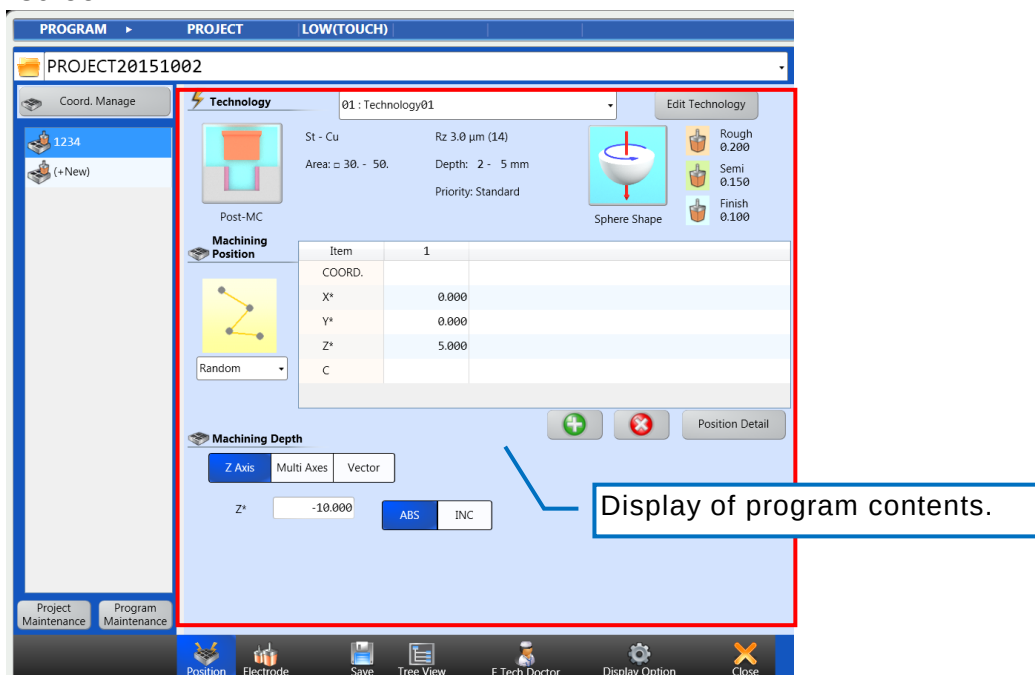


Figure 6-11 Content of program

6.1.3 New addition of program

A new program can be added to the displayed project by touching [+NEW] at the rear of the program list.

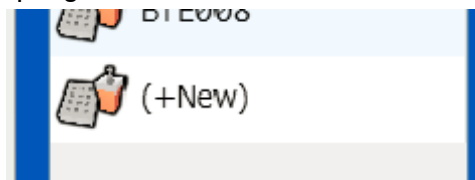


Figure 6-12 New addition of program

6.1.3.1 Operation of Project

Touching the [Project Maintenance] button displays the project operation buttons. Also, touching the [Program Maintenance] button displays the program operation buttons.

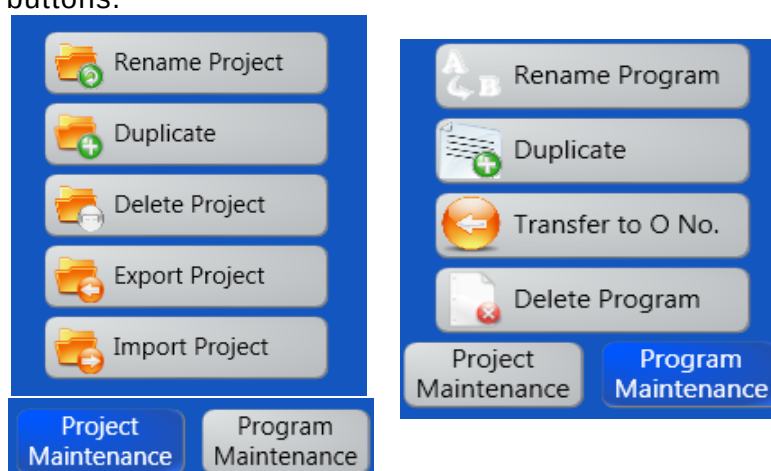


Table 6-1 Buttons of project operation

Item name	Explanation
Rename Project	Rename the displayed project.
Duplicate	Make a copy of selected program.
Delete Project	Delete the displayed project. (All program included in the project is deleted.)
Export Project	Output the project data.
Import Project	Input the project data.

Table 6-2 Buttons of program operation

Item name	Explanation
Rename Program	Rename the selected program name.
Duplicate	Make a copy of selected program.
Transfer to O No.	The copy of the selected program is saved in O number.
Delete Program	Delete the selected program.

[Note] Be sure to save the program and project before using the functions in project operation.

6.1.4 Functions for each buttons on the Project Screen



Figure 6-13 Project Screen Buttons

(1) Position



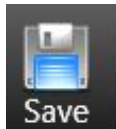
Open machining position screen.

(2) Electrode



Open electrode screen.

(3) Save



Save data for the machining position and the electrode.

(4) Tree view



Display the machining information of the saved data.

(5) E Tech Doctor



Display the E Tech Doctor.

(6) Display Option



Set the surface roughness and conducts initial settings for the templates.

(7) Close



Close the project.

6.1.5 Position



You can edit technology, machining position, and machining depth.

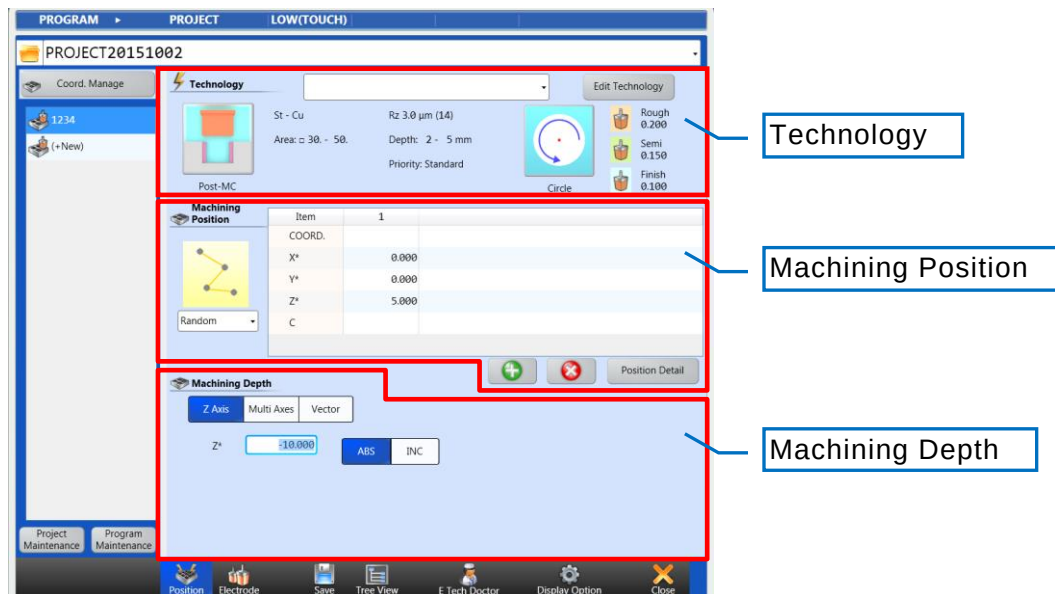


Figure 6-14 Position Screen

In the Machining Position screen, start entering from the top of the screen. Various types of editing can be performed if needed.

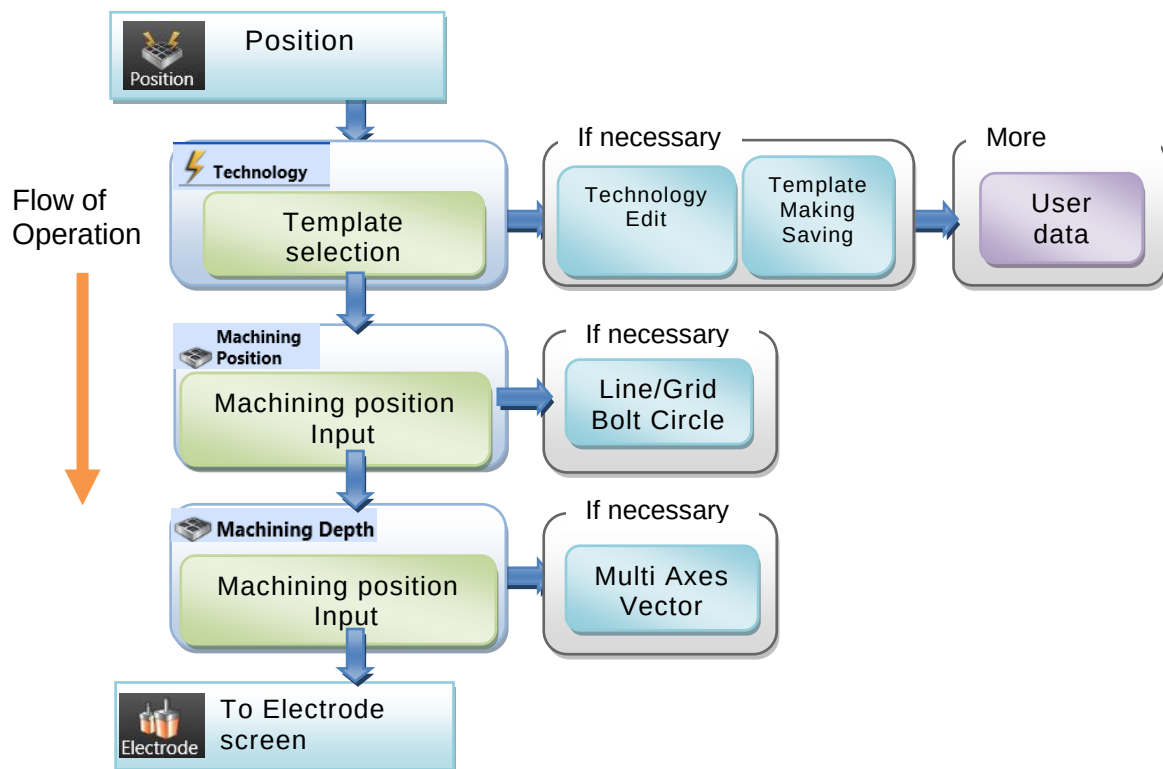


Figure 6-15 Flow of operation of Position screen

6.1.5.1 Technology

Details about current technology are displayed in the Technology area.

The technology contains the following contents:

- Machining condition (Material, Spark area, Finish surface roughness)
- Machining priority (Five stages of Quality from Speed)
- Machining methods (Orbiting functions)
- Electrode information (Electrode reduction (Designed value), Type of Machining (Rough, Semi, Finish)) etc.

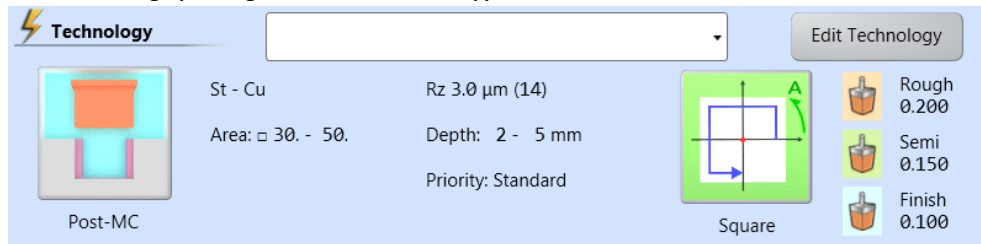


Figure 6-16 Technology

The content of the Technology area can be replaced completely using a template.

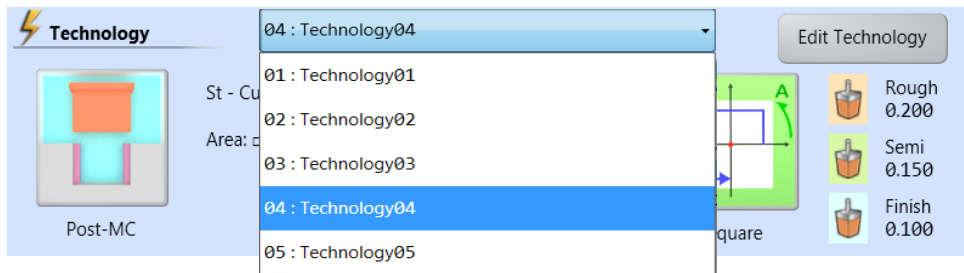


Figure 6-17 Template selection

To edit the detailed content of a template, press the [Edit Technology] button. For more information, see "6.1.10 Edit Technology".

The template used for creating a new template can be specified beforehand in [Display Option].

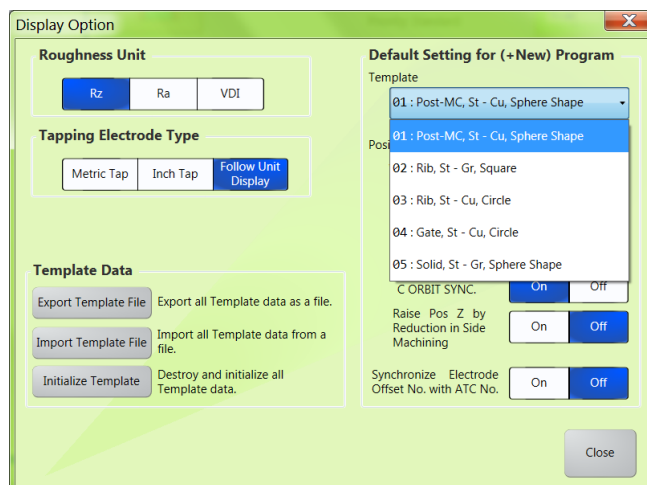


Figure 6-18 New Template selection

6.1.5.2 Machining Position

The method of positioning and machining position coordinates, etc. are displayed.

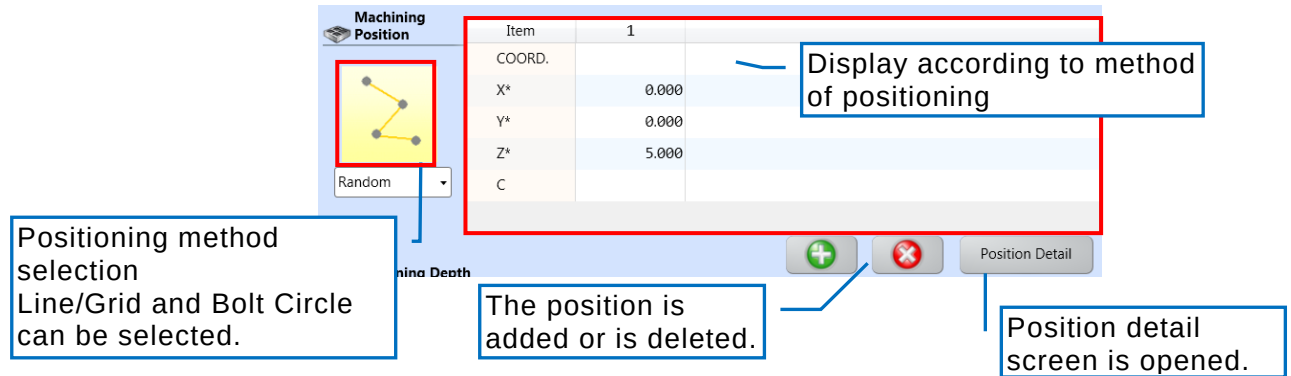


Figure 6-19 Machining Position (Random)

To enter each item, touch the box so that entry is enabled, and then enter using the keyboard.

Enter the numerical value, and press the Enter key to set the value.

Item	1	
COORD.		
X*	0.000	
Y*	0.000	
Z*	5.000	
C		

Figure 6-20 Input of machining position

[Note]

The machining position entered here is the "Machining Start Position".

Enter a position where the workpiece and electrode will not interfere with each other. The operations below can be performed in the Position Detail screen.

- WORK ROTATION on/off
- ROTATE OFFSET on/off
- SPLIT POSITION on/off
- C ORBIT SYNCRONIZE on/off
- Raise Pos Z by Reduction in Side Machining on/off
- Copy operation of machining position coordinates



Figure 6-21 Machining Position Detail (Random)

6.1.5.2.1 Line/Grid, Bolt Circle

The screen is changed according to the method of positioning line/Grid and Bolt Circle.

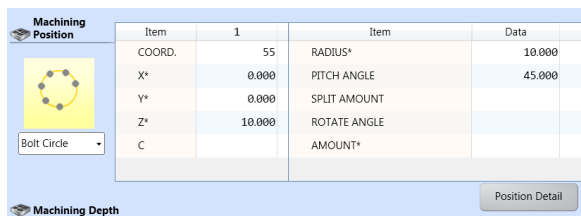


Machining Position

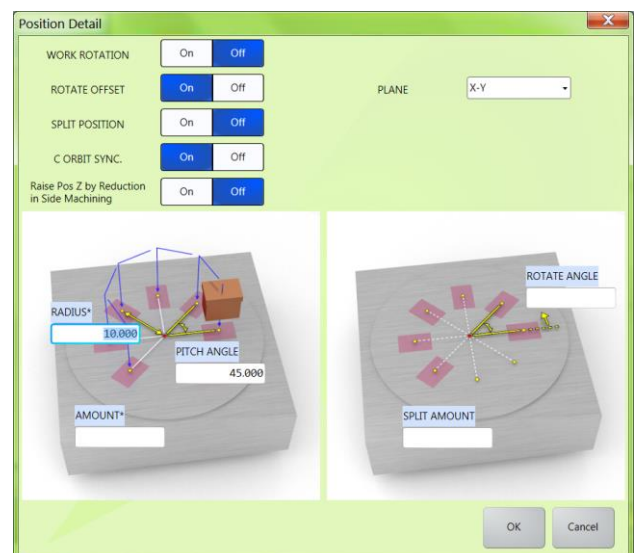


Machining Position Detail

Figure 6-22 Machining Position Detail (Line/Grid)



Machining Position



Machining Position Detail

Figure 6-23 Machining Position Detail (Bolt Circle)

6.1.5.3 Machining Depth

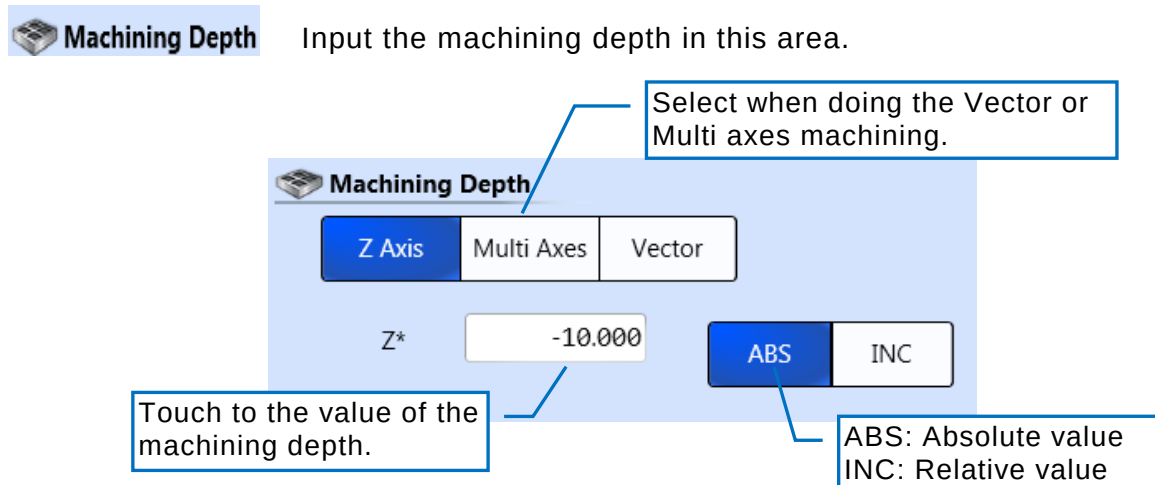


Figure 6-24 Machining Depth (Z axis)

6.1.5.3.1 Multi axes, Vector

When you select a multiple-axes machining or vector machining, input change accordingly.

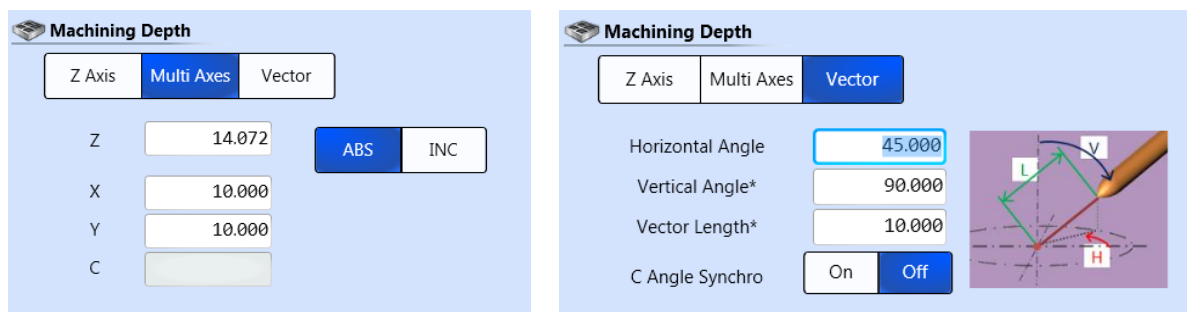


Figure 6-25 Machining Depth (Multi axes, Vector)

6.1.5.4 Coordinate System Selection

Select the common coordinate system number for all programs contained in a single project.

- (1) Click the [Coord. Manage] button.

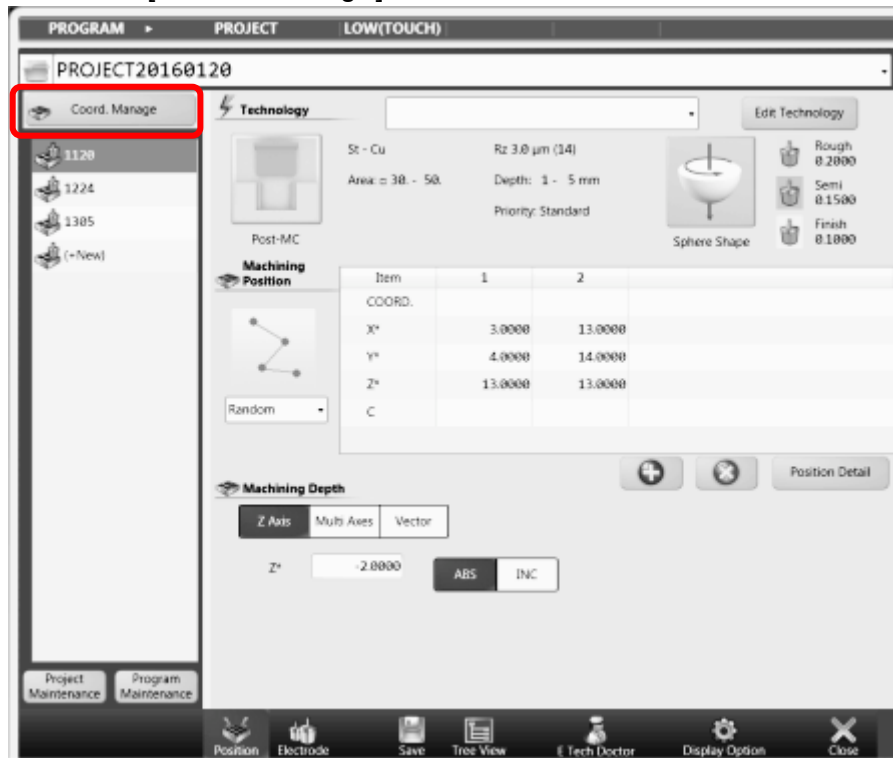


Figure 6-26 Coordinate System Manage Button

- (2) In the [Coord. Manage] dialog box, select the coordinate system number used by the programs contained in the project, and click the [Add] button

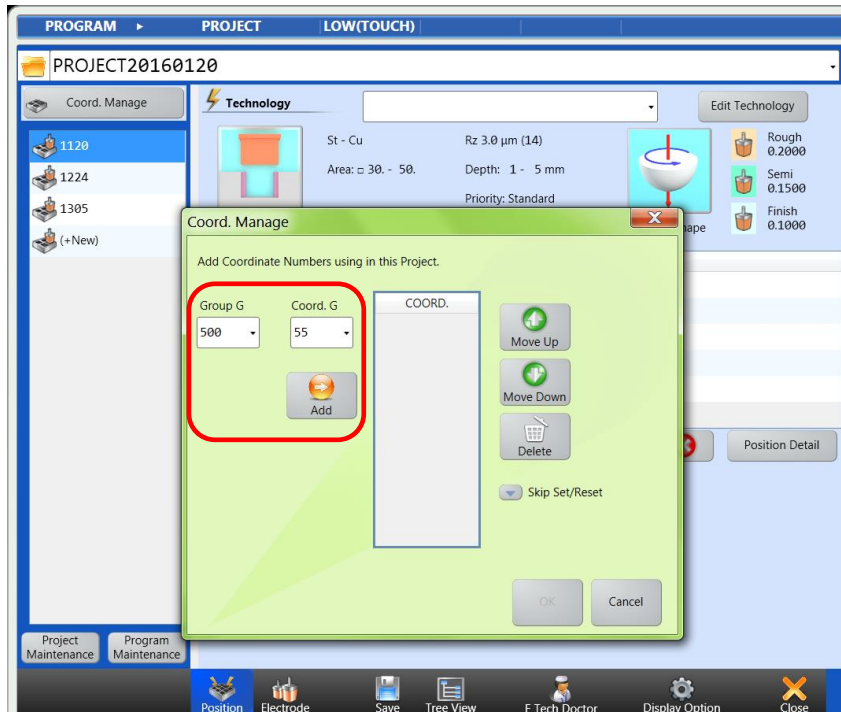


Figure 6-27 Coordinate System dialog

- (3) The buttons on the right side can be used to perform the [Move Up], [Move Down], and [Delete] operations on the selected coordinate system number.

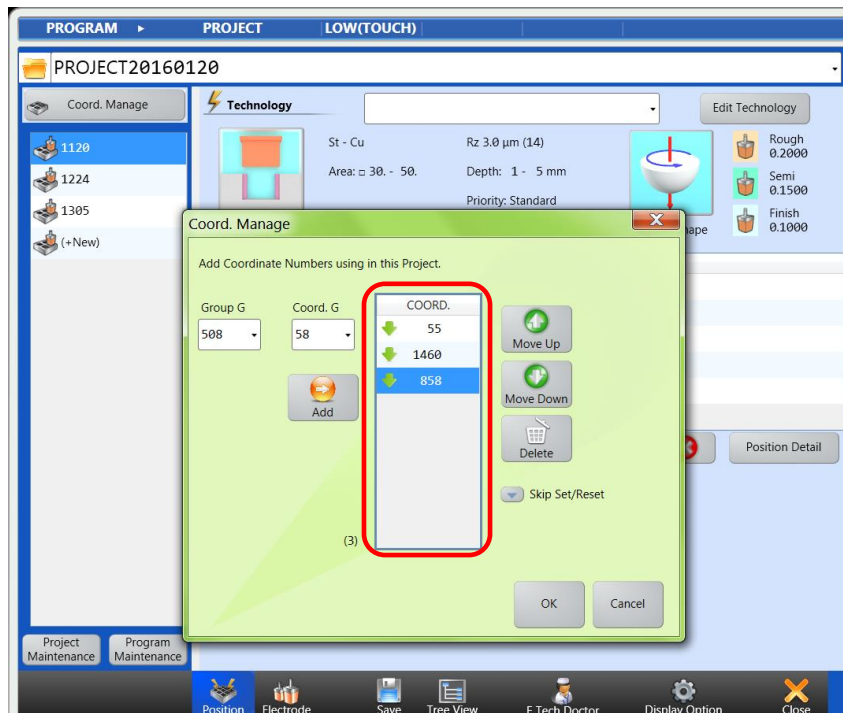


Figure 6-28 Coordinate System dialog

- (4) Coordinate Manage dialog box enables adding of a sequential workpiece coordinate system number to the list.

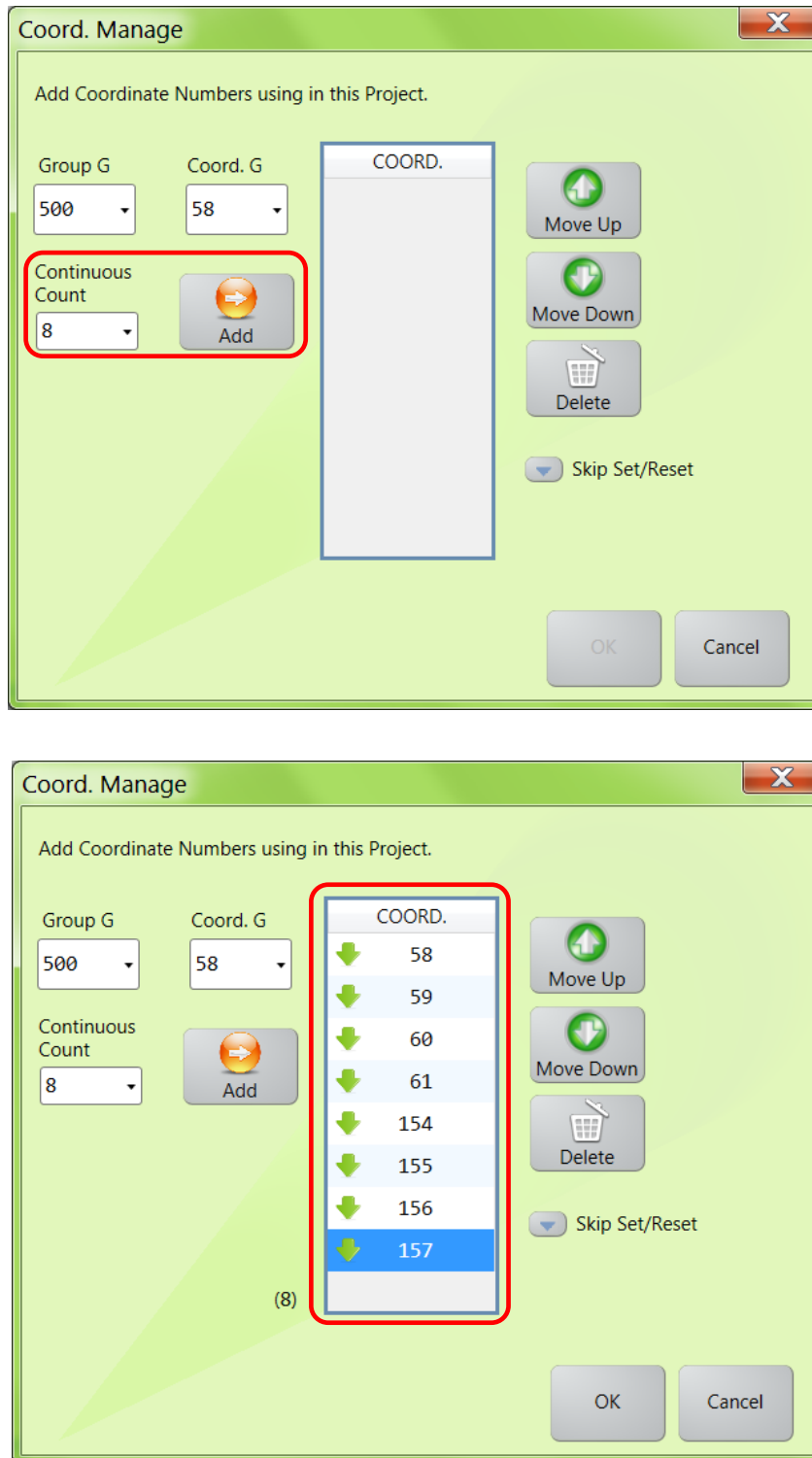


Figure 6-29 Coordinate System dialog

- (5) Executes the process applied to the selected coordinate system number for all programs contained in the displayed project by clicking [OK] button. The coordinate system number selected for the displayed project appears on the screen.

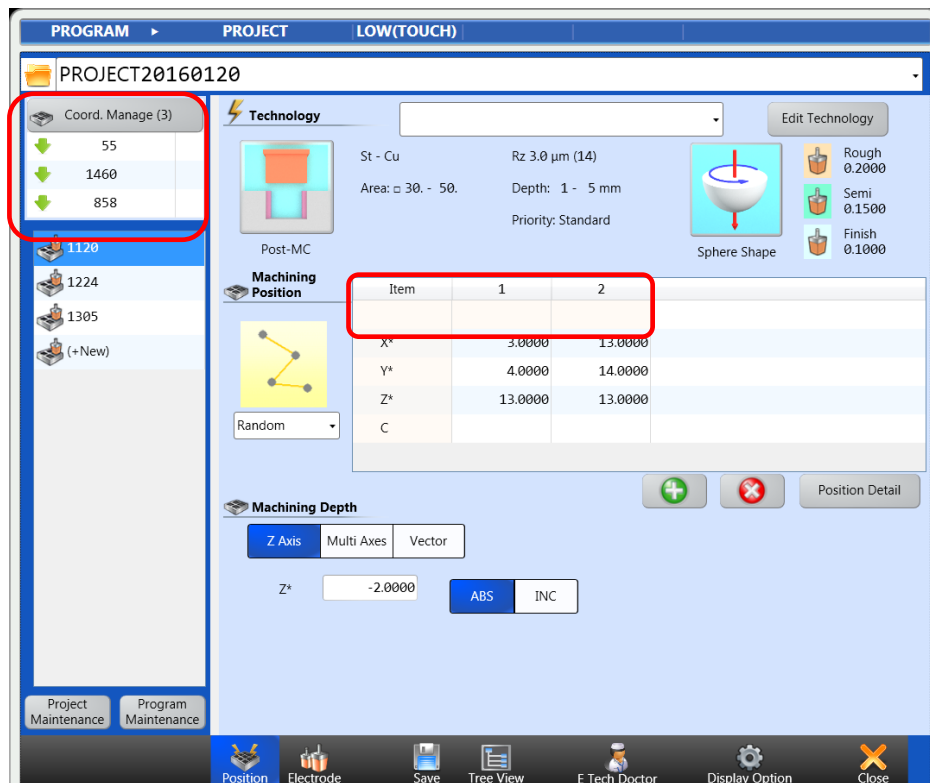


Figure 6-30 Project screen

In projects where the coordinate system is selected, the [COORD.] field displayed for [Machining Position] is blank and cannot be edited.

6.1.6 Electrode



When you press this button, screen for entering number of electrodes, ATC number, and machining sequence, etc. is displayed.

Electrode Data

No.	Usage*	Reduction/(Side)*	ATC No.	Offset No.	Comp. Reduction	Comp. Position X	Y
1	Rough	0.200	1	1			
2	Semi	0.150	2	2			
3	Finish	0.100	3	3			

Machining Sequence

No.	Usage*	Reduction/(Side)*	ATC No.	1	2	3	4
1	Rough	0.200	1	→	→	→	→
2	Rough	0.200	1	→	→	→	→
3	Finish	0.200	3	→	→	→	→
4	Finish	0.200	2	→	→	→	→

Add Electrode

Rough 0.200 [Delete]

Semi 0.150 [Delete]

Finish 0.100 [Delete]

Reuse 0.100 [Delete]

Machining Sequence

Skip Set/Reset

Skip Set [Reset]

Figure 6-31 Electrode data

This is used to create an electrode list at the top of the Electrode screen.

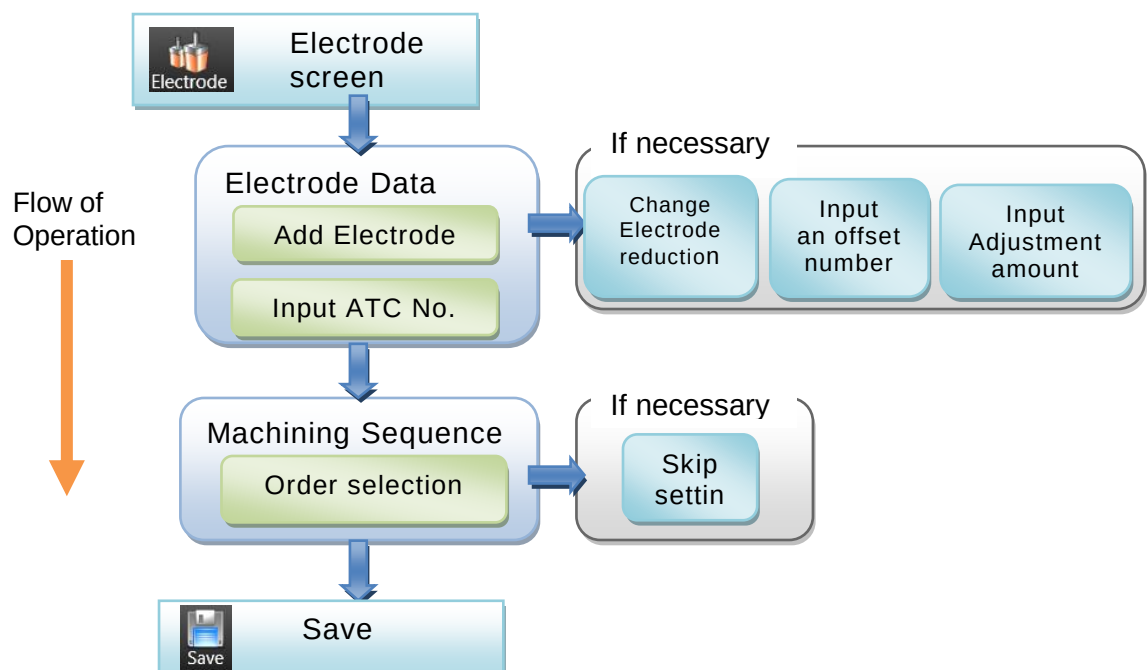


Figure 6-32 Electrode data

6.1.6.1 Electrode Data

In the Electrode Data screen, you can add electrode, input ATC number, etc.

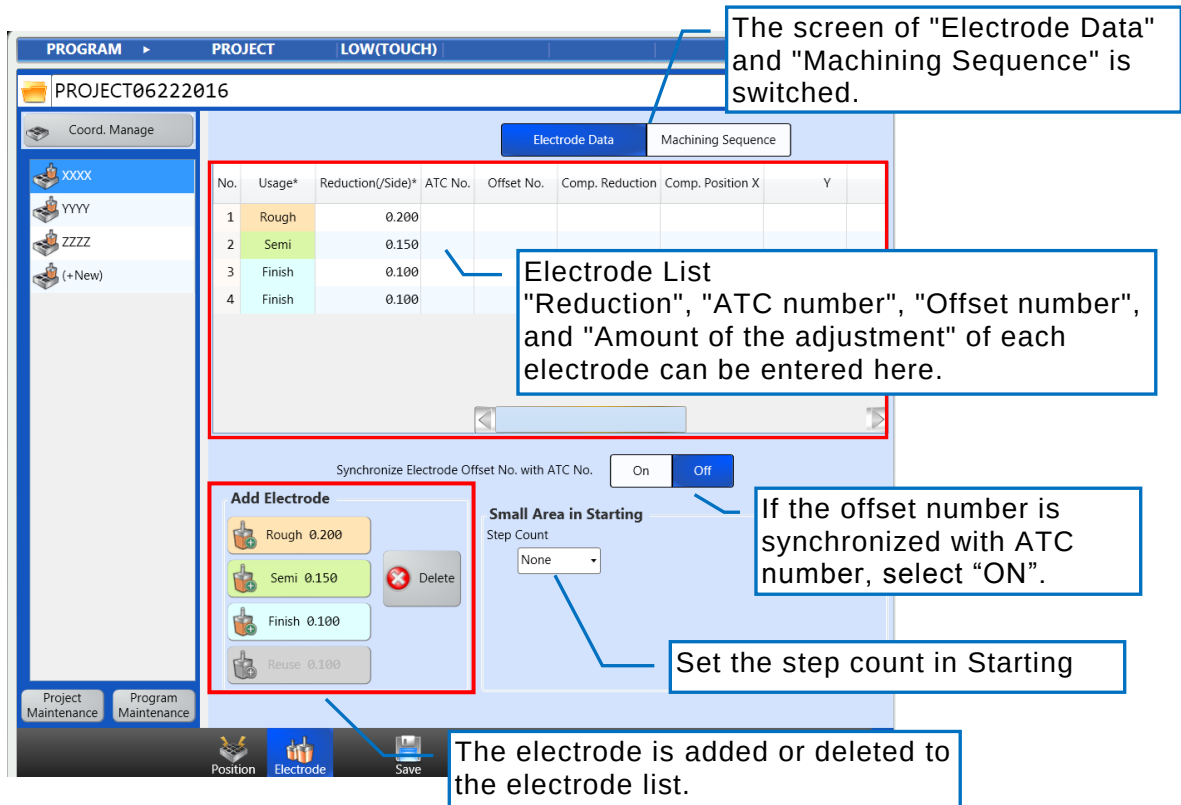


Figure 6-33 Electrode Data

Pressing the [Rough], [Semi], or [Finish] button, respective electrode will be added or deleted from the electrode list.

Reuse cannot be used simultaneously with other electrode types.

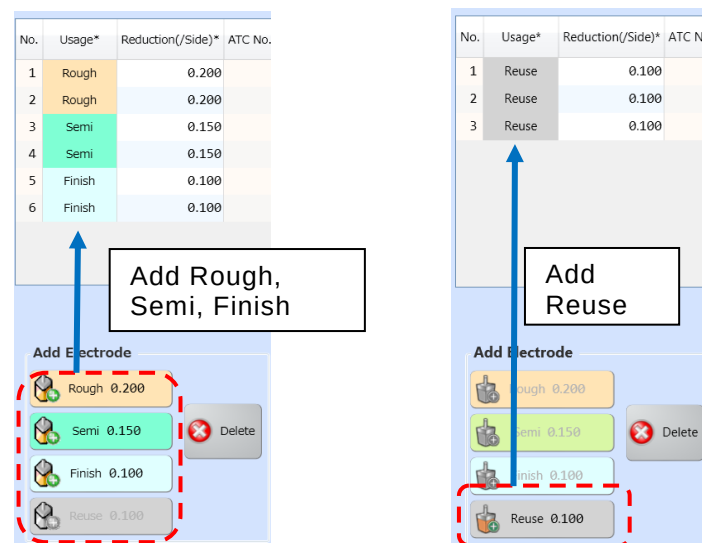


Figure 6-34 Add Electrode

This displays the [Electrode] page.
Select [Step Count] in the [Small Area in Starting] section.

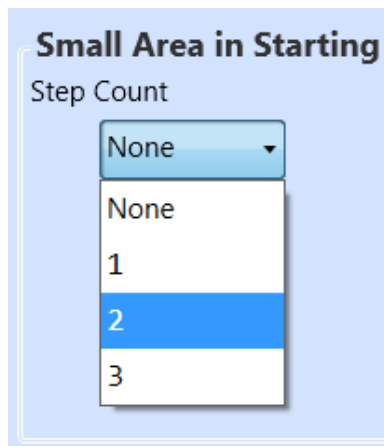


Figure 6-35 Step count in Starting

Select [Area] for each step, and enter the height for each area.
Click the [Save] button.

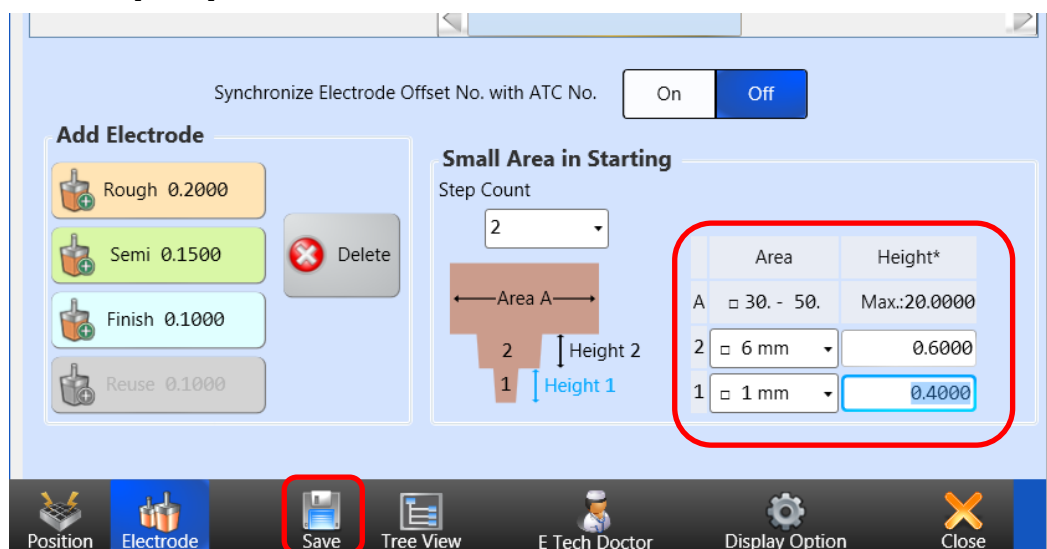


Figure 6-36 Step count in Starting

6.1.6.2 Machining Sequence

In the Machining Sequence screen, the machining positions and electrodes are arranged in a grid shape, the directions of the arrows indicates the electrode machining sequence.

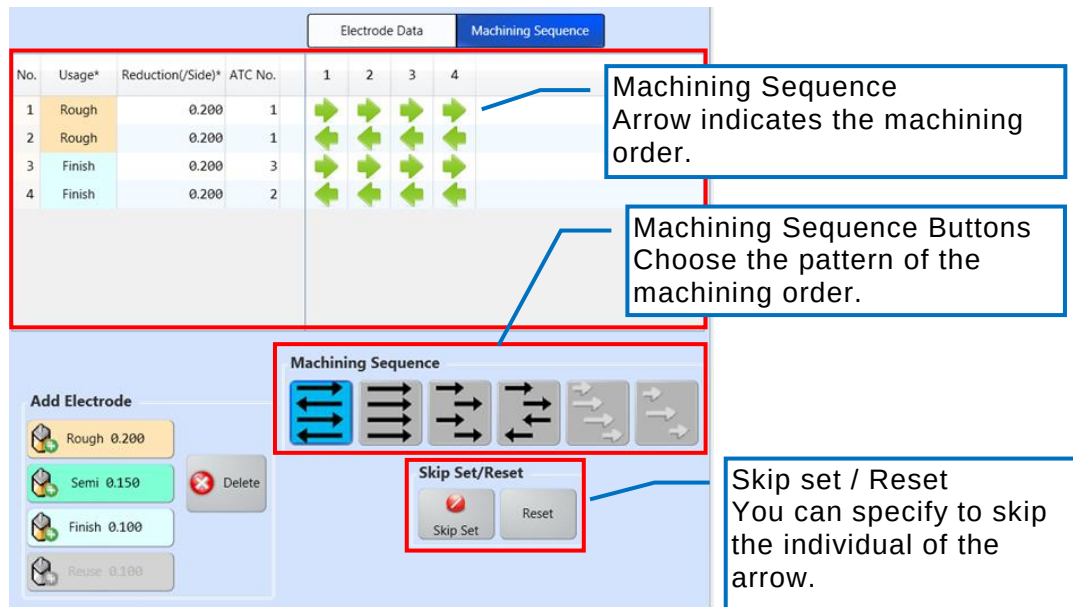


Figure 6-37 Machining Sequence Screen

The number of machining positions in Electrode Screen is based on the preset number of machining positions in the Machining Position screen. First electrode starts machining from the first position and proceeds in order of the arrow direction.

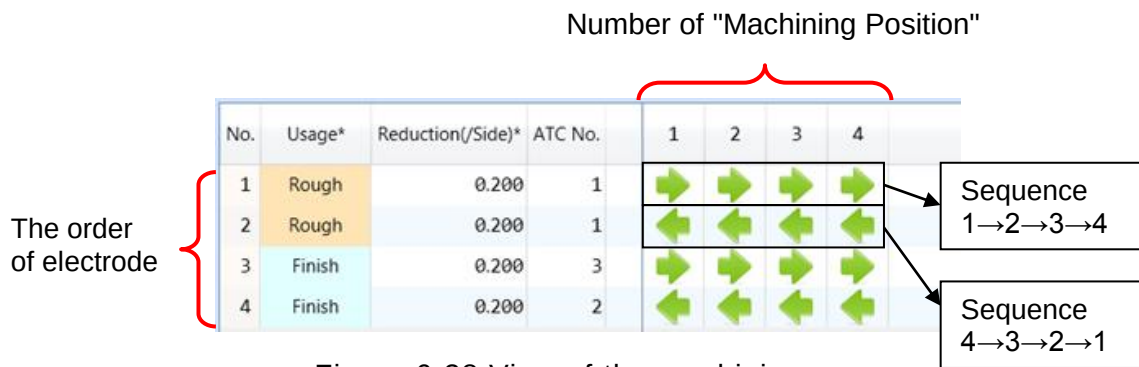


Figure 6-38 View of the machining sequence

6.1.6.2.1 Machining Sequence

The pattern of machining sequence can be changed using the [Machining Sequence] button.

(1) Forward and reverse arrangement



No.	Usage*	Reduction(/Side)*	ATC No.	1	2	3	4
1	Rough	0.200	1	→	→	→	→
2	Rough	0.200	2	←	←	←	←
3	Semi	0.150	3	→	→	→	→
4	Finish	0.100	4	←	←	←	←

Rough machining is all done with the electrode No.1. After the electrode change, a finish machining is executed in the reverse direction. Each time the electrode is changed, the machining direction is changed.

Figure 6-39 Forward and reverse arrangement

(2) Forward arrangement



No.	Usage*	Reduction(/Side)*	ATC No.	1	2	3	4
1	Rough	0.200	1	→	→	→	→
2	Rough	0.200	2	→	→	→	→
3	Semi	0.150	3	→	→	→	→
4	Finish	0.100	4	→	→	→	→

Each electrode will work at all machining positions and all processes are executed in the same

Figure 6-40 Forward arrangement

(3) Equal arrangement forward



No.	Usage*	Reduction(/Side)*	ATC No.	1	2	3	4
1	Rough	0.200	1	→	→		
2	Rough	0.200	2			→	→
3	Semi	0.150	3	→	→	→	→
4	Finish	0.100	4	→	→	→	→

Each rough electrode is allocated to equal number of machining positions. Both rough and finish will be arranged in the same sequence.

Figure 6-41 Equal arrangement forward

(4) Equal arrangements reverse forward



No.	Usage*	Reduction(/Side)*	ATC No.	1	2	3	4
1	Rough	0.200	1	→	→		
2	Rough	0.200	2			→	→
3	Semi	0.150	3	←	←	←	←
4	Finish	0.100	4	→	→	→	→

Each rough electrode is allocated to equal number of machining positions. However the sequence will be opposite between rough and finish.

Figure 6-42 Equal arrangements reverse forward

(5) Reuse function



No.	Usage*	Reduction/(Side)*	ATC No.	1	2	3	4
1	Reuse	0.100		→			
2	Reuse	0.100		→	→		
3	Reuse	0.100		→	→	→	
4	Reuse	0.100			→	→	→
5	Reuse	0.100				→	→
6	Reuse	0.100					→

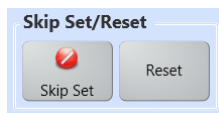


No.	Usage*	Reduction/(Side)*	ATC No.	1	2	3	4
1	Reuse	0.100		→			
2	Reuse	0.100		→	→		
3	Reuse	0.100			→	→	
4	Reuse	0.100				→	→
5	Reuse	0.100					→
6	Reuse	0.100					

This differs to the other arrangement. Electrodes used in finish machining can be reused for rough machining in the next position. There are 2 types of reusing. Please select the suitable one according to the number of electrodes and machining

Figure 6-43 Reuse function

6.1.6.2.2 Skip Set/Reset



A specific machining position can be removed (skipped) from the machining sequence. Touch the arrow that you want to skip, and then press the [Skip Set] button. Once the arrow changes to a skip mark, the setting is complete. Do it once again, skip mark will change back to arrow.

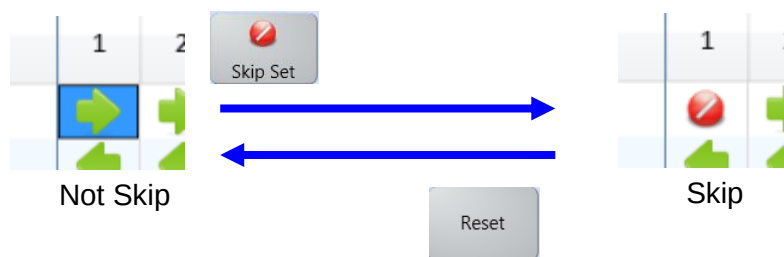


Figure 6-44 Skip set / Reset

6.1.7 Saving a Program



Pressing the [Save] button saves the content to a program.

When [Save] is pressed, if the compulsory information is not input, screen will display a message without saving data.

6.1.8 Tree View



Information of all programs registered in a project can be displayed in a tree view.

In the tree view, the technology, electrode information, machining positions, and other details can all be viewed in a list, which is useful for checking the content after creating a project.

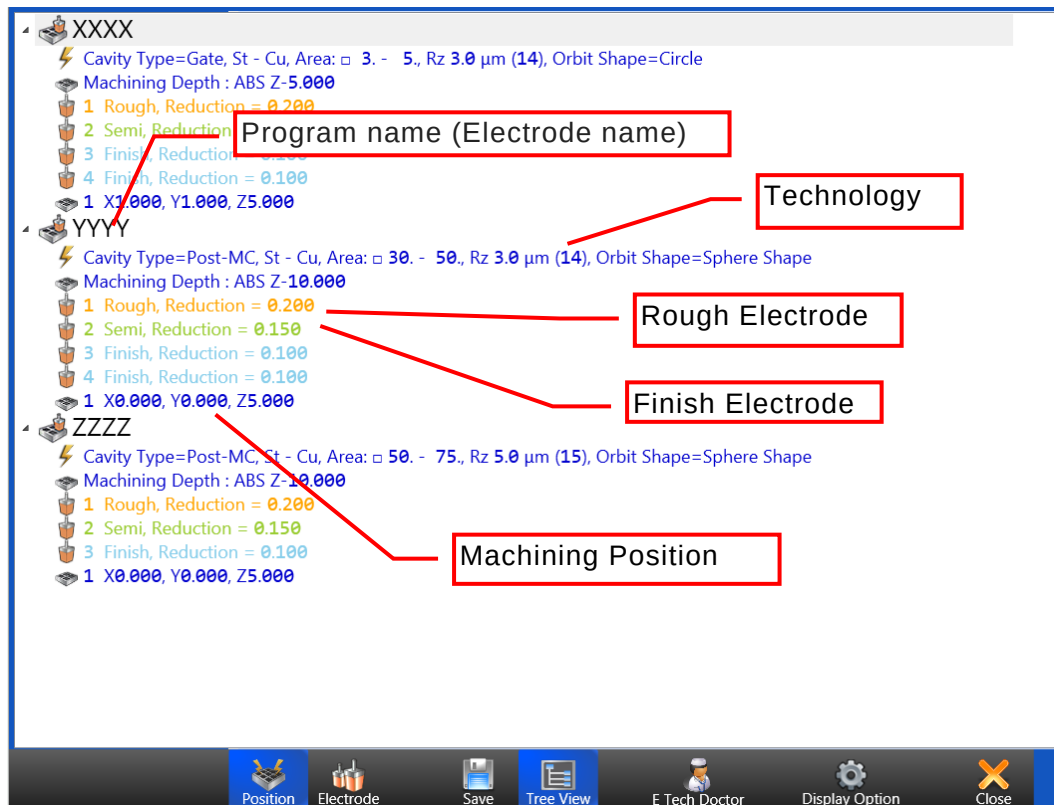


Figure 6-45 Tree View

6.1.9 MINPULS Tech Doctor



Base on the machining result, settings can be made to improve the [MC Time], [Surface Roughness], and [Accuracy of form].

In the Project screen, press the [E Tech Doctor] button while the target program is open. Select the improvement from the three options in the Start screen, and press [Next].

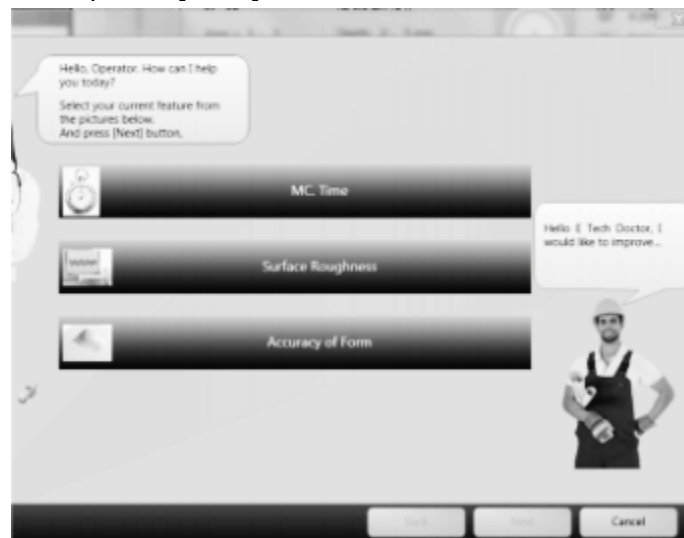


Figure 6-46 E Tech Doctor Start screen

Enter or select the information by answering the questions in the E Tech Doctor.



Figure 6-47 E Tech Doctor Screen

Base on your answer to these questions, E Tech Doctor will make the improvement. When the [OK] button is pressed, it is applied to the program. A doctor mark will be added near to the Technology icon if improvements are applied to the program.

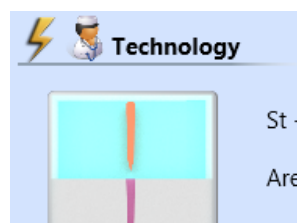


Figure 6-48 After applying E Tech Doctor

6.1.10 Display Option



This is used to set roughness unit and initializing templates.

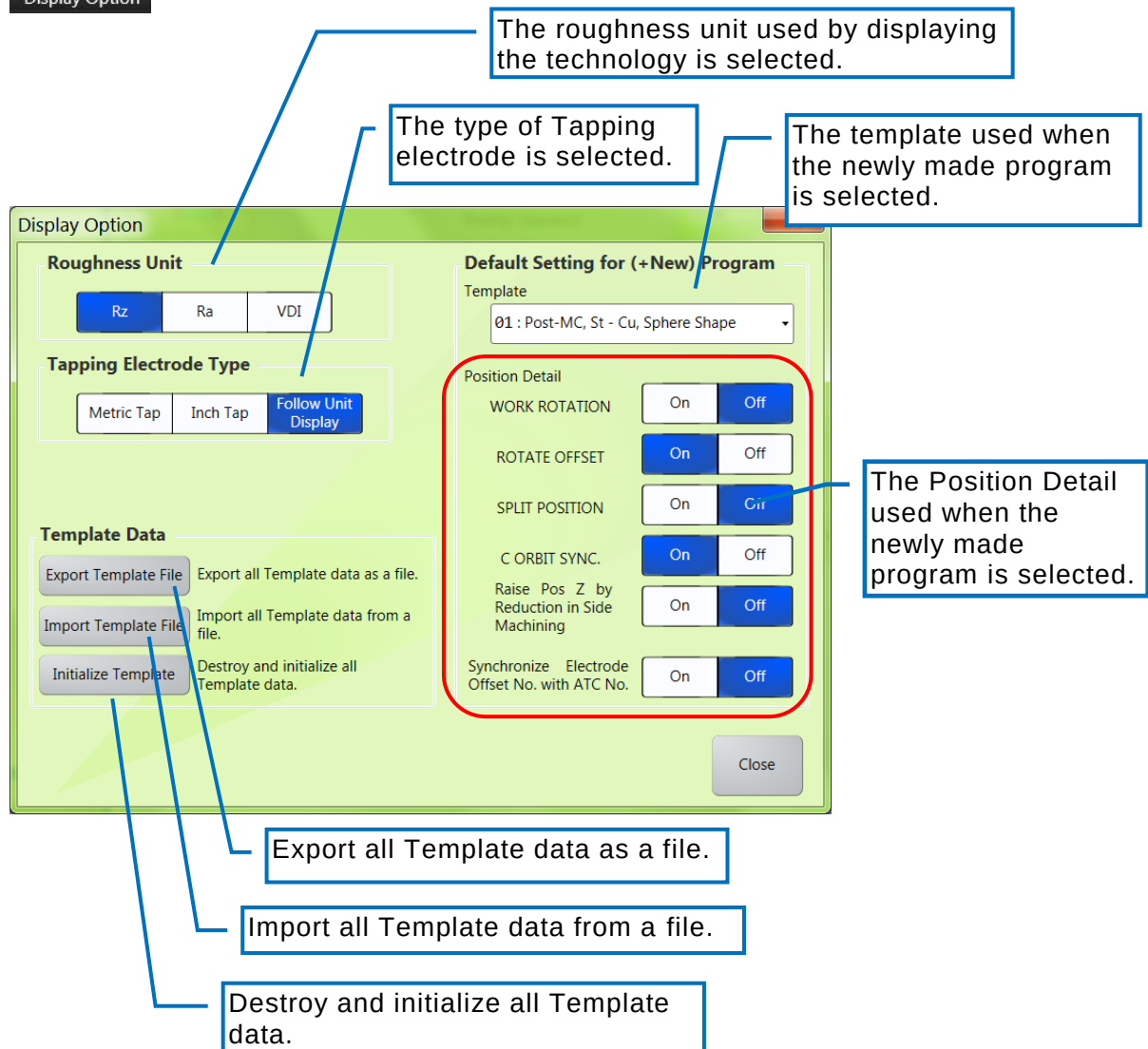


Figure 6-49 Display Option

6.1.11 Edit Technology

If the required technology was not found in the existing template, use [Edit Technology] to change the content of machining technology. The Edit Technology screen consists of four screens: [Conditions], [Orbit Set], [Option Set], and [User Data]. Rename, delete operation can be performed on templates.

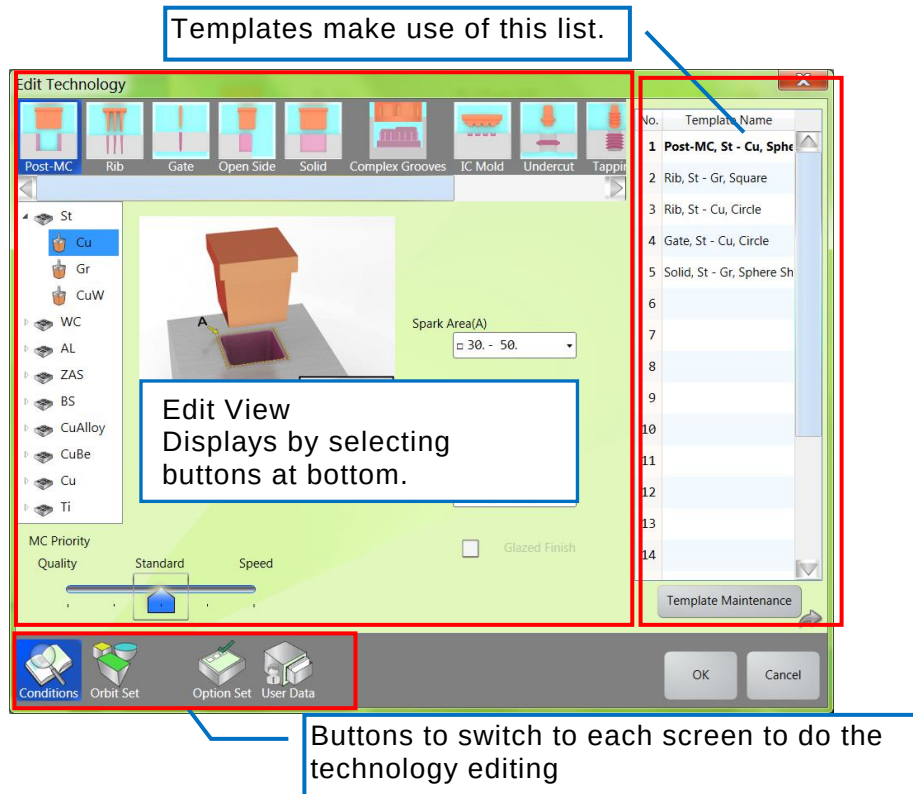


Figure 6-50 Edit Technology

In the Edit Technology screen, [Conditions], [Orbit Set], and [Option Set] can be entered, additionally, template operations and [User Data] can also be manipulated.

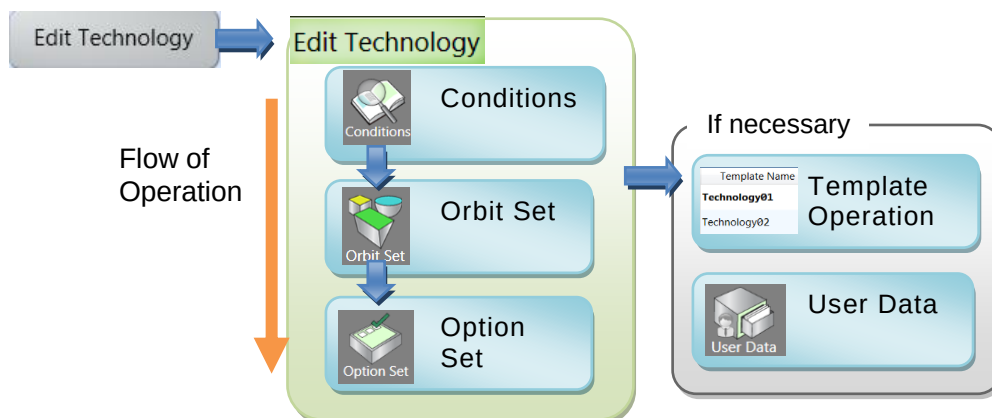


Figure 6-51 The flow of the Technology Edit

6.1.11.1 Technology and Template

What is a template?

A template is a data format where the technology setting is saved.

All of content in technology will be set by applying a template. By setting commonly used technologies as templates, you can easily switch among different technologies when creating programs.

Several templates are already predefined at the factory.

When editing a template

The current template will not be changed unless [Save Template] operation is performed. In the Edit Technology screen, template can be edited and applied to a program while the original content of this template will not be changed.

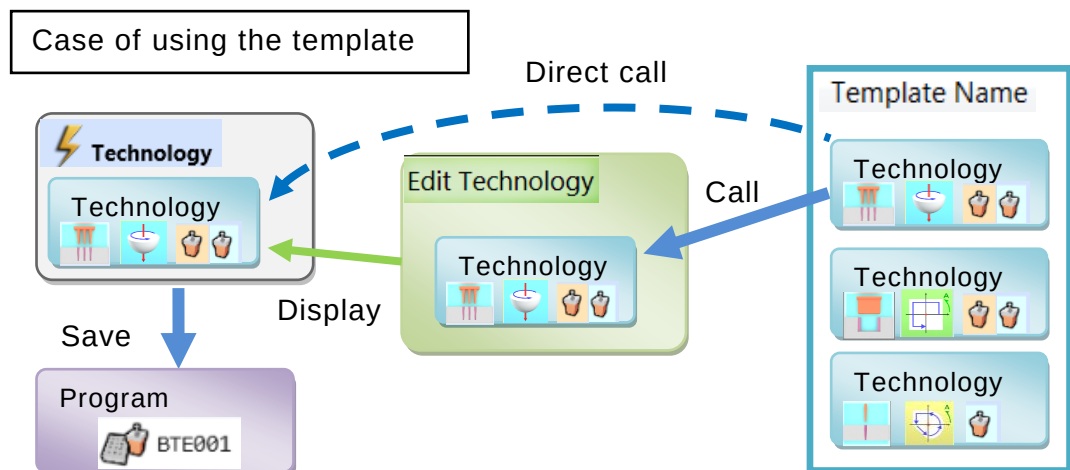


Figure 6-52 Case of using the template

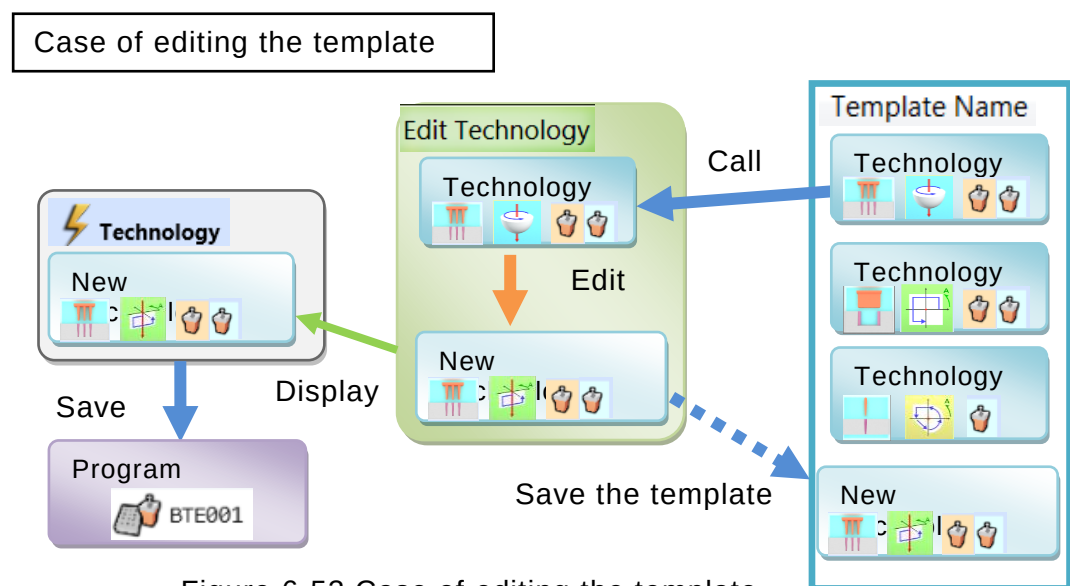


Figure 6-53 Case of editing the template

6.1.11.2 Template List

All of the registered templates are shown in the Template List.
Several templates are already predefined at the factory.
A maximum of 20 templates can be saved.

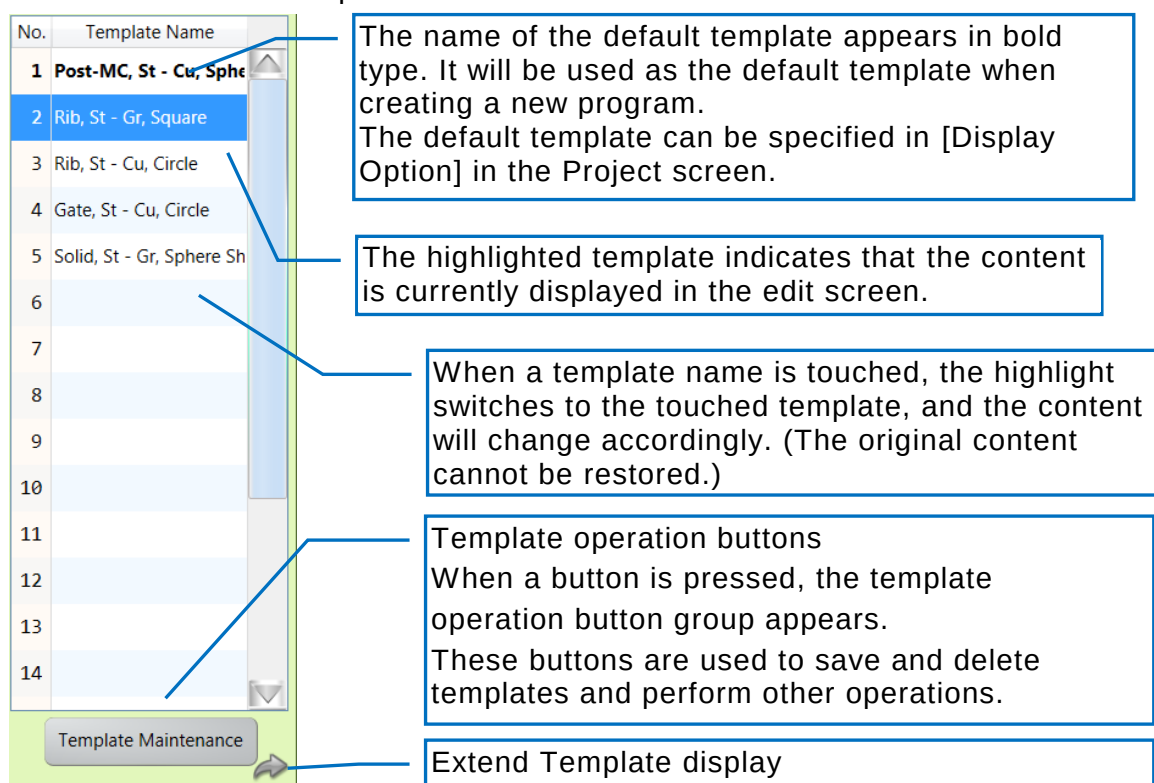


Figure 6-54 Template List

6.1.11.2.1 Operation of Template

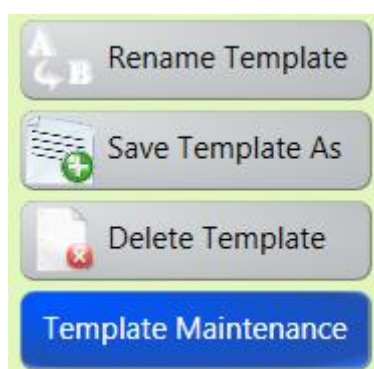
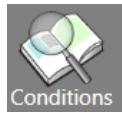


Table 6-3 Buttons of Template operation

Item name	Explanation
Rename Template	Rename the selected Template name.
Save Template	Save the Template.
Delete Template	Delete the selected Template.

6.1.11.3 Functions for Each Button on the Edit Technology Screen

(1) Conditions Set



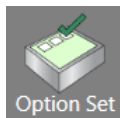
Information on the type of machining, the material, and the spark area, etc. is set.

(2) Orbit Set



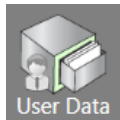
Information on the orbit and the electrode reduction, etc. is set.

(3) Option Set



Information on the machining option and M function is set.

(4) User Data



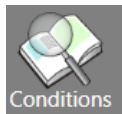
Detailed information based on the making method of Model Plan is set.

(5) OK, Cancel



OK: Data is saved and the technology edit screen is closed.
Cancel: Data is not saved and the technology edit screen is closed.

6.1.11.4 Conditions Set



In this screen, set the basic information about the machining.

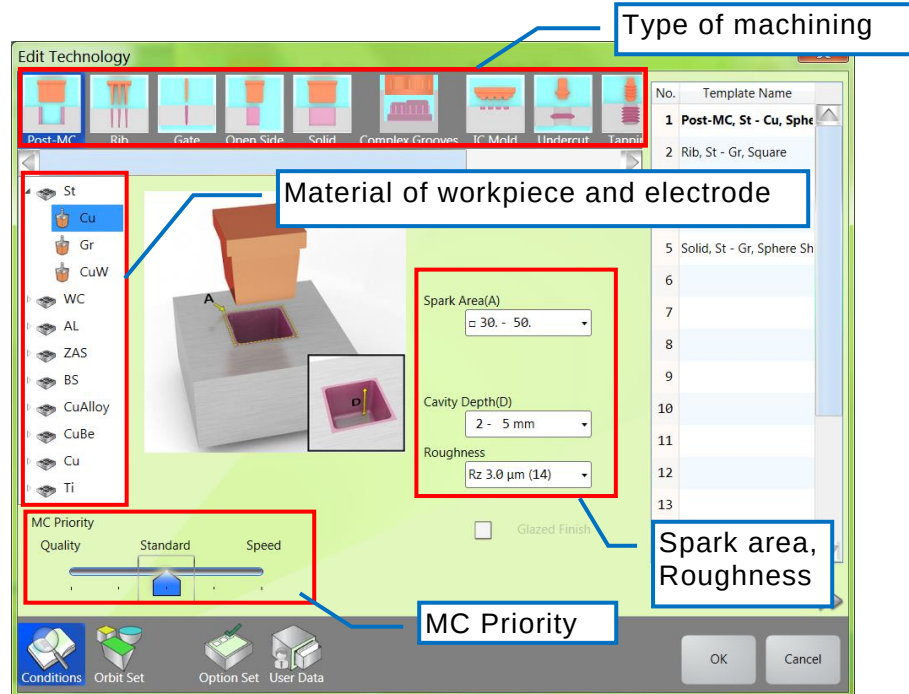
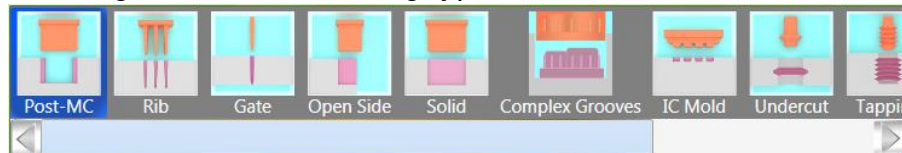


Figure 6-55 Conditions screen

Type of machining: Select a machining type.



Material: The workpiece material and the electrode material are tree structures. The highlighted material has been selected.

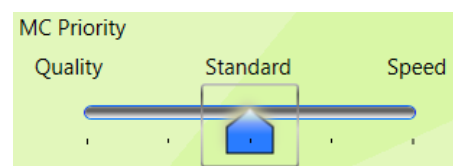
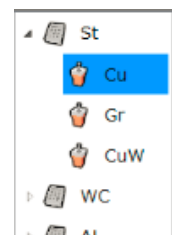
Spark area: Select the spark area.

Cavity Depth: Select the machining depth of the net.

Roughness: Select the target surface roughness.

MC Priority: If necessary, you can choose among 5 levels of priority by adjusting the slider bar

Speed: Machining speed-oriented
Quality: Machining quality-oriented



6.1.11.5 Orbit Setting



Orbit and reduction is set.

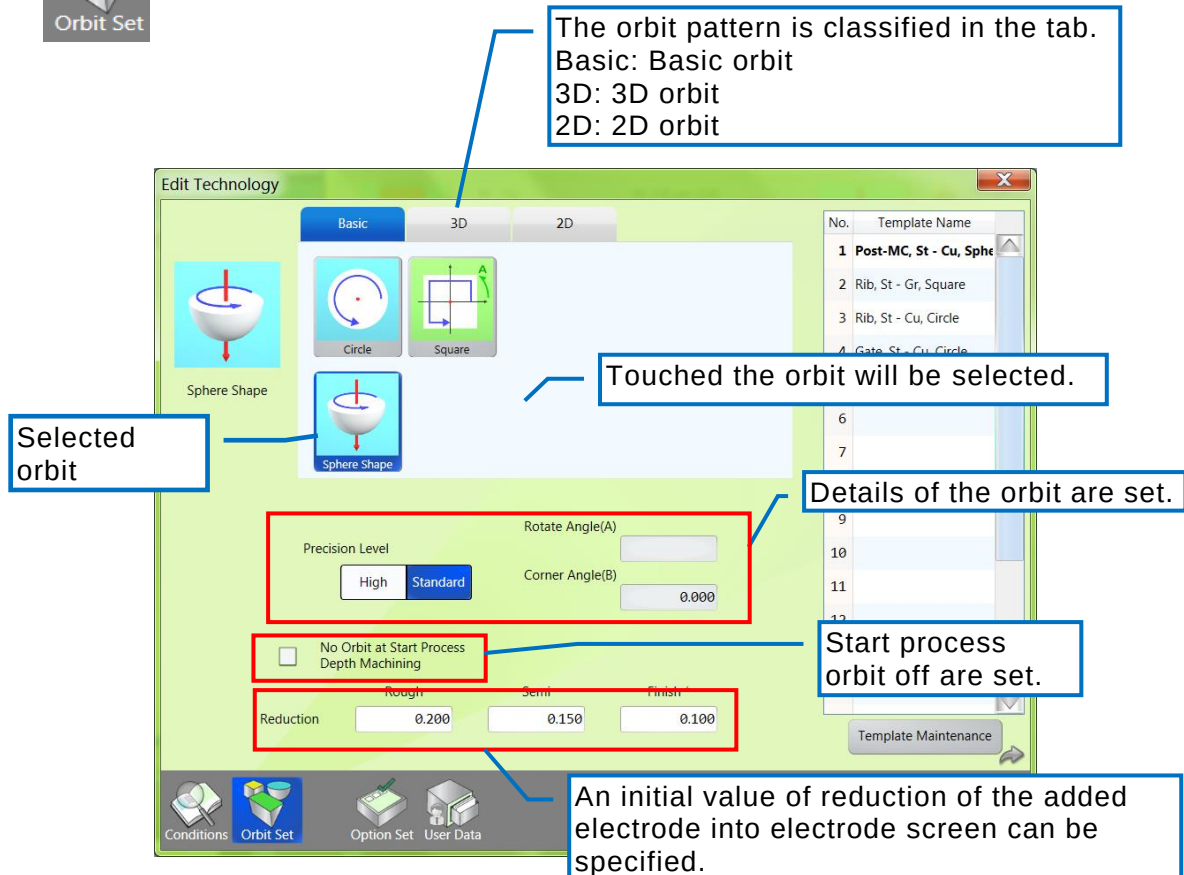


Figure 6-56 Orbit Set screen

Precision Level

Select HIGH if high precision is required. When HIGH is applied, the machining time will be longer than standard machining.

Corner Angle

If the selected orbit pattern needs Corner Angle, this input box is enabled.

Rotate Angle

If the selected orbit pattern needs Rotate Angle, this input box is enabled.

No Orbit at Start Process Depth Machining

Start process orbit off are set.

However, if the machining shapes below are selected in the [Conditions] page, the checkbox is set to a constantly ON state, and this function cannot be used.

[IC Mold] [Undercut] [Tapping] [Connector] [Helical]

Reduction

Enter the reduction for Rough, Semi, Finish electrode, when you add electrode on Electrode Screen, this reduction value will be used.

6.1.11.6 Optional Set



This sets the auxiliary functions required for machining.
Options not found in the machine specifications are unavailable.

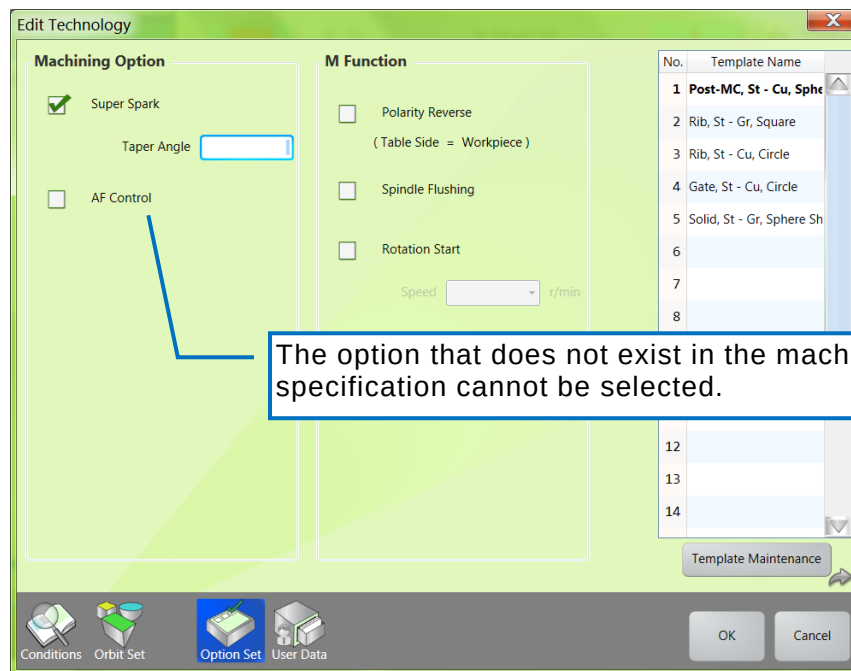


Figure 6-57 Optional Set

Machining Option

- Super Spark

Insert a check mark here to automatically apply Super Spark function.
The system automatically determines whether Super Spark can be used based on the settings.

(If no check mark is inserted, the Super Spark function is disabled.)

Enter the information for "Side Taper Angle" if necessary.

- AF Control

Insert a check mark here to use automatically apply AF Control function.

M Functions

Select machine operations you want to perform throughout the whole machining process.

- Polarity Reverse
- Spindle Flushing
- Rotation Start
- Tank Up
- Tank Down After Machining

6.1.11.7 User Data Set



Editing can be performed for each item based on the model plan. This is used to perform more advanced program editing.

	Reference			User		
	Rough	Semi	Finish	Rough	Semi	Finish
MODEL DATA No.*	323	323	323			
START PROCESS No.*	4	6	408			
END PROCESS No.*	9	9	14			
FINISH PROCESS No.*	14	14	14			
SIDE REMAIN COMP.	100	100	100			
BOTTOM REMAIN COMP.	100	100	100			
MC METHOD*	23	13	93			
ORBITING PATTERN*	1111	1111	1111			
ROTATION ANGLE						
BOTTOM SHAPE PATTERN	0	0	0			
CORNER ANGLE	0.000	0.000	0.000			
JUMP AMOUNT*	8	8	8			
JUMP CYCLE*	10005	10005	10005			
JUMP SPEED*	10	10	10			

Figure 6-58 User Data screen

The data made automatically from the content set on each of the [Conditions], [Orbit Set], and [Option Set] screens is displayed in the "Reference" box.

The data made from the content set on each screen automatically is displayed.

Press [Refer -> User] button to copy data to the User box, and touch the cell that you want to edit to enter the desired numerical value.

When user data was used, the technology area shown in the Project screen displays the program in model plan format.

Technology		
G132D32003H1Q32A32M2R15U30.000; G102E423I5J10O15D100H100L23P1111M0B0.000S8T6F10U12V40;		Rough 0.200
G132D32003H1Q32A32M2R15U30.000; G102E423I7J10O15D100H100L13P1111M0B0.000S8T6F10U12V40;		Semi 0.150
G132D32003H1Q32A32M2R15U30.000; G102E423I10J15O15D100H100L93P1111M0B0.000S8T6F10U12V40;		Finish 0.100

Figure 6-59 Technology display when User Data is used

Technology using user data can also be saved as a template.

6.1.12 Schedule Run

You can transfer programs from projects to schedule list, switch to schedule mode and start executing. Refer to chapter 8 “Run”.



Figure 6-60 Schedule Run

6.2 Program File

Display the NC Program registered on the NC unit in ascending order from the lower O Number. Editing of the program can also be performed.

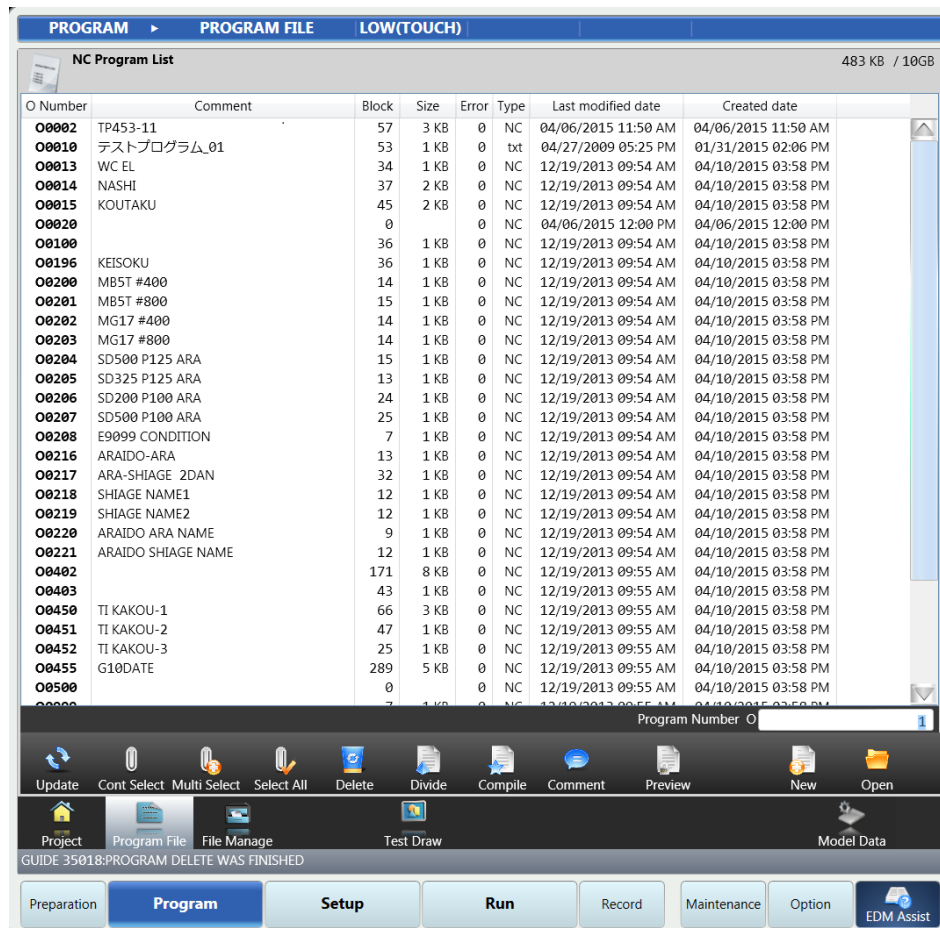


Figure 6-61 Program – Program File Screen

Show the total memory size for all NC programs.

10 GB

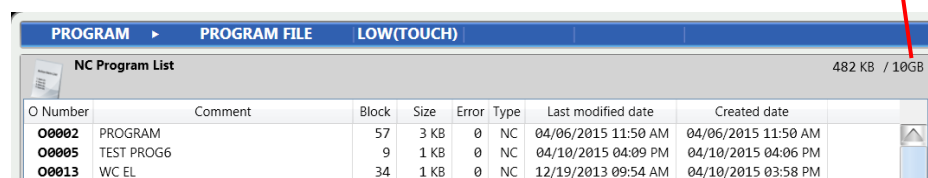


Figure 6-62 Program List Display

Table 6-4 Program List Display Items

Items	Description
O Number	Display program number.
Comment	Displays supplementary explanation on the program, etc.
Block	Displays total number of blocks in the program.
Size	Displays memory size used for the program.
Error	Displays number of errors in the program. When there is over one error, programs cannot be run.
Type	Display the type of file. • NC Program [NC]
Last modified date	Displays the last updated time and date.
Created date	Displays the time and date of creation.

6.2.1 Function of Each Button on Program List Screen



Figure 6-63 Program List Button

(1) Update



Update program list display to the most recent information.

(2) Cont. Select



Used for continuous selection of NC Programs.

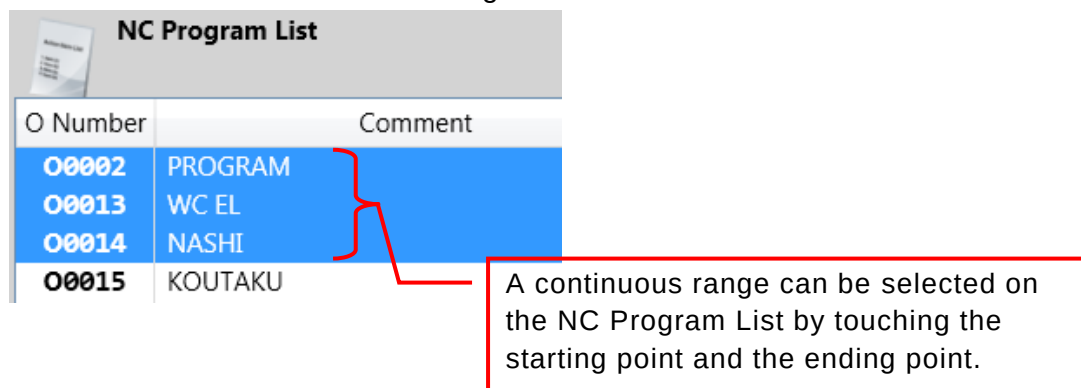


Figure 6-64 Cont. Select

(3) Multi Select



Use for nonconsecutive selection of NC Programs.

NC Program List		
O Number	Comment	Block
00002	PROGRAM	
00013	WC EL	
00014	NASHI	
00015	KOUTAKU	

Multiple programs can be selected by touching them on the NC Program list.

Figure 6-65 Multi Select

(4) Select All



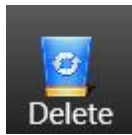
Use to select all of the NC Programs.

NC Program List		
O Number	Comment	Block
00002	PROGRAM	
00013	WC EL	
00014	NASHI	
00015	KOUTAKU	

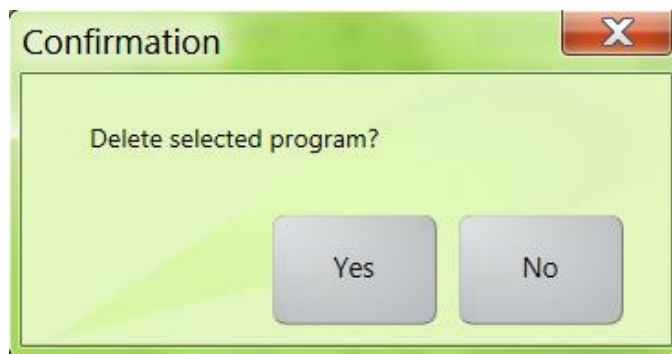
All programs will be selected from the top to the bottom of the NC Program list.

Figure 6-66 Select All

(5) Delete



Delete the selected program.



Delete by selecting programs from the program list, and when the [Delete] button is pressed a confirmation window will appear.

Touch the [Yes] button to delete the program.

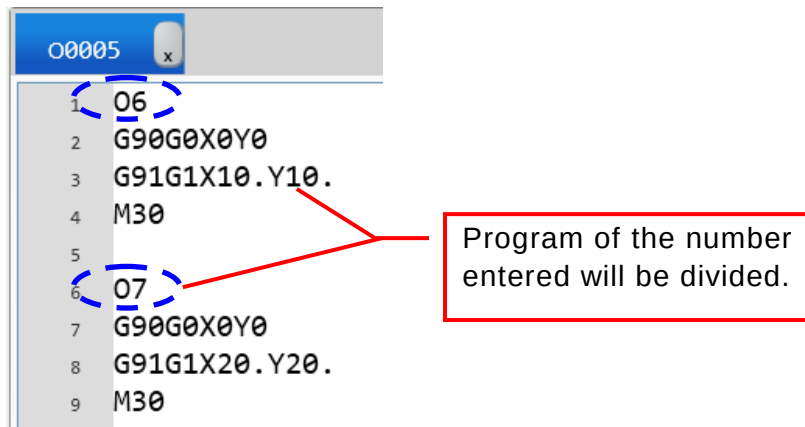
Touch the [No] button to cancel deletion.

Figure 6-67 Delete

(6) Divide



Divide the selected program.



(A) Select file for divide by touching.

NC Program List		
O Number	Comment	Block
00001	SUICYOKU KAKOU	6
00002	ARUMI	4
00003	1/2 HOLDER TEST CUT	14
00004	DENKYOKU KAKOU	37
00005	BUNKATSU TEST	

(B) Touch the Divide button.



Figure 6-68 Divide

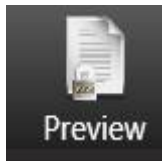
- * Dividing an empty file will cause it to be deleted.
- * The program will not be divided if it exists in the NC Program list.

(7) Compile



Compile the program selected.

(8) Preview



Display the selected program.

Display content of selected program files from the NC Program list in a Preview window.

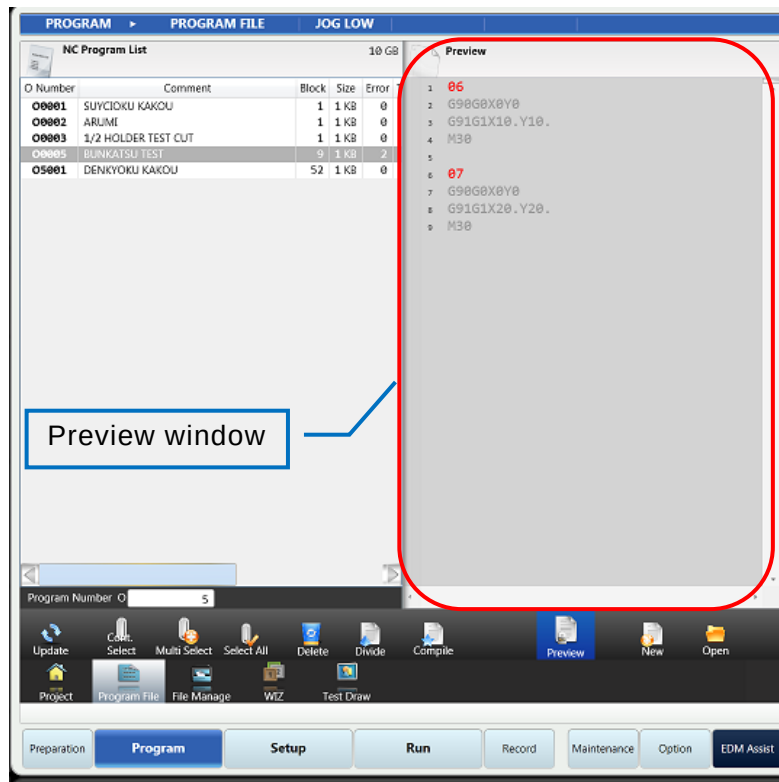


Figure 6-69 Preview Window

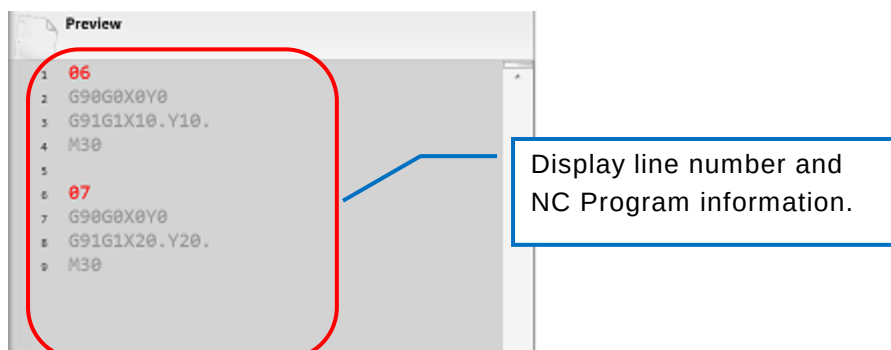
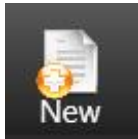
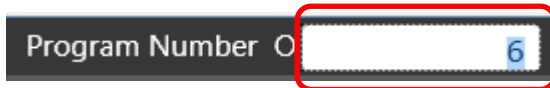


Figure 6-70 Preview Window (details)

(9) New



Create a new program file.



Set the O Number to new create.

Figure 6-71 New

- (A) Set by enter the O Number for new creation in the [Program Number O].
If the O Number has not been entered, the lowest available number will be used for creation.
- (B) Touching the [New] button will create the specified O Number and transfer to the [Edit] screen.
Refer to chapters 7.5 and 7.6 for info on how to control the [Edit] screen.

(10) Open



Edit the selected program.

From the program list display touch to select the program for editing, and touch the Edit button to show the [Edit] screen.

Refer to chapter 7.2.3 for info on how to control the [Edit] screen.

6.2.2 Changing Comments

Add or change comments on the selected program.

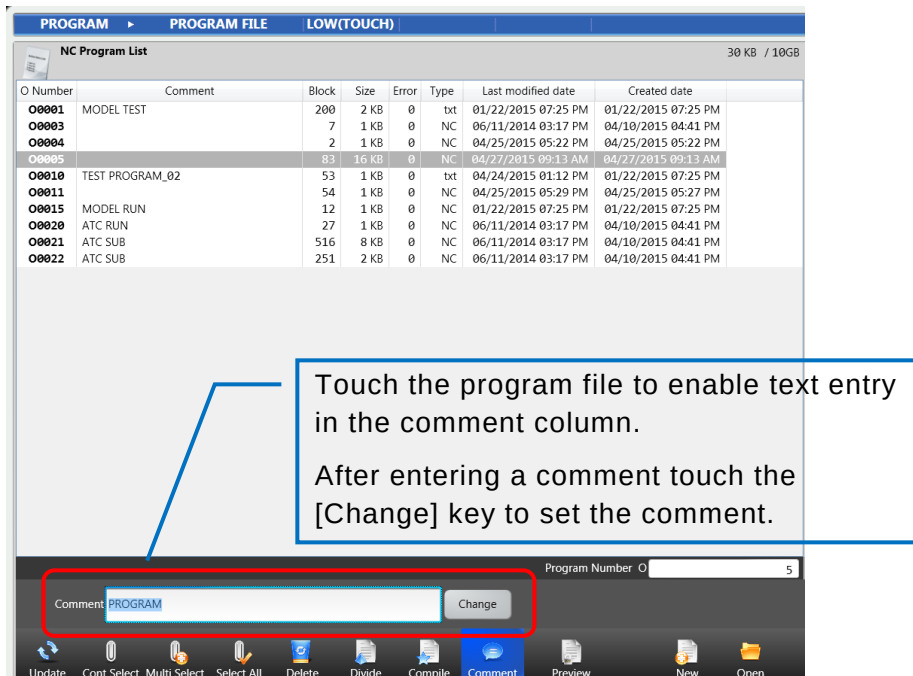


Figure 6-72 Operation

6.2.3 Operation Method of Edit Screen

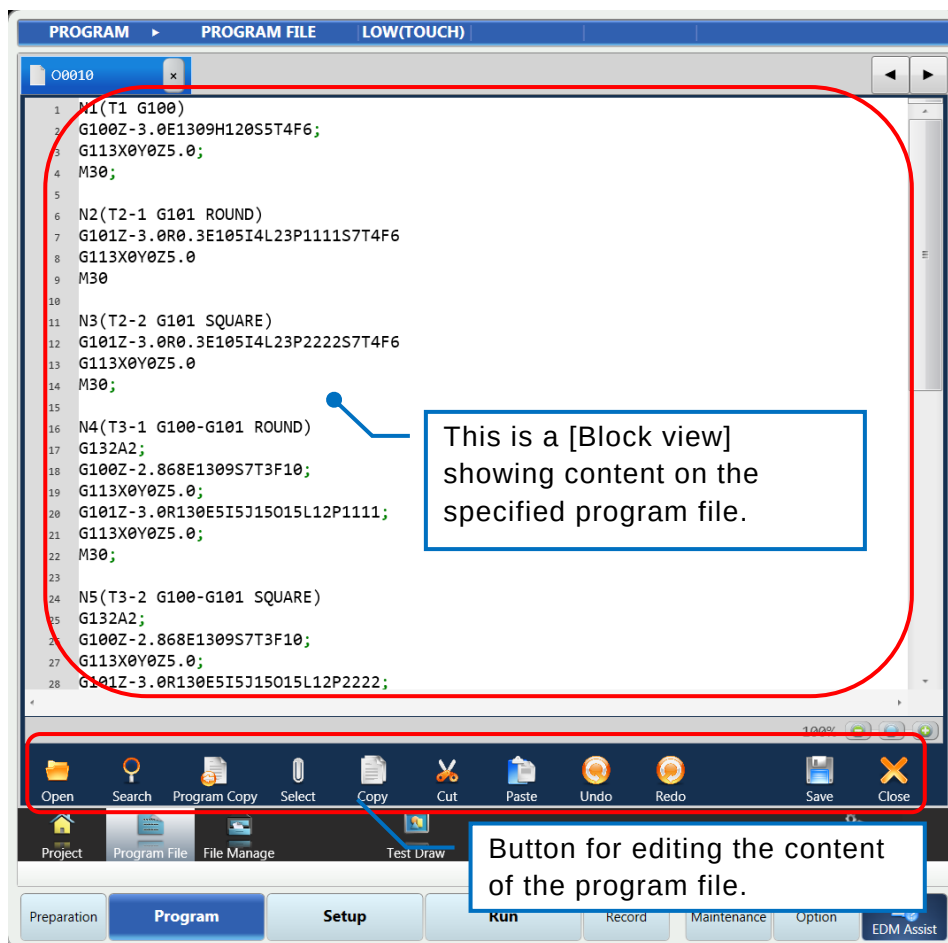


Figure 6-73 Edit Screen

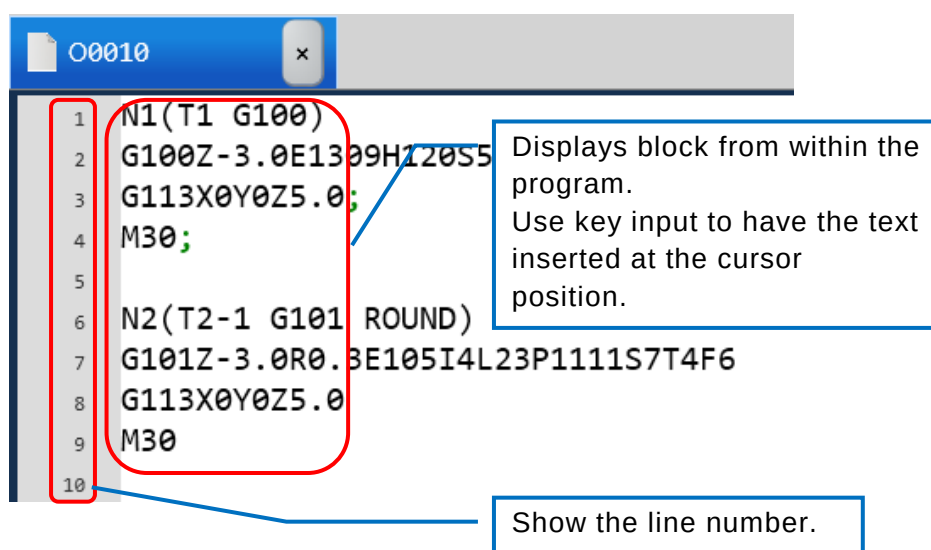


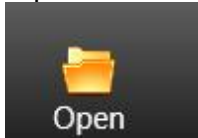
Figure 6-74 Block View

6.2.4 Function of Each Button on Edit Screen



Figure 6-75 Edit Buttons

(1) Open



Edit the selected program.

From the program list display touch to select the program for editing, and touch the Edit button to show the [Edit] screen.

Refer to chapter 6.2.3 for info on how to control the [Edit] screen.

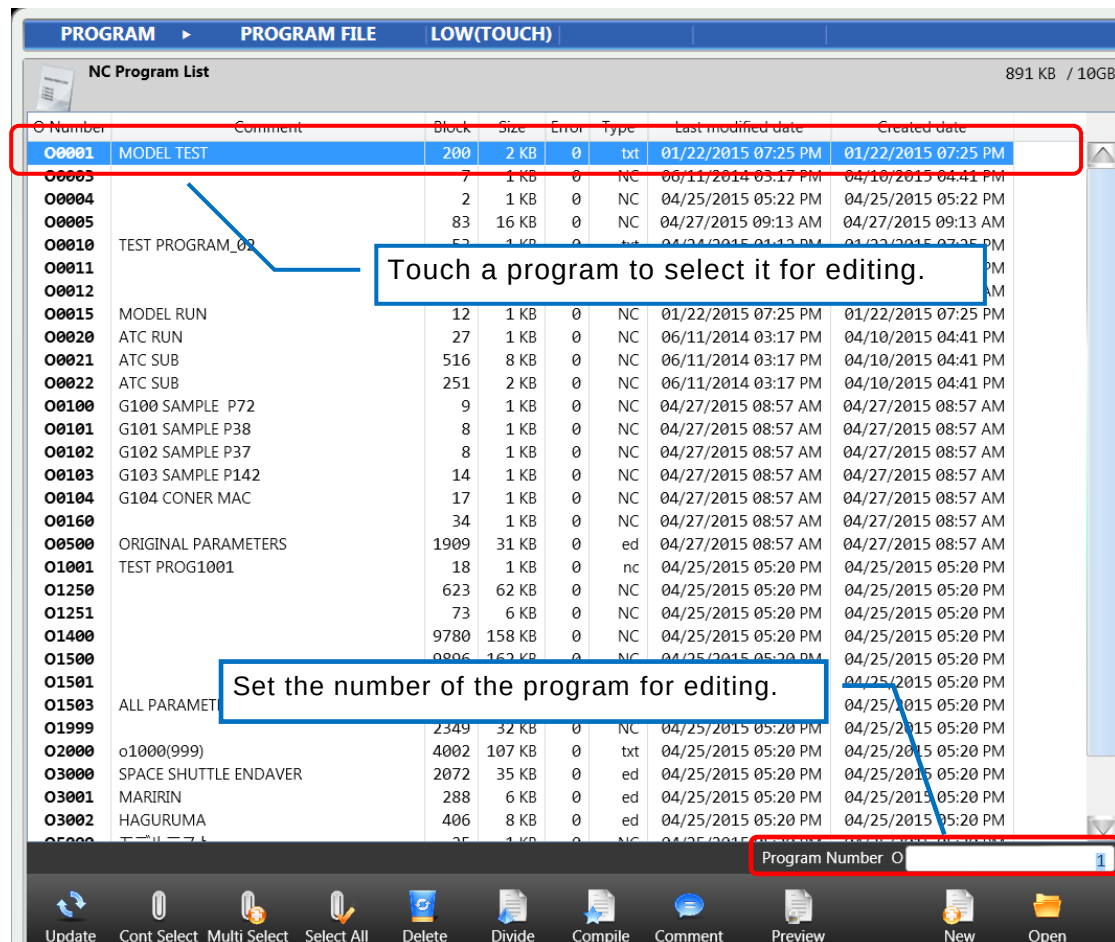


Figure 6-76 Open (NC Program list)

(2) Search



Perform a search through or replace the text.

1) Search

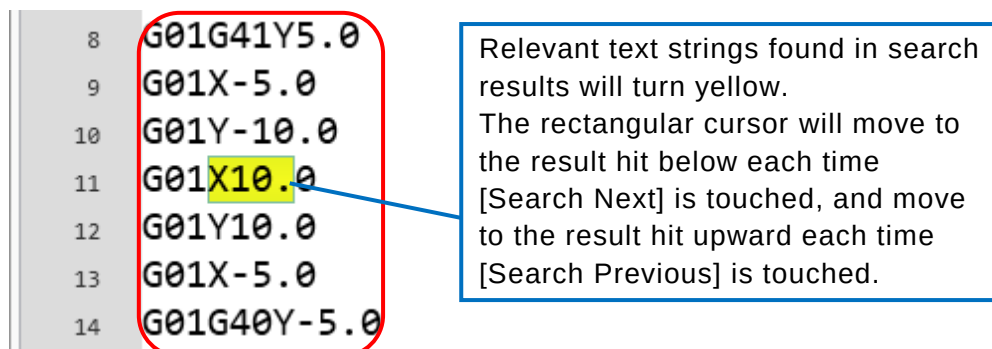
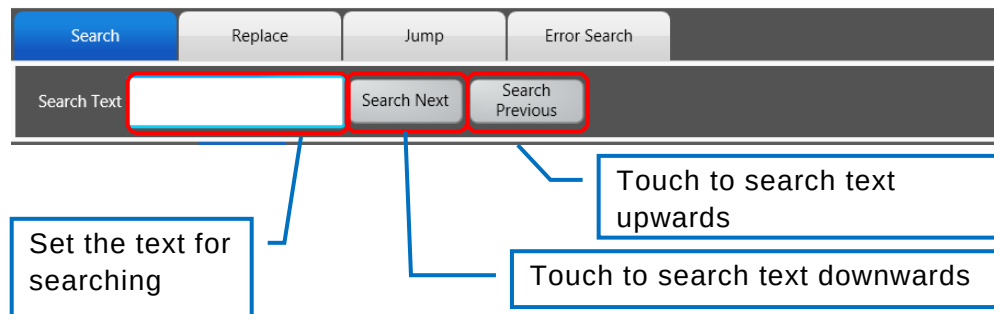


Figure 6-77 Search

(A) Set the text string for searching next to [Search Text].

(B) Touch the [Search Next] button.

Searching will start downward from the top of the program, and relevant text strings will turn be highlighted in yellow.

To continue searching the same text touch the [Search Next] button to search downwards, or [Search Previous] to search upwards.

2) Replace

Replace the searched text with different text.

There are two ways to replace text, either replacing each instance found one by one, or replacing them all at once.

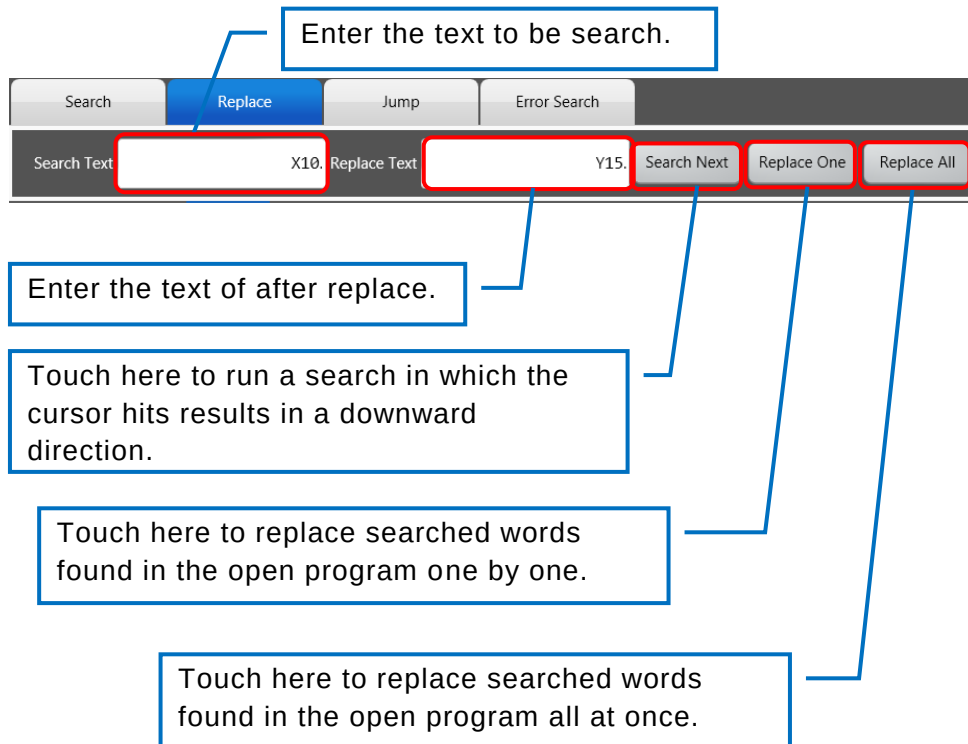


Figure 6-78 Replace

Replace One

- (A) Input text for replacement in the [Search Text] box.
- (B) Input new text in [Replace Text] to replace the previous text.
- (C) Touch the [Replace One] button.

Replace All

- (A) Input text for replacement in the [Search Text] box.
- (B) Input new text in [Replace Text] to replace the previous text.
- (C) Touch the [Replace All] button.

3) Jump

Perform a jump to the setting line.

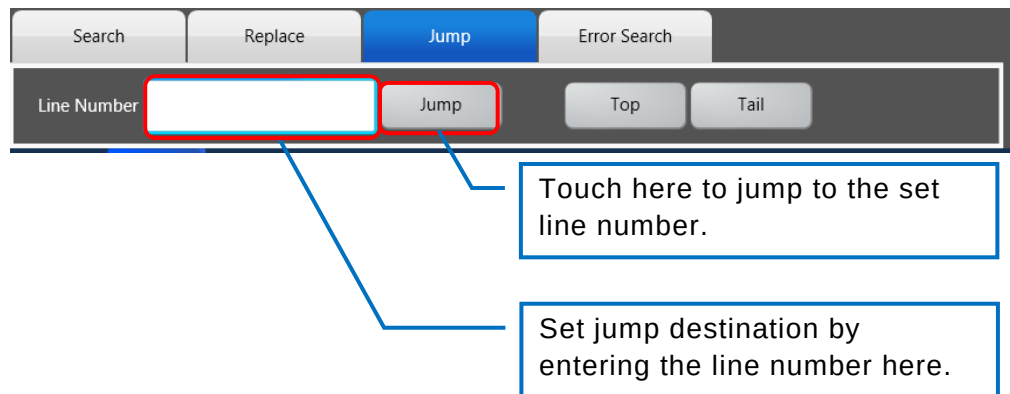


Figure 6-79 Jump

(A) Specify line number for the jump destination on [Line Number].

(B) Touch the [Jump] button.

[Top] button moves the cursor to the first line of program.

[Tail] button moves the cursor to the final line of program.

4) Error Search

Search through the program for error lines.

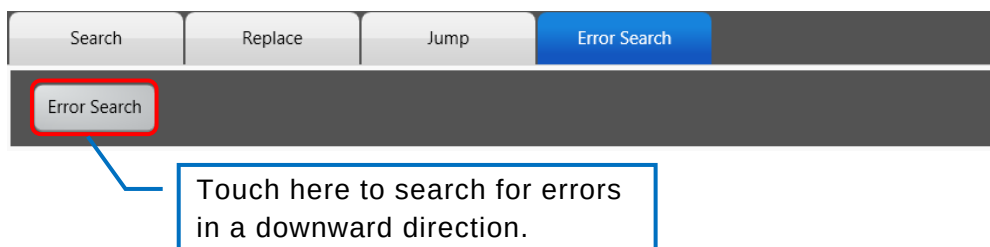


Figure 6-80 Error Search

(3) Program Copy



Allow for copying the whole program file to any O Number.

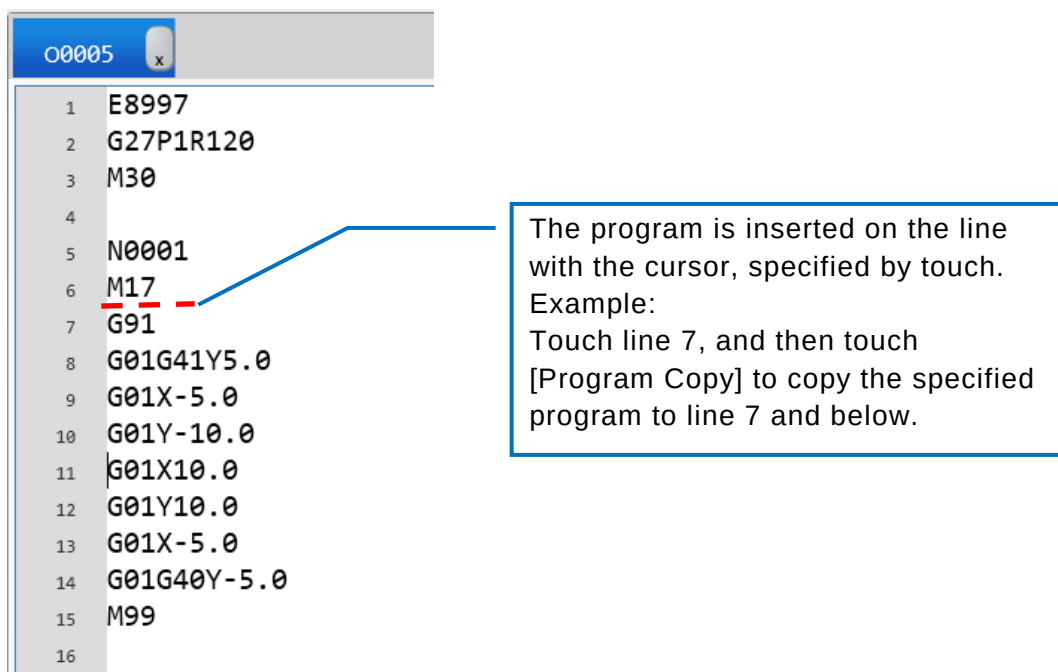
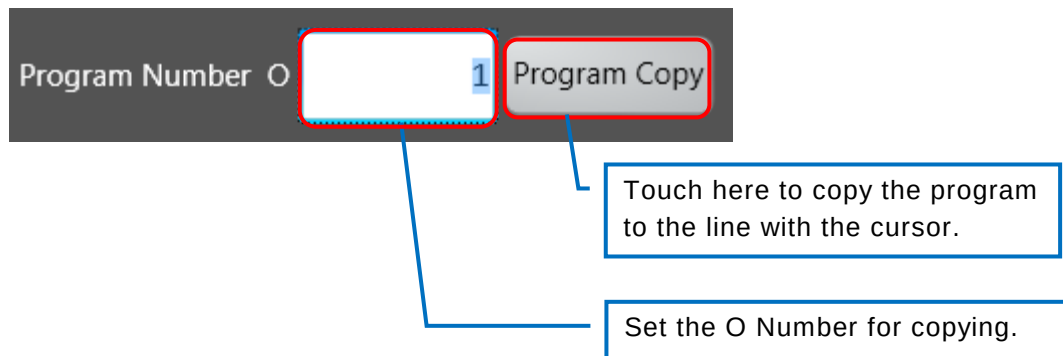


Figure 6-81 Program Copy

- (A) Set the O Number for insertion at [Program Number O].
- (B) Move cursor to where you want to insert the program.
- (C) Touch the [Program Copy] button. The program is inserted between the line with the cursor and the line before it.

(4) Select



This function is used to copy, paste, or delete multiple blocks.

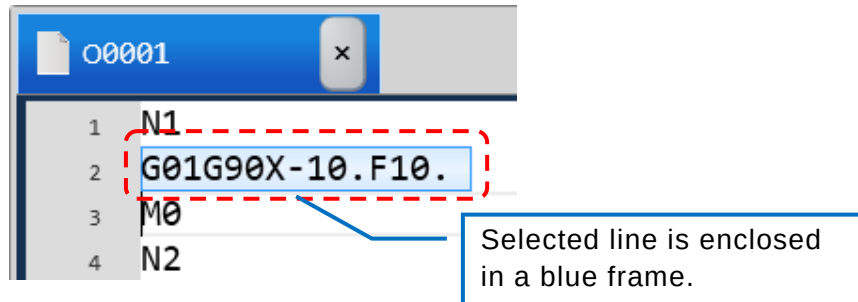


Figure 6-82 Select

- (A) To select lines, touch the line and press the [Select] button.
- (B) One line will be selected when the [Select] button is touched.
- (C) To select the range in an upward direction from the line touched, slide in an upward direction in the block view.
- (D) To select the range in a downward direction from the line touched, slide in a downward direction in the block view.

(5) Copy



Copy the selected range.

- (A) When copying only one line, place the cursor on the line to be copied and touch the [Copy] button.
- (B) To copy a wide area, select the area and touch the [Copy] button.

(6) Cut



Cut the selected area.

- (A) When cut only one line, place the cursor on the line to be cut and touch the [Cut] button.
- (B) To cut a wide area, select the area and touch the [Cut] button.

(7) Paste



Paste the copied block to any position.

- (A) Move cursor to where you want to paste the program.
- (B) Touch the [Paste] button. The program is paste between the line with the cursor and the line before it.

(8) Undo



Undo the editing done in the previous step.

(9) Redo



Cancel the action performed with the [Redo] button, restoring the previous status.

(10) Save

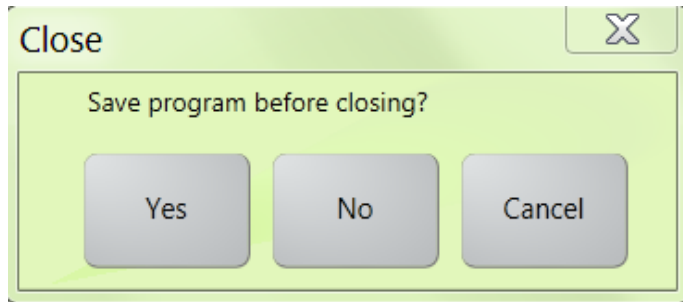


Overwrite the edited program, and return to the List screen.

(11) Close



Return to the List screen when not performing editing.
After editing the [Close] window is displayed.



After editing the [Close] window is displayed.
Press the [Yes] button to save the changes.
Press the [No] button to not save the changes.
To return to the Edit screen, touch the [Cancel] button.

Figure 6-83 Close

6.3 File Manage

Perform external input and output of the NC program.

There are two sections divided on the screen, [List view] shows the O Numbers registered on the NC unit, while [External device view] shows the external files.

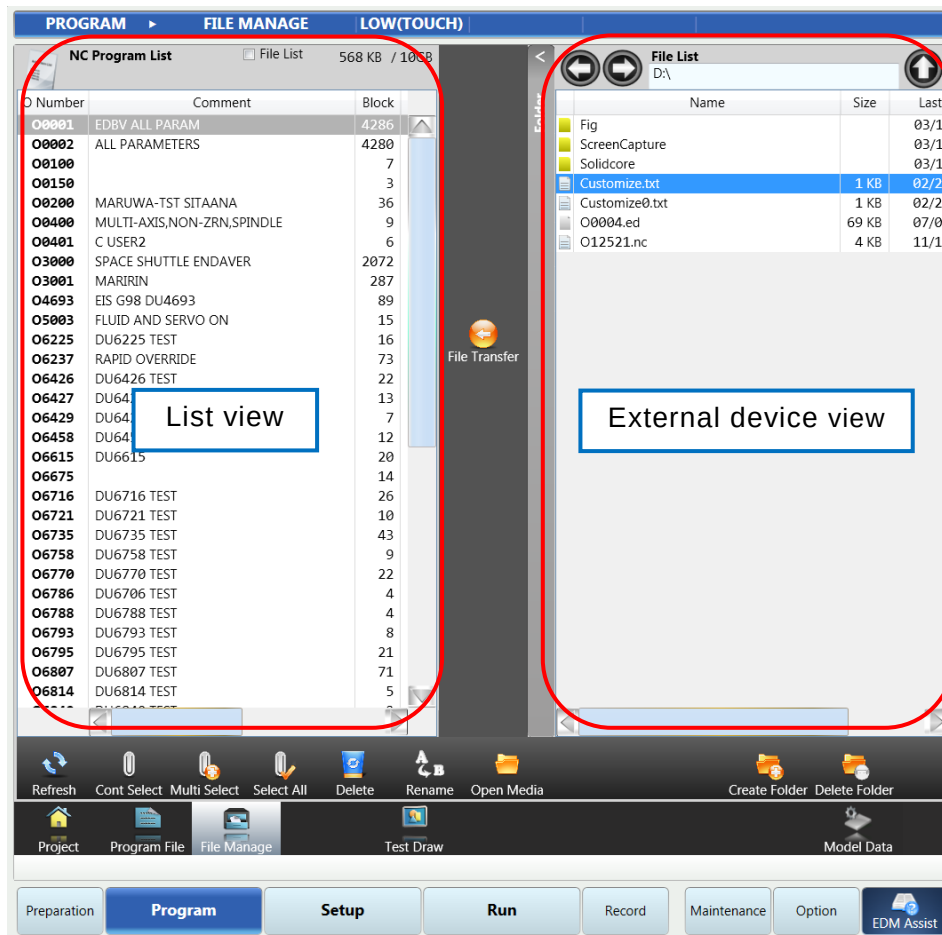


Figure 6-84 File Manage

6.3.1 NC Program List

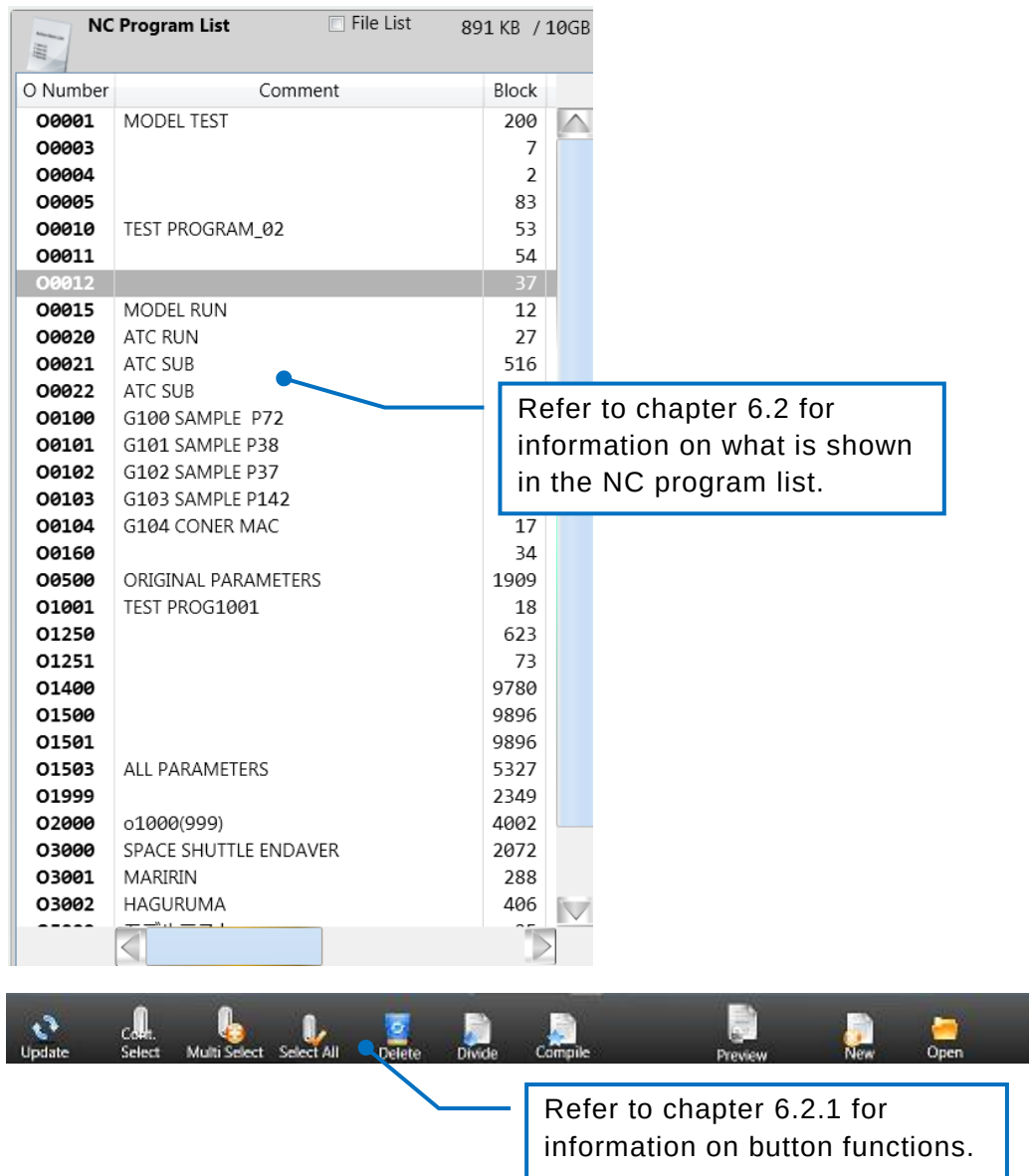


Figure 6-85 Program- File Manage Screen

6.3.2 File List

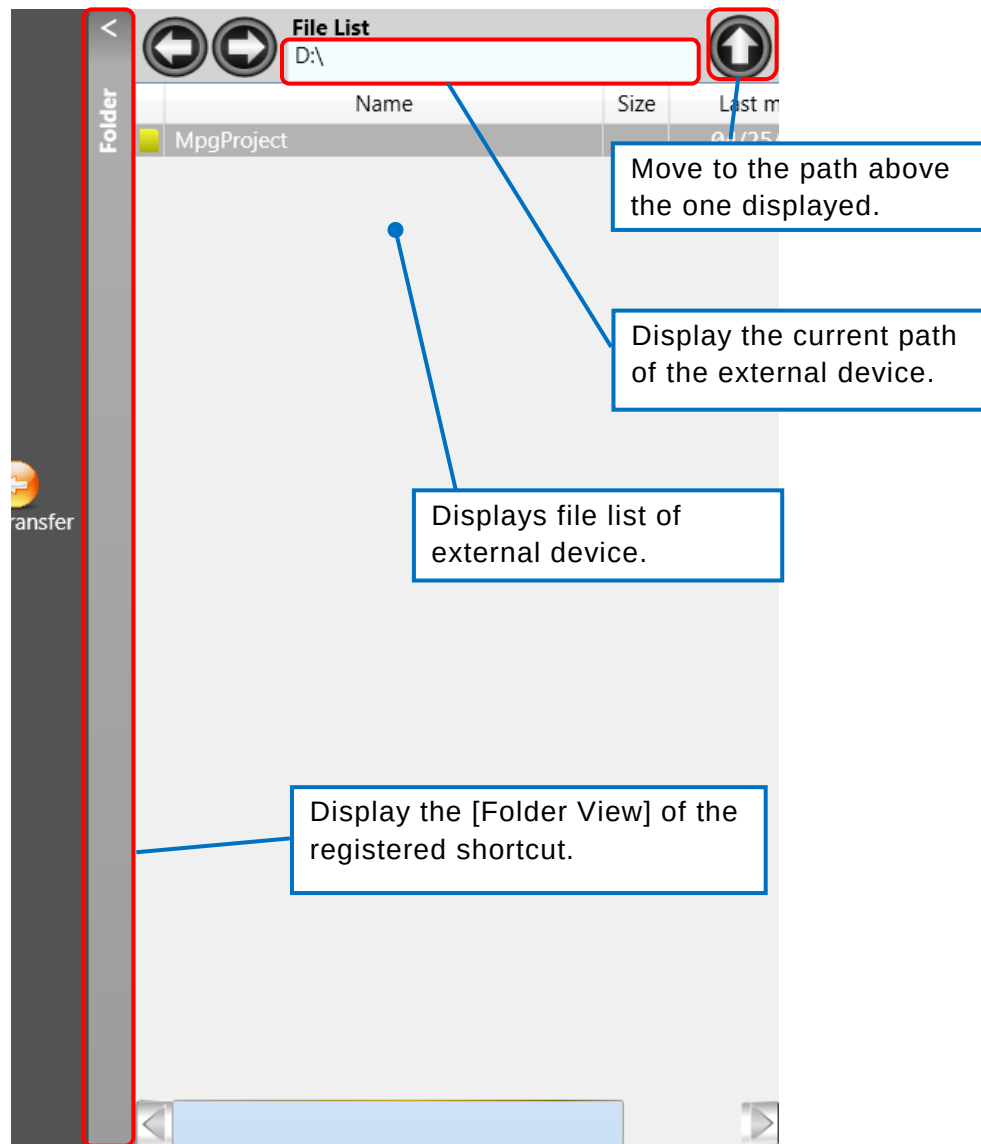


Figure 6-86 External Device View

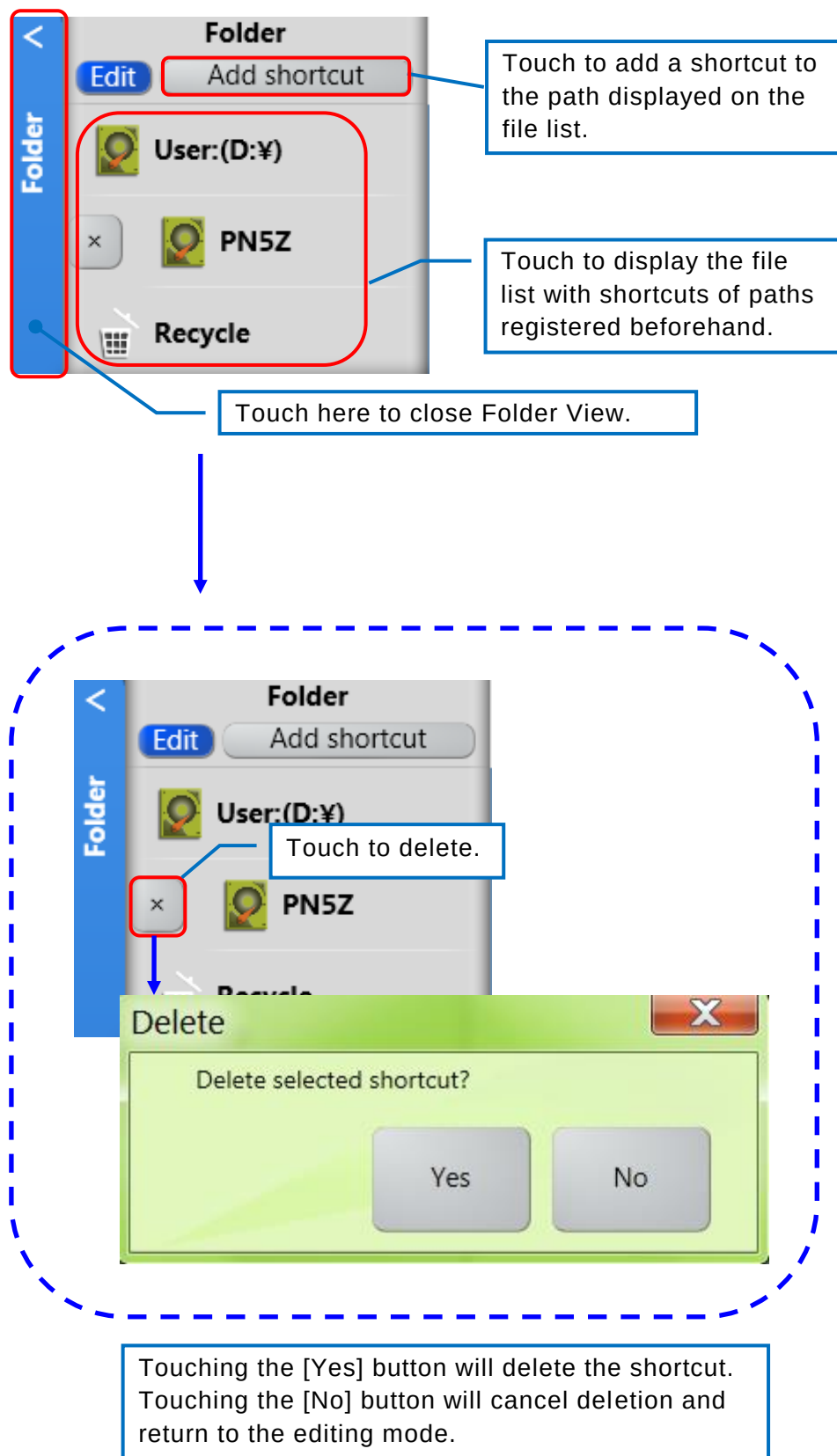


Figure 6-87 Folder View

6.3.3 Function of Each Button on File List Screen



Figure 6-88 Various Buttons of the File List

(1) Refresh



Refresh the file list display to the most recent information.

(2) Cont. Select



Use for continuous selection in the file list.

The operation method is the same as chapter 6.2.1, [(2) Cont. Select].

(3) Multi. Select



Use for nonconsecutive selection of file list.

The operation method is the same as chapter 6.2.1, [(3) Multi. Select].

(4) Select All



Use to select all files in the file list.

(5) Delete



Delete the selected file.

The operation method is the same as chapter 6.2.1, [(5) Delete].

(6) Rename



Rename the selected file.

(7) Open Media



The files in the USB memory or network (shared folder), could be opened directly on the machine.

Therefore, the contents of a program file or a related image file, etc. can be checked before transmitting NC program to a machine.

Followings are the file types which can be opened directly on the machine:

- Text (txt, nc, iso)
- Video(mp4)
- PDF (pdf)
- Image (jpg, jpeg, png)

(8) Create Folder



Create a folder in the file list.

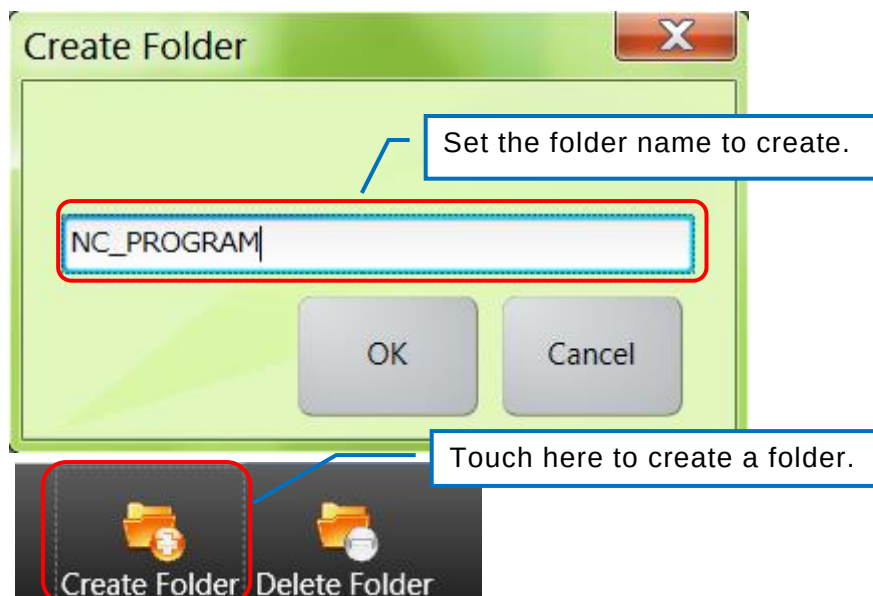


Figure 6-89 Create Folder

(A) Set the folder name next to [File/Folder Name].

(B) Touch the [Create Folder] button.

* Folders which already exist cannot be created.

(9) Delete Folder



Delete a folder from the file list.

(A) To delete a folder, touch it to select it from the file list.

(B) Touch the [Delete Folder] button.

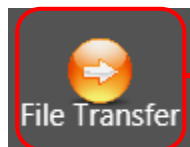


Touch the [Yes] button to delete the selected folder.
Touch the [No] button to cancel deletion.

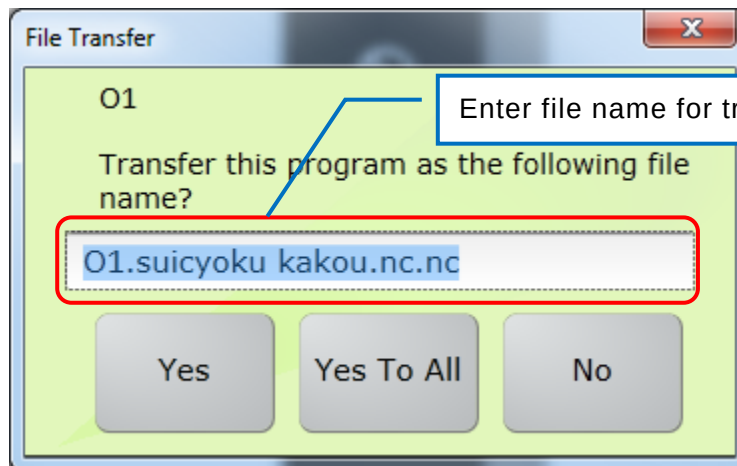
Figure 6-90 Delete Folder

6.3.4 Transferring Program Files

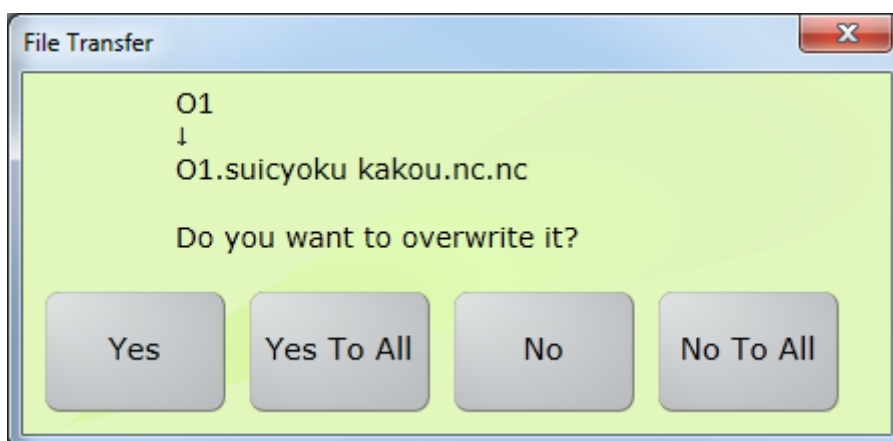
(1) Transfer Files from the NC Program List to the File List



Touch here to output files from [List view] to [External device view].



[Yes] : Touch to transfer using the entered file name.
 [Yes To All] : Touch to transfer multiple files, with all programs using the format of "O Number.comment.nc."
 [No] : Touch if you do not want to perform a transfer.



[Yes] : Touch to overwrite the selected file.
 [Yes To All] : Touch to overwrite multiple files even if a file of the same name already exists in the destination.
 [No] : Touch if you do not want to overwrite.
 [No To All] : Touch to not overwrite any of the files even if a file of the same name exists.

Figure 6-91 File Transfer (right side)

- (A) On the NC program list, touch to select programs for transfer to the file list.
 - (B) Touch the [File Transfer] button.
 - (C) Set the file name to be saved in the [File Transfer] window.
 - (D) Transfer file by touching the [Yes] button on the [File Transfer] window.
- A confirmation window will appear if there is a file of the same name in the transfer destination.

(2) Transfer Files from the File List to the NC Program List

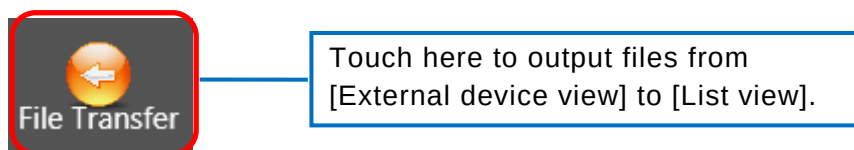


Figure 6-92 File Transfer Button (left side)

- (A) On the file list, touch to select file for transfer to the NC program list.
 - (B) Touch the [File Transfer] button.
 - (C) Set the O number to be saved in the [File Transfer] window.
 - (D) Transfer file by touching the [Yes] button on the [File Transfer] window.
- A confirmation window will appear if there is a file of the same name in the transfer destination.

(3) Transfer

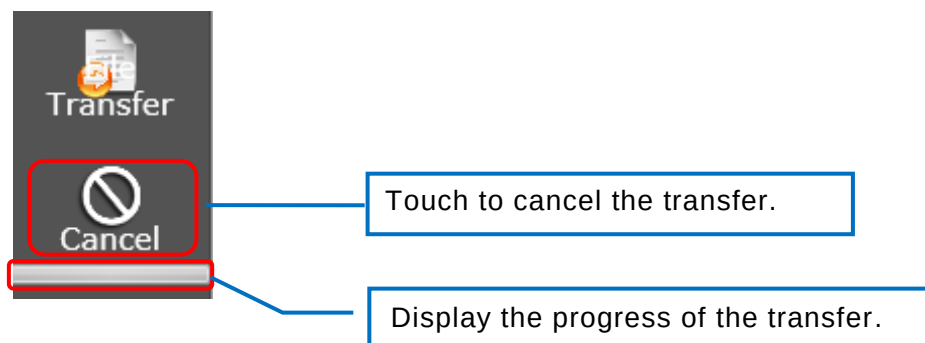


Figure 6-93 Transfer

- (A) The transfer status bar is displayed when a [File Transfer] is executed.
- (B) Touch the [Cancel] button to cancel the transfer.

6.4 Test Drawing

This function allows for checking of the program by drawing the program.

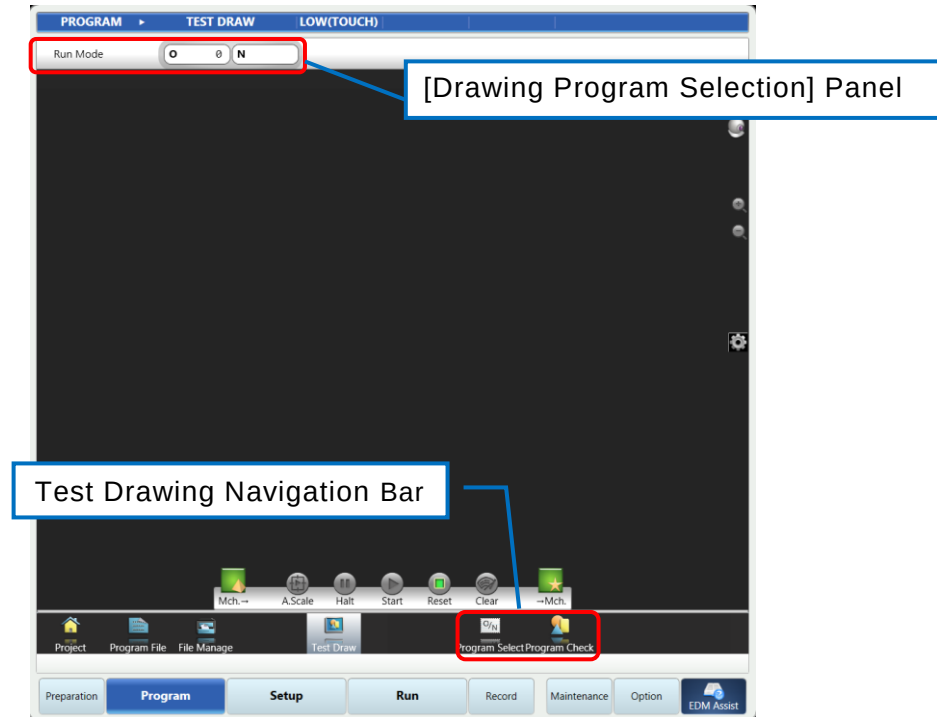


Figure 6-94 Test Drawing

(1) Test Drawing Navigation Bar

There are three operations in Test Drawing (Program Select, NC Setting and Program Check), which are operated by touch.



Figure 6-95 Navigation Bar

(2) Drawing Program Selection Panel

Set the O Number and N Number for the test drawing.

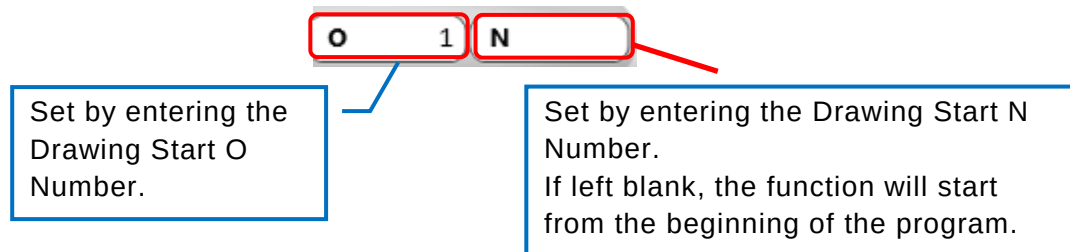


Figure 6-96 Drawing Program Selection Panel

(3) Main Drawing Panel / Sub-Drawing Panel

Checking can be performed before machining with the drawing (draft) made from the specified O/N Number program and the NC settings.

In addition, enlargement/reduction of the drawn image, switching 2D/3D, and changing the angle of the X/Y axis in 3D is possible.

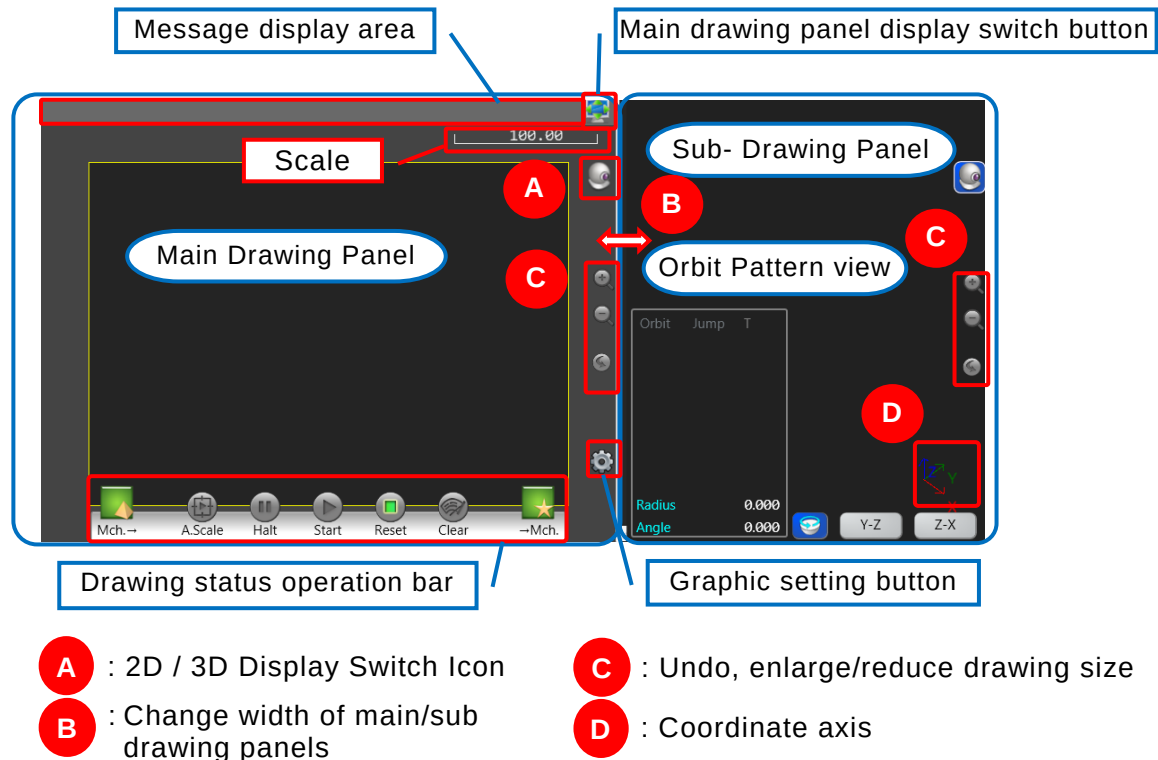


Figure 6-97 Main Drawing Panel / Sub-Drawing Panel

(A) Main Drawing Panel & Sub-Drawing Panel

Normally, the main drawing panel displays the 2D image (X axis rotation: 0°, Y axis rotation: 0°), and the sub-drawing panel displays the 3D image (X axis rotation: 45°, Y axis rotation: 45°).

When taper mode for NC setting is 2, drawing is done on the specified drawing plane, and in the case of 0 or 1 drawing is done with the program plane or sub-plane height, but when the sub-plane height is 0 the drawing is on the program plane.

By dragging/dropping to any spot on the drawing panel, the graphic image can be moved.

In addition, the size of the graphic can be enlarged by pinch-out (using two fingers to touch the screen and slide apart), or reduced by pinch-in (using two fingers to touch the screen and slide together).

(B) Message Display Area

Guide messages and alarm messages are displayed. When a message is being displayed, icons for showing EDM Assist are also displayed.

(C) Main Drawing Panel Display Switch Button

Display of the main drawing panel is enlarged.

By using the Switch 2D / 3D display tool, it's possible to switch display of the graphic image.

Clicking the Switch Display button on the enlarged main drawing screen panel will revert back to showing two panels, the main drawing and sub-drawing panel.

If the main drawing panel is quit while enlarged, it will still be enlarged the next time it is opened.

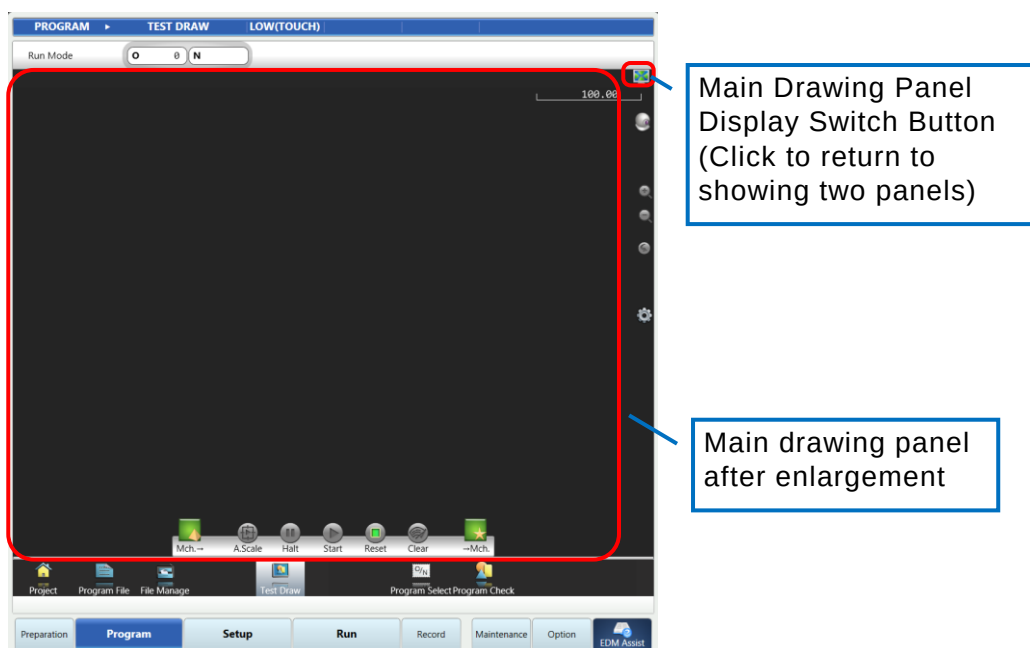


Figure 6-98 Main Panel after Enlargement

(D) Scale Display

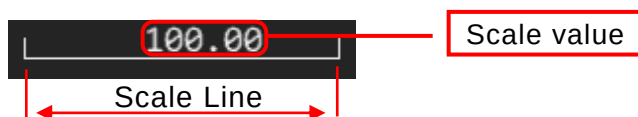


Figure 6-99 Scale Display

When the graphic image shown on the main drawing panel and sub-drawing panel is in 2D, scale values and a scale line is shown to have a rough understanding of figure's dimensions.

In figure 6-90, Reduced Scale Display, the length of the scale line indicates around 1 mm. The scale units displayed are specified in the [Units] window on the [Options] screen.

●2D / 3D Display Switch Icon

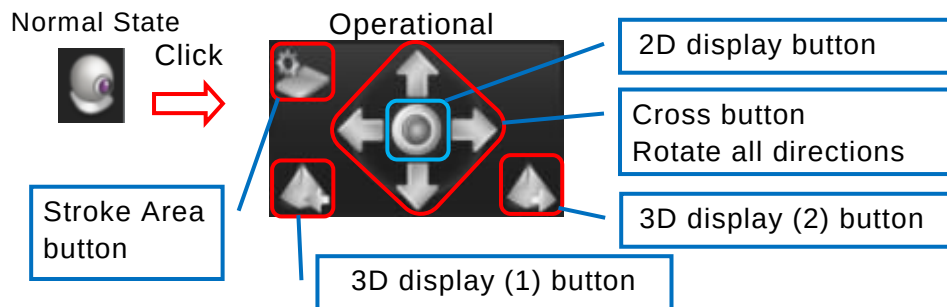


Figure 6-100 2D / 3D Display Switch Icon

- (i) Click the Normal State icon to switch to Operational State.
 - (ii) Click the [Stroke Area] button to display the ranged figure with soft limit [Max Coordinate] [Min Coordinate].
 - (iii) Click the [2D Display] button to display graphic image in 2D (X axis rotation: 0°, Z axis rotation: 0°).
 - (iv) Click the [3D Display (1)] button to display the graphic image in 3D (X axis rotation: 45°, Z axis rotation: 45°).
Click the [3D Display (2)] button to display the graphic image in 3D (X axis rotation: -45°, Z axis rotation: -45°).
 - (v) Click the Cross Button to rotate the graphic image in any direction.
Click the [↑] key or [↓] key once to rotate the X axis 15° or -15°.
Click the [←] key or [→] key once to rotate the Z axis 15° or -15°.
In addition, holding down the button will rotate the graphic image in the specified direction.
- (E) Changing Width of the Main Drawing/Sub Drawing Panel
- It's possible to change the border of the main and sub-drawing panels by drag and drop controls. The most recently changed panel width will be shown the next time it is opened.
- (F) Drawing Size Enlargement / Reduction / Undo
- (i) Enlargement / Reduction
Display of the 2D/3D graphic image can be altered by a factor of 0.01 ~ 5000.00.
Enlarge the image with the [+] button, and reduce the size with the [-] button.
 - (ii) UNDO
Cancel the previous action, and display the status as it was before.

(G) Coordinate Axis

Currently the X, Y, and Z coordinate axes are displayed for the image being drawn. When the figure has been rotated the coordinate axes from after rotation will be shown.

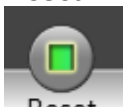
(H) Drawing Status Operation Bar

With the drawing status operation bar on the main drawing panel the running status of the program drawing is displayed. Also, operation of program drawing can be performed here.



Figure 6-101 Drawing Status Operation Bar & Buttons

Table 6-5 Drawing Status Operation Button

Button name	Description
Auto Scale  A.Scale	Turn ON the [A. Scale] button to display the ideal size for fitting the whole image in the drawing panel. This button can be clicked to redisplay the ideal size for the whole image, such as after enlarging parts of the image for checking.
Halt  Halt	Halts the program drawing and the [Halt] button will be turned ON. Since the drawing is temporarily Halted, it's possible to check the trajectory of the drawing. Press the [Start] button to restart the drawing.
Start  Start	Start the program drawing. Operation is not halted even if halted blocks are included in the program (M00, M01 or M08). If there are any warnings or alarms in the block, a message is displayed and drawing is temporarily halted. Drawing speed is adjusted with the [Speed Adjust] slider under [Graphic Drawing] on the [Graphic Settings] window.
Reset  Reset	Drawing actions can be interrupted.
Clear  Clear	Images drawn in the main or sub-drawing panels are cleared.
MC→Graphic  →Mch.	NC functions on the run data side, offset data, etc. is transferred to the drawing data. A confirmation message box appears when touched. Press [Yes] to transfer the data. Press [No] to not transfer the data.
Graphic→MC  →Mch.	Transfer NC functions from the test drawing and offset data, etc. to the run data. Long press to display a message box confirming the data transfer. Press [Yes] to transfer the data. Press [No] to not transfer the data.

(4) Graphic Setting

Various settings related to graphic drawing are performed here.

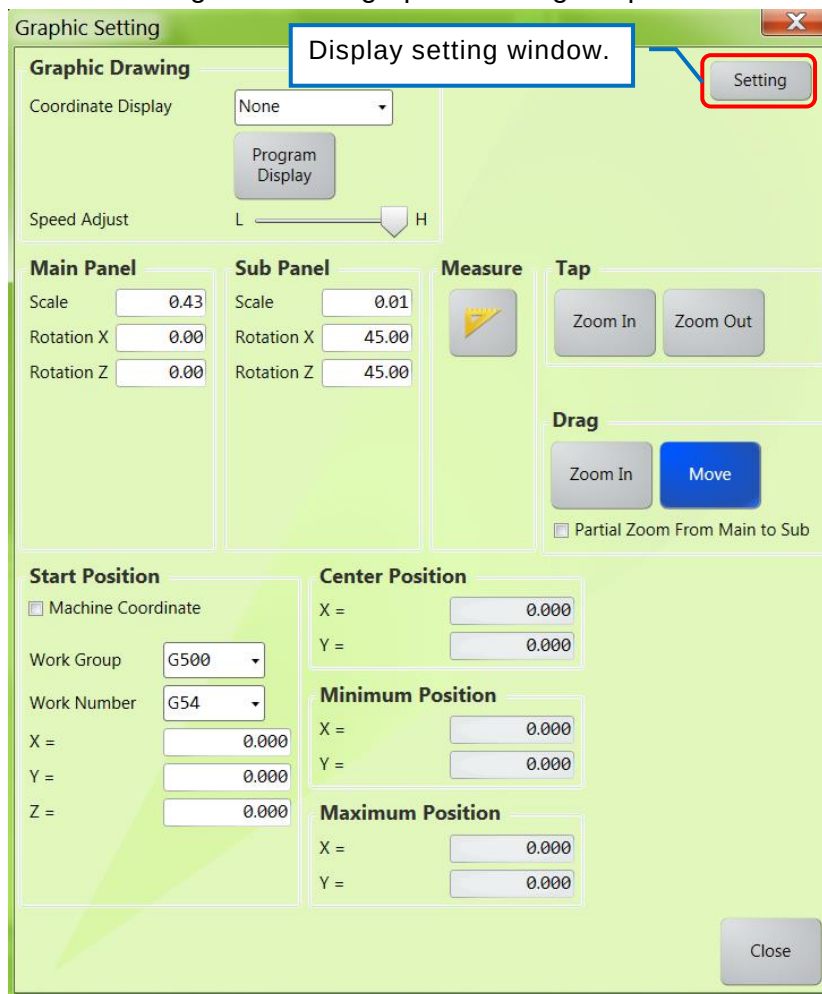


Figure 6-102 Graphic Setting Window

(A) Graphic Drawing

Make selections for coordinates shown on the main drawing panel, hide/display blocks, and drawing speed.

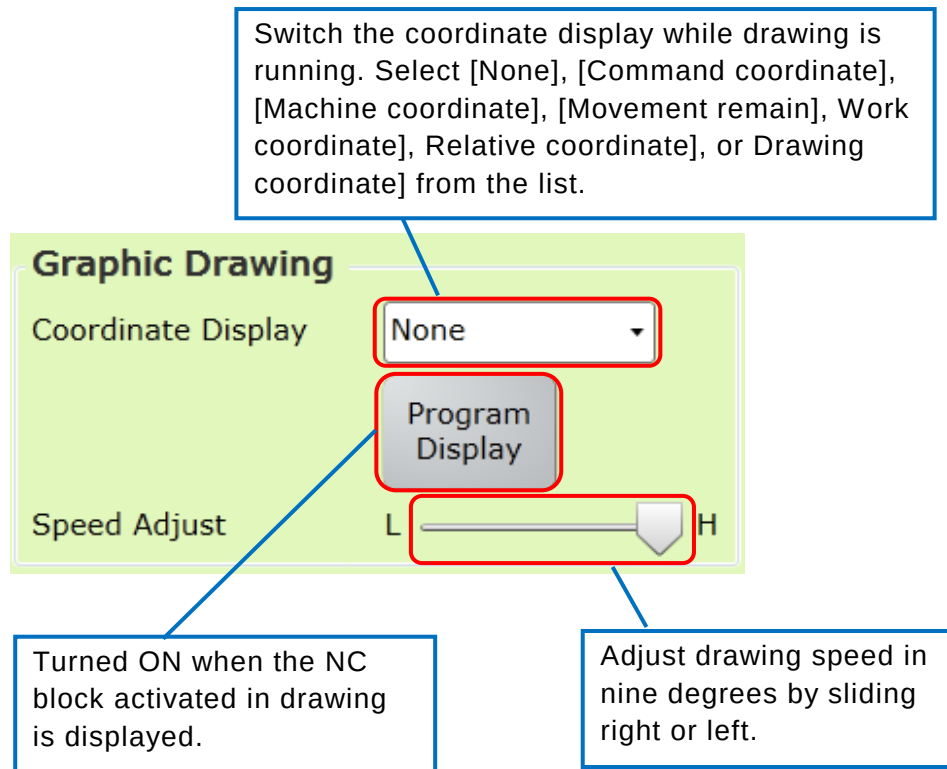


Figure 6-103 Graphic Drawing

(B) Main Drawing Panel / Sub-Drawing Panel

The drawing scale and rotation angles (X axis, Z axis) for the main drawing panel and sub-drawing panel can be set up here.

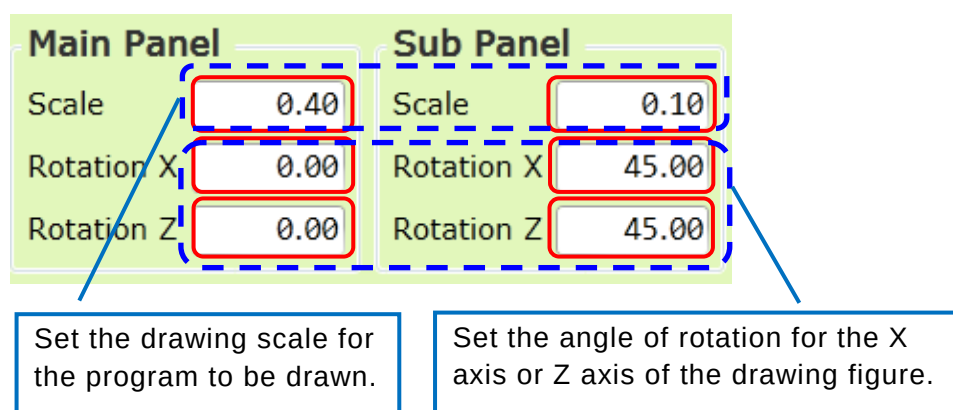


Figure 6-104 Main Drawing Panel / Sub-Drawing Panel

(C) Measure

Measurement can be made between any two points that are touched.

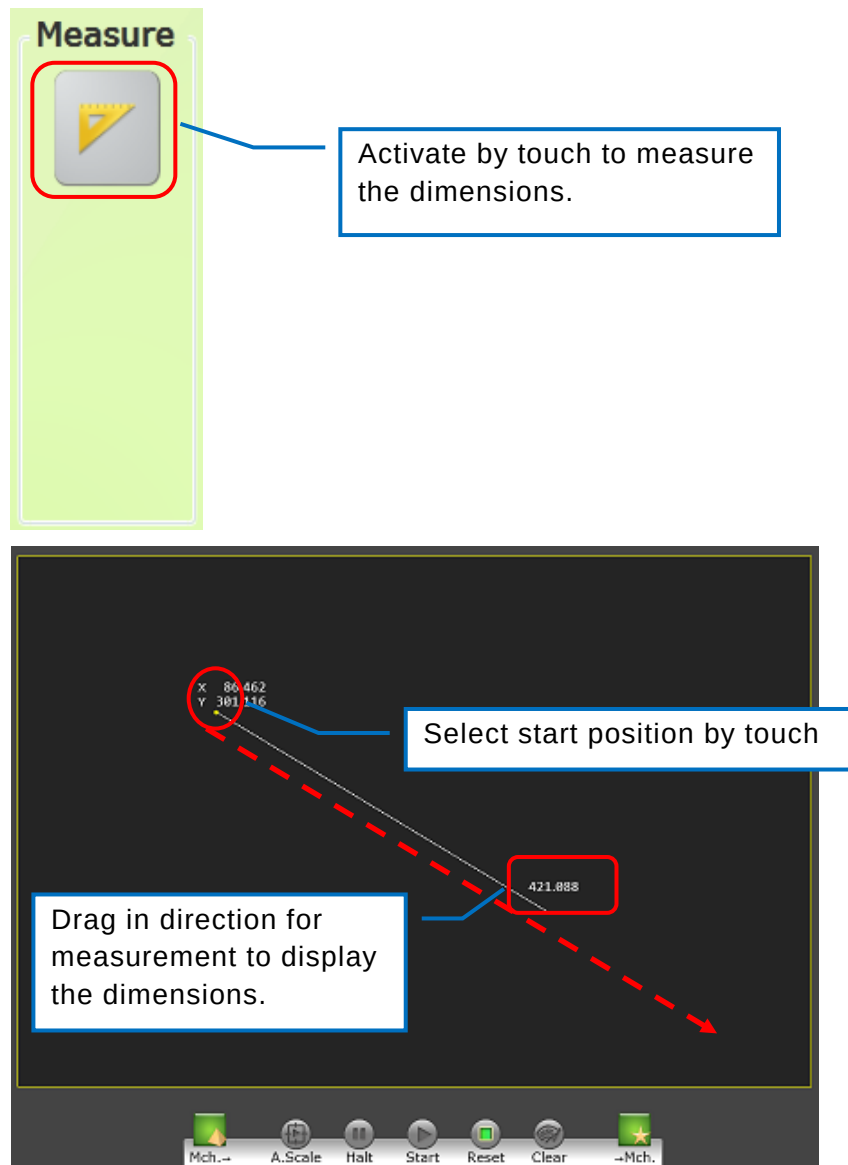


Figure 6-105 Measure

Figure enlargement or reduction by dragging or tapping does not work during measurement of dimensions.

(D)Tap / Drag

Set image display behaviors with Tap and Drag.

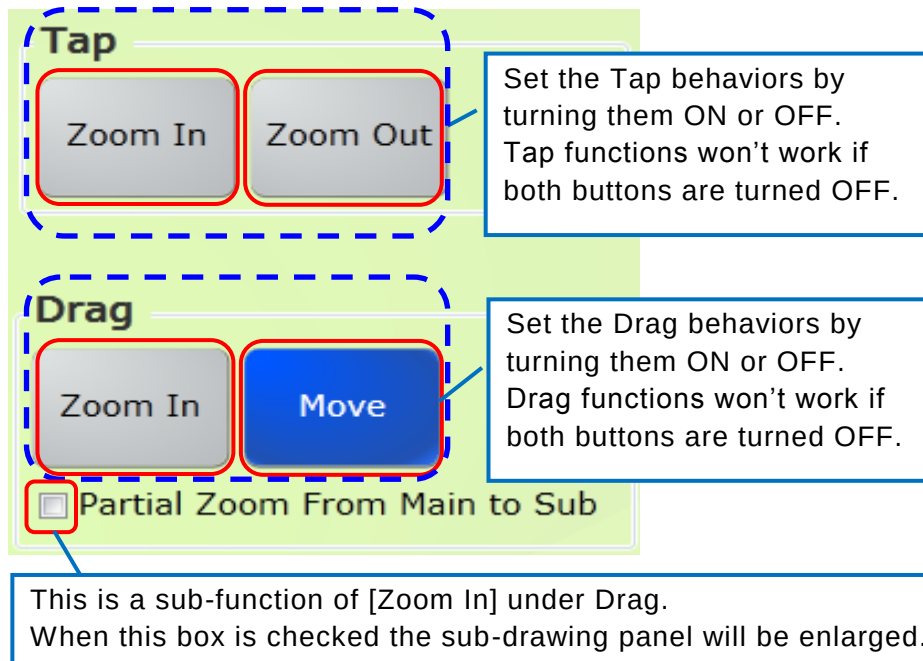


Figure6-106 Tap / Drag

Table 6-6 Tap

Button	Description
Zoom In	Figure is enlarged each time the main drawing panel is tapped.
Zoom Out	Figure is reduced each time the main drawing panel is tapped.

Table 6-7 Drag

Button	Description
Zoom In	Drag on the main drawing panel to enlarge the figure in the selected range.
Move	Dragging on the main drawing panel will move the figure in the direction dragged.

(E) Start Position

Enter the settings of the coordinate system and coordinate group configured as a modal when starting a test drawing, and the X/Y coordinate values used to start drawing.

The 'Start Position' dialog box contains the following elements and annotations:

- Machine Coordinate:** A checked checkbox. Annotation: "Check here if the start position is set as the machine coordinates. If left unchecked, the start position will use the work coordinate specified in the [Work Group] and [Work Number] below."
- Work Group:** A dropdown menu showing 'G500'. Annotation: "Select the coordinate system G500 ~ G515, set as a modal."
- Work Number:** A dropdown menu showing 'G54'. Annotation: "Select the coordinate system G54 ~ G61, set as a modal."
- X =:** A text input field with '-100.000'. Annotation: "Set the coordinates for the X-axis to start drawing."
- Y =:** A text input field with '-100.000'. Annotation: "Set the coordinates for the Y-axis to start drawing."
- Z =:** A text input field with '-10.000'. Annotation: "Set the coordinates for the Y-axis to start drawing."

Figure 6-107 Start Position

(F) Center Position / Minimum Position / Maximum Position

The center, minimum and maximum positions configured are displayed when the [Drawing Status Operation] and then the [Auto Scaling] buttons are touched. Values cannot be changed.

The dialog box is divided into three sections, each with X and Y coordinate inputs, all showing '0.000':

- Center Position:** X = 0.000, Y = 0.000
- Minimum Position:** X = 0.000, Y = 0.000
- Maximum Position:** X = 0.000, Y = 0.000

Annotation: "After Auto Scaling, the center position, minimum position and maximum position will be displayed."

Figure 6-108 Center Position / Minimum Position / Maximum Position

(5) Setting Window

In the [Graphic Setting] window, detailed setting for drawing is available in the window that appears when the [Set] button is touched.

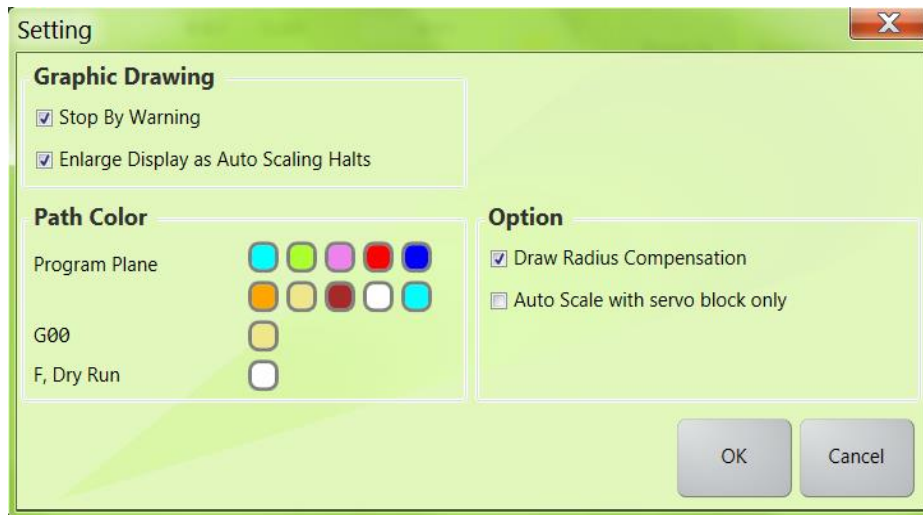


Figure 6-109 Setting Window

(A) Estimation

Configure the display for the stop drawing method, or for auto scaling.

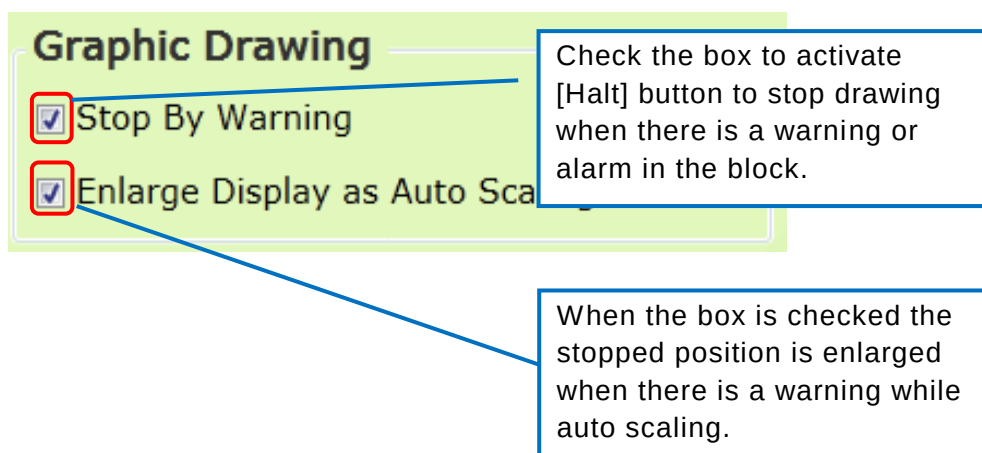


Figure 6-110 Graphic Drawing

(B) Path Color

Set the path colors for machining feed, G00 rapid feed, F feed and dry run on G01.

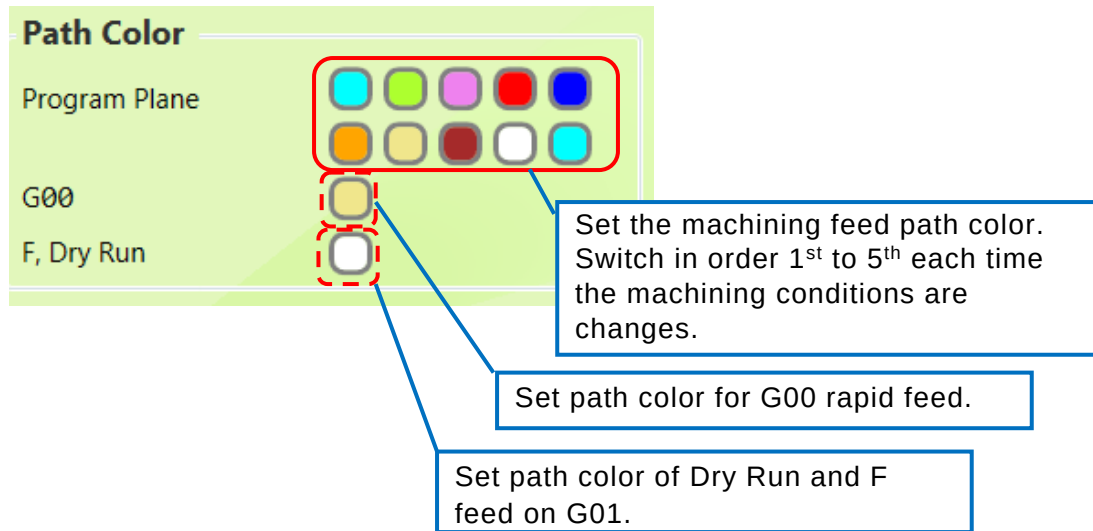


Figure 6-111 Path Color

(C) Option

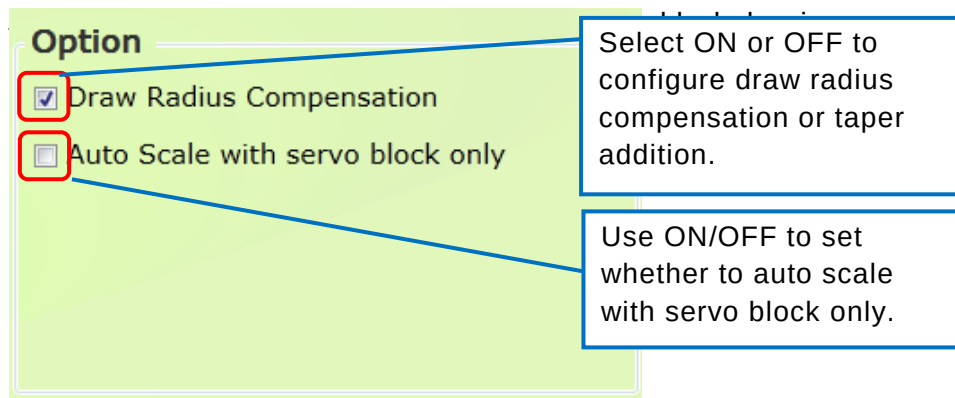


Figure 6-112 Option

(i) [Draw Radius Compensation]

ON (enabled): Do standard drawing (Radius compensation, taper added)

OFF (disabled): Draw program path without radius compensation or taper adding. This is useful for when checking shape without radius compensation (machining target dimensional figures), or checking radius compensation direction (G41, G42).

(ii) [Auto Scale with servo block only]

ON (enabled): Draw program tracing without G00 rapid feed, F feed or dry run. This is useful when checking only the machining shape.

OFF (disabled): Perform standard drawing (G00 rapid feed, F feed, dry run adding).

6.4.1 Program Selection

Select program for test drawing from the programs registered on the NC unit.

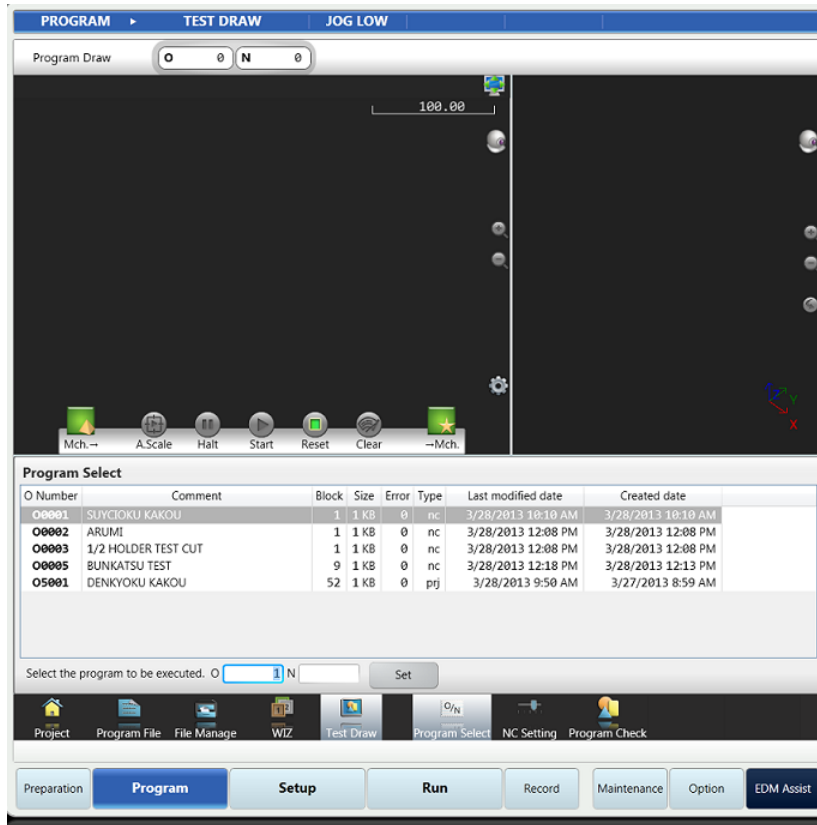


Figure 6-113 Program Selection

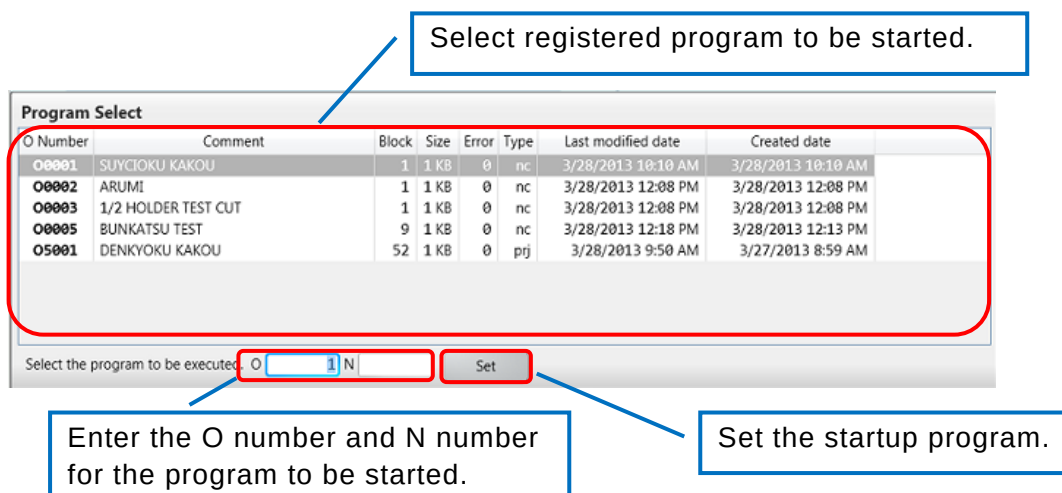


Figure 6-114 Program Selection View

When the block currently being drawn has Orbit specification, the Orbit Pattern data is displayed.

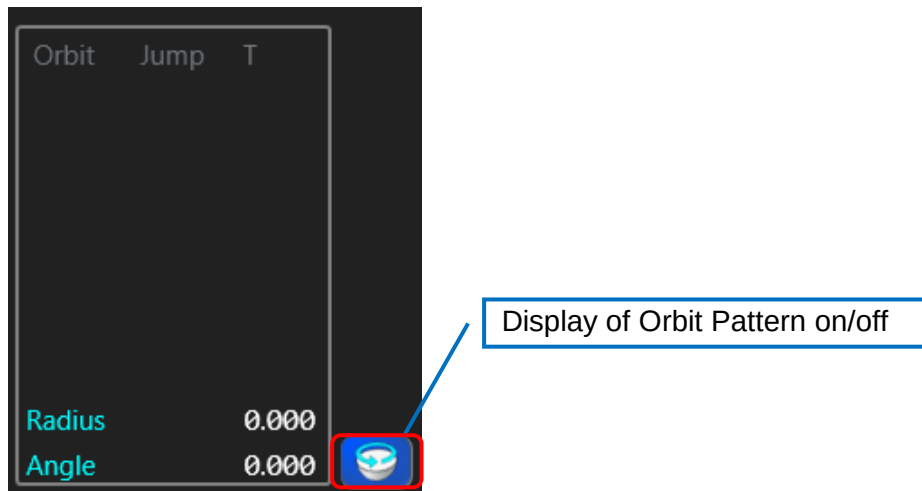


Figure 6-115 Orbit Pattern view

(A) Orbit and Jump Statuses

The ON/OFF status of the orbit function and that of the jump function are displayed.

(B) Display of Orbit Pattern

When the block currently being drawn has Orbit specification, the Orbit Pattern data and the command values of Orbit radius R and Orbit angle are displayed.

6.4.2 Program Check

This screen displays a motional image of the program registered to the NC. The motional image of the background program not executed at present, or the current machine operation paths are displayed. Moreover, the NC function (optional stop, skip and single blocking) for Test Drawing and the rotation angle of coordinate system are set.

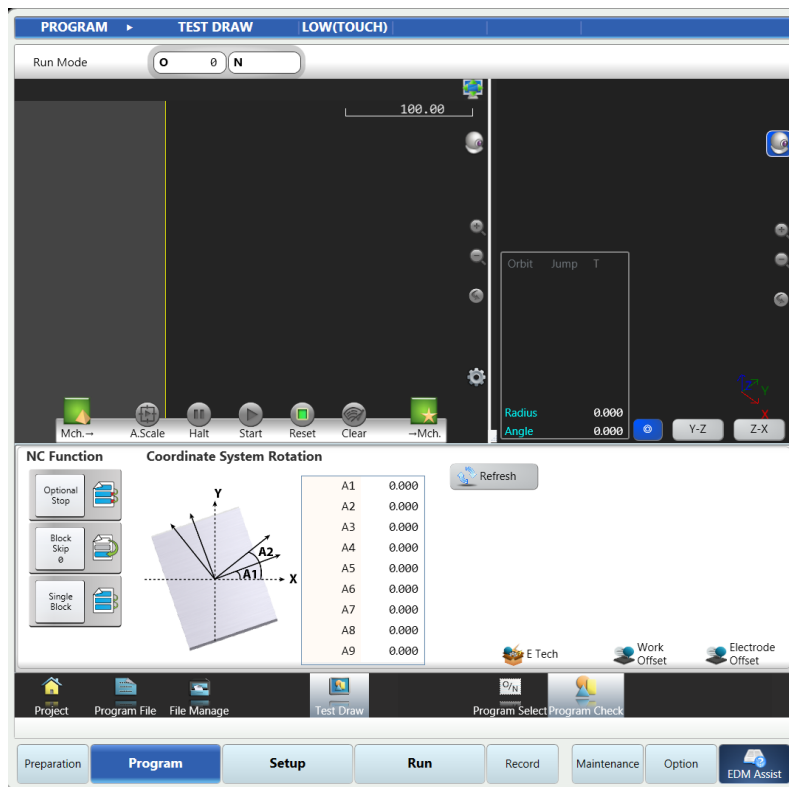


Figure 6-116 Program Check

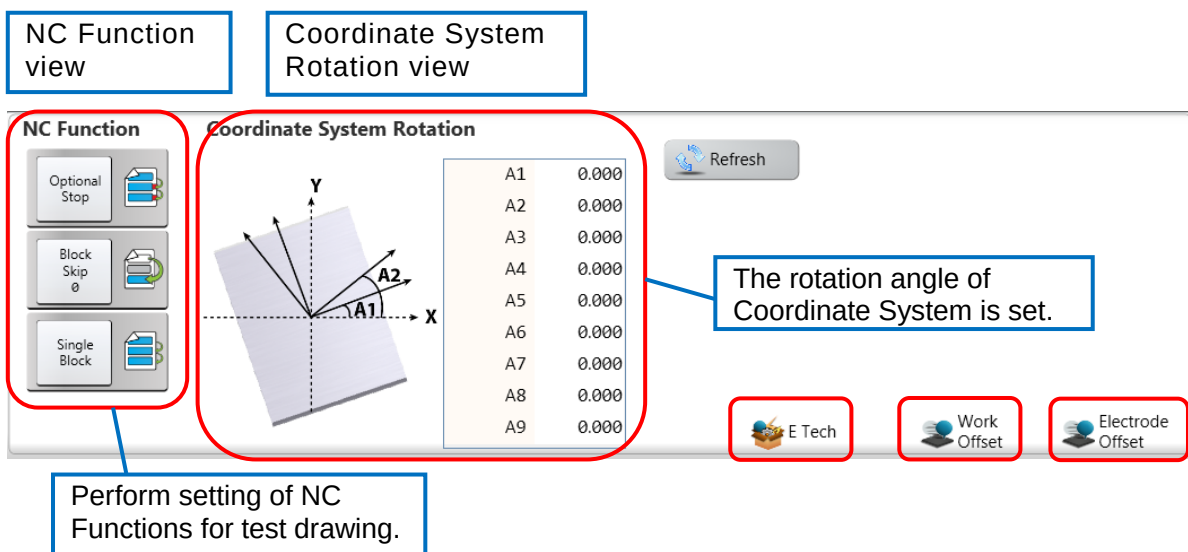


Figure 6-117 NC Setting View

(1) NC Function

Set NC functions on test drawing side. For detailed info on the functions, refer to "Chapter 4 Status Monitor."

Offset data and NC function buttons are exclusively for Test Draw.

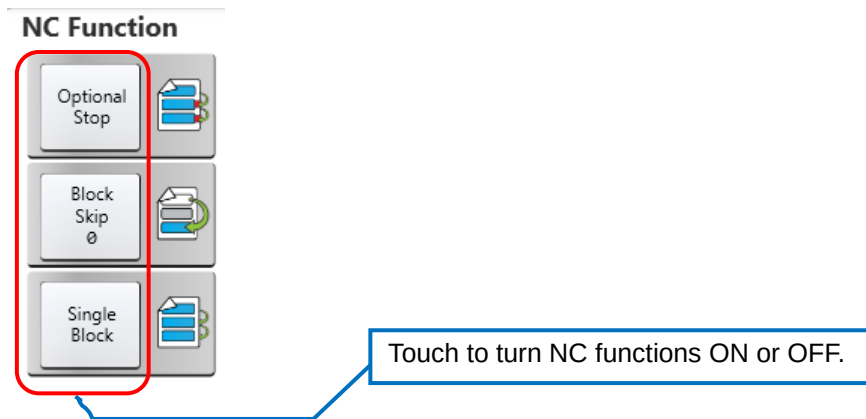


Figure 6-118 NC Function

(2) Coordinate System Rotation

Set up the rotation angle that will be used for the rotation of Coordinate system of the G92. The angles that can be set up consist of nine types from "A1 ~ A9".

To cancel the rotation of the workpiece coordinate system, specify "0."

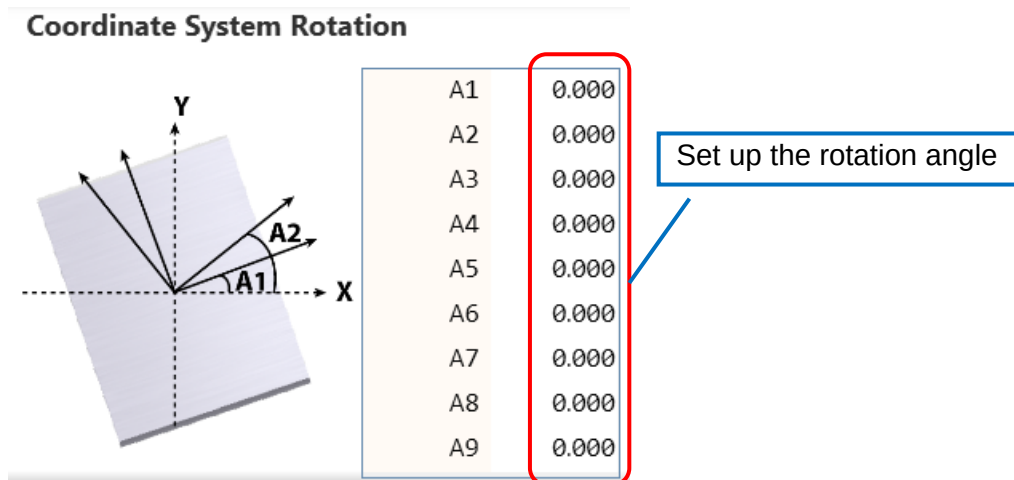


Figure 6-119 Coordinate System Rotation

(3) E Tech

Perform setting of the value of indirect D for Test Drawing.

(4) All Work Offset

The work offsets for test drawing are displayed.

The 'Work Offset' dialog box displays a grid of offset values for G54 through G61. The G54 and G55 offsets for X, Y, and Z are -100.000, while C is 0.000. All other offsets (G56 through G61) are 0.000 for all axes. The dialog includes a search bar and a close button.

G54 (A0)	G55 (A0)	G56 (A0)	G57 (A0)
X -100.000	X -100.000	X 0.000	X 0.000
Y 0.000	Y -100.000	Y 0.000	Y 0.000
Z 0.000	Z 0.000	Z 0.000	Z 0.000
C 0.000	C 0.000	C 0.000	C 0.000

G58 (A0)	G59 (A0)	G60 (A0)	G61 (A0)
X 0.000	X 0.000	X 0.000	X 0.000
Y 0.000	Y 0.000	Y 0.000	Y 0.000
Z 0.000	Z 0.000	Z 0.000	Z 0.000
C 0.000	C 0.000	C 0.000	C 0.000

Search: G500 G54

Close

Figure 6-120 Work Offset

(5) Electrode offset

Electrode offset for test drawing is displayed.

The 'Electrode Offset' dialog box displays a grid of offset values for electrode groups 1 through 8. All offsets for X, Y, Z, and C are 0.000. The dialog includes a search bar and a close button.

(1)	(2)	(3)	(4)
X 0.000	X 0.000	X 0.000	X 0.000
Y 0.000	Y 0.000	Y 0.000	Y 0.000
Z 0.000	Z 0.000	Z 0.000	Z 0.000
C 0.000	C 0.000	C 0.000	C 0.000

(5)	(6)	(7)	(8)
X 0.000	X 0.000	X 0.000	X 0.000
Y 0.000	Y 0.000	Y 0.000	Y 0.000
Z 0.000	Z 0.000	Z 0.000	Z 0.000
C 0.000	C 0.000	C 0.000	C 0.000

Electrode Offset No. Search

Close

Figure 6- 121 Electrode offset

7.Setup

The Setup screen is for workpiece setup, electrode measurement and positioning before performing machining.

7.1. Configuration of the Measurement Screen

As shown in Figure 7-1 Setup Screen (Positioning Screen), the measurement screen is mainly displayed as five areas.

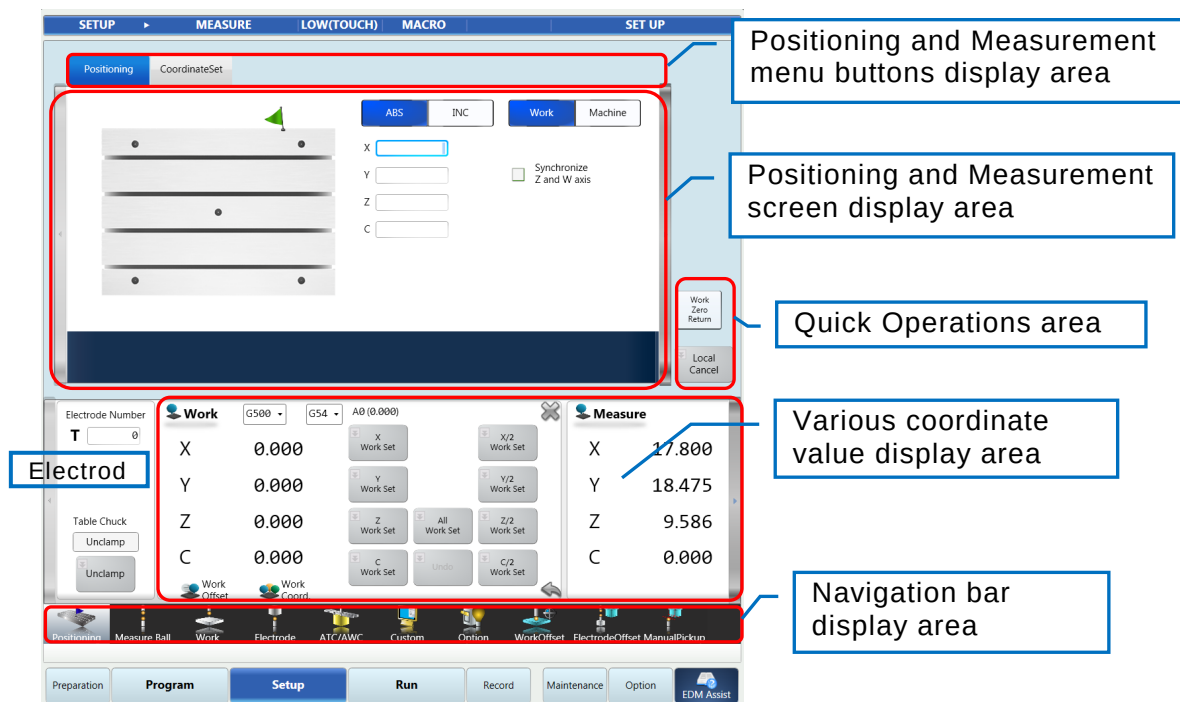


Figure 7-1 Setup Screen (Positioning Screen)

The Positioning and Measurement screen is operated in the manual operation mode.

A semi-transparent blue window appears in modes other than the manual operation mode.

By touching a semi-transparent blue area, you can switch the mode to the manual operation mode.

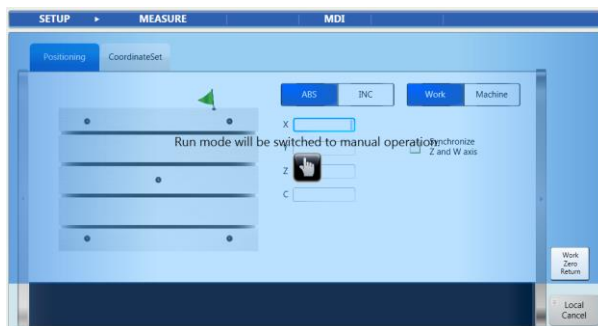


Figure 7-2 Display in Case of Modes other than the Manual Mode (Positioning Screen)

7.1.1. Positioning/Measurement Menu Button

The menu button of [Positioning] or [Measurement] selected on the navigation bar is displayed. Touching the menu button changes the display to show the corresponding screen.



Figure 7-3 Positioning Menu Button



Figure 7-4 MeasureBall Menu Button



Figure 7-5 Electrode Measurement Menu Button



Figure 7-6 Workpiece Measurement Menu Button

7.1.2. Positioning / Measurement Screen

Various measurement settings, measurement results and image drawings appear. For more details, see 7.2. "Positioning" and succeeding sections which describe various measurements.

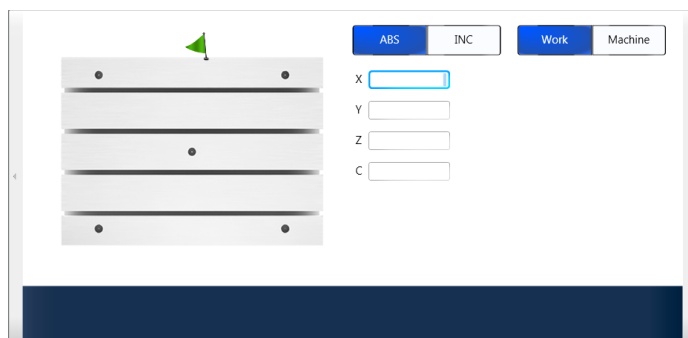


Figure 7-7 Positioning Screen

7.1.3. Positioning / Coordinate set

It is easier to perform operations for changing work coordinate, setting work coordinate offset and local offset.

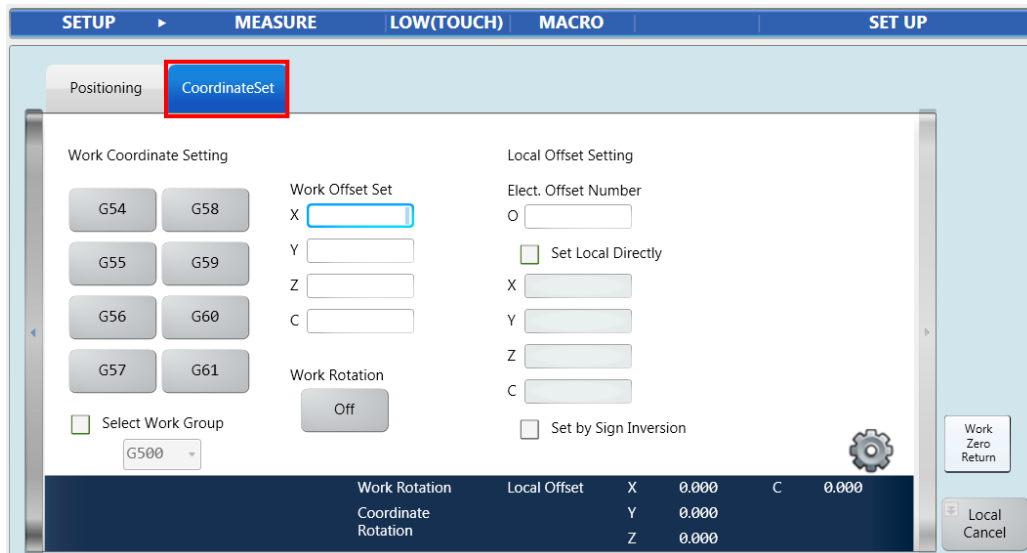


Figure 7-8 Positioning/Coordinate set Screen

7.1.4. Values Coordinate Value

Various coordinate values are displayed. You can check the position of the axis being measured and the measurement result from coordinate values. For more details, see 7.13 "Coordinate Display" and succeeding sections.

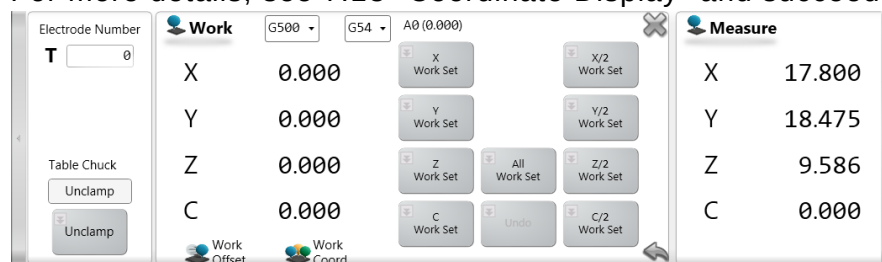


Figure 7-9 Values Coordinate Value (Work Setting Buttons Display Status)

7.1.5. Electrode/Workpiece ID (Optional)

The electrode ID on the machine is displayed.

[Chuck Unclamp] button can clamp or unclamp the table check.

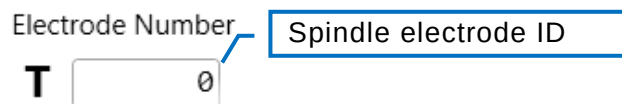


Table Chuck

Unclamp

Unclamp

Figure 7-10 Electrode ID screen

7.1.6. Navigation

When you touch the button, either the Positioning screen or the Various Measurements screen appears.



Figure 7-11 Navigation Bar

(1) Positioning

When you touch the icon, the Positioning screen appears.

Details on the display screen are described in 7.2."Positioning".

(2) Various Measurements

When you touch the icon, the corresponding Various Measurements screen appears.

Details on the display screen are described in 7.3. "Measure Ball".

7.1.7. Measurement record dialog

Presses the icon (red box in the figure below) located in the measurement result area of each measurement and open the “History” dialog window.

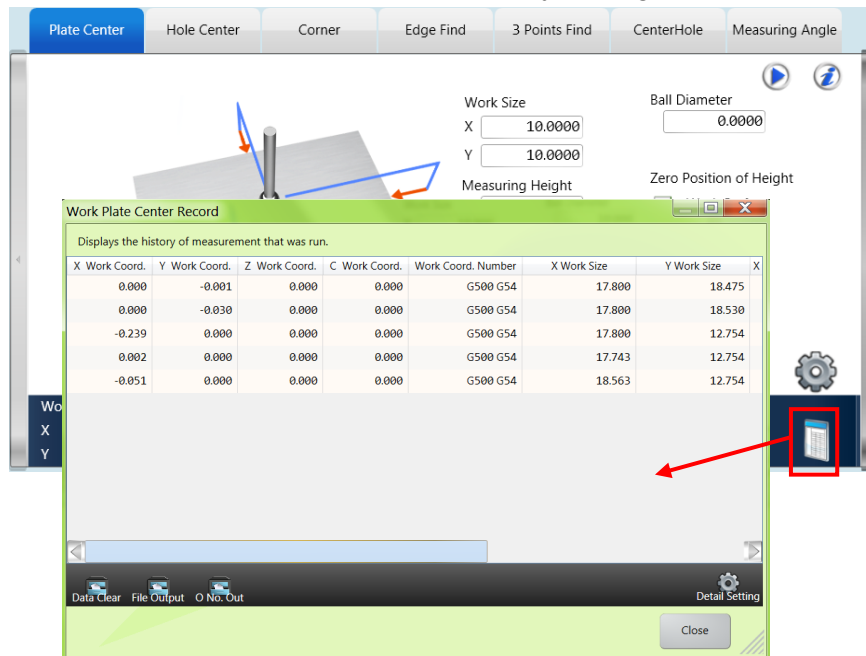


Figure 7-12 Record Dialog

Table 7-1 Record Contents

Item	Content
Work Coord.	Displays the workpiece coordinate values when measurement was completed.
Work Coord. Number	Displays the workpiece group number (G500-G515) when measurement was conducted. It is displayed together when workpiece coordinate values.
Measurement	Displays the measurement width when Measure Ball measurement, Plate Center measurement, 3 Points Find measurement and Hole Center measurement is conducted. Measuring Angle will display when parallelism measurement is done.
Local Offset	Local Offset displayed.
Machine Coord.	Displays the machine coordinate values when measurement was completed.
Record Time	Displays the measured date and time.

*For items that are not displayed as a standard feature, you can display these items using details setting.

*Displayed item will differ depending on the measured items.

7.1.8. Indication that value has been changed in DETAILS SET

The DETAILS SET icon will change its icon design when any item is changed to a non-default value in the Detail setting dialog box on the [SETUP] screen.

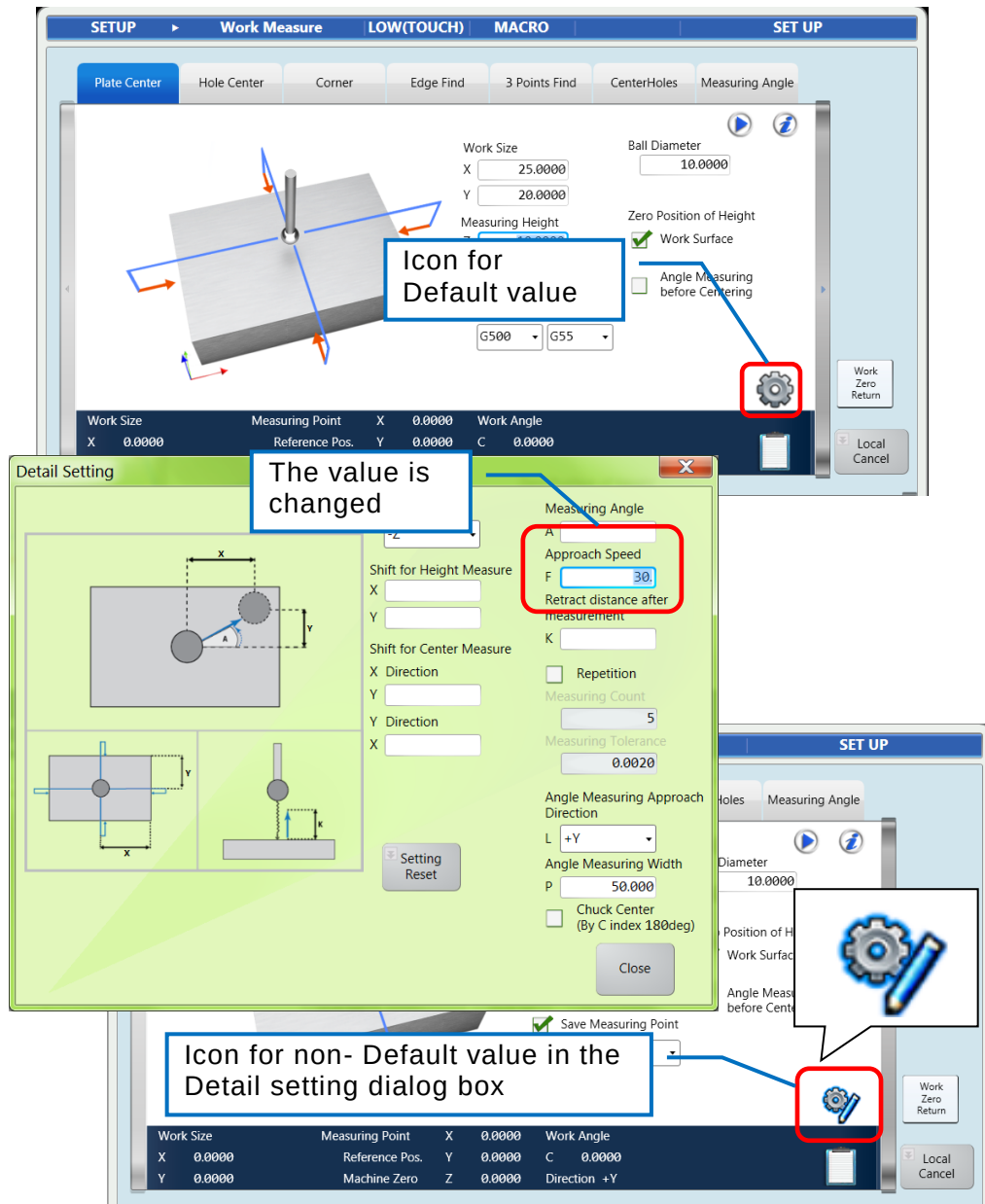


Figure 7-13 Detail Setting icon

The value is set back to the default by pressing the [Setting Reset] button in the DETAILS SET dialog box. Once the values have been reset, the DETAILS SET icon will return to its original state.

7.2. Positioning

With respect to the selected coordinates, axis move to the position specified.

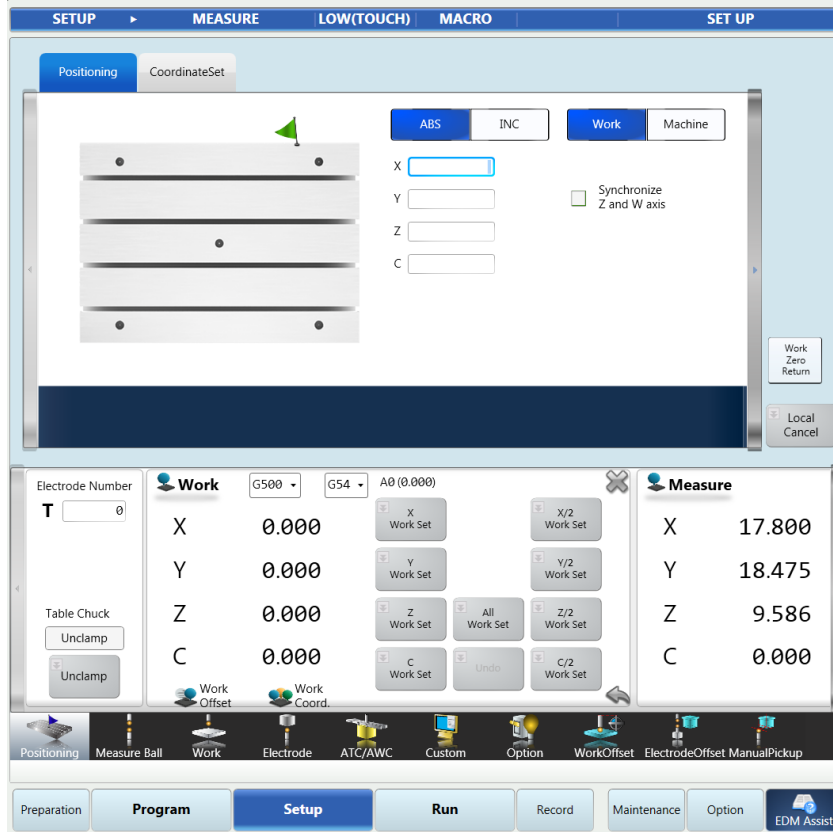


Figure 7-14 Positioning Screen

7.2.1. Setting Items

Enter move command value of each axis. Pressing the [START] key on the portable operation panel will positioning the respective axis.

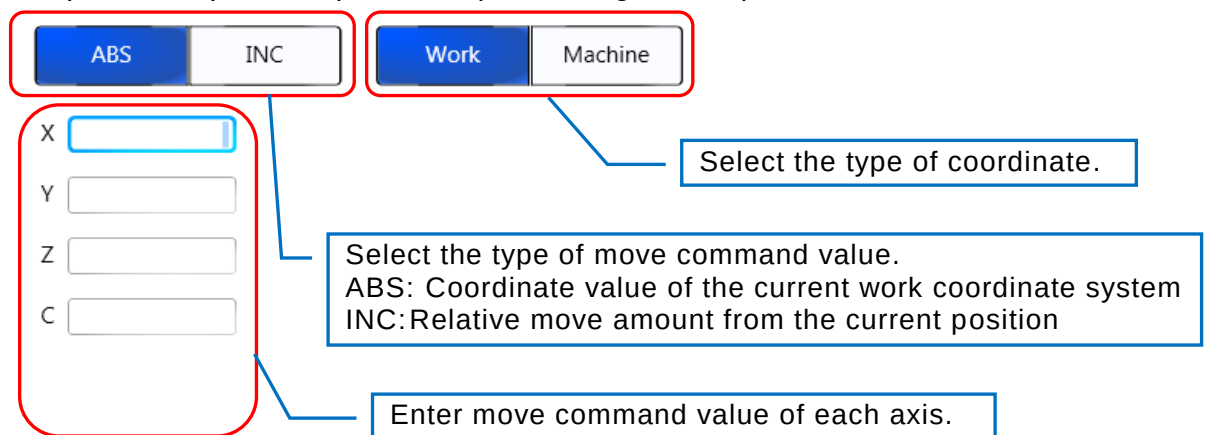


Figure 7-15 Positioning Screen Details (Left Side of Screen)

7.2.2. Operation Procedure

- (1) Select the coordinate type for movement from [ABS], [INC], [Work] and [Machine].
- (2) Enter move command value in each of X ~ C axis in Figure 7-11.
- (3) Check that there are no obstacles on the axis movement path.
- (4) Pressing the [START] key on the portable operation panel will move and position the respective axis

Table 7-2 List of Type of Coordinates for Coordinate Positioning Command

Button	Description
ABS	Specifies the coordinate value of the current work coordinate system.
INC	Specifies relative move amount from the current position.
Work	Specifies the work coordinate value.
Machine	Specifies the machine coordinate value.

7.2.3. Coordinate Set

(Operating Procedures)

- (1) Work coordinate system switching procedure

Select the target work coordinates in [Work Coordinate Setting].

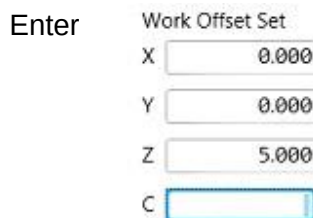
Example: When switching to G503 G54,



and then press the [START] button on the FPB2.

- (2) Setting the workpiece coordinates

Example: Setting X0Y0Z5.0 and workpiece coordinates



and then press the [START] button on the FPB2.

(3) Turning off workpiece rotation

When workpiece rotation is turned on, [Coordinate System Rotation] (see below) appears in the status indicator.



(Workpiece Rotation On is set)



(Workpiece Rotation Off is set)

This is used when setting this status to off.

Select Work Rotation



and press the [START] button on the FPB2 to turn off workpiece rotation.

This also turns off [Coordinate System Rotation] in the status indicator.

(This is explained above.)

(4) Setting local coordinates

Values can be set to local coordinates.

Electrode offset data or direct data can be entered to make the settings.

(4-1) Setting data for electrode offset

Local Offset Setting

Elect. Offset Number

O

Enter the electrode offset number that was set.

☐ Set Local Directly

X

Y

Z

C

When an electrode offset number is entered,
The value that is set appears in the
electrode offset number.
*At this stage, this value cannot be
edited.

☐ Set by Sign Inversion

Enter the value to the electrode offset number, and then press the [START] button on the FPB2.

(4-2) Setting data directly

Local Offset Setting

Elect. Offset Number

O 

Set Local Directly

X Y Z C 

Set by Sign Inversion

When a check mark is inserted for [Set Local Directly], a value can be entered in the input box below it.
*At this stage, entry to the input box for the electrode offset number is disabled.

Entered local offset values.

Select [Set Local Directly], and set the local value that you want to set. Then, press the [START] button on the FPB operation panel.

The local coordinate value that is set can be confirmed on the screen.



Set by Sign Inversion

Y



Local Offset	X	2.012	C	0.000
	Y	10.758		
	Z	1.596		

(4-3) Reversing the sign of input values and making local settings

The sign of a selected electrode offset number or entered value can be reversed when making the local settings. This function is useful in cases when using data measured by an external measurement device or when this type of processing is necessary.

(a) In the Details Settings, select the axis whose sign will be reversed.

For example, select the Y-axis for sign reversal.

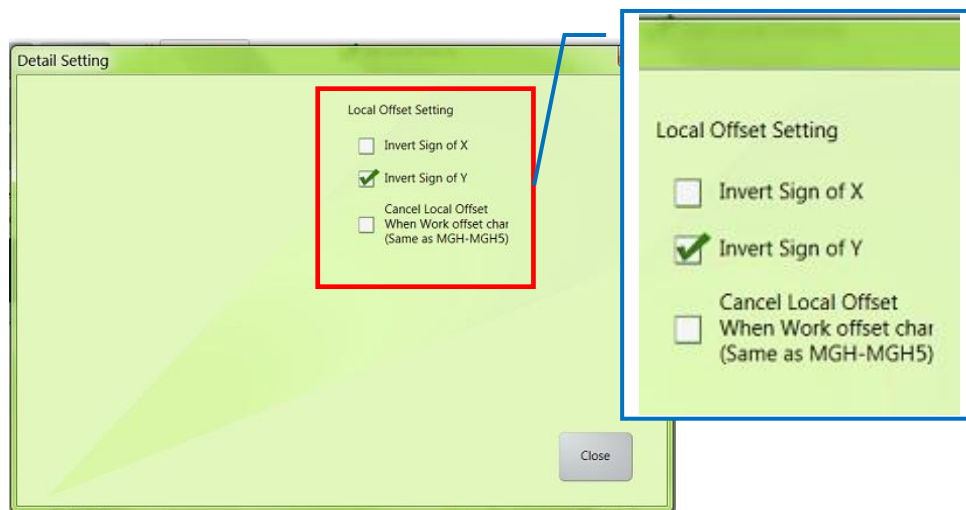
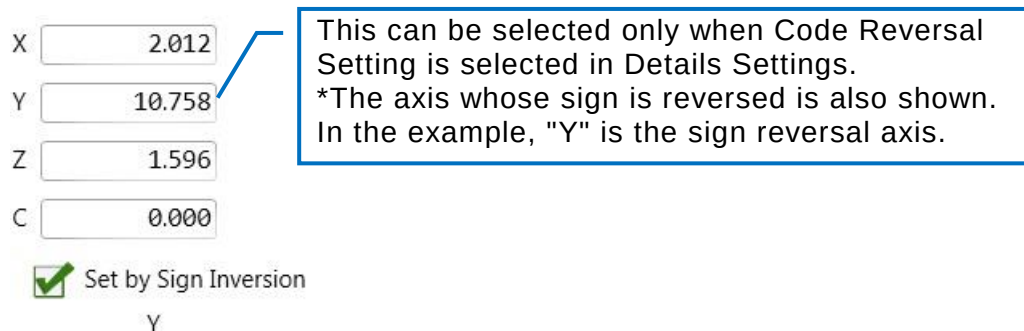


Figure 7-16 [Coordinate Set] – Detail Setting

(b) Turn on [Set by Sign Inversion] in the [Coordinate Set].



Turn on [Set by Sign Inversion], and then press the [START] button on the FPB2. In this example, the local values below are set.

X 2.012
Y -10.758 (value is set by reversing the sign)
Z 1.596
C 0.000

7.3. Measure Ball

7.3.1. Measure Ball

Using the Spindle ball and the Table ball, set the reference position of workpiece and the center of rotation of the C axis.

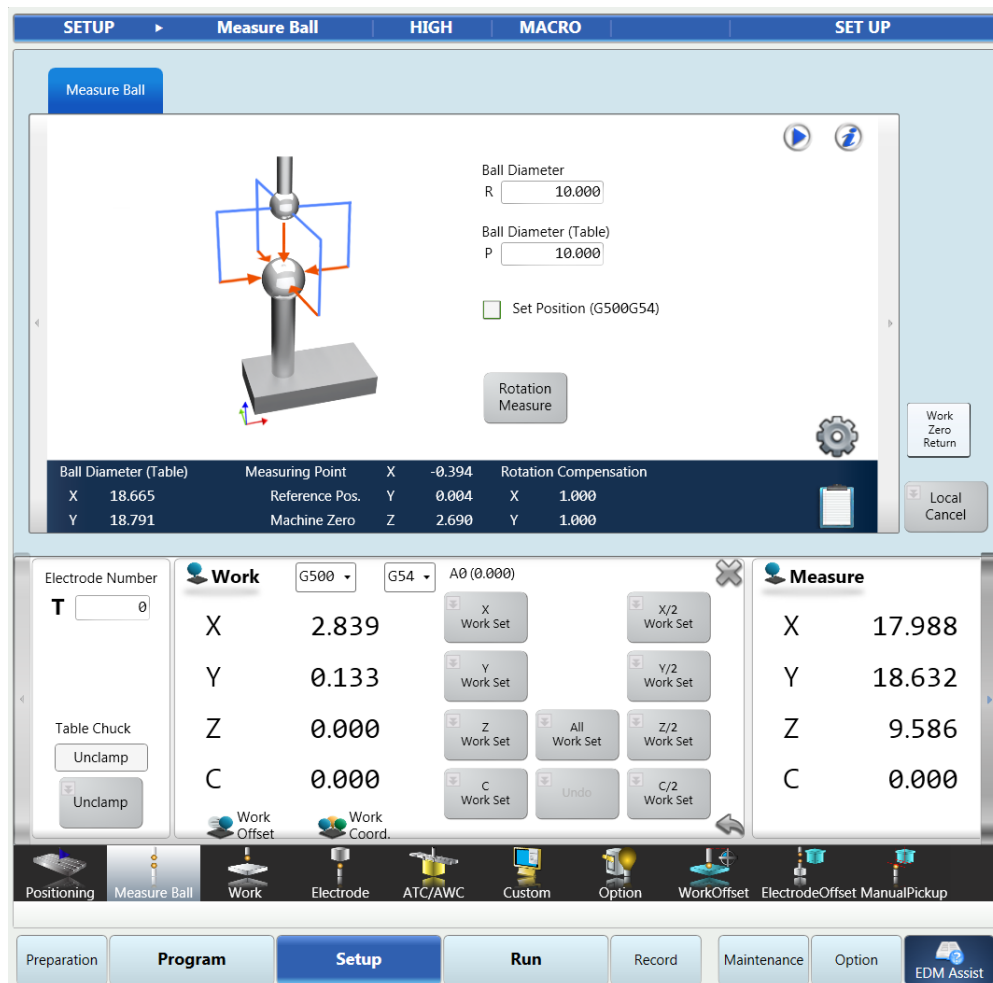


Figure 7-17 Measure Ball Screen

7.3.2. Setting Items

(1) Setting Items of Spindle ball / Table ball

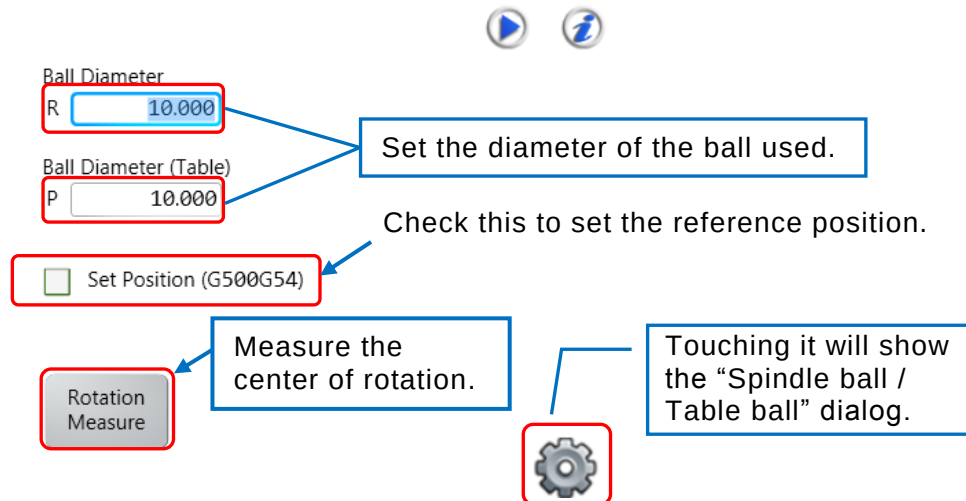


Figure 7-18 Measure Ball Screen Setting Items

(2) Details Settings for Spindle ball / Table ball

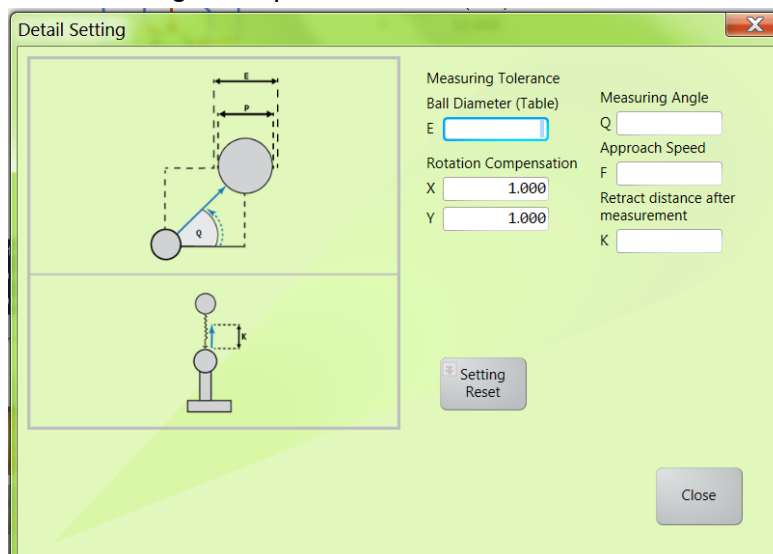


Figure 7-19 Measure Ball Detail Setting Dialog

Table 7-3 Detailed Setting Parameters for Measure Ball

Items	Description
E: Measuring Tolerance Ball Diameter (Table)	Set up the tolerance during measurement. Confirm the measurement repeatability error and the measurement error. If the preset tolerance is not satisfied (maximum five repeated measurements), the warning "Excessive measurement error" is displayed and the operation enters the pause state and then stops. (Restart possible) The measurement diameter is the sum of the "measurement sphere diameter" and the "alignment sphere diameter."
Q: Measuring Angle	Set the rotated angle of the measuring direction on X-Y plane.
F: Approach Speed	Set the feed speed of contact sensing.
K: Retract Distance after measurement	Set the amount of relief from a measurement point.
X,Y: Rotation Compensation	Set the amount of rotation compensation.

7.3.3. Operation Procedure

- (1) Move the Spindle ball above the table ball.
- (2) Enter a value in [R: Ball Diameter] and [P: Ball Diameter (Table)].
- (3) To set the measurement result at the reference position, check [Set Position (G500G54)].
- (4) To set the error tolerance, rotation angle, approach speed and retract distance after measurement, specify them in the Detail Settings Parameters of Measure Ball dialog box.
- (5) Press the [START] key to begin measurement.
- (6) ※If the preset tolerance is not satisfied, measurement is repeated up to five times.
Once the measurement result satisfies the tolerance, the measurement operation finishes normally.
- (7) When the measurement finishes, coordinates X and Y at the center of rotation and Measuring point are displayed.
- (8) The measurement result is displayed in the lower right of the screen.

Ball Diameter (Table)		Measuring Point		X		Rotation Compensation	
X	18.665	Reference Pos.	Y	0.004	X	1.000	
Y	18.791	Machine Zero	Z	2.690	Y	1.000	

Figure 7-20 Measurement result

7.3.4. Video display method

The video concerning the measurement method can be seen on NC.

- (1) Select any tree item. Press the  button to display video

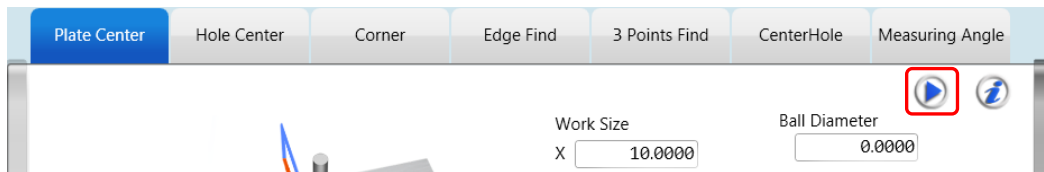


Figure 7-21 Video play button

- (2) Video player will be displayed automatically and video will be played.

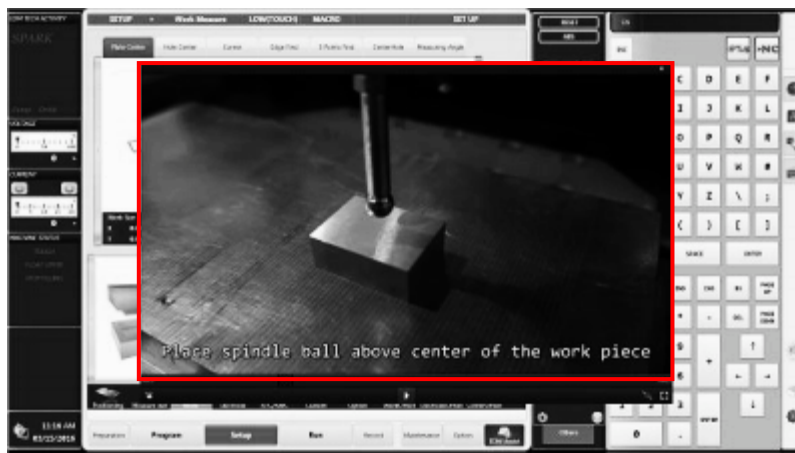


Figure 7-22 Video play button

7.4. Workpiece Measurement

Measure a workpiece before machining and set up the origin (reference position) of the work coordinate.

7.4.1. Plate Center

Measure a rectangular workpiece and set the center coordinate as the origin of the work coordinate.

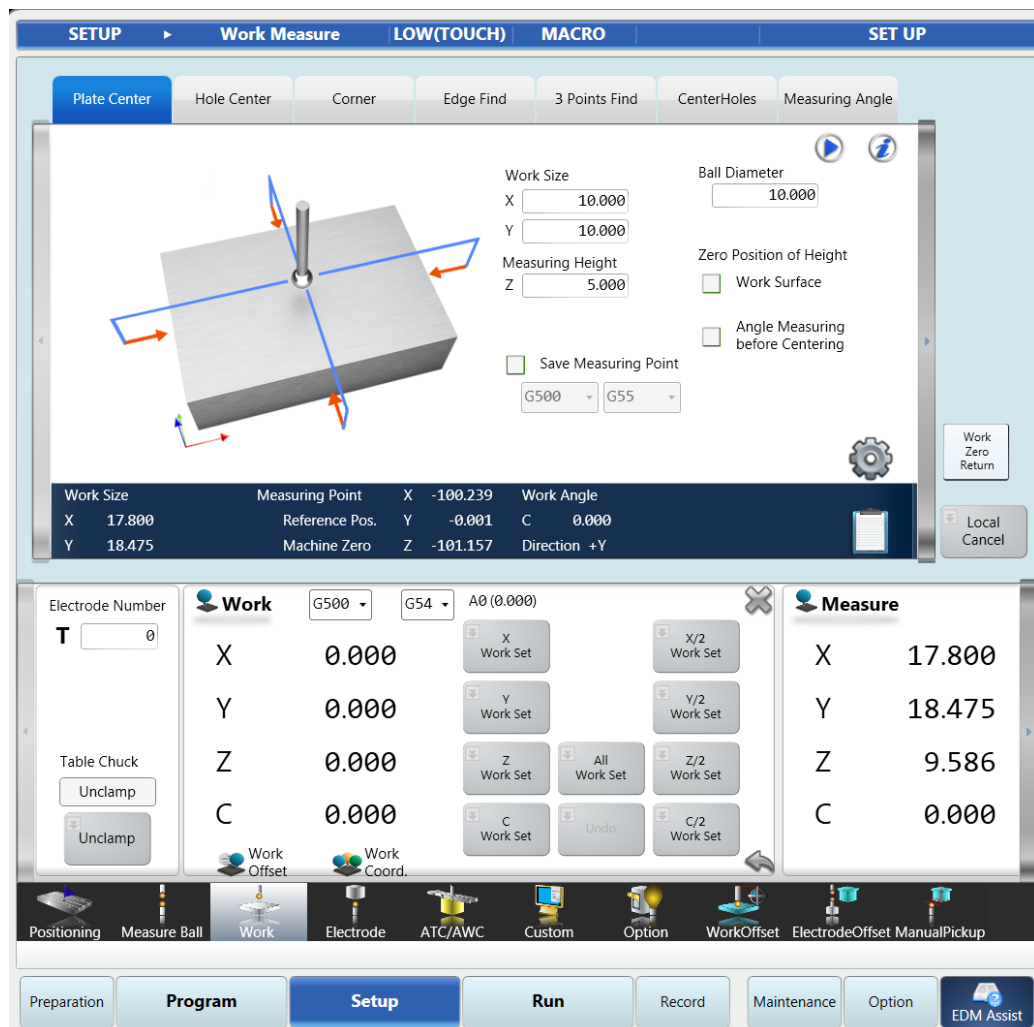


Figure 7-23 Workpiece measurement Plate Center Screen

7.4.2. Setting Items

(1) Setting Items of Workpiece Plate Center

The screenshot shows the 'Workpiece Plate Center' settings screen. Red boxes highlight specific input fields, and blue boxes with arrows provide instructions for each.

- Work Size:** X Y . Callout: "Set the size of the measurement workpiece."
- Ball Diameter:** . Callout: "Set the diameter of the Spindle ball used."
- Measuring Height:** Z . Callout: "Set the height of Z axis at measurement."
- Zero Position of Height:** ☐ Work Surface. Callout: "Set to measure at the workpiece surface height."
- Angle Measuring before Centering:** ☐. Callout: "Set to do workpiece angle measurement."
- Save Measuring Point:** ☐. Callout: "Set the work coordinate offset number to store measurement result."
- Coordinate Selection:** G500 (dropdown) and G55 (dropdown). Callout: "Set the work coordinate offset number to store measurement result."
- Gear Icon:** A gear icon with a callout: "Touching it will show the 'Workpiece Plate Center' dialog."

Figure 7-24 Workpiece Plate Center Screen Details

(2) Details Settings for Workpiece Plate Center

The 'Detail Setting' dialog box contains various parameters for the measurement process, organized into sections with diagrams.

- Height Direction:** -Z (dropdown)
- Shift for Height Measure:** X Y
- Shift for Center Measure:** X Direction Y Direction X
- Measuring Angle:** A
- Approach Speed:** F
- Retract distance after measurement:** K
- Repetition:** ☐
- Measuring Count:**
- Measuring Tolerance:**
- Angle Measuring Approach Direction:** L +Y (dropdown)
- Angle Measuring Width:** P
- Chuck Center (By C index 180deg):** ☐
- Buttons:** Setting, Reset, Close

Diagrams on the left show the workpiece setup for height and center measurement, with axes X, Y, and Z labeled.

Figure 7-25 Workpiece Plate Center Detail Setting Dialog

Table 7-4 Detailed Setting Parameters for Plate Center Measurement

Items	Description
Height Direction	Set the axial direction to measure the height.
X, Y: Shift for Height Measuring	When positioning the edges in the direction of height, set this to measure by shifting the X and Y axes.
X,Y: Shift for Center Measuring	Set this to shift the X-axis direction, such as when there is a notch in the measurement section of a column.
A: Measuring Angle	Set the rotated angle of the measuring direction on X-Y plane.
F: Approach Speed	Set the feed speed of contact sensing.
K: Retract Distance after measurement	Set the amount of relief from a measurement point.
Chuck Center	Set the chuck center to the origin of the work coordinate.
L: Angle Measuring Approach Direction	Set the measurement approach direction.
P: Angle Measuring Width	Set the angle measurement width.
Repetition	Set to do Repeat Measurements.
Measuring Count	Set the maximum number of times the measurement is repeated (1 to 9). If the difference between the position after the previous measurement and the position after the next measurement is within the specified error tolerance, the measuring operation will end even before the number of times measurement repeated has reached the specified "Measuring Count" value.
Measuring Tolerance	Set the error tolerance for repeat measurement.

7.4.3. Operation Procedure

- (1) Move the Spindle ball to the upper area near the center of the workpiece.
- (2) Enter a value in [X, Y: Work Size] and [Measuring Height].
Make sure that the diameter of the Spindle ball to be used is correctly set in [Ball Diameter].
- (3) To save the measurement point, check [Save measuring Point] and set up the work coordinate system to be used to store measurement point.
- (4) Press the [START] key to begin measurement.
- (5) When measurement finishes, the measurement point is stored in the work coordinate system previously specified.
- (6) The workpiece size is displayed in the lower right of the screen as the measurement result.

Work Size	Measuring Point	X	-100.239	Work Angle	
X 17.800	Reference Pos.	Y	-0.001	C	0.000
Y 18.475	Machine Zero	Z	-101.157	Direction	+Y



Figure 7-26 Measurement result

7.4.4. Hole Center

Measure the workpiece hole and set the center point as the origin of the work coordinate.

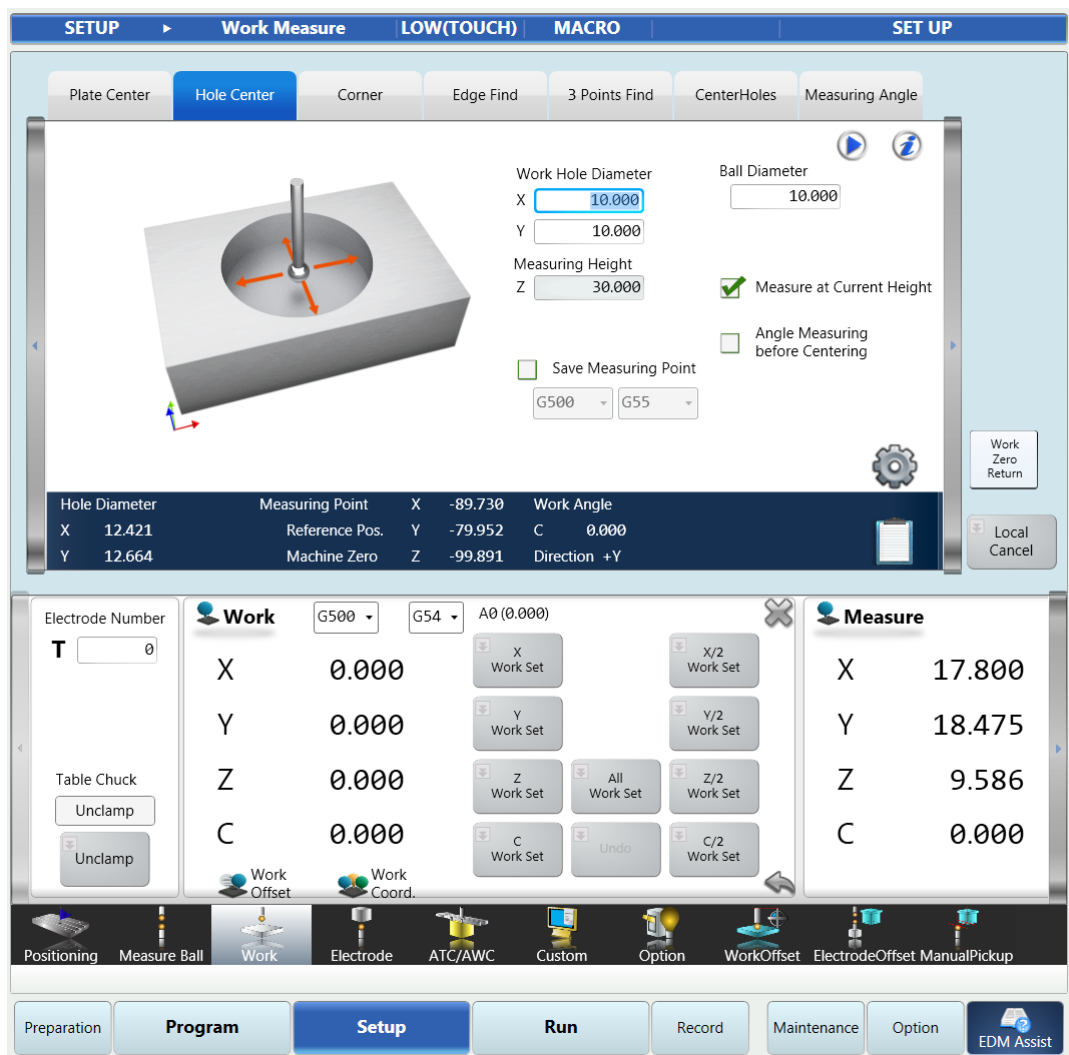


Figure 7-27 Workpiece measurement Hole Center screen

7.4.5. Setting Items

(1) Setting Items of Workpiece Hole Center

The screenshot shows the 'Workpiece Hole Center' setup screen with the following settings and callouts:

- Work Hole Diameter:** X: 10.000, Y: 10.000. Callout: "Set the size of the measurement workpiece."
- Ball Diameter:** 10.000. Callout: "Set the diameter of the Spindle ball used."
- Measuring Height:** Z: 30.000. Callout: "Set the height of Z axis at measurement."
- Measure at Current Height:** ☒. Callout: "If a check mark is inserted, measurement is performed at the current position without moving."
- Angle Measuring before Centering:** ☐. Callout: "Set to do workpiece angle measurement."
- Save Measuring Point:** ☐. Callout: "Set the work coordinate offset number to store measurement result."
- Coordinate Offsets:** G500, G55. Callout: "Touching it will show the 'Workpiece Plate Center' dialog."
- Settings Icon:** A gear icon representing the settings menu.

Figure 7-28 Workpiece Hole Center Screen Details

(2) Details Settings for Work piece Hole Center

The 'Detail Setting' dialog box contains the following settings:

- Height Direction:** -Z
- Shift for Height Measure:** X, Y
- Rapid Movement (One Way):** X, Y
- Move to Measuring Height after Rapid feed:** ☐
- Measuring Angle:** A
- Approach Speed:** F
- Retract distance after measurement:** U
- Repetition:** ☐
- Measuring Count:** 5
- Measuring Tolerance:** 0.002
- Angle Measuring Approach Direction:** L +Y
- Angle Measuring Width:** P 50.000
- Chuck Center (By C index 180deg):** ☐
- Buttons:** Setting, Reset, Close

Figure 7-29 Workpiece Hole Center Detail Setting Dialog

Table 7-5 Detailed Setting Parameters for Hole Center Measurement

Items	Description
Height Direction	Set the axial direction to measure the height.
X,Y: Shift for Height measurement	When positioning the edges in the direction of height, set this to measure by shifting the X and Y axes.
X,Y: Rapid Movement	Set the amount of rapid traverse from the touch sensing starting position. The approach time in each axis can be shortened.
A: Measuring Angle	Set the rotated angle of the measuring direction on X-Y plane.
F: Approach Speed	Set the feed speed of contact sensing.
K: Retract Distance after measurement	Set the amount of relief from a measurement point.
Chuck Center	Set the chuck center to the origin of the work coordinate.
L: Angle Measuring Approach Direction	Set the measurement approach direction.
P: Angle Measuring Width	Set the angle measurement width.
Repetition	Set to do Repeat Measurements.
Measuring Count	Set the maximum number of times the measurement is repeated (1 to 9). If the difference between the position after the previous measurement and the position after the next measurement is within the specified error tolerance, the measuring operation will end even before the number of times measurement repeated has reached the specified "Measuring Count" value.
Measuring Tolerance	Set the error tolerance for repeat measurement.

7.4.6. Operation Procedure

- (1) Move the measurement sphere to the upper area near the center of the workpiece hole
- (2) Enter a value in [X, Y: Work Hole Size] and [Z: Measuring Height].
Make sure that the diameter of the measurement sphere to be used is correctly set in [Ball Diameter].
To save the measurement point, check [Save Measuring Point] and set up the work coordinate system to be used to store measurement point.
- (3) Press the [START] key to begin measurement.
- (4) When measurement finishes, the measurement point is stored in the work coordinate system previously specified.
- (5) The workpiece size is displayed in the lower right of the screen as the measurement result.

Hole Diameter	Measuring Point	X	-89.730	Work Angle
X 12.421	Reference Pos.	Y	-79.952	C 0.000
Y 12.664	Machine Zero	Z	-99.891	Direction +Y

Figure 7-30 Measurement result

7.4.7. Corner

Measure a corner of a workpiece and set the corner edge as the origin of the workpiece coordinates.

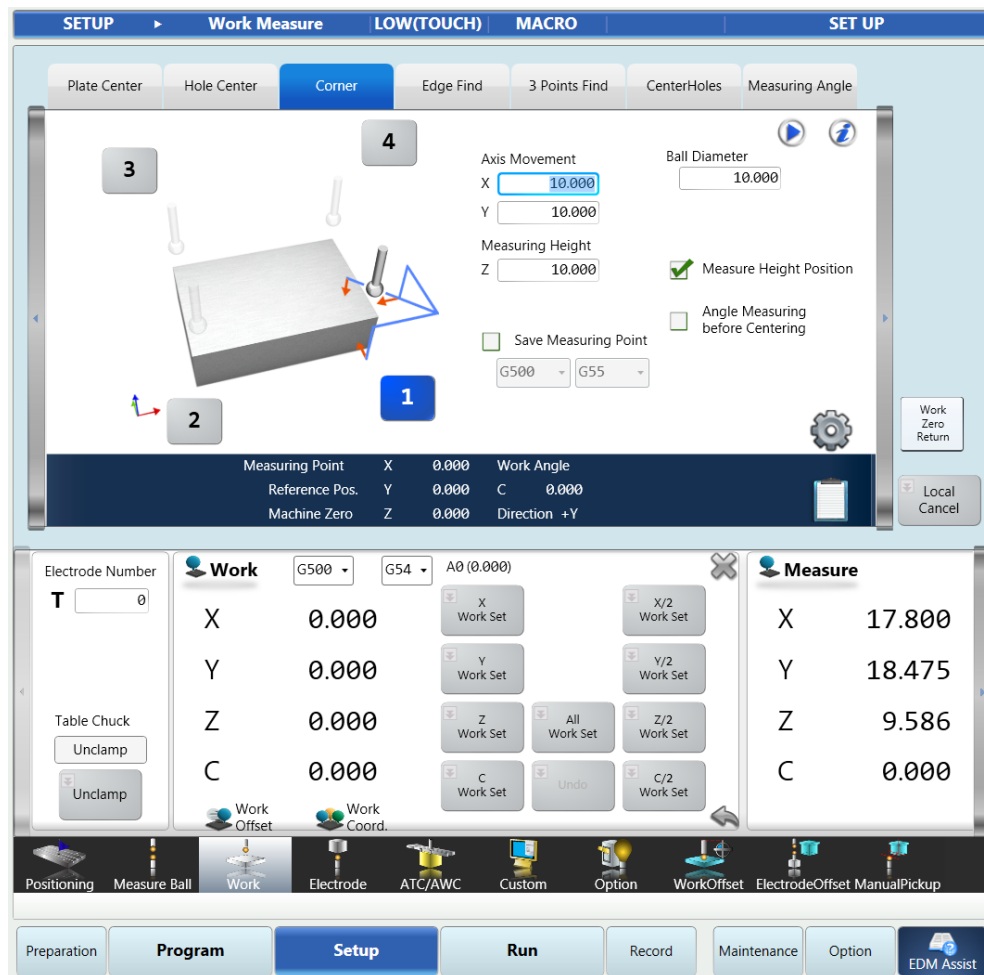


Figure 7-31 Workpiece measurement Corner screen

7.4.8. Setting Items

(1) Setting Items of Workpiece Corner

The screenshot shows the 'Workpiece Corner' setup screen with the following settings and callouts:

- Axis Movement:** X and Y coordinates are both set to 10.000. Callout: "Set the size of the measurement workpiece."
- Ball Diameter:** Set to 10.000. Callout: "Set the diameter of the Spindle ball used."
- Measuring Height:** Z coordinate is set to 10.000. Callout: "Set the height of Z axis at measurement."
- Measure Height Position:** Checked (indicated by a green checkmark). Callout: "If a check mark is inserted, measurement is performed at the current position without moving."
- Angle Measuring before Centering:** Not checked. Callout: "Set to do workpiece angle measurement."
- Save Measuring Point:** Not checked. Callouts: "Set the work coordinate offset number to store measurement result." and "Touching it will show the 'Workpiece Plate Center' dialog." (pointing to a gear icon).
- Coordinate Offsets:** G500 and G55 are selected from dropdown menus.

Figure 7-32 Workpiece Corner Screen Details

(2) Details Settings for Workpiece Corner

The 'Detail Setting' dialog box contains the following settings:

- Shift for Height Measure:** X and Y coordinates are set to 0.000.
- Measuring Angle:** A is set to 0.000.
- Approach Speed:** F is set to 0.000.
- Retract distance after measurement:** U is set to 0.000.
- Angle Measuring Approach Direction:** L is set to +Y.
- Angle Measuring Width:** Q is set to 50.000.
- Buttons:** 'Setting Reset' and 'Close' buttons are located at the bottom.

Two diagrams on the left illustrate the measurement setup: the top one shows a workpiece with a corner and a measuring ball, and the bottom one shows the ball's position relative to the corner with dimensions X, Y, and U.

Figure 7-33 Workpiece Corner Detail Setting Dialog

Table 7-6 Detailed Setting Parameters for Corner Measurement

Items	Description
X,Y: Shift for Height Measuring	When positioning the edges in the direction of height, set this to measure by shifting the X and Y axes.
A: Measuring Angle	Set the rotated angle of the measuring direction on X-Y plane.
F: Approach Speed	Set the feed speed of contact sensing.
U: Retract Distance after measurement	Set the amount of relief from a measurement point.
L: Angle Measuring Approach Direction	Set the measurement approach direction.
Q: Angle Measuring Width	Set the angle measurement width.

7.4.9. Operation Procedure

- (1) Move the Spindle ball to near the measurement point (1, 2, 3, 4) you have selected.
- (2) Enter a value in [X, Y: Axis Movement] and [Z: Measuring Height].
Make sure that the diameter of the Spindle ball to be used is correctly set in [Ball Diameter].
- (3) To save the measurement point, check [Save Measuring Point] and set up the work coordinate system to be used to store measurement point.
- (4) Press the [START] key to begin measurement.
- (5) When measurement finishes, the measurement point is stored in the work coordinate system previously specified.

7.4.10. Edge Find

Measure the edge of a workpiece and set it as the origin of the work coordinate.

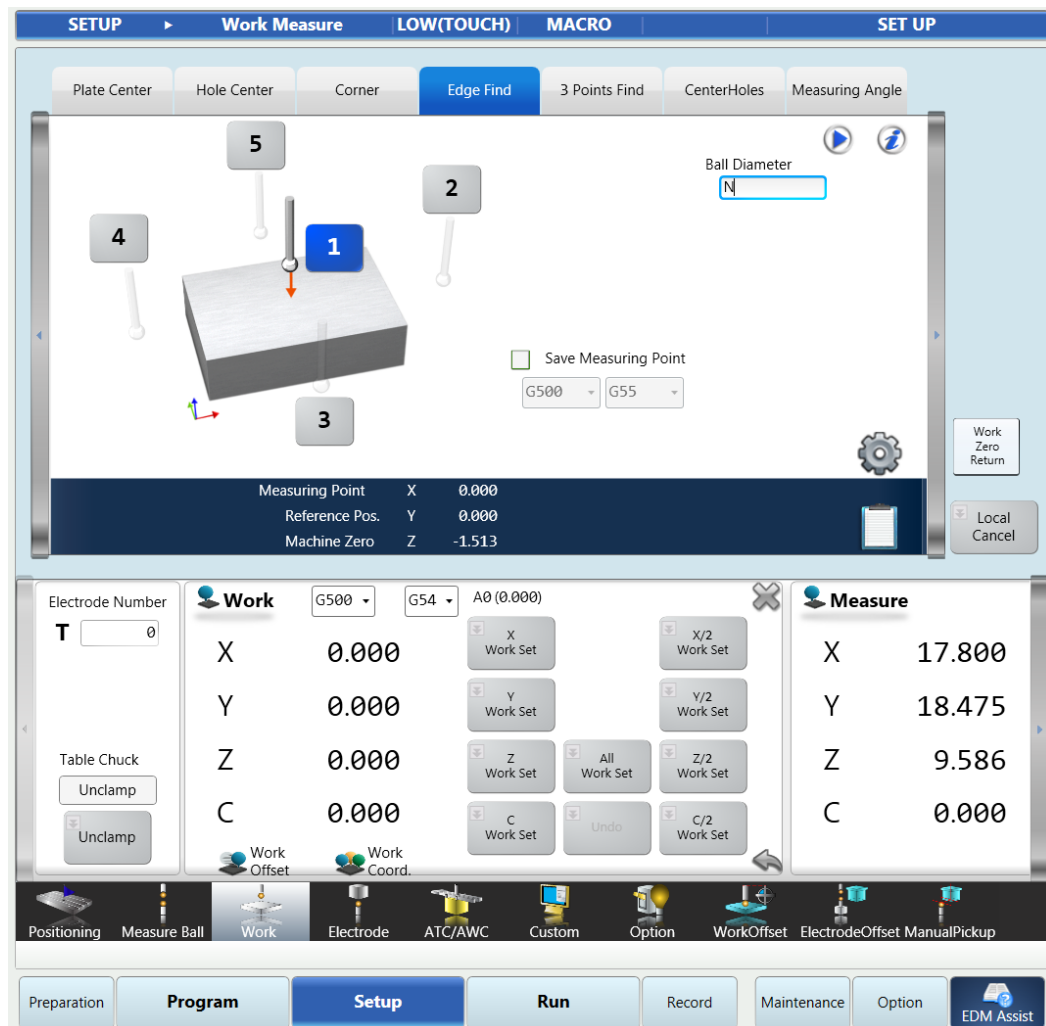


Figure 7-34 Workpiece measurement Edge Find screen

7.4.11. Setting Items

(1) Setting Items of Workpiece Edge Find

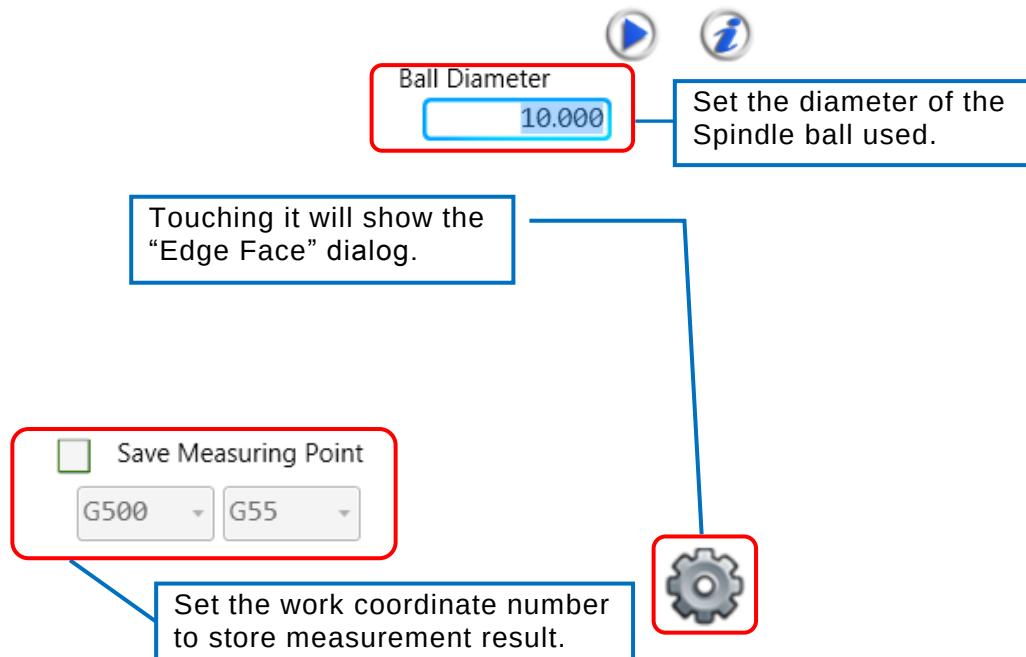


Figure 7-35 Workpiece Edge Find Details

(2) Details Settings for Workpiece Edge Find

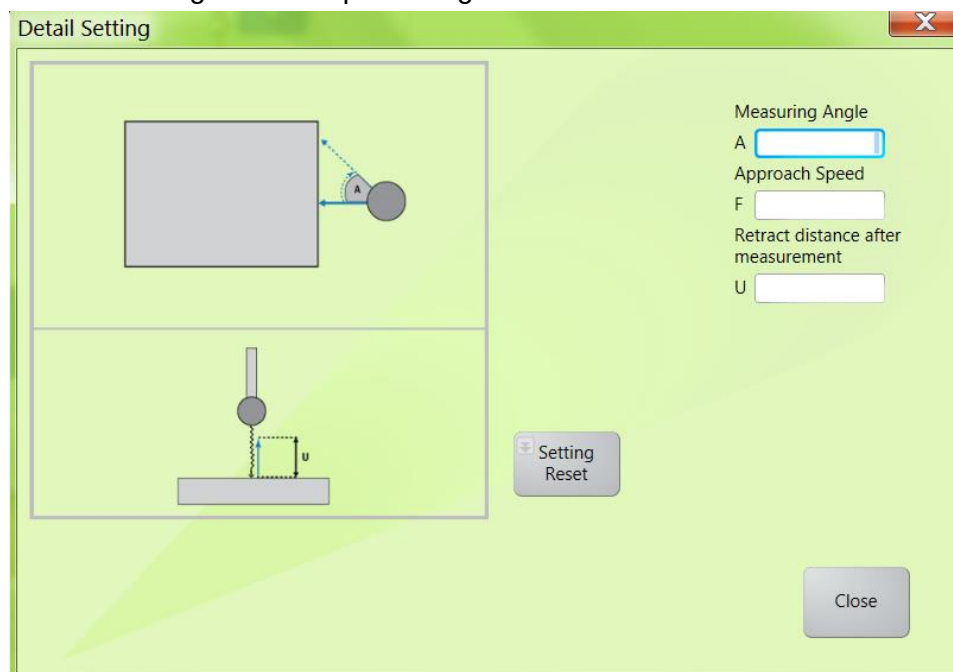


Figure 7-36 Workpiece Edge Find Detail Setting Dialog

Table 7-7 Detailed Setting Parameters for Edge Find Measurement

Items	Description
A: Measuring Angle	Set the rotated angle of the measuring direction on X-Y plane.
F: Approach Speed	Set the feed speed of contact sensing.
U: Retract Distance after measurement	Set the amount of relief from a measurement point.

7.4.12. Operation Procedure

- (1) Move the Spindle ball to near the measurement point (1, 2, 3, 4) you have selected.
- (2) Make sure that the diameter of the Spindle ball to be used is correctly set in [Ball Diameter].
- (3) To save the measurement point, check [Save Measuring Point] and set up the work coordinate system to be used to store measurement point.
- (4) Press the [START] key to begin measurement.
- (5) When measurement finishes, the measurement point is stored in the work coordinate system previously specified.

7.4.13. 3 Points Find

Measure the outside and inside of the Colum workpiece and set the center point as the origin of the work coordinate

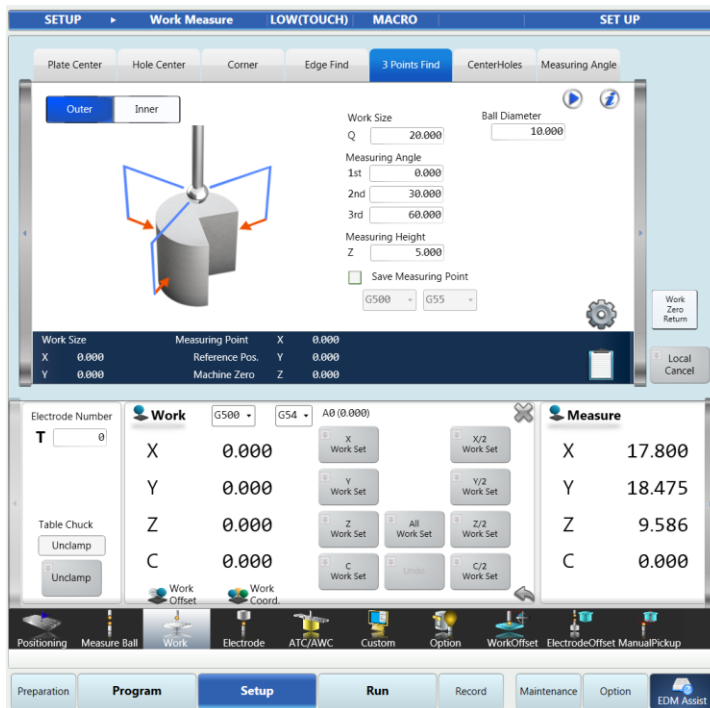


Figure 7-37 Workpiece measurement 3 Points Find (Outer Screen)

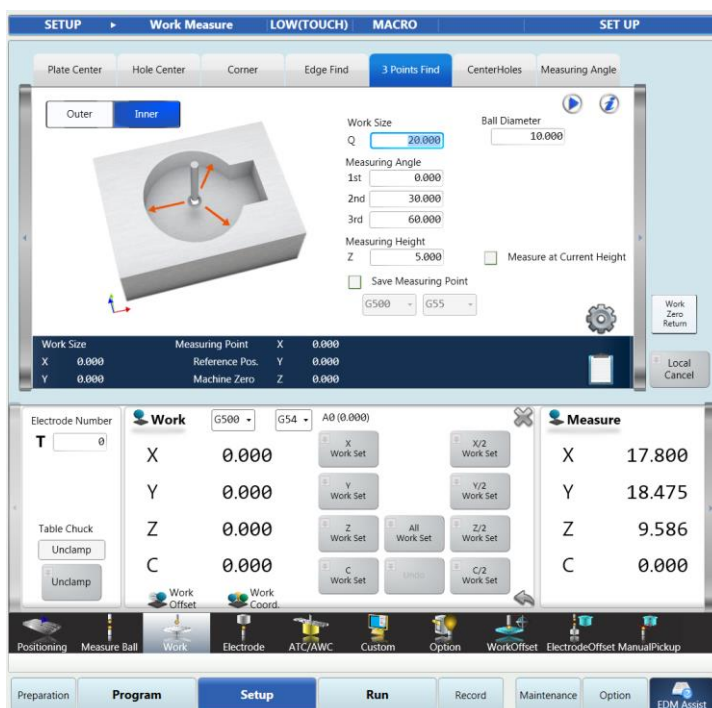


Figure 7-38 Workpiece measurement 3 Points Find (Inner) Screen

7.4.14. Setting Items

(1) Setting Items of Workpiece Colum Center (Outer)

The screenshot shows the 'Workpiece Colum Center (Outer)' settings screen. It includes the following fields and callouts:

- Work Size**: A text box labeled 'Q' with the value '0.000'. Callout: 'Set the size of the measurement workpiece.'
- Ball Diameter**: A text box with the value '10.000'. Callout: 'Set the diameter of the Spindle ball used.'
- Measuring Angle**: Three text boxes labeled '1st', '2nd', and '3rd' with values '0.000', '30.000', and '60.000' respectively. Callout: 'Set the angle of each measurement position taken as the 0 degree reference on X axis.'
- Measuring Height**: A text box labeled 'Z' with the value '10.000'. Callout: 'Set the height of Z axis at measurement.'
- Save Measuring Point**: A checkbox (checked) and two dropdown menus showing 'G500' and 'G55'. Callout: 'Set the work coordinate number to store measurement result.'
- Settings Icon**: A gear icon with a callout: 'Touching it will show the "workpiece Colum Center" dialog.'

Figure 7-39 Workpiece Colum Center (Outer) Screen Details

(2) Setting Items of Workpiece Colum Center (Inner)

The screenshot shows the 'Workpiece Colum Center (Inner)' settings screen. It includes the following fields and callouts:

- Work Size**: A text box labeled 'Q' with the value '0.000'. Callout: 'Set the size of the measurement workpiece.'
- Ball Diameter**: A text box with the value '10.000'. Callout: 'Set the diameter of the Spindle ball used.'
- Measuring Angle**: Three text boxes labeled '1st', '2nd', and '3rd' with values '0.000', '30.000', and '60.000' respectively. Callout: 'Set the angle of each measurement position taken as the 0 degree reference on X axis.'
- Measuring Height**: A text box labeled 'Z' with the value '10.000' and a checkbox labeled 'Measure at Current Height' (unchecked). Callout: 'The height of the measurement is the height from the position in which the measurement begins.'
- Save Measuring Point**: A checkbox (checked) and two dropdown menus showing 'G500' and 'G55'. Callout: 'Set the work coordinate number to store measurement result.'
- Settings Icon**: A gear icon with a callout: 'Touching it will show the "workpiece Colum Center" dialog.'

Figure 7-40 Workpiece Colum Center (Inner) Screen Details

(3)Details Settings for Workpiece Colum Center (Outside)

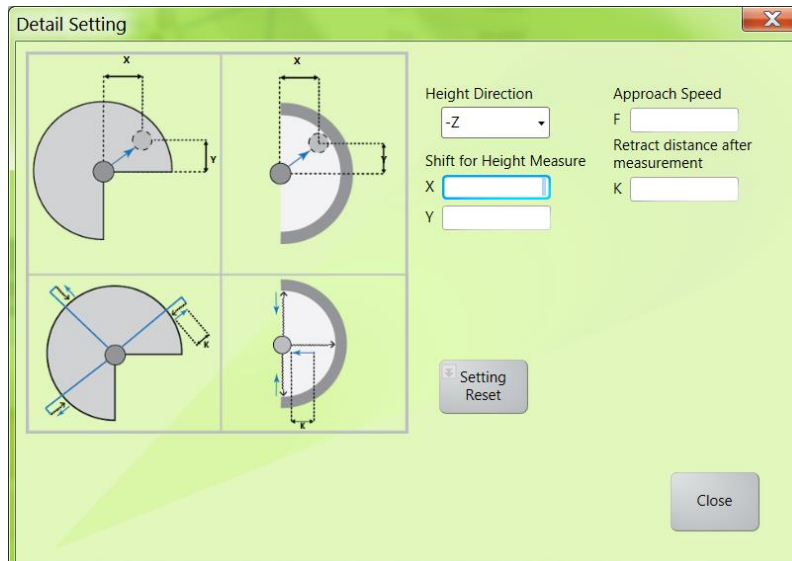


Figure 7-41 Workpiece Colum Center (Outside) Detail Setting Dialog

Table 7-8 Detailed Setting Parameters for Colum Center (Outside) Measurement

Items	Description
Height Direction	Set the axial direction to measure the height.
X,Y:Shift for Height measuring	When positioning the edges in the direction of height, set this to measure by shifting the X and Y axes.
F:Approach Speed	Set the feed speed of contact sensing.
K:Retract Distance after measurement	Set the amount of relief from a measurement point.

(4)Details Settings for Workpiece Colum Center (Inside)

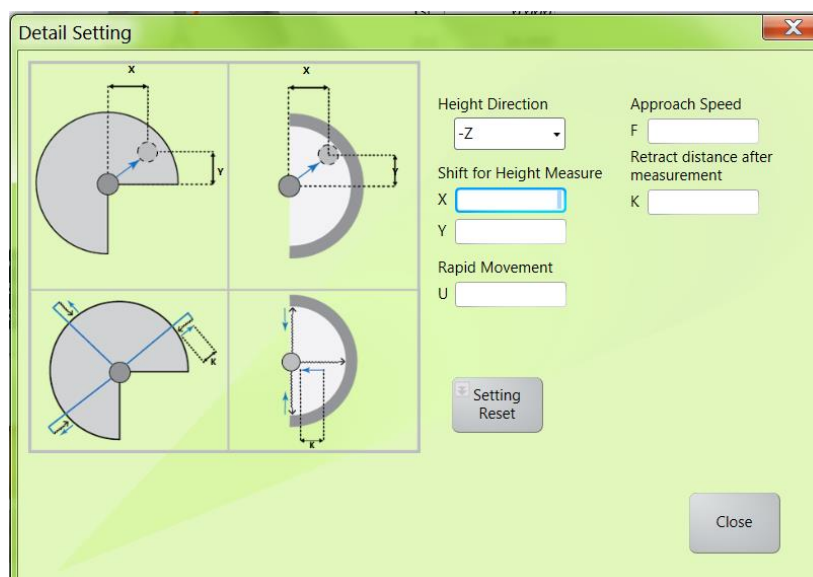


Figure 7-42 Workpiece Colum Center (Inside) Detail Setting Dialog

Table 7-9 Detailed Setting Parameters for Colum Center (Inside) Measurement

Items	Description
Height Direction	Set the axial direction to measure the height.
X,Y: Shift for Height Measuring	When positioning the edges in the direction of height, set this to measure by shifting the X and Y axes.
U: Rapid Movement	Set the amount of rapid traverse from the touch sensing starting position. The approach time in each axis can be shortened.
F: Approach Speed	Set the feed speed of contact sensing.
K: Retract Distance after measurement	Set the amount of relief from a measurement point.

7.4.15. Operation Procedure

- (1) Move the Spindle ball to near the center of the Colum workpiece.
- (2) Enter a value in [Q: Work Size], [Measuring Angle 1, 2, 3] and [Z: Measuring Height].
- (3) To save the measurement point, check [Save Measuring Point] and set up the work coordinate system to be used to store measurement point.
- (4) To shift at measurement of height, in the X-axis or in the Y-axis direction, or to set the approach speed or retract distance after measurement, set in the Details Settings for Workpiece Colum Center dialog box.
- (5) Press the [START] key to begin measurement.
- (6) When measurement finishes, the measurement point is stored in the work coordinate system previously specified.
- (7) The workpiece size is displayed in the lower right of the screen as the measurement result.

Work Size	Measuring Point	X	0.000
X 0.000	Reference Pos.	Y	0.000
Y 0.000	Machine Zero	Z	0.000



Figure 7-43 Measurement result

7.4.16. Center Holes

Measure the center of multiple workpiece holes and set the center point as the origin of the work coordinate.

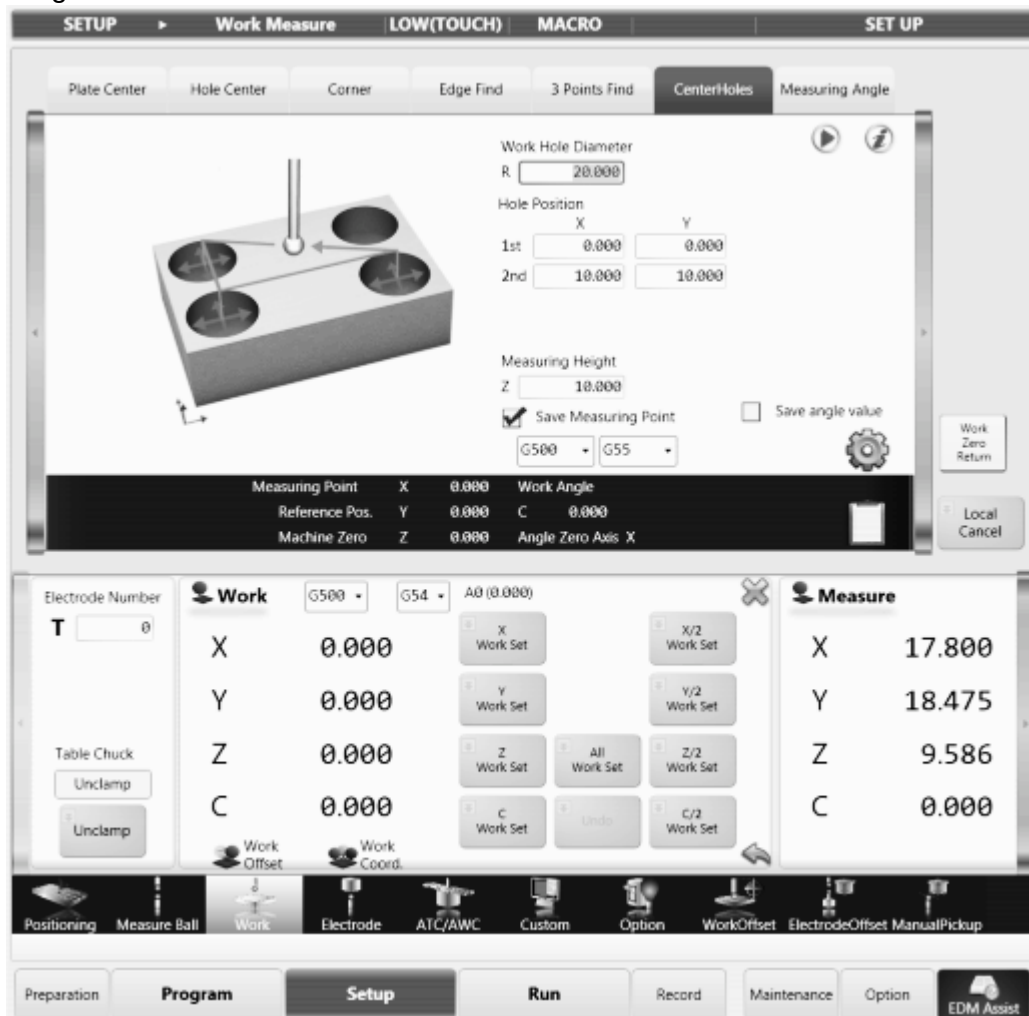


Figure 7-44 Workpiece measurement Center Holes Screen

7.4.17. Setting Items

(1) Setting Items of Workpiece Center Holes

The screenshot shows the 'Workpiece Center Holes' setup screen with several fields and checkboxes. Callouts provide detailed instructions for each field:

- Work Hole Diameter R:** Set to 20.000. Callout: "Set the size of the measurement hole of workpiece."
- Hole Position:** A table for X and Y coordinates for the 1st and 2nd holes.

	X	Y
1st	0.000	0.000
2nd	10.000	10.000

 Callout: "Set the hole position from the 1st hole to the 4th hole. These data, after positioning to each well, when moving into the hole, but is a condition that does not contact the workpiece, less exact data is not required."
- Measuring Height Z:** Set to 10.000. Callout: "Set the height of Z axis at measurement."
- Save Measuring Point:** Checked. Callout: "Set the work coordinate number to store measurement result." Below it are dropdowns for G500 and G55.
- Save angle value:** Unchecked. Callout: "Angle between the straight line connecting Hole 1 and Hole 2". Below it is a gear icon with a callout: "Touching it will show the 'workpiece Colum Center'".

Figure 7-45 Workpiece Center Holes Screen Details

(2) Details Settings for Workpiece Center Holes

The 'Detail Setting' dialog box contains the following settings:

- Height Direction:** -Z
- Approach Speed:** F
- Rapid Movement (One Way):** P
- Angle Zero Axis:** L X
- Hole Count:** 2
- Buttons:** Setting, Reset, Close

A diagram on the left shows a workpiece with four holes and a dashed line connecting two of them, with an angle 'P' indicated.

Figure 7-46 Workpiece Center Holes Detail Setting Dialog

Table 7-10 Detailed Setting Parameters for Workpiece Center Holes Measurement

Items	Description
Height Direction	Set the axial direction to measure the height.
P:Rapid Movement	Set the amount of rapid traverse from the touch sensing starting position. The approach time in each axis can be shortened.
Hole Count	The input of "Hole Position" of the set hole count becomes possible.
F:Approach Speed	Set the feed speed of contact sensing.

7.4.18. Operation Procedure

- (1) Move the Spindle ball to the upper area near the center of the first workpiece hole.
- (2) Enter a value in [R: Work Hole Size], the hole position to be measured (X axis, Y axis) and [Z: Measuring Height].
- (3) To save the measurement point, check [Save Measuring Point] and set up the work coordinate system to be used to store measurement point.
- (4) Press the [RUN] key to begin measurement.
- (5) When measurement finishes, the measurement point is stored in the work coordinate system previously specified.

7.4.19. Measuring Angle

Measure the inclination of the workpiece placed on the table.

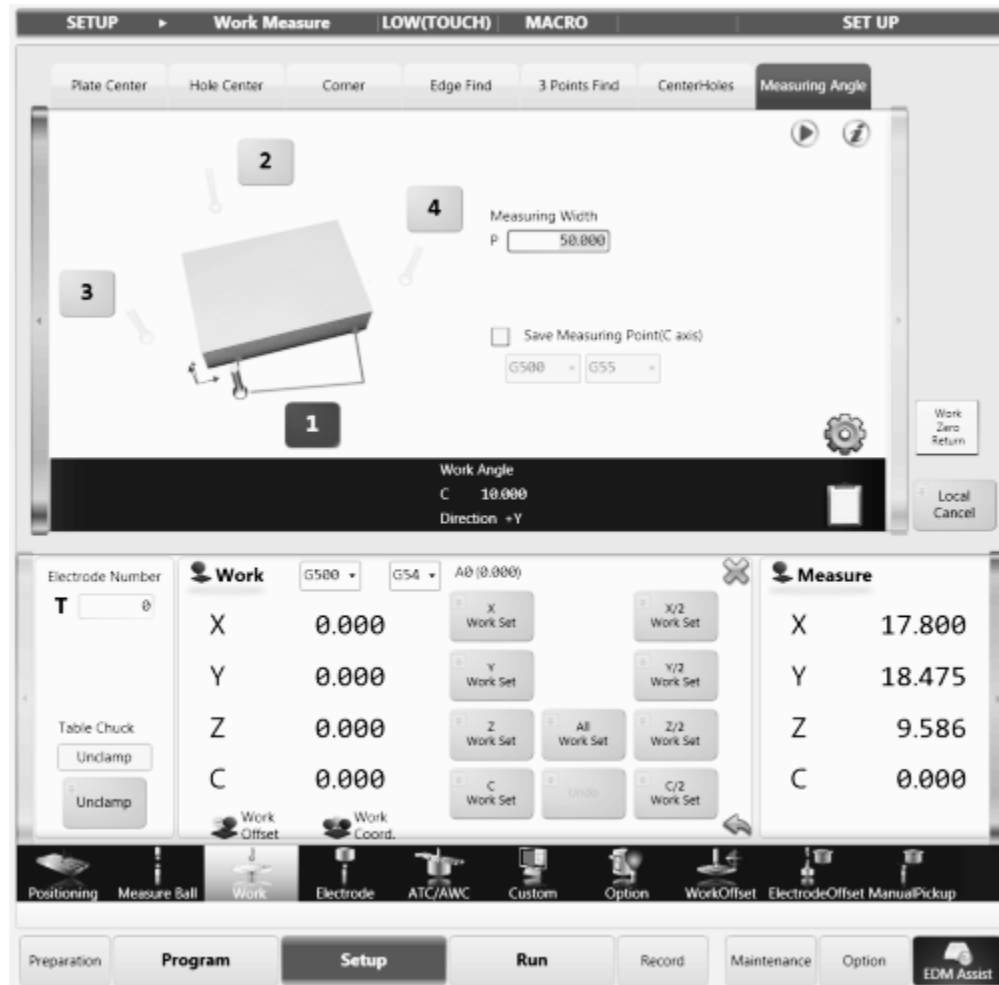


Figure 7-47 Workpiece measurement Measuring Angle Screen

7.4.20. Setting Items

(1) Setting Items of Workpiece Measuring Angle

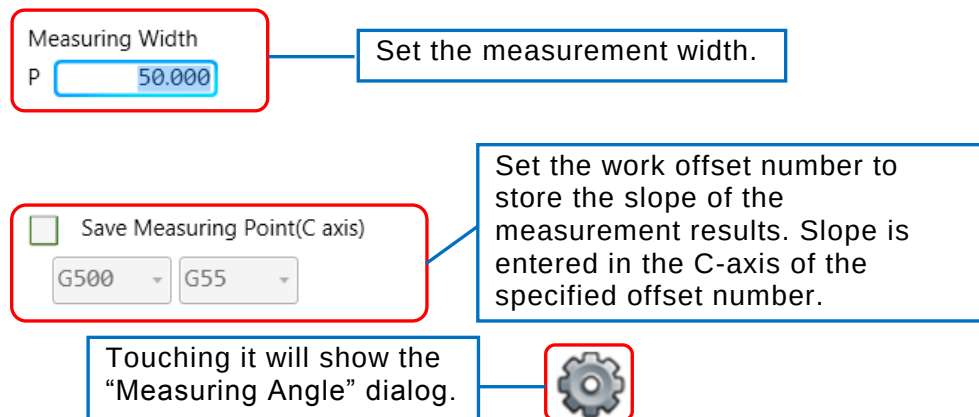


Figure 7-48 Workpiece Measuring Angle Details

(2) Details Settings for Workpiece Measuring Angle

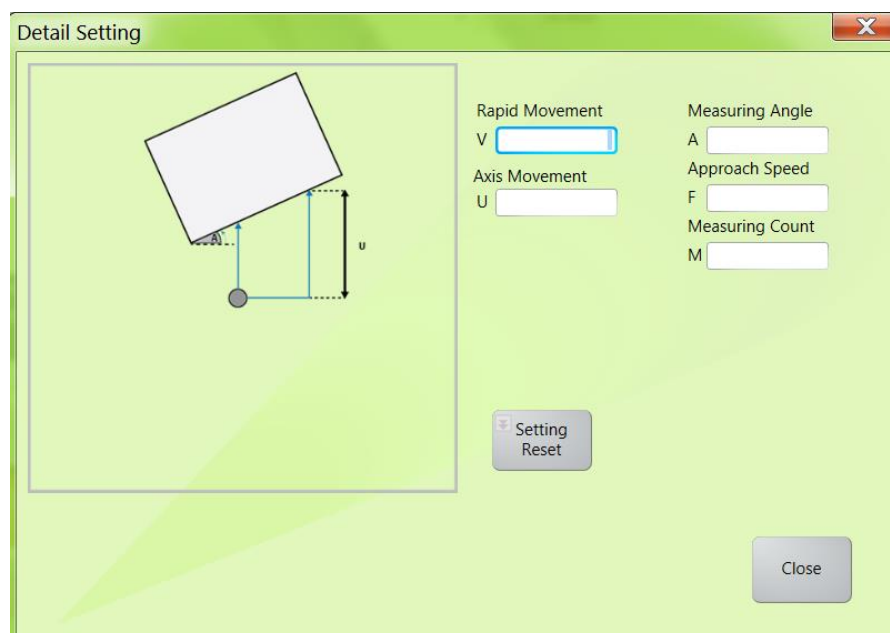


Figure 7-49 Workpiece Measuring Angle Dialog

Table 7-11 Detailed Setting Parameters for Workpiece Dialog Measurement

Items	Description
V:Rapid Movement	Set the amount of rapid traverse from the touch sensing starting position. The approach time in each axis can be shortened.
U:Axis Movement	Set an enough value to touch with workpiece.
A:Measuring Angle	Set the rotated angle of the measuring direction on X-Y plane.
F:Approach Speed	Set the feed speed of contact sensing.
M:Measuring Count	Set the repeat number of measurements.

7.4.21. Operation Procedure

- (1) Move the Spindle ball to near the measurement point (1, 2, 3, 4) you have selected.
- (2) Enter a value in [P: Measuring Width].
- (3) To save the slope angle, check [Save Measuring Point (C axis)] and set up the work coordinate system to be used to save the slope angle.
- (4) Press the [START] key to begin measurement.
- (5) When measurement finishes, the measurement point is stored in the work coordinate system previously specified.

7.5. Electrode Measurement

Before machining, measure the misalignment of the electrode core and the electrode size.

7.5.1. Plate Center

Measure the square electrode.

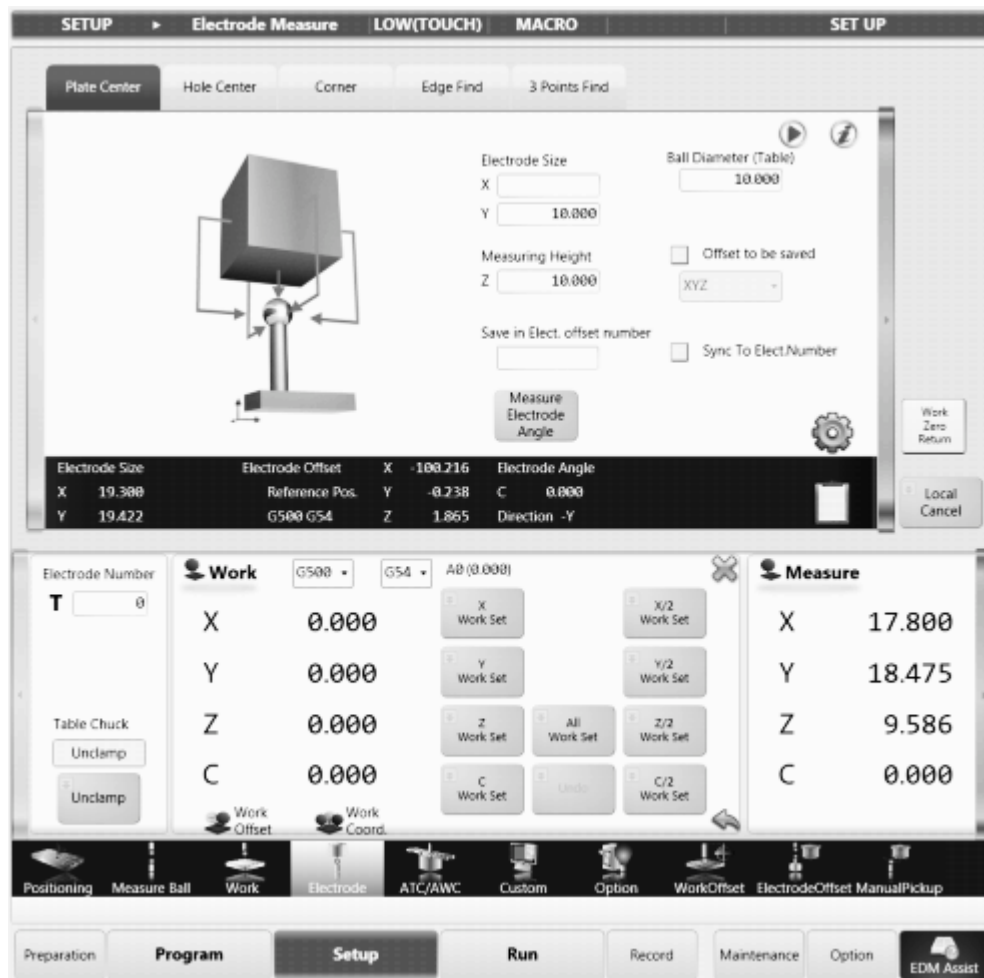


Figure 7-50 Electrode measurement Plate Center Screen

7.5.2. Setting Items

(1) Setting Items of Electrode Plate Center

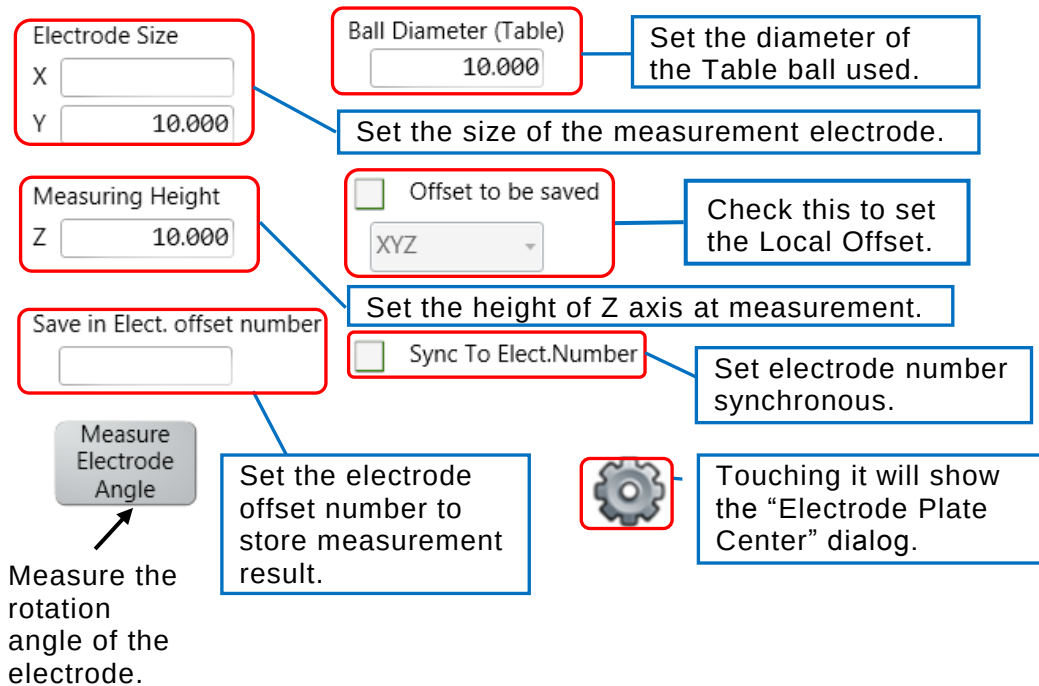


Figure 7-51 Electrode Plate Center Screen Details

(2) Details Settings for Electrode Plate Center

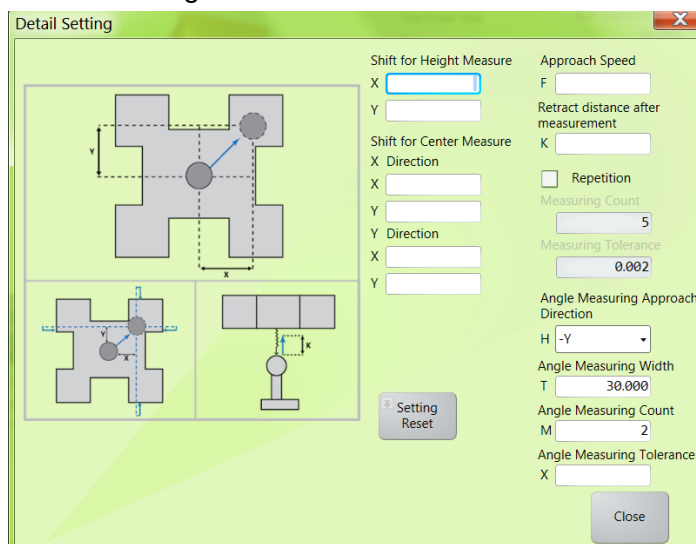


Figure 7-52 Electrode Plate Center Detail Setting Dialog

Table 7-12 Detailed Setting Parameters for Plate Center Measurement

Items	Description
X, Y: Shift for Height Measuring	When positioning the edges in the direction of height, set this to measure by shifting the X and Y axes.
X,Y: Shift for X Direction	Set this to shift the X-axis direction, such as when there is a notch in the measurement section of a column.
X,Y: Shift for Y Direction	Set this to shift the Y-axis direction, such as when there is a notch in the measurement section of a column.
F: Approach Speed	Set the feed speed of contact sensing.
K: Retract Distance after measurement	Set the amount of relief from a measurement point.
H: Angle Measuring Place	Set the axis for which the parallelism is measuring.
T: Angle Measuring Width	Set the measuring width.
M: Angle Measuring Count	Set the count for parallelism operation.
X: Angle Measuring Tolerance	Set the measuring tolerance limit. When the parallelism operation exceeds the count set to the item M, warn of [MEASUREMENT ERROR OUT OF RANGE] is displayed.
Repetition	Set to do Repeat Measurements.
Measuring Count	Set the maximum number of times the measurement is repeated (1 to 9). If the difference between the position after the previous measurement and the position after the next measurement is within the specified error tolerance, the measuring operation will end even before the number of times measurement repeated has reached the specified "Measuring Count" value.
Measuring Tolerance	Set the error tolerance for repeat measurement.

7.5.3. Operation Procedure

- (1) Move the electrode to the upper area near the center of the table ball.
- (2) Enter a value in [X,Y: Electrode Size] and [Z: Measuring Height].
Make sure that the diameter of the Table ball to be used is correctly set in [Ball Diameter (table)].
- (3) To save the measurement point, enter the electrode offset number at the storing destination in [Result Save Number].
- (4) To set the measurement point in the local coordinates, check [Set Elect. Shift to Local].
- (5) To shift at measurement of height, in the X-axis or in the Y-axis direction, or to set the approach speed or retract distance after measurement, set in the Details Settings for Electrode Plate Center dialog box.
- (6) Press the [RUN] key to begin measurement.
- (7) When measurement finishes, the measurement point is stored in the electrode offset number or local coordinates previously specified.
- (8) The electrode size and Electrode Offset, Electrode Angle is displayed in the lower right of the screen as the measurement result.

Electrode Size		Electrode Offset		X -100.216		Electrode Angle	
X	19.300	Reference Pos.		Y	-0.238	C	0.000
Y	19.422	G500 G54		Z	1.865	Direction -Y	



Figure 7-53 Measurement result

7.5.4. Hole Center

Measure an electrode with a hole or groove.

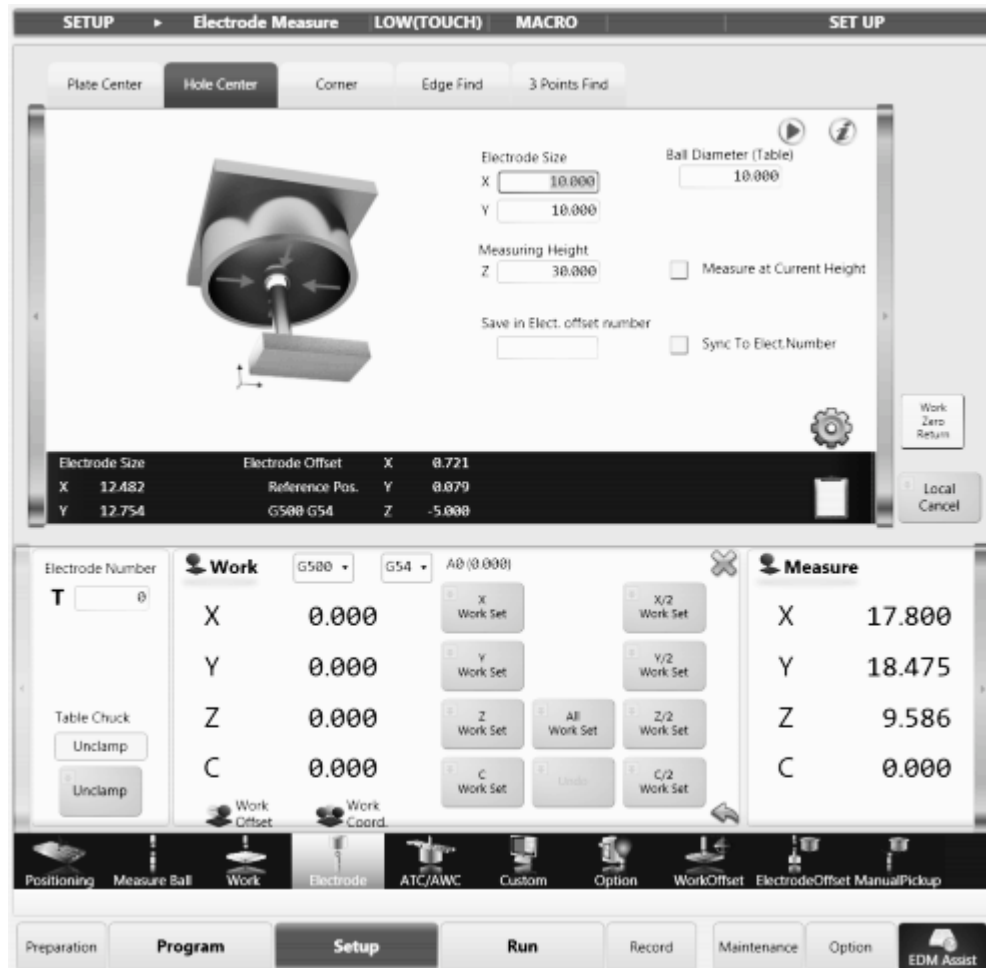


Figure 7-54 Electrode measurement Hole Center Screen

7.5.5. Setting Items

(1) Setting Items of Electrode Hole Center

The screenshot shows the 'Electrode Hole Center' screen with the following settings and callouts:

- Electrode Size:** X: 10.000, Y: 10.000. Callout: "Set the size of the measurement electrode."
- Ball Diameter (Table):** 10.000. Callout: "Set the diameter of the Table ball used."
- Measuring Height:** Z: 30.000. Callout: "Set the height of Z axis at measurement."
- Measure at Current Height:** ☐. Callout: "If a check mark is inserted, measurement is performed at the current position without moving."
- Save in Elect. offset number:** [Empty field]. Callout: "Set the electrode offset number to store measurement result."
- Sync To Elect.Number:** ☐. Callout: "Set electrode number synchronous."
- Gear Icon:** Callout: "Touching it will show the 'Electrode Hole Center' dialog."

Figure 7-55 Electrode Hole Center Screen Details

(2) Details Settings for Electrode Hole Center

The 'Detail Setting' dialog box contains the following settings:

- Shift for Height Measure:** X: [Empty], Y: [Empty]
- Rapid Movement (One Way):** X: [Empty], Y: [Empty]
- Measuring Angle:** A: [Empty]
- Approach Speed:** F: [Empty]
- Retract distance after measurement:** U: [Empty]
- Move to Measuring Height after Rapid feed:** ☐
- Repetition:** ☐
- Measuring Count:** 5
- Measuring Tolerance:** 0.002
- Buttons:** Setting, Reset, Close

Figure 7-56 Electrode Hole Center Detail Setting Dialog

Table 7-13 Detailed Setting Parameters for Hole Center Measurement

Items	Description
X, Y: Shift for Height Measuring	When positioning the edges in the direction of height, set this to measure by shifting the X and Y axes.
X,Y: Rapid Movement	Set the amount of rapid traverse from the touch sensing starting position. The approach time in each axis can be shortened.
A: Measuring Angle	Set the rotated angle of the measuring direction on X-Y plane.
F: Approach Speed	Set the feed speed of contact sensing.
U: Retract Distance after measurement	Set the amount of relief from a measurement point.
Repetition	Set to do Repeat Measurements.
Measuring Count	Set the maximum number of times the measurement is repeated (1 to 9). If the difference between the position after the previous measurement and the position after the next measurement is within the specified error tolerance, the measuring operation will end even before the number of times measurement repeated has reached the specified "Measuring Count" value.
Measuring Tolerance	Set the error tolerance for repeat measurement.

7.5.6. Operation Procedure

- (1) Move the electrode hole to the upper area near the center of the table ball.
- (2) Enter a value in [X,Y: Electrode Size] and [Z: Measuring Height].
Make sure that the diameter of the Table ball to be used is correctly set in [Ball Diameter (table)].
- (3) To save the measurement point, enter the electrode offset number at the storing destination in [Result Save Number].
- (4) To shift at measurement of height, in the X-axis or in the Y-axis direction, or to set the approach speed or retract distance after measurement, set in the Details Settings for Electrode Hole Center dialog box.
- (5) Press the [RUN] key to begin measurement.
- (6) When measurement finishes, the measurement point is stored in the electrode offset number or local coordinates previously specified.
- (7) The electrode size and Electrode Offset is displayed in the lower right of the screen as the measurement result.

Electrode Size	Electrode Offset	X	0.000
X 0.000	Reference Pos.	Y	0.000
Y 0.000	G500 G54	Z	0.000

Figure 7-57 Measurement result

7.5.7. Corner

Four corners of the electrode can be measured with easy input.

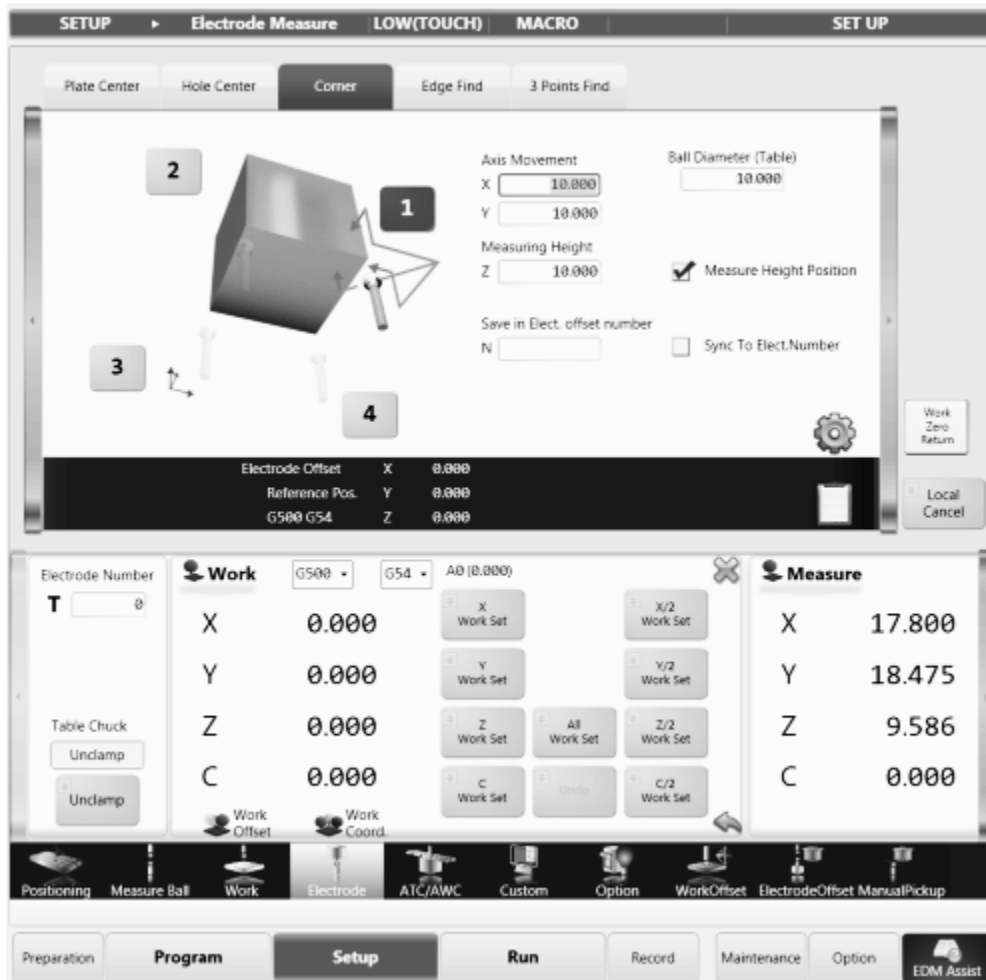


Figure 7-58 Electrode measurement Corner Screen

7.5.8. Setting Items

(1) Setting Items of Electrode Corner

The screenshot shows the 'Electrode measurement Corner' screen with several settings and callouts:

- Axis Movement:** X and Y coordinates are set to 10.000. Callout: "The position measured in the XY plane."
- Ball Diameter (Table):** Set to 10.000. Callout: "Set the diameter of the Table ball used."
- Measuring Height:** Z coordinate is set to 10.000. Callout: "The height of the measurement is the height from the position in which the measurement begins."
- Measure Height Position:** A checked checkbox.
- Save in Elect. offset number:** A field labeled 'N' is empty. Callout: "Set the electrode offset number to store measurement result."
- Sync To Elect.Number:** An unchecked checkbox. Callout: "Set electrode number synchronous."
- Gear Icon:** A gear icon in a red box. Callout: "Touching it will show the 'Electrode Colum Center' dialog."

Figure 7-59 Electrode measurement Corner Screen Details

(2) Details Setting for Electrode Corner

The 'Detail Setting' dialog box contains the following settings:

- Shift for Height Measure:** X and Y fields are empty.
- Measuring Angle:** A field labeled 'A' is empty.
- Approach Speed:** A field labeled 'F' is empty.
- Retract distance after measurement:** A field labeled 'U' is empty.
- Buttons:** 'Setting Reset' and 'Close' buttons are located at the bottom.

Figure 7-60 Electrode Corner Detail Setting Dialog

Table 7-14 Detailed Setting Parameters for Electrode Corner

Items	Description
X,Y: Shift for Height Measuring	When positioning the edges in the direction of height, set this to measure by shifting the X and Y axes.
A: Measuring Angle	Set the rotated angle of the measuring direction on X-Y plane.
F: Approach Speed	Set the feed speed of contact sensing.
U: Retract Distance after measurement	Set the amount of relief from a measurement point.

7.5.9. Operation Procedure

- (1) Manually move the corner position of the electrode to be measured to the vicinity above the Table ball.
- (2) Select the direction of the measurement from one of the four possible buttons (1-4).
- (3) Fill in the required measurement inputs (measurement distance and height etc.)
- (4) When the START key is pushed, the measurement will begin.
- (5) Electrode Offset is displayed in the lower right of the screen as the measurement result.

Electrode Offset	X	0.000
Reference Pos.	Y	0.000
G500 G54	Z	0.000

Figure 7-61 Measurement result

7.5.10. Edge Find

The electrode offset can be measured each edge face of electrode.



Figure 7-62 Electrode measurement Edge Find Screen

7.5.11. Setting Items

(1) Setting Items of Electrode Edge Find

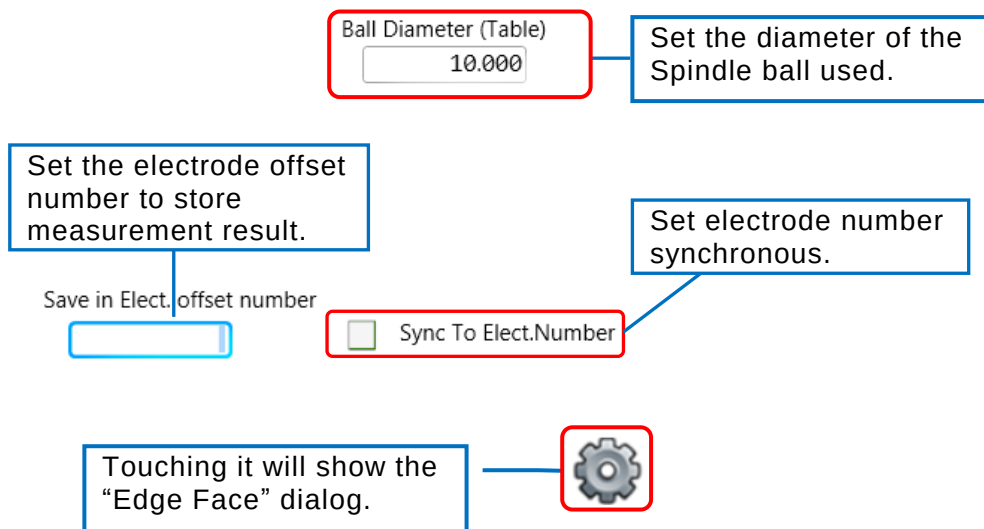


Figure 7-63 Electrode measurement Edge Find Screen Details

(2) Details Setting for Electrode Corner

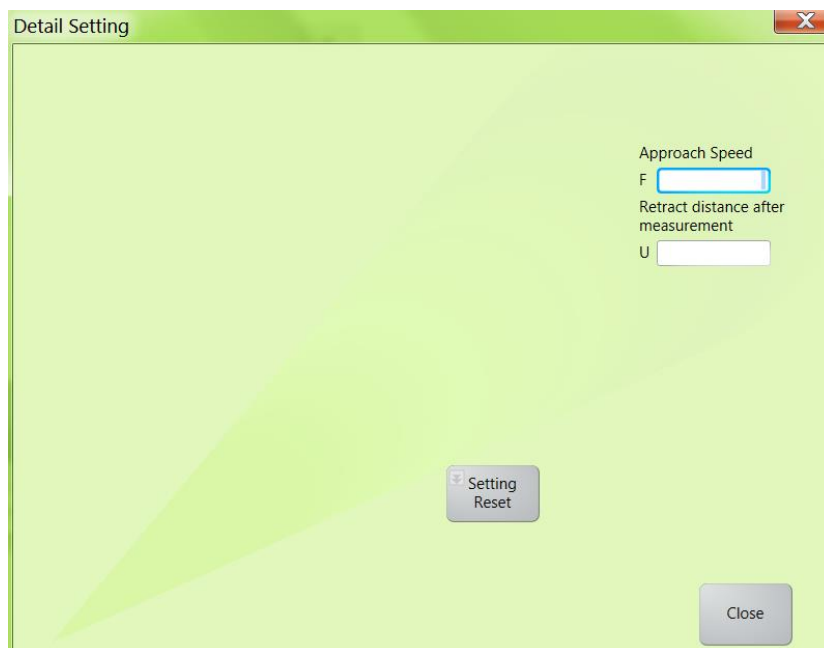


Figure 7-64 Electrode measurement Edge Find Detail Setting Dialog

Table 7-15 Detailed Setting Parameters for Electrode Corner

Items	Description
F: Approach Speed	Set the feed speed of contact sensing.
U: Retract Distance after measurement	Set the amount of relief from a measurement point.

7.5.12. Operation Procedure

- (1) Select measuring edge face with button [1]-[5]
- (2) Measurement will start when press [START] button on the FPB2.
- (3) Measurement results (Electrode Offset) will be displayed after the completion of measurement.

It is offset between reference position (G500G54) and measuring edge face position.

Electrode Offset	X	0.000
Reference Pos.	Y	0.000
G500 G54	Z	0.000

Figure 7-65 Measurement result

- * To set measurement results into Electrode Offset, enter electrode number to [Save in Elect. offset number].

7.5.13. 3 Points Find

Measure the outside and inside of the Colum electrode.

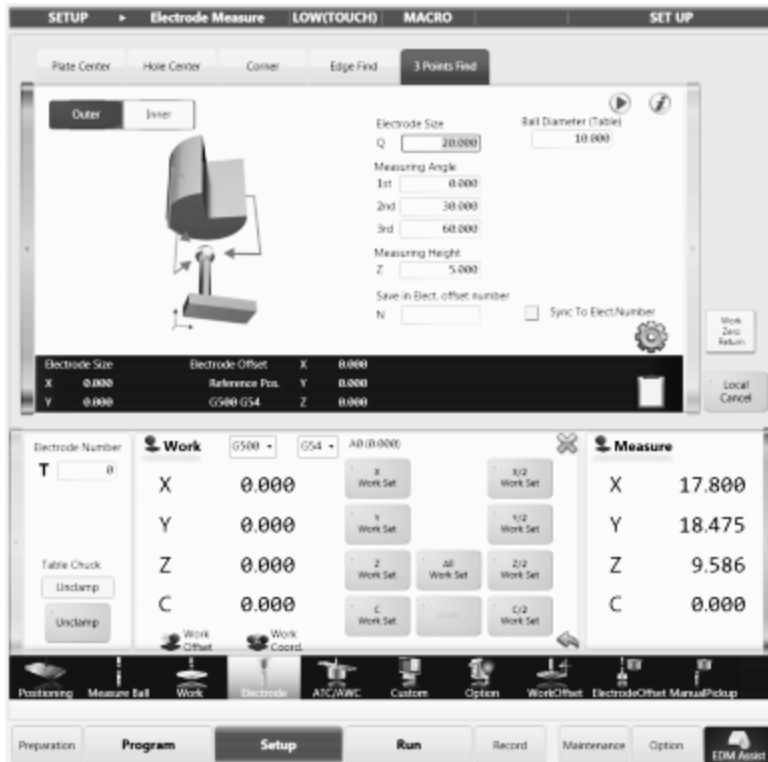


Figure 7-66 Electrode measurement Colum Center (Outer) Screen



Figure 7-67 Electrode measurement Colum Center (Inner) Screen

7.5.14. Setting Items

(1) Setting Items of Electrode Column Center (Outer)

The screenshot shows the 'Electrode Column Center (Outer)' settings screen. The fields and their descriptions are as follows:

- Electrode Size**: A text input field labeled 'Q' with the value '20.000'. Callout: 'Set the size of the measurement electrode.'
- Ball Diameter (Table)**: A text input field with the value '10.000'. Callout: 'Set the diameter of the Table ball used.'
- Measuring Angle**: Three text input fields labeled '1st', '2nd', and '3rd' with values '0.000', '30.000', and '60.000' respectively. Callout: 'Set the angle of each measurement position taken as the 0 degree reference on X axis.'
- Measuring Height**: A text input field labeled 'Z' with the value '5.000'. Callout: 'Set the height of Z axis at measurement.'
- Save in Elect. offset number**: A text input field labeled 'N'. Callout: 'Set the electrode offset number to store measurement result.'
- Sync To Elect.Number**: A checkbox that is currently unchecked. Callout: 'Set electrode number synchronous.'
- Settings Icon**: A gear icon. Callout: 'Touching it will show the "Electrode Column Center" dialog.'

Figure 7-68 Electrode Column Center (Outer) Screen Details

(2) Setting Items of Electrode Column Center (Inner)

The screenshot shows the 'Electrode Column Center (Inner)' settings screen. The fields and their descriptions are as follows:

- Electrode Size**: A text input field labeled 'Q' with the value '20.000'. Callout: 'Set the size of the measurement electrode.'
- Ball Diameter (Table)**: A text input field with the value '10.000'. Callout: 'Set the diameter of the Table ball used.'
- Measuring Angle**: Three text input fields labeled '1st', '2nd', and '3rd' with values '0.000', '30.000', and '60.000' respectively. Callout: 'Set the angle of each measurement position taken as the 0 degree reference on X axis.'
- Measuring Height**: A text input field labeled 'Z' with the value '5.000'. Callout: 'Enter the measuring height, or set to measure at the current height.'
- Measure at Current Height**: A checkbox that is currently checked. Callout: 'Set electrode number synchronous.'
- Save in Elect. offset number**: A text input field labeled 'N'. Callout: 'Set the electrode offset number to store measurement result.'
- Sync To Elect.Number**: A checkbox that is currently unchecked. Callout: 'Set electrode number synchronous.'
- Settings Icon**: A gear icon. Callout: 'Touching it will show the "Electrode Column Center" dialog.'

Figure 7-69 Electrode Column Center (Inner) Screen Details

(3) Details Settings for Electrode Column Center (Outer)

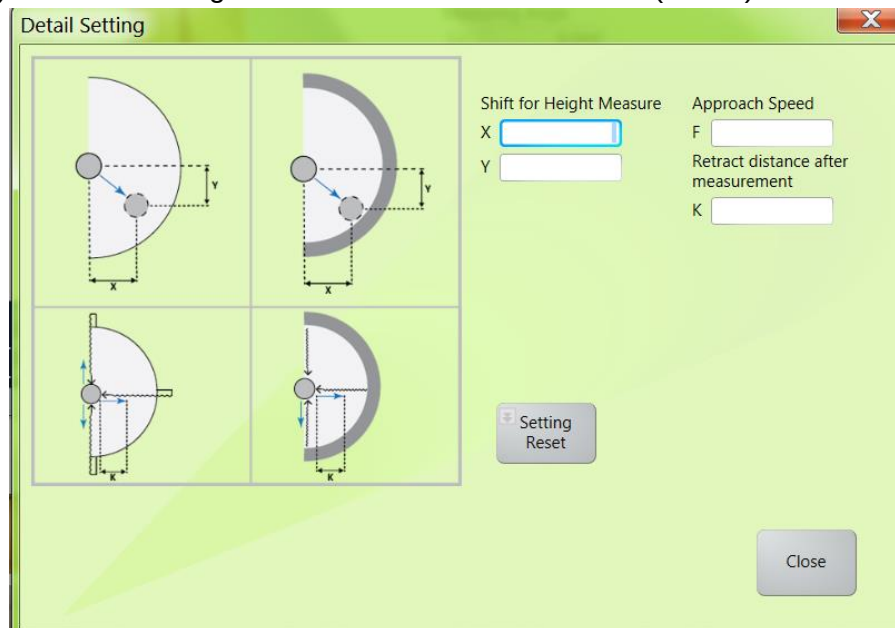


Figure 7-70 Electrode Column Center (Outer) Detail Setting Dialog

Table 7-16 Detailed Setting Parameters for Colum Center (Outer) Measurement

Items	Description
X, Y: Shift for Height Measuring	When positioning the edges in the direction of height, set this to measure by shifting the X and Y axes.
U: Rapid Movement	Set the amount of rapid traverse from the touch sensing starting position. The approach time in each axis can be shortened.
F: Approach Speed	Set the feed speed of contact sensing.
K: Retract Distance after measurement	Set the amount of relief from a measurement point.

(4) Details Settings for Electrode Colum Center (Inner)

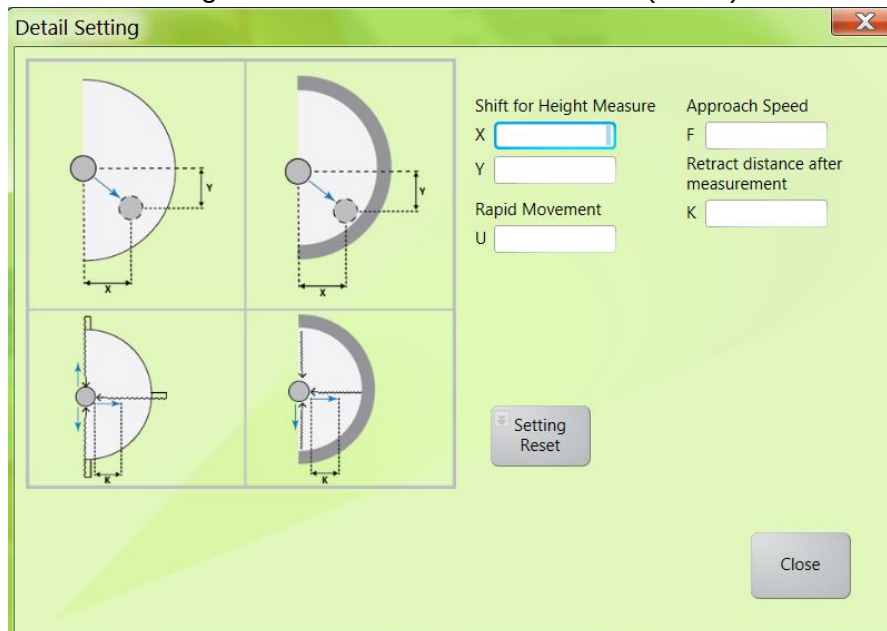


Figure 7-71 Electrode Colum Center (Inner) Detail Setting Dialog

Table 7-17 Detailed Setting Parameters for Colum Center (Inner) Measurement

Items	Description
X,Y: Shift for Height Measuring	When positioning the edges in the direction of height, set this to measure by shifting the X and Y axes.
F: Approach Speed	Set the feed speed of contact sensing.
K: Retract Distance after measurement	Set the amount of relief from a measurement point.

7.5.15. Operation Procedure

- (1) Move the Colum electrode to the upper area near the center of the table ball.
- (2) Enter a value in [Q: Electrode Size], [Measuring Angle 1, 2, 3] and [Z: Measuring Height].
Make sure that the diameter of the Table ball to be used is correctly set in [Ball Diameter (Table)].
- (3) To save the measurement point, enter the electrode offset number at the storing destination in [Result Save Number].
- (4) To set the measurement point in the local coordinates, check [Set Elect. Shift to Local].
- (5) To shift at measurement of height, in the X-axis or in the Y-axis direction, or to set the approach speed or retract distance after measurement, set in the Details Settings for Electrode Colum Center dialog box.
- (6) Press the [START] key to begin measurement.
- (7) When measurement finishes, the measurement point is stored in the electrode offset number or local coordinates previously specified.
- (8) The electrode size and Electrode Offset is displayed in the lower right of the screen as the measurement result.

Electrode Size	Electrode Offset	X	0.000
X 0.000	Reference Pos.	Y	0.000
Y 0.000	G500 G54	Z	0.000

Figure 7-72 Measurement result

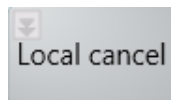
7.6. Quick Operations

7.6.1. Work Zero Return



Moves to the current chosen work coordinate system.
In the ON state by pressing the button, pressing the [START] key on the portable control panel will move to work origin.

7.6.2. Local cancel



Reset the local offset to 0 and cancel the local settings.
※This button does not take effect unless it is held down for at least 1 second.

7.7. ATC/AWC (Option)

Manual operation of ATC and AWC can be done on this screen.

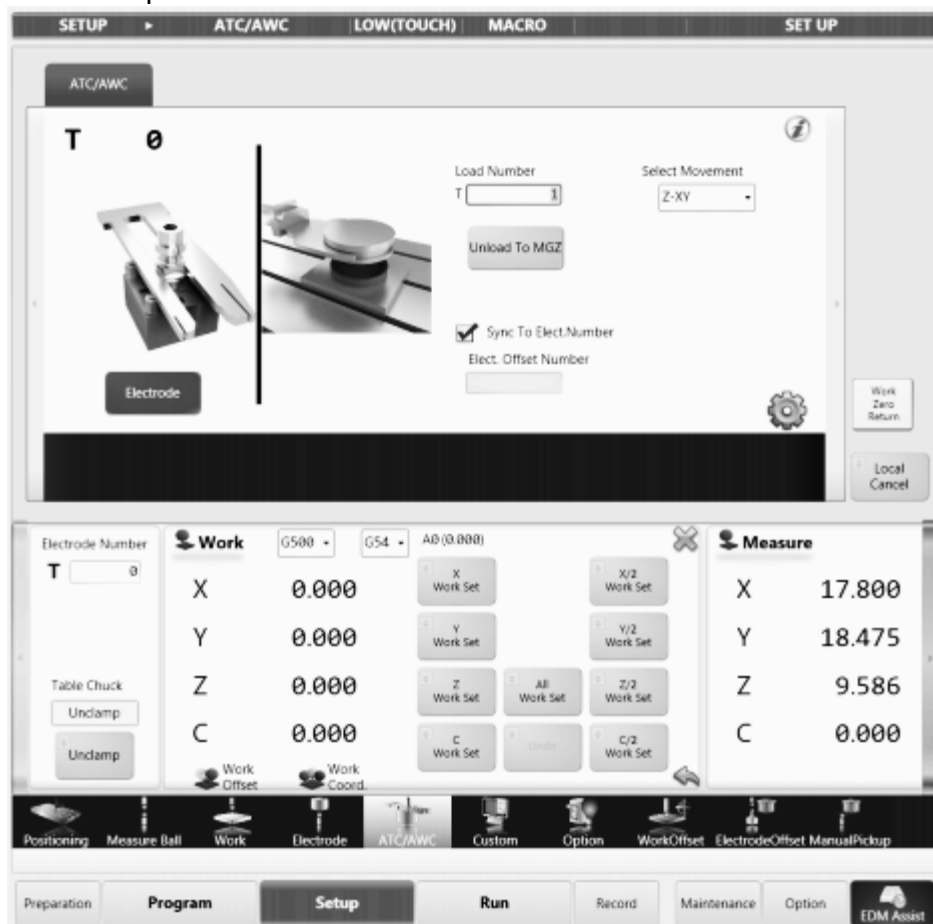


Figure 7-73 ATC/AWC Screen

7.7.1. Setting Items

(1) The operated equipment is selected.

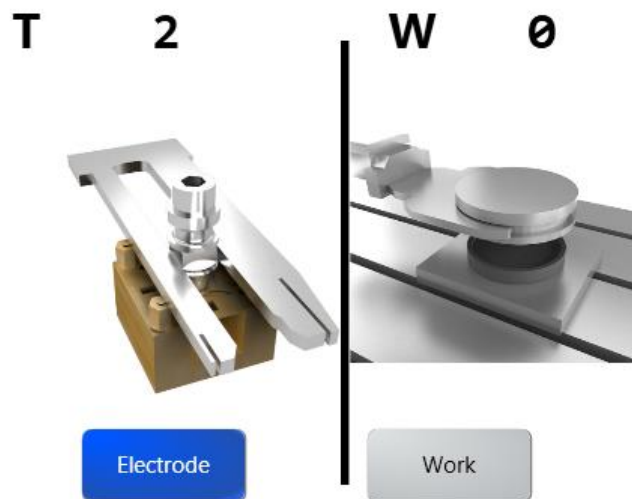


Figure 7-74 ATC/AWC selection

(2) Setting Items of [ATC/AWC]

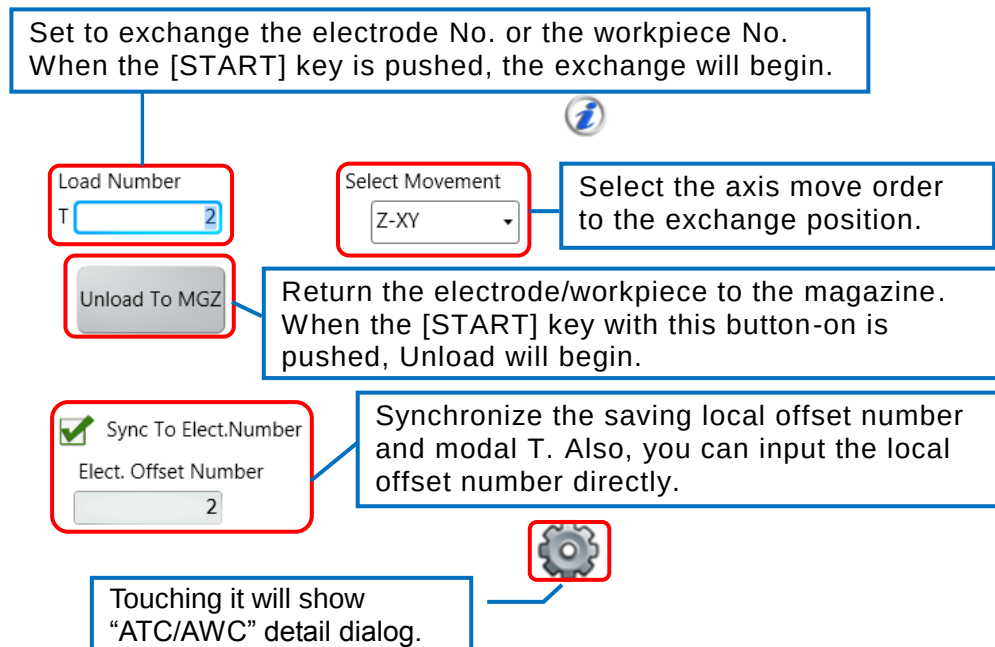


Figure 7-75 ATC/AWC Setting Items

(3) [ATC/AWC] Detail Setting

Detail Setting

☐ Change coord. system after exchange

G500 G55

Axis movement position after exchange

X

Y

Z

C

Close

Figure 7-76 ATC/AWC detail Setting Dialog

Table 7-18 ATC/AWC detail Setting Items

Items	Description
Change Work Coordinate After Change	When this checkbox is on, the work coordinate system is changed to the one specified after ATC/AWC.
X,Y,Z,C: Axis Move Position After Change	When a value is entered in the edit boxes of X, Y, Z and C (when the rotation head is set), the axes move to the specified coordinates after ATC/AWC.

7.8. Custom

7.8.1. User

The program of the user definition is called, and the program is made interactively.

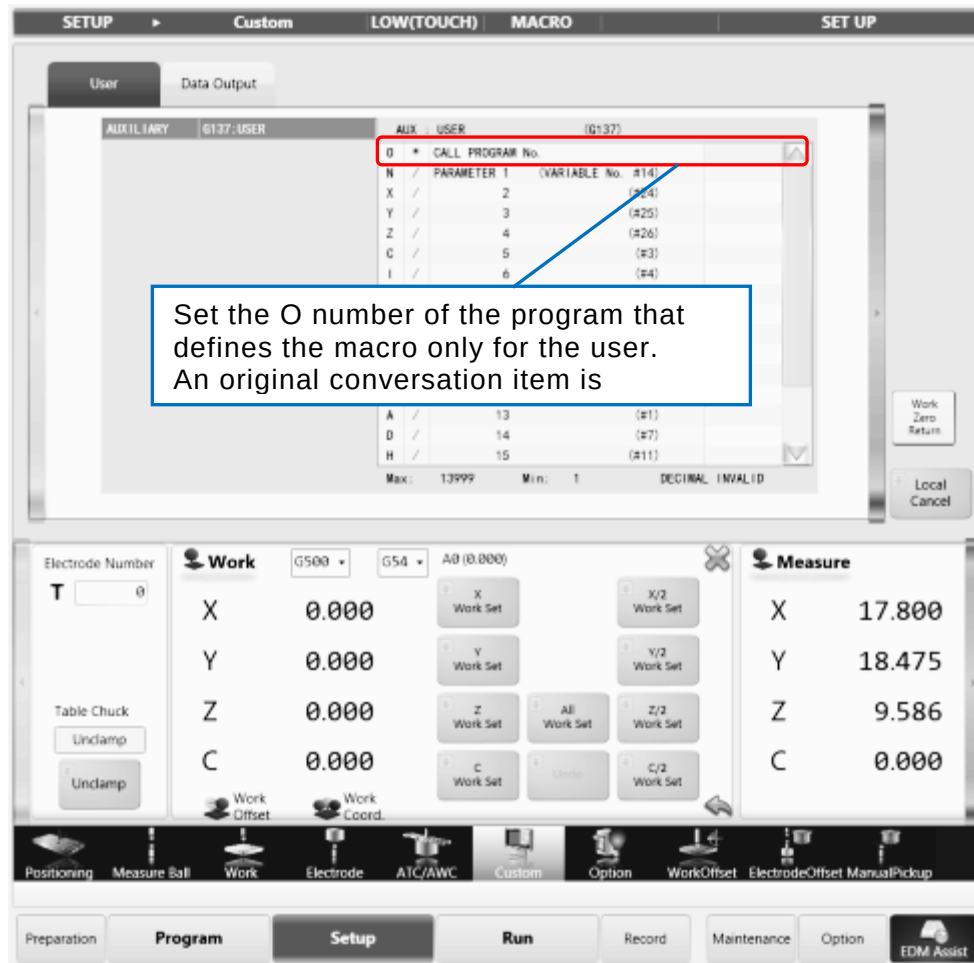


Figure 7-77 User Screen

7.8.2. Data Output

Data output can be done interactively.

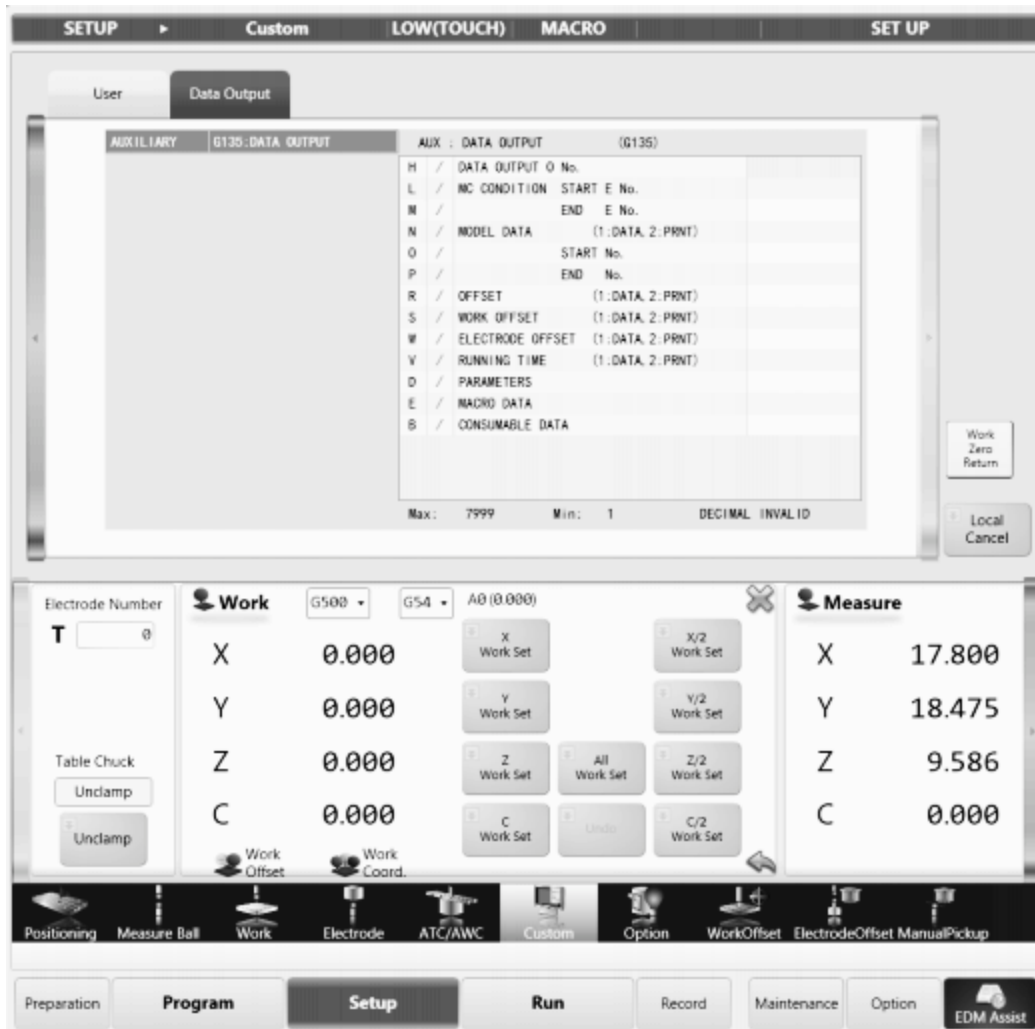


Figure 7-78 Data Output Screen

The following data is output by a set value of item D.

“1, 6”: Original parameters (in case of Updating)

“5”: All parameters

7.9. Option

The manual operation of each option unit can be done.

7.9.1. Rotary Head

The manual operation of Rotary head can be done on this screen.

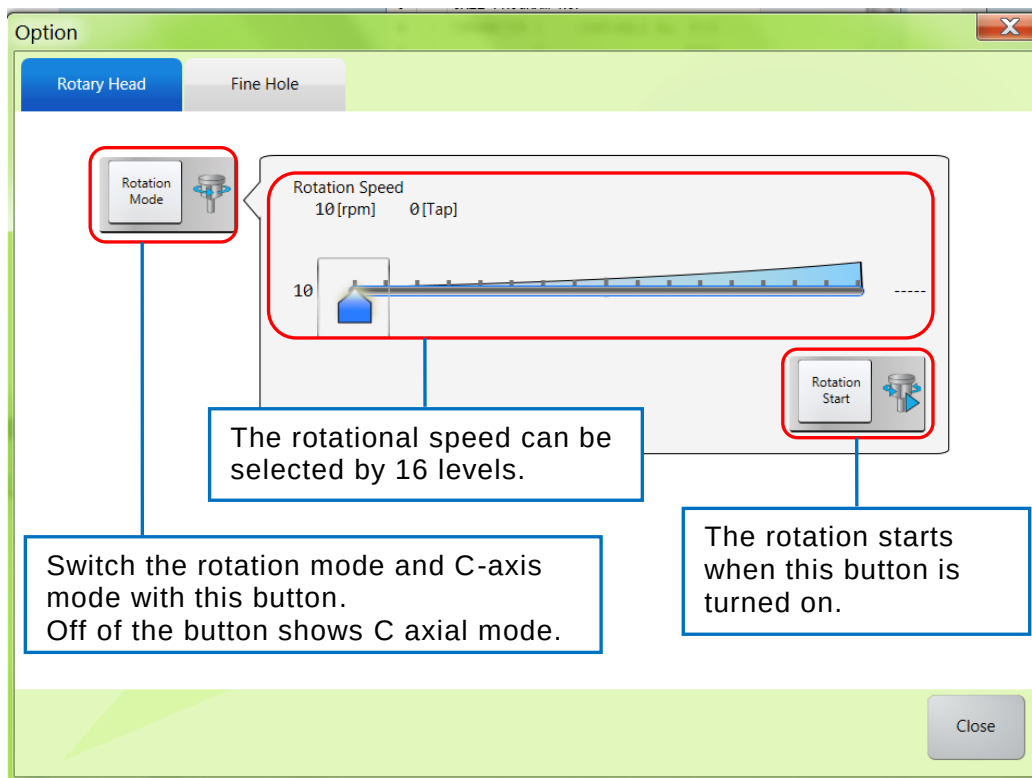


Figure 7-79 Rotary Head Dialog

7.9.2. Flushing

[Machine Type: ES200A, EDAF2/EDAF3]

Spindle flushing and tank flushing/suction operation can be performed.

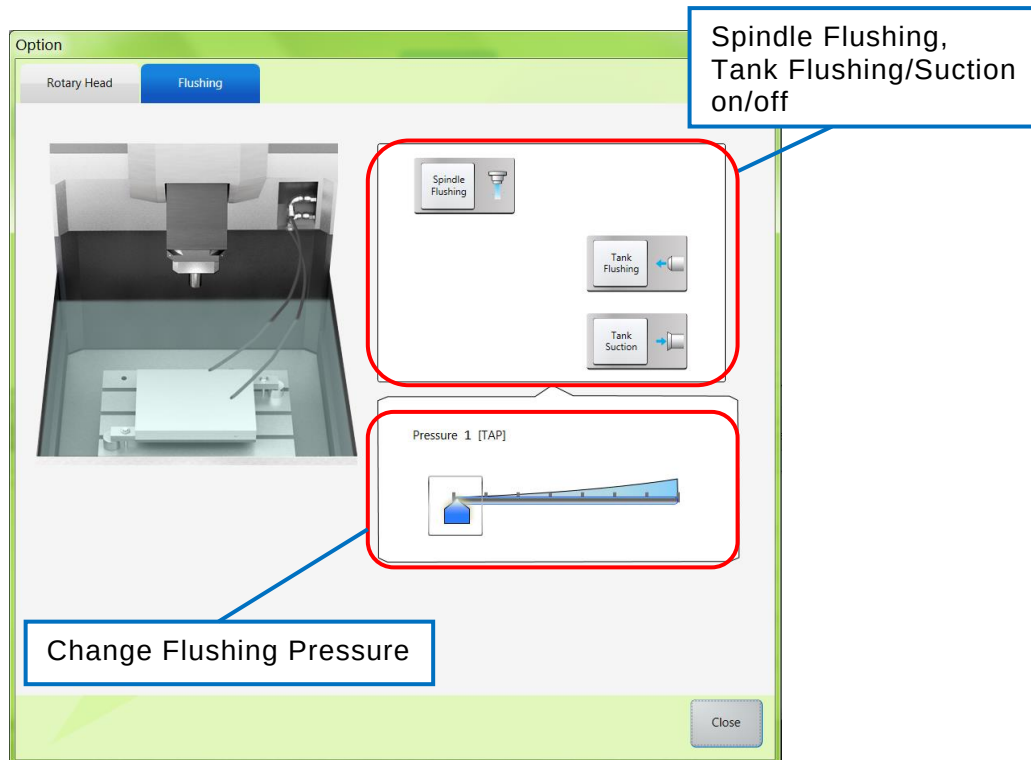


Figure 7-80 [Flushing] dialog

7.9.3. Fine Hole

The manual operation of Fine Hole unit can be done on this screen.

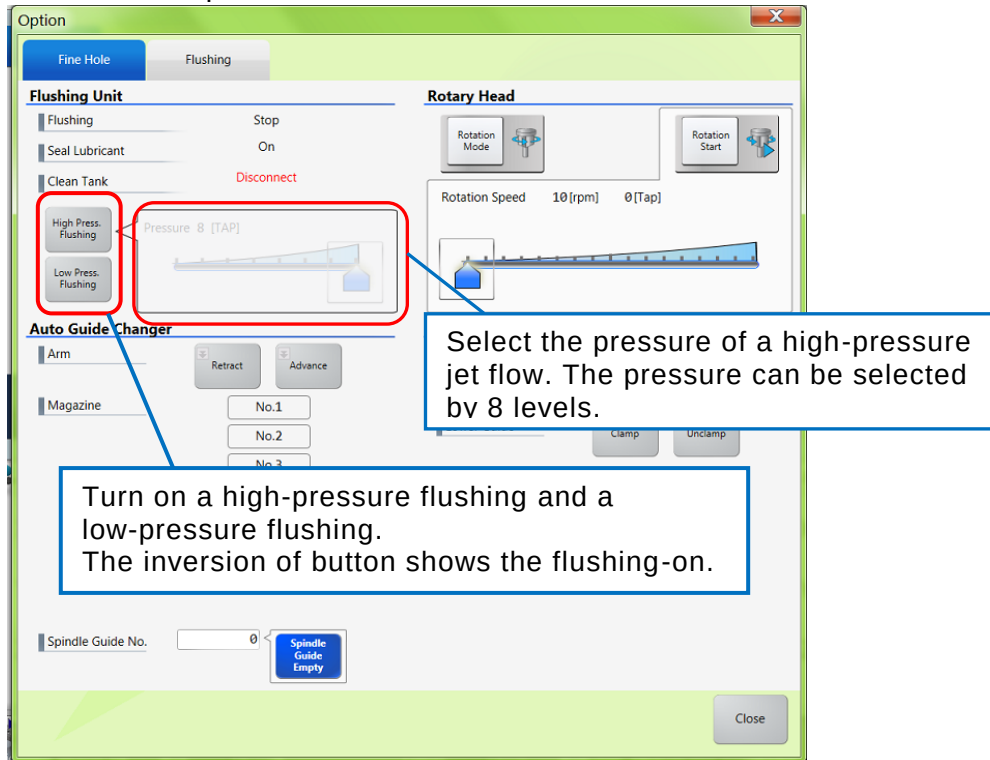


Figure 7-81 Fine Hole Dialog

Display the operating status of the "Flushing".

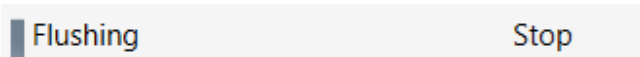


Figure 7-82 Status display of the "Flushing"

Table 7-19 Status of "Flushing"

State	Description
STOP	The flushing is in stop status.
WAIT FOR PRESSURE OFF	The high /constant pressure has been stopped and the pressure is being reduced.
WAIT FOR PRESSURE ON	High flushing has been started and the pressure is being increased to the specified value.
HIGH FLUSHING START	High pressure flushing is in start status.
HIGH FLUSHING	High pressure flushing is being executed.
WAIT FOR PRESSURE ON	Low flushing has been started and the pressure is being decreased to the specified value.
LOW FLUSHING START	Low pressure flushing is in start status.
LOW FLUSHING	Low pressure flushing is being executed.

Display the operating status of the "Clean Tank".

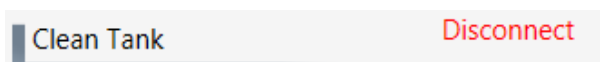


Figure 7-83 Status display of the "Clean Tank"

Table 7-20 Status of "Clean Tank"

State	Description
DISCONNECT	The tank is not connected (Displayed in red color).
EMPTY	The dielectric fluid in the tank is insufficient (Displayed in yellow color).
FULL	The dielectric fluid in the tank is full.
NORMAL	The dielectric fluid in the tank is enough for the high flushing operation.
FILLING	The work tank is being filled with dielectric fluid (Displayed in yellow color).

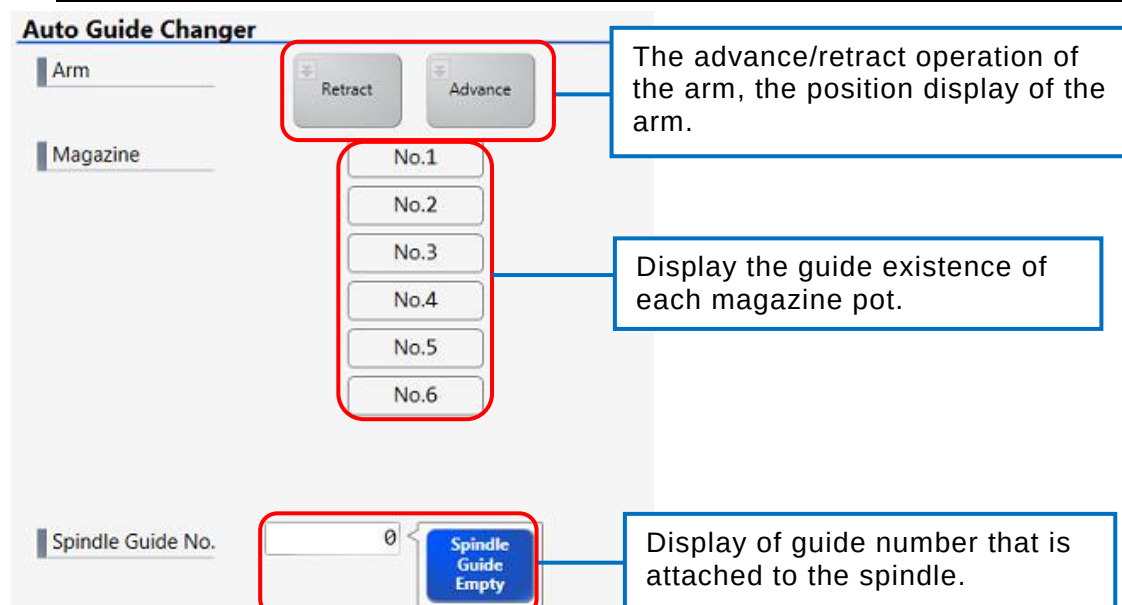


Figure 7-844 Auto Guide Changer operation

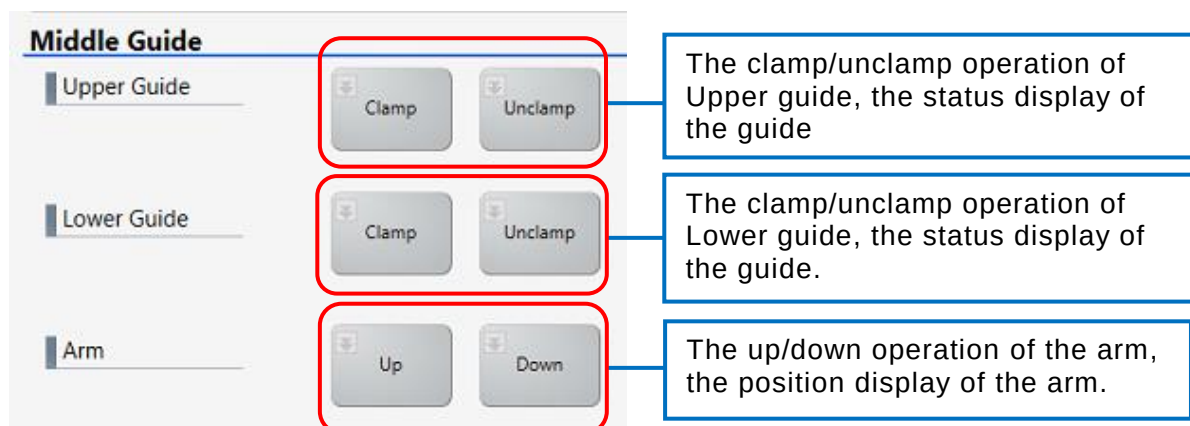


Figure 7-85 Middle Guide operation

7.9.4. Fluid Distribute Unit

Manual operation of Fluid Distribute unit can be done.

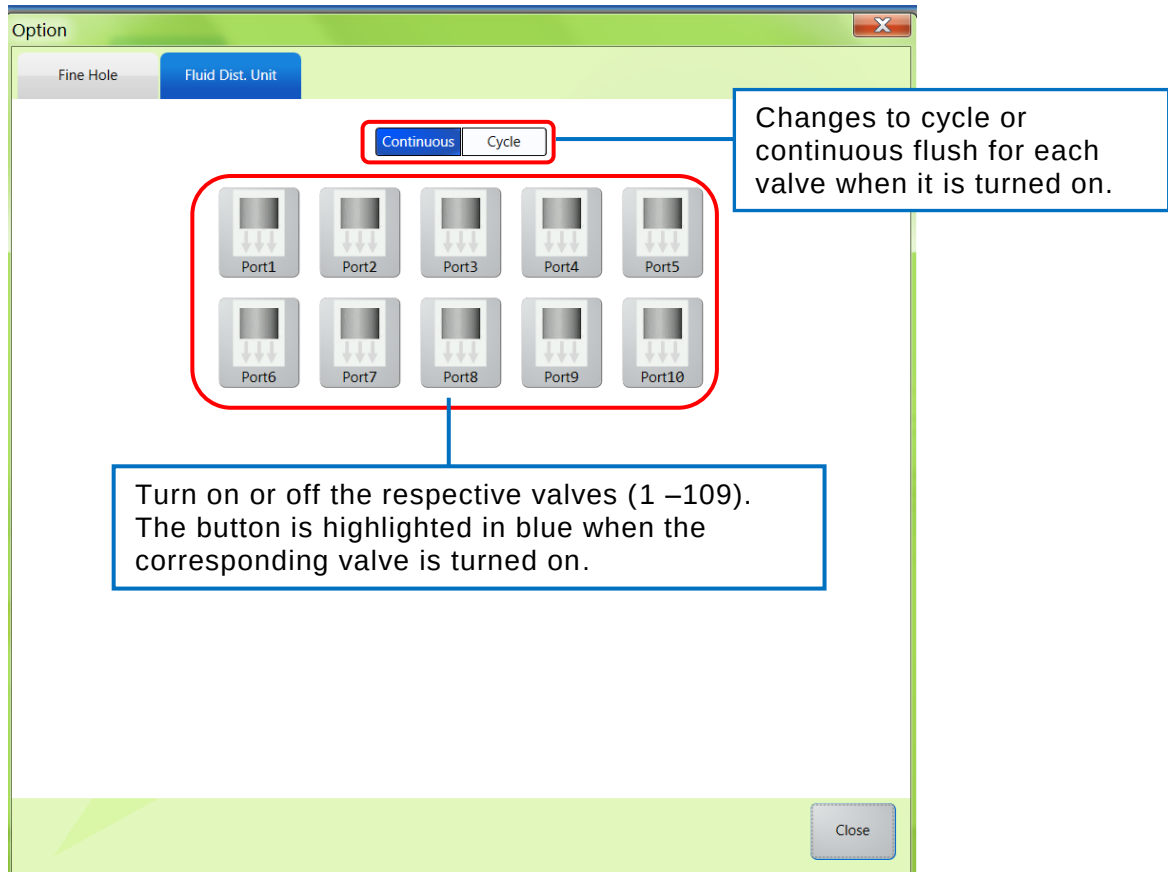


Figure 7-85 Fluid Distribute Unit Dialog

Each port can be operated only in the reset state of manual mode.

When machining is performed with multiple ports used, choose the [Cycle] mode to alternately operate the ports if machining chips can be discharged more efficiently through intermittent jet than continuous jet.

In the reset state, the [Continuous] mode is chosen by default.

7.10. Fine Hole

The manual operation of Fine Hole unit can be done on this screen.

7.10.1. Machine Type: EDBV3/EDBV8

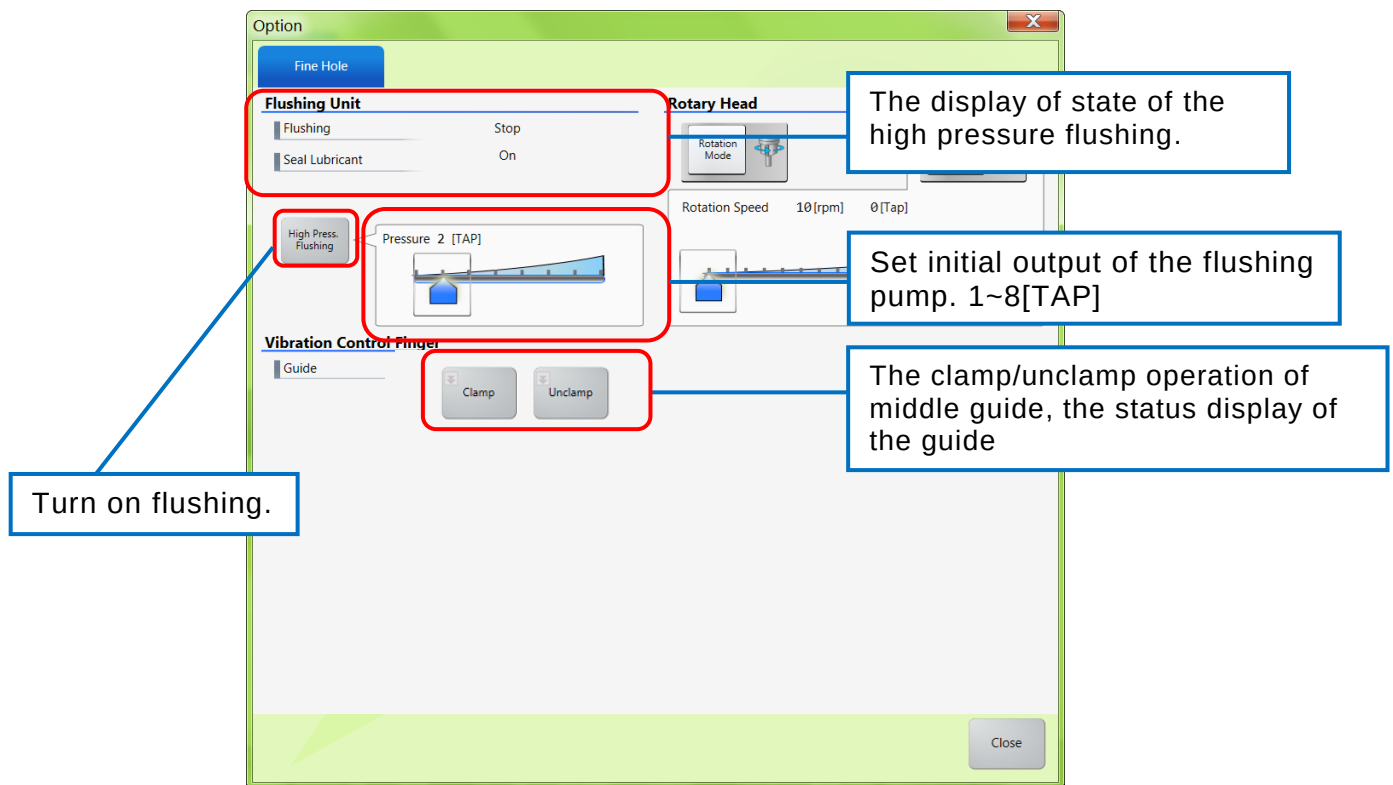


Figure 7-87 Fine Hole Dialog

7.10.2. Machine Type: BX3

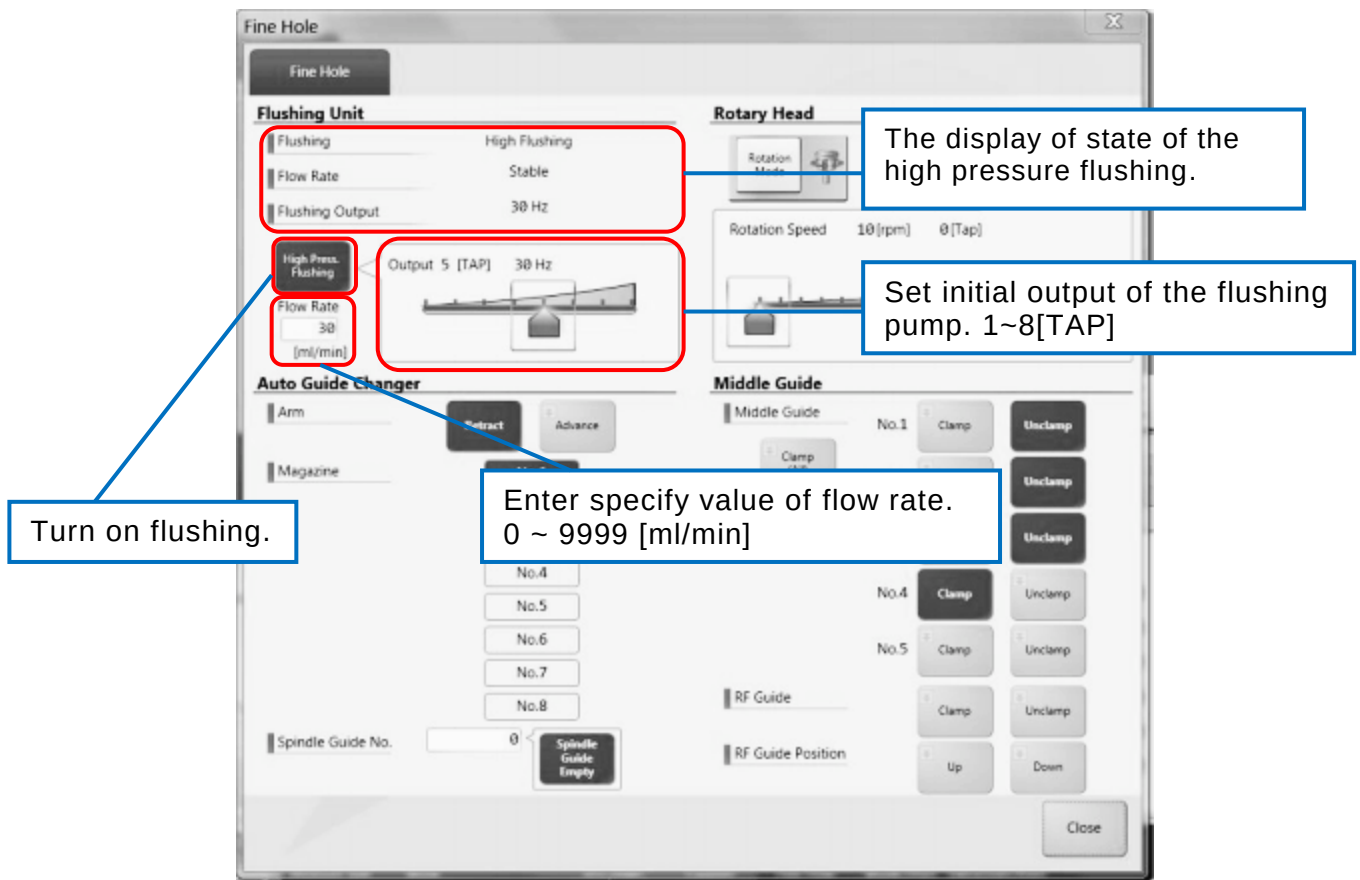


Figure 7-88 Fine Hole Dialog

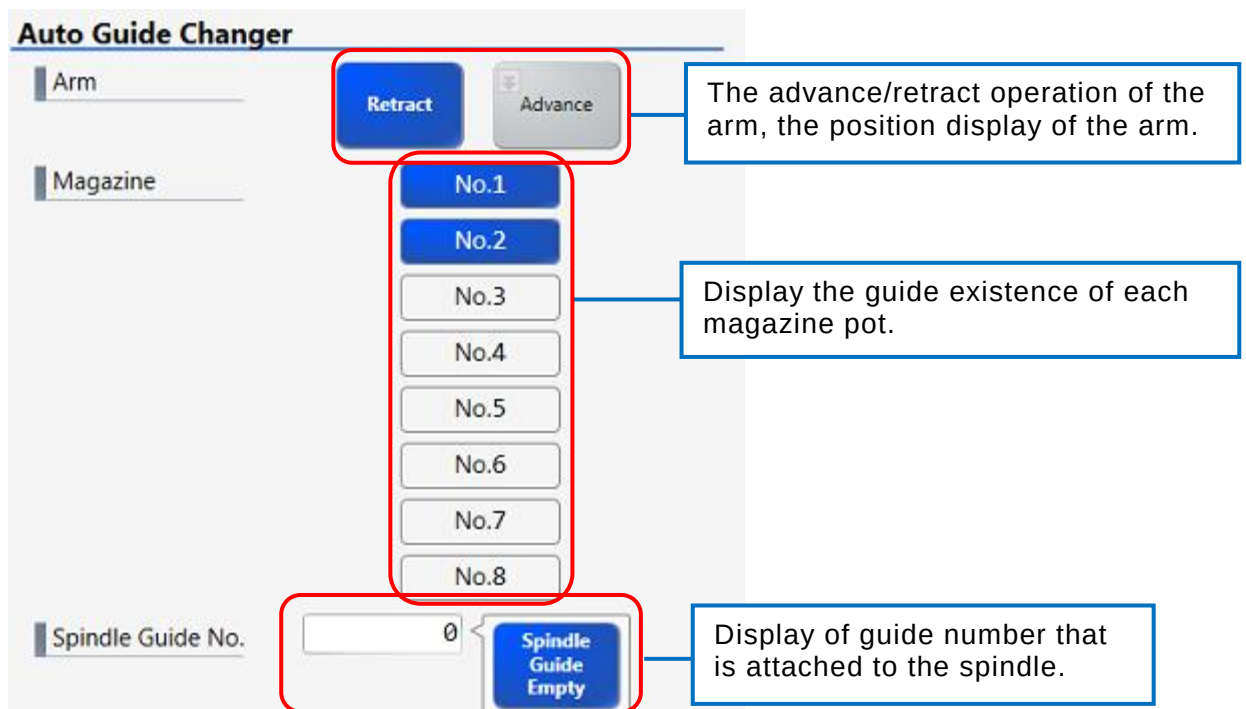


Figure 7-869 Auto Guide Changer operation

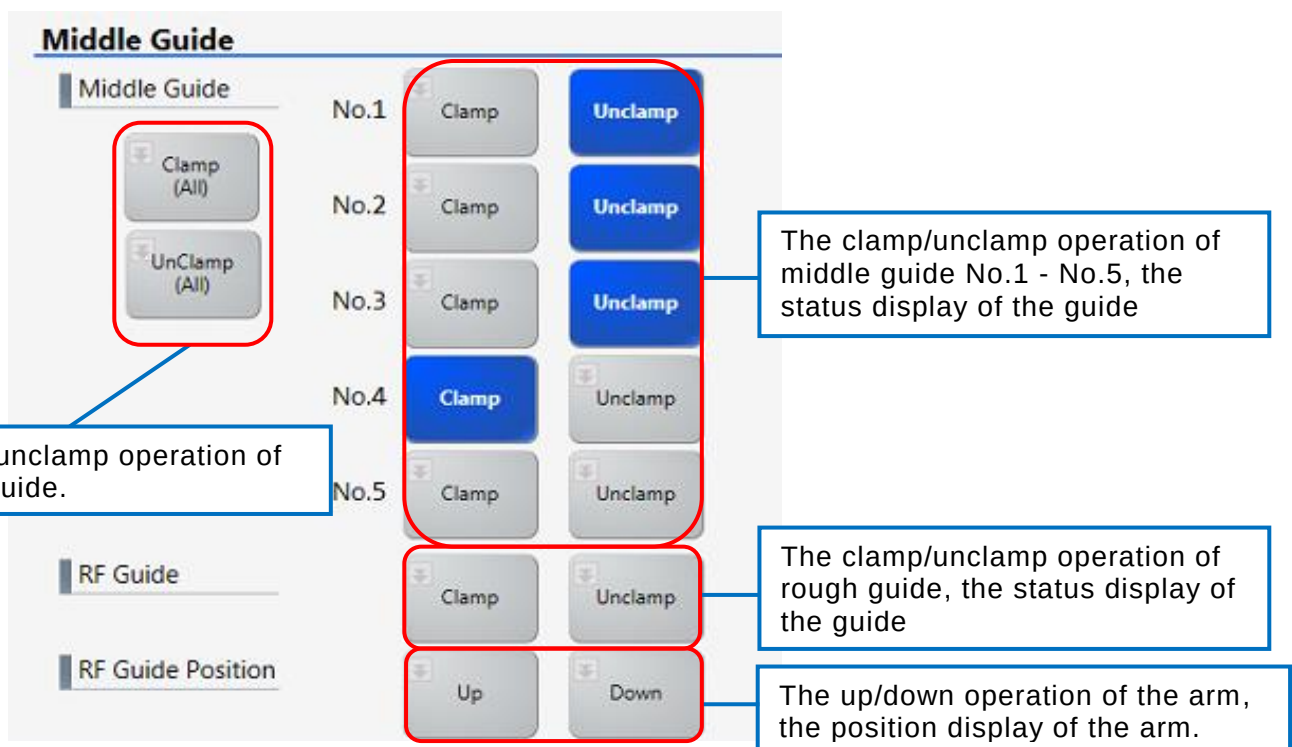


Figure 7-90 Middle Guide operation

7.11. Work Offset

Shows the list of work offset.

There are a total 16 work offset groups as shown in figure below, from G500 to G515. There will be 16 groups of work offset with 8 work offset in each group, from G54 to G61. A total of 128 work offset can be used.

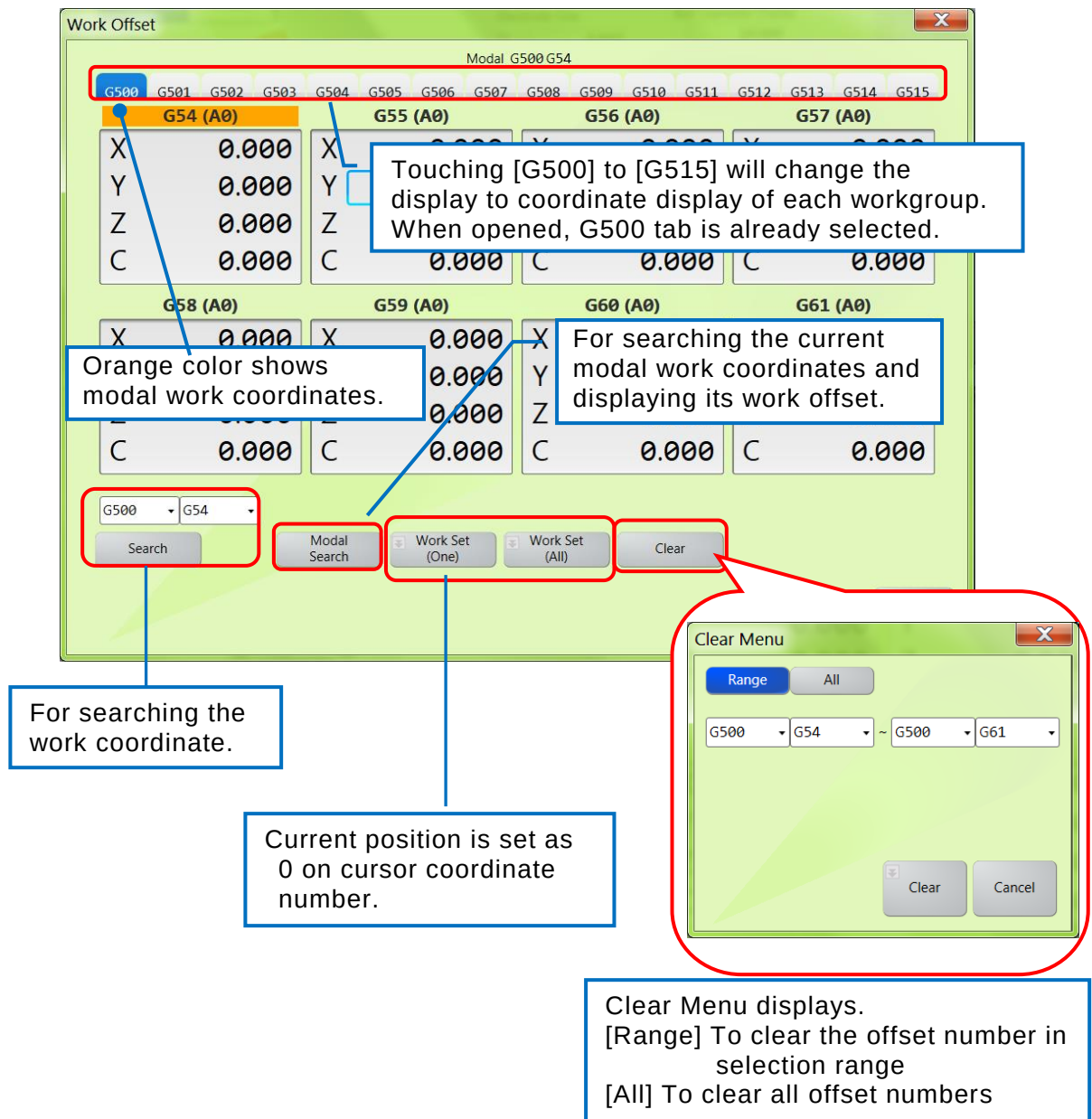


Figure 7-91 Work Offset Dialog

7.12.Electrode Offset

Shows the list of electrode offset.

There are a total 8 electrode offset groups as shown in figure below.

A total of 200 electrode offset can be used.

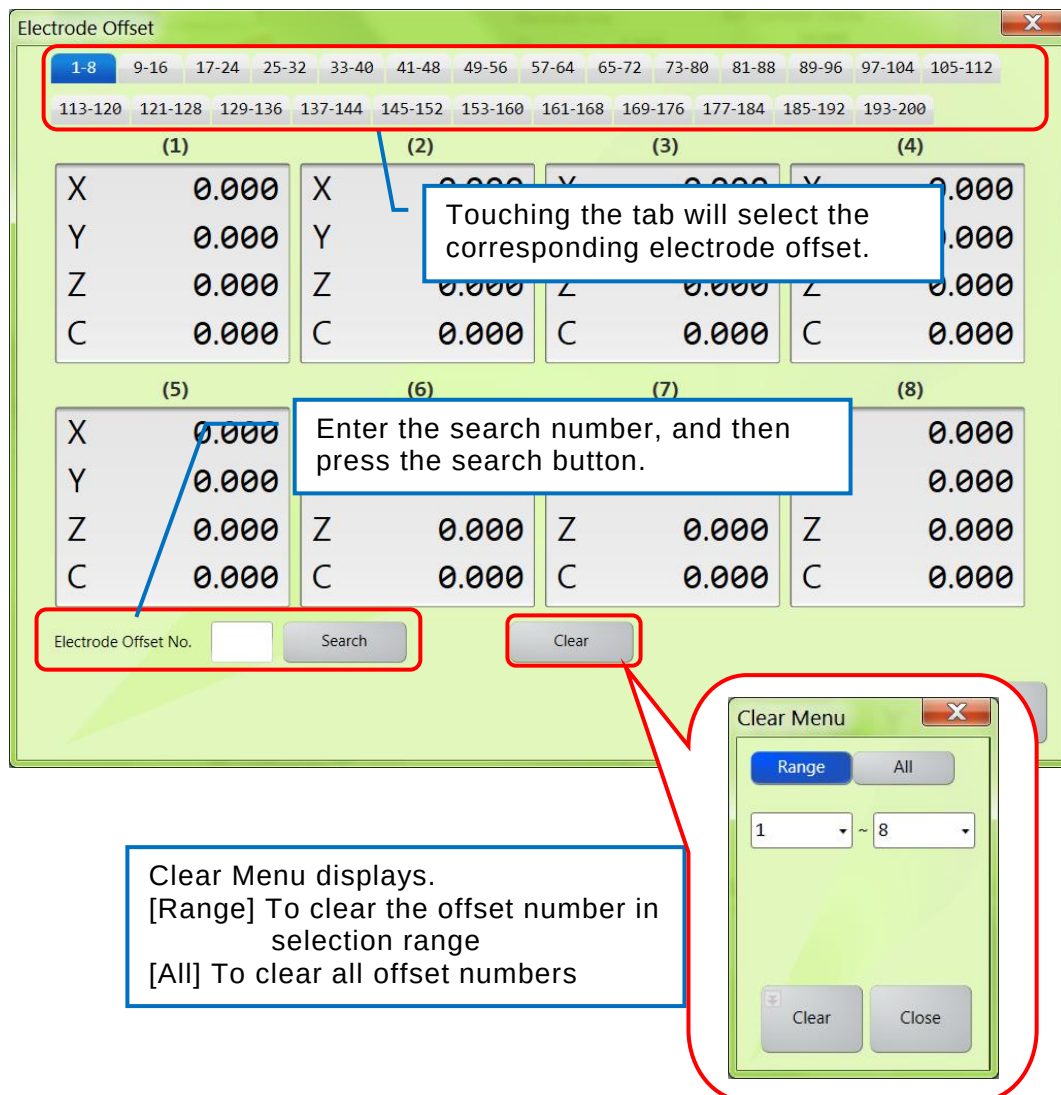


Figure 7-9287 Electrode Offset Dialog

7.13.Center Offset

"Center Offset" and "Local Offset" are confirmed on this screen.

Moreover, the storage location of the amount of the electrode gap to a standard work coordinate is specified.

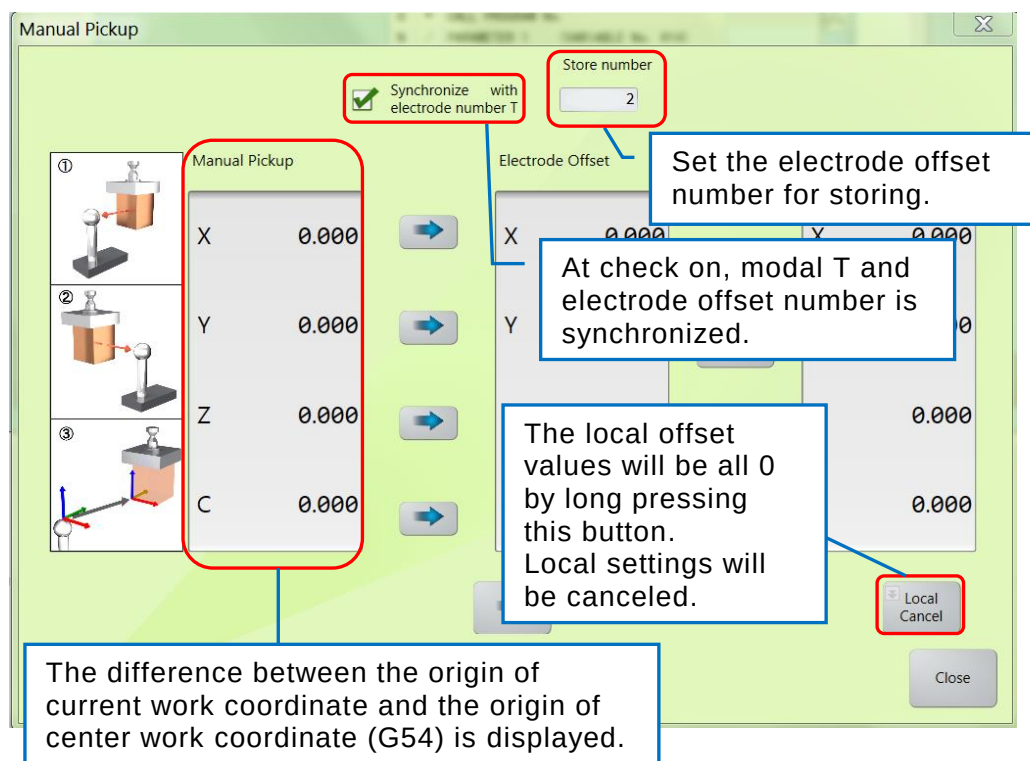


Figure 7-93 Center Offset Dialog

7.14. Coordinate Display

Displays various coordinate values.

In the standard display, work coordinates, machine coordinates, and relative coordinates are displayed.

You can also change the coordinates displayed and add other coordinates in the display.

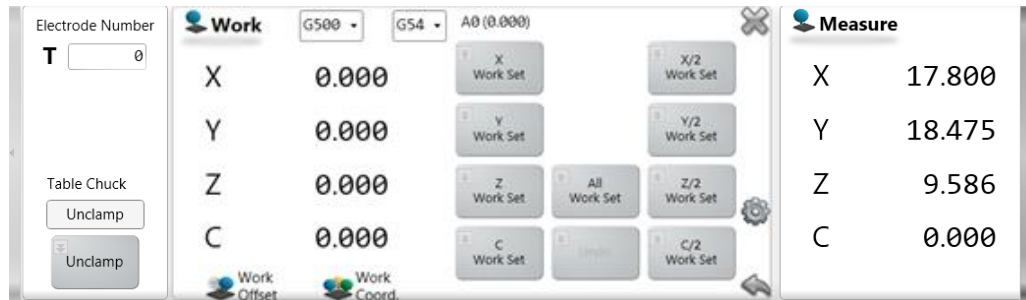


Figure 7-884 Coordinate Display

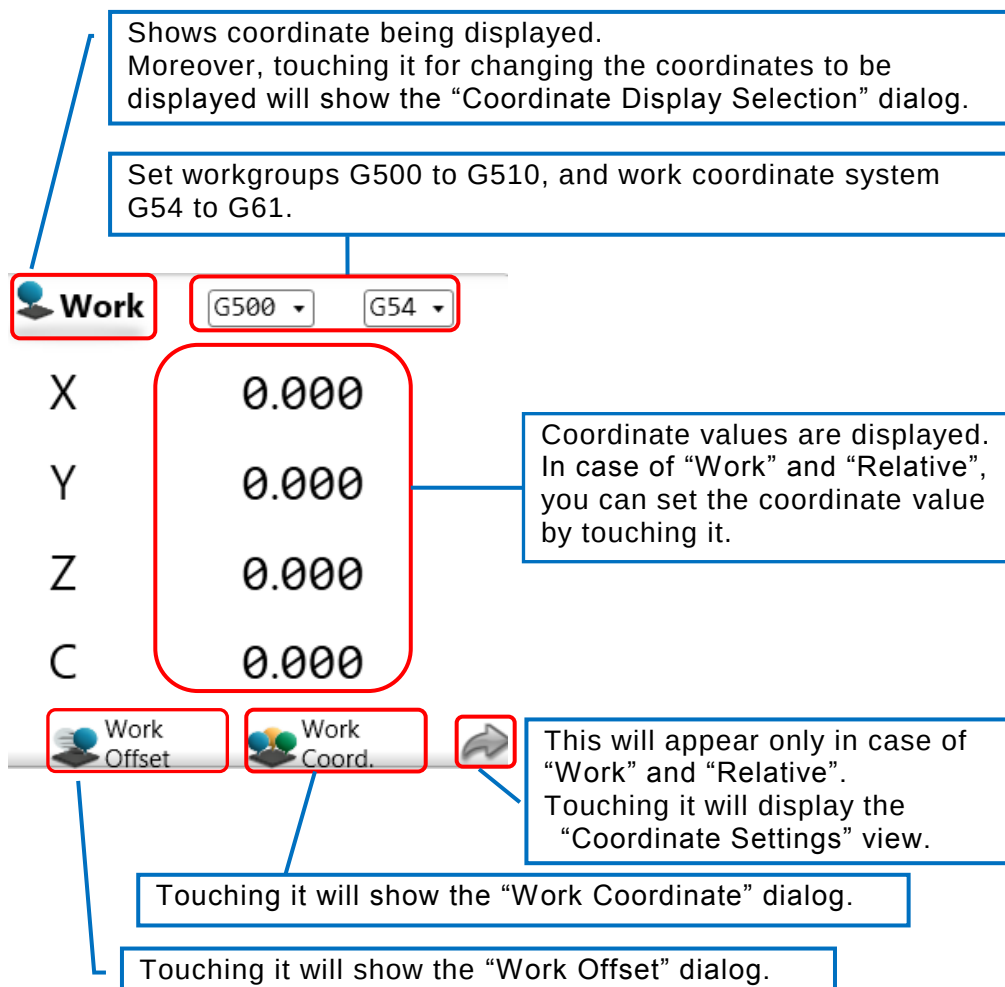


Figure 7-895 Coordinate Display (work coordinate)

7.14.1. Coordinate Settings

Only when “Work” and “Relative” coordinates are displayed, using the Coordinate Setting button, you can set the coordinate values of X, Y, Z and C axis of work coordinate or relative coordinate. The kind of the ORG button is switched.

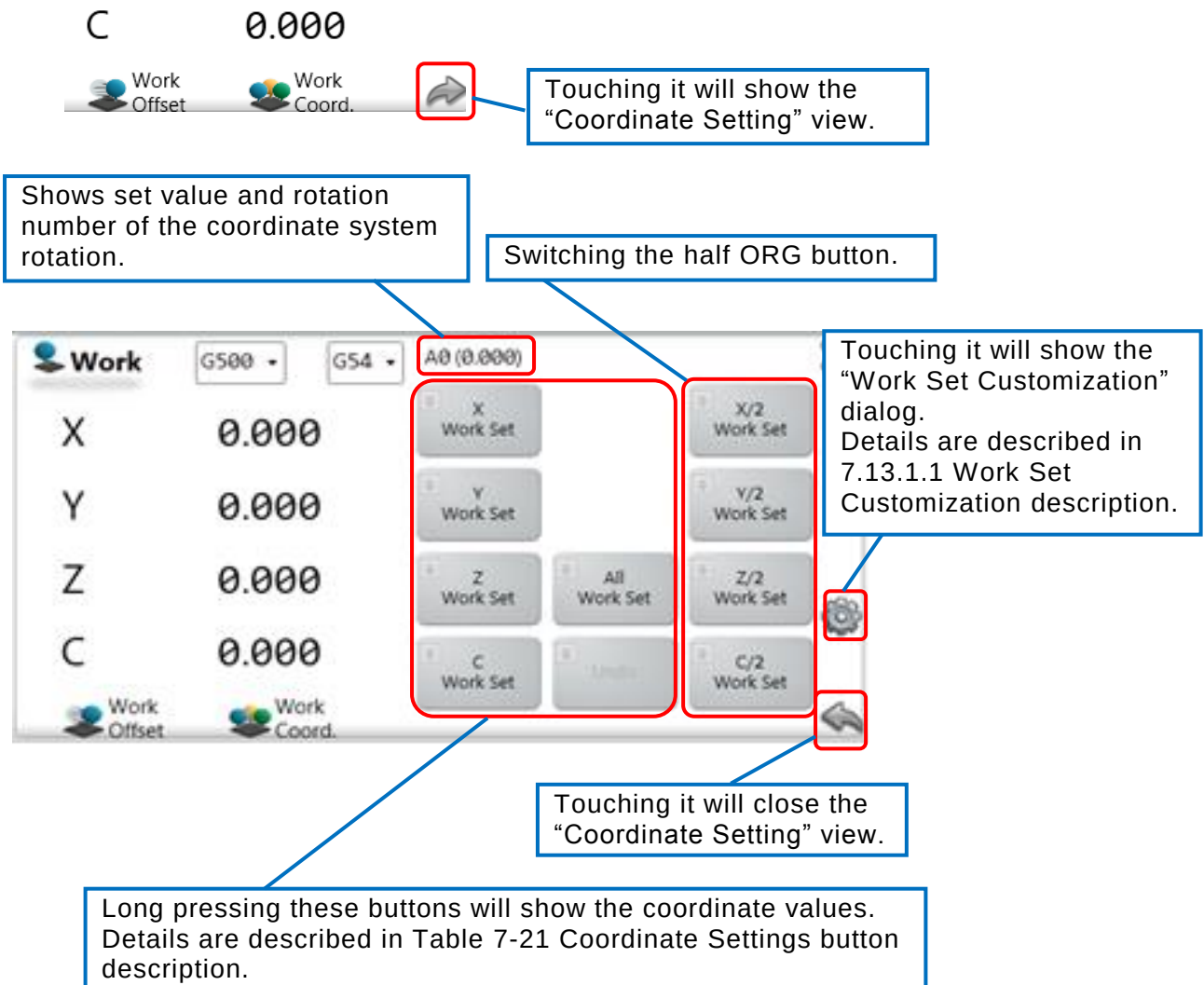


Figure 7-906 Coordinate Display (work coordinate)

Table 7-21 Coordinate Settings Button Description

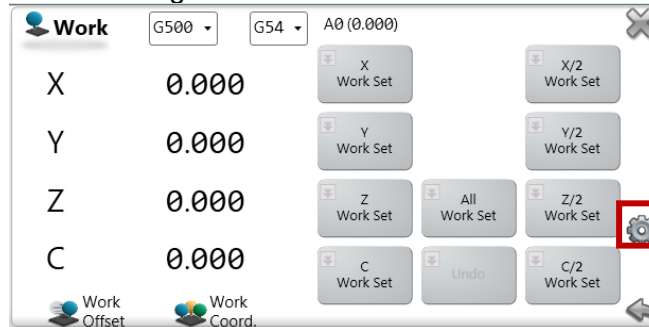
Button name	Description
X Work Set	Sets the X axis coordinate value of work coordinate to 0.
X/2 Work Set	Sets the X axis coordinate value of work coordinate to 1/2. In case of a fraction number, it will be rounded off to four decimal places.
Y Work Set	Sets the Y axis coordinate value of work coordinate to 0.
Y/2 Work Set	Sets the Y axis coordinate value of work coordinate to 1/2. In case of a fraction number, it will be rounded off to four decimal places.
Z Work Set	Sets the Z axis coordinate value of work coordinate to 0.
Z/2 Work Set	Sets the Z axis coordinate value of work coordinate to 1/2. In case of a fraction number, it will be rounded off to four decimal places.
C Work Set	Sets the C axis coordinate value of work coordinate to 0.
C/2 Work Set	Sets the C axis coordinate value of work coordinate to 1/2. In case of a fraction number, it will be rounded off to four decimal places.
All Work Set	Sets X, Y, Z, and C coordinate values of work coordinates to 0.
X Relative set	Sets X axis coordinate value of relative coordinate to 0.
X/2 Relative set	Sets the X axis coordinate value of relative coordinate to 1/2. In case of a fraction number, it will be rounded off to four decimal places.
Y Relative set	Sets Y axis coordinate value of relative coordinate to 0.
Y/2 Relative set	Sets the Y axis coordinate value of relative coordinate to 1/2. In case of a fraction number, it will be rounded off to four decimal places.
Z Relative set	Sets Z axis coordinate value of relative coordinate to 0.
Z/2 Relative set	Sets the Z axis coordinate value of relative coordinate to 1/2. In case of a fraction number, it will be rounded off to four decimal places.
All Relative set	Sets X, Y, Z, and C coordinate values of relative coordinates to 0.
Undo	Undo to the value of coordinate set one step before. (Undo to operation of 10 times before)

7.14.1.1. Work Set Customization

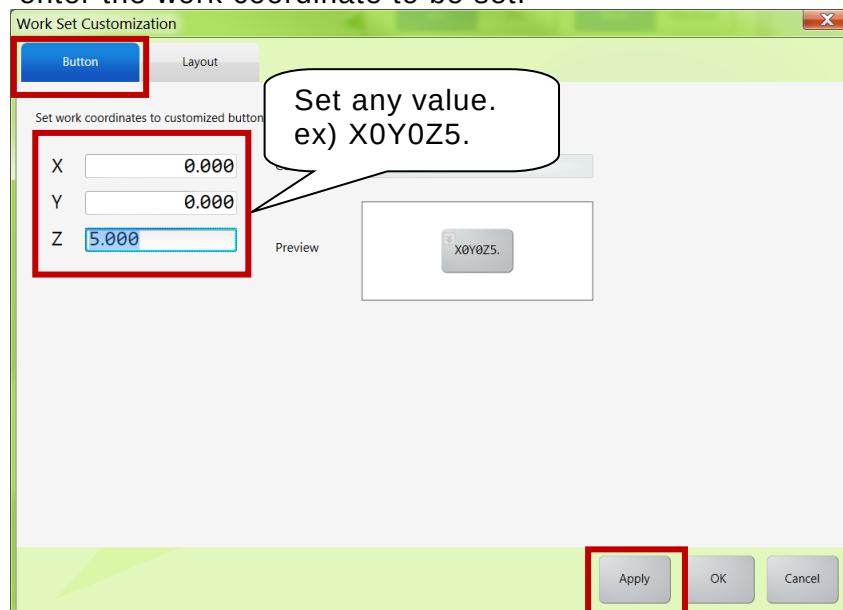
This dialog can change the setting regarding “Work Set” button on the work coordinate panel in [Setup] screen.

7.14.1.1.1.Added Custom Work Set Button

- ① Press the gear icon  on the work coordinate panel.



- ② Enter the value in the work coordinate editbox under the [Button] tab to enter the work coordinate to be set.



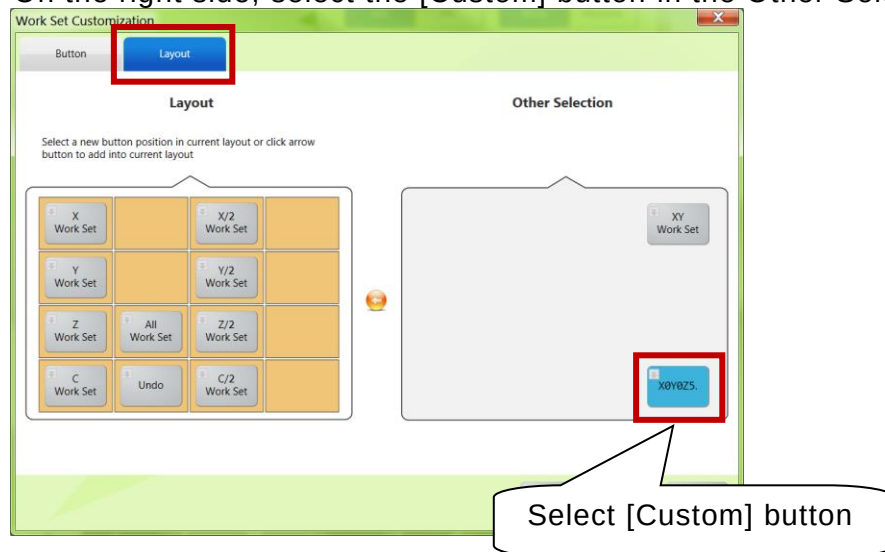
- ③ Press the [Apply] button to save the [Custom] button.

Add Custom Work Set button

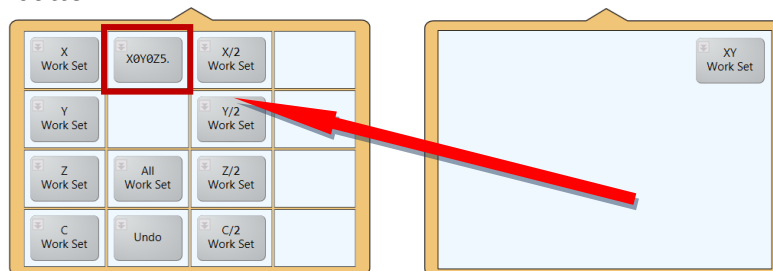
The Custom Work Set button is not located on the work coordinate panel by default.

Use the following procedure to add the button to the work coordinate panel.

- ① Click the [Layout] tab.
- ② On the right side, select the [Custom] button in the Other Selection.

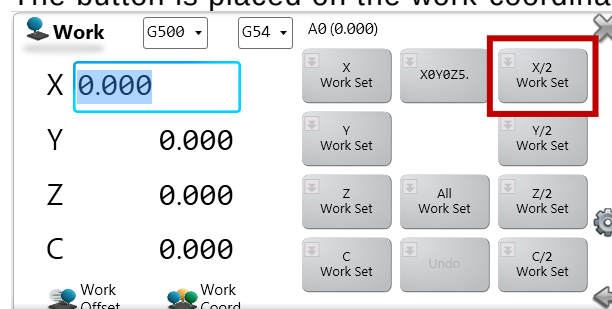


- ③ On the left side, select a position in the Layout, to move the [Custom] button.



- ④ Press the [OK] button to save the position setting and close the dialog box.

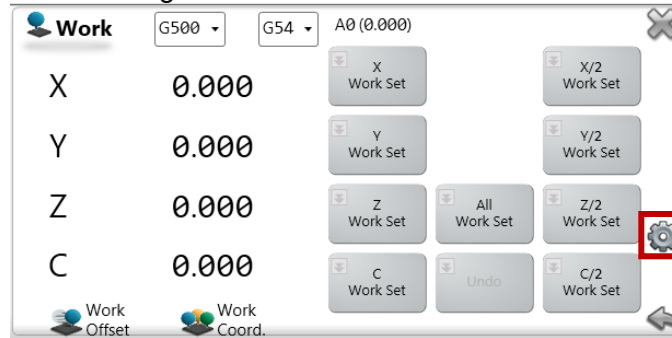
The button is placed on the work coordinate panel.



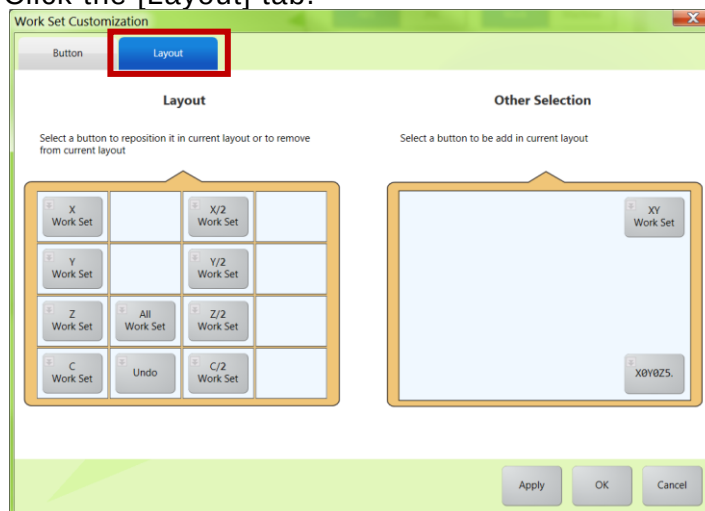
7.14.1.1.2. Layout customization of Work Set Button

The Work Set buttons can be placed in the work coordinate panel in [Setup] screen.

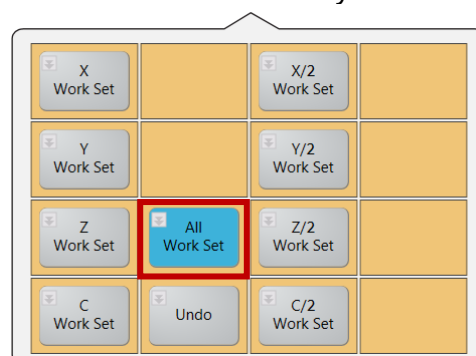
- ① Press the gear icon  on the work coordinate display panel.



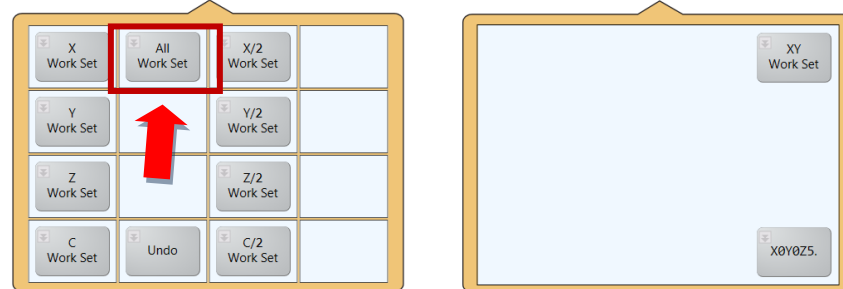
- ② Click the [Layout] tab.



- ③ Select the button which you want to move its position.

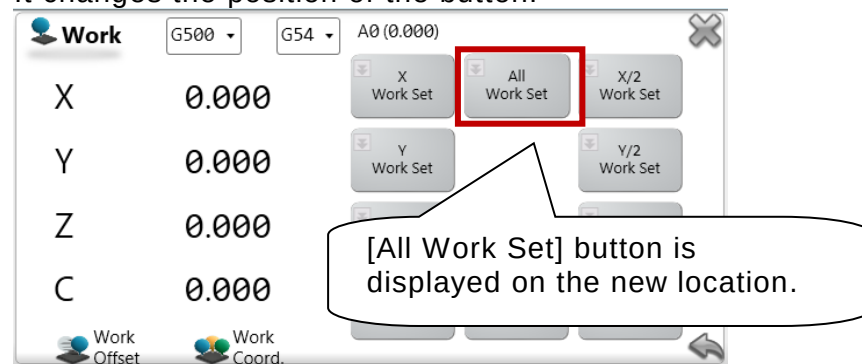


- ④ Select the new position for the button to move.

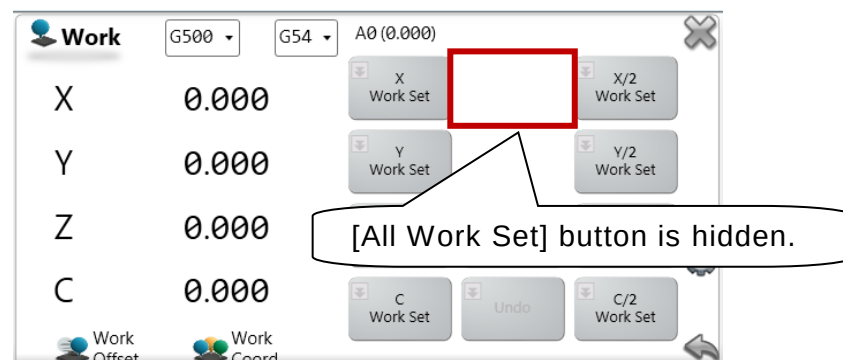
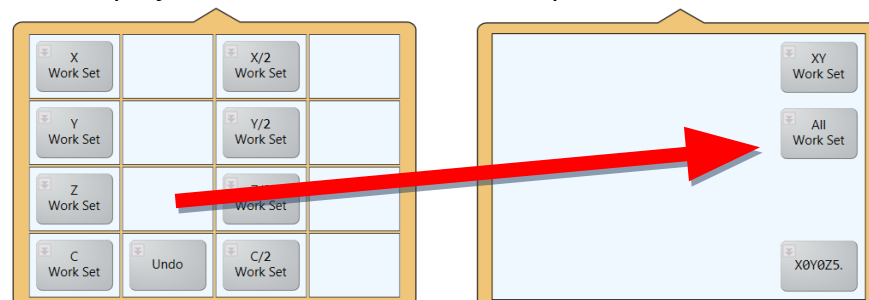


- ⑤ Press the [OK] button to save the position setting and close the dialog box.

It changes the position of the button.



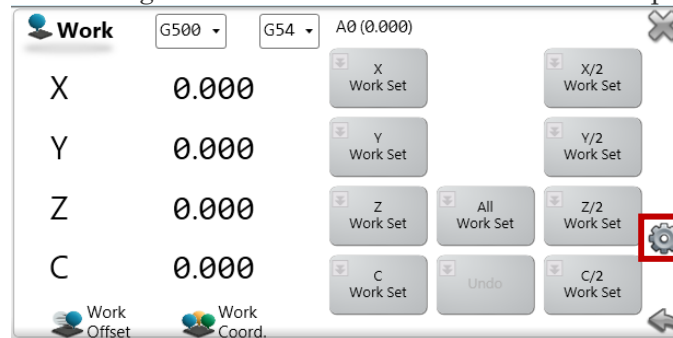
*Once a button is moved to the Other collection on the right side, it is non-displayed on the work coordinate panel.



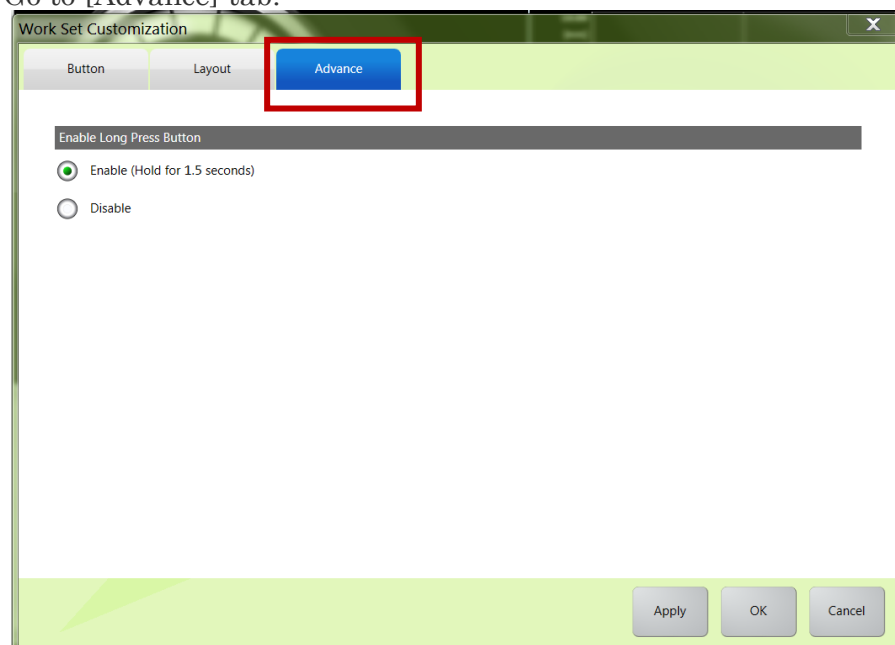
7.14.1.1.3. Long-Press setting for [Work Set] button

It is possible to enable or disable long-press setting on Work Set button.

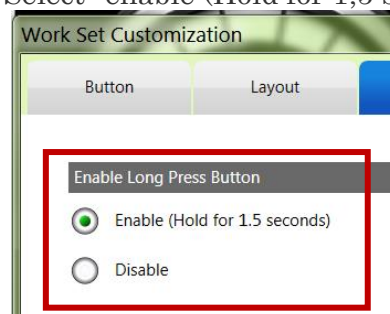
- ①. Press the gear icon  on the work coordinate panel.



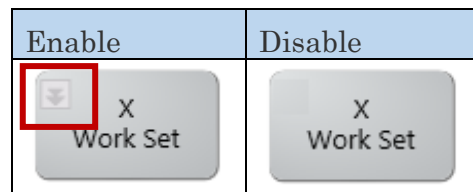
- ②. Go to [Advance] tab.



- ③. Select “enable (Hold for 1,5 seconds)” for Long- press setting.



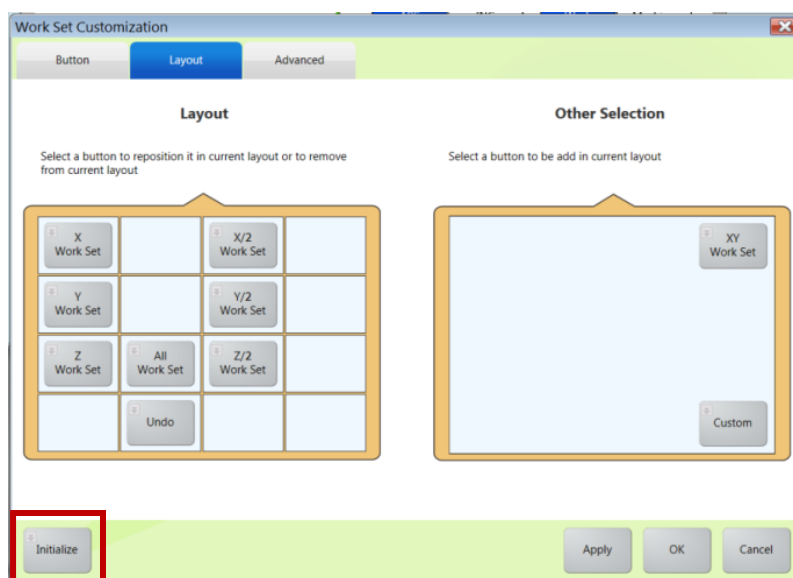
The Work Set button changes based on the Enable or Disable state.



In the standard settings, long-press is used for Enable. (Compatible with previous models)

7.14.1.1.4. Initializing customized settings

[Initialize] button can be initialized Work set customization settings.



7.14.2. Coordinate Display Selection Dialog

On the Coordinate Display Selection dialog, you can change or add the coordinates to be displayed on the Setup screen.

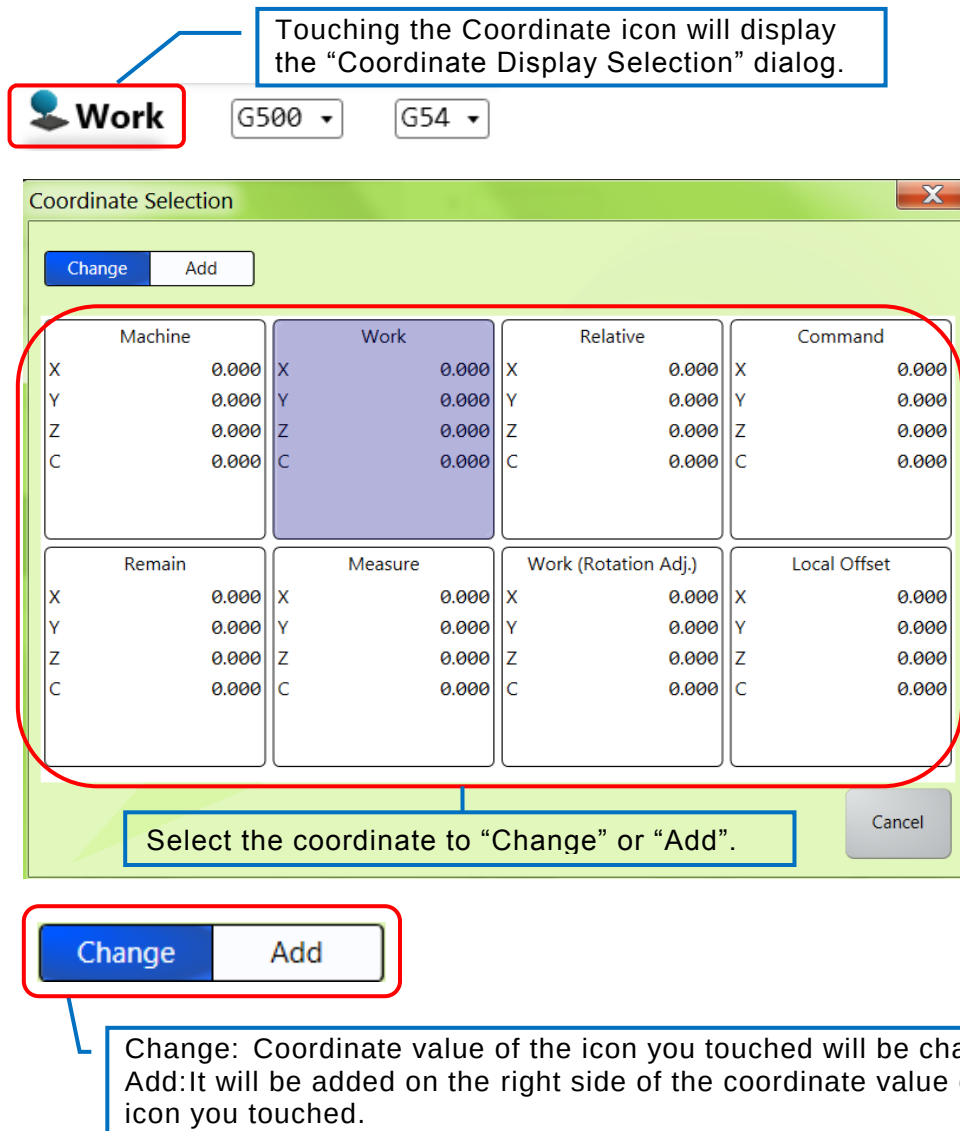


Figure 7-917 Coordinate Display Selection Dialog

Table 7-22 Coordinate Display Selection Buttons

Button	Description
Change	Coordinate of the coordinate icon you touched will be replaced with the coordinate you selected on the Coordinate Display Selection dialog.
Add	On the right side of the coordinate of the coordinate icon you touched, coordinate you selected on the Coordinate Display Selection dialog will be added.

Table 7-23 Lists of Coordinate Parameters

Coordinate Name	Description
Machine	The absolute coordinate of the machine itself.
Work	Work Coordinate can be freely set on any location. Normally, machining program is written based on the origin of work coordinate. Work Coordinate can be set only on RESET state.
Relative	Relative Coordinate can be freely set on any location. It can be set even in START state. Normally, relative coordinate is used to identify location different from work coordinate.
Command	During Program run, the coordinate of target location of the last program block.
Remain	During Program run, the remaining coordinates to reach the target location.
Measure	The coordinate result of measurement from positioned functions like hole center and plate width
Work (Rotation adjustment)	The rotation adjustment value when the coordinate system is rotated by the program will be displayed. When the rotation adjustment is not done, it becomes "0".
Local	The value of a local offset will be displayed.

7.14.3. Work Offset Dialog

Shows the list of work offset.

There are a total 16 work offset groups as shown in figure below, from G500 to G515. There will be 16 groups of work offset with 8 work offset in each group, from G54 to G61. A total of 128 work offset can be used.

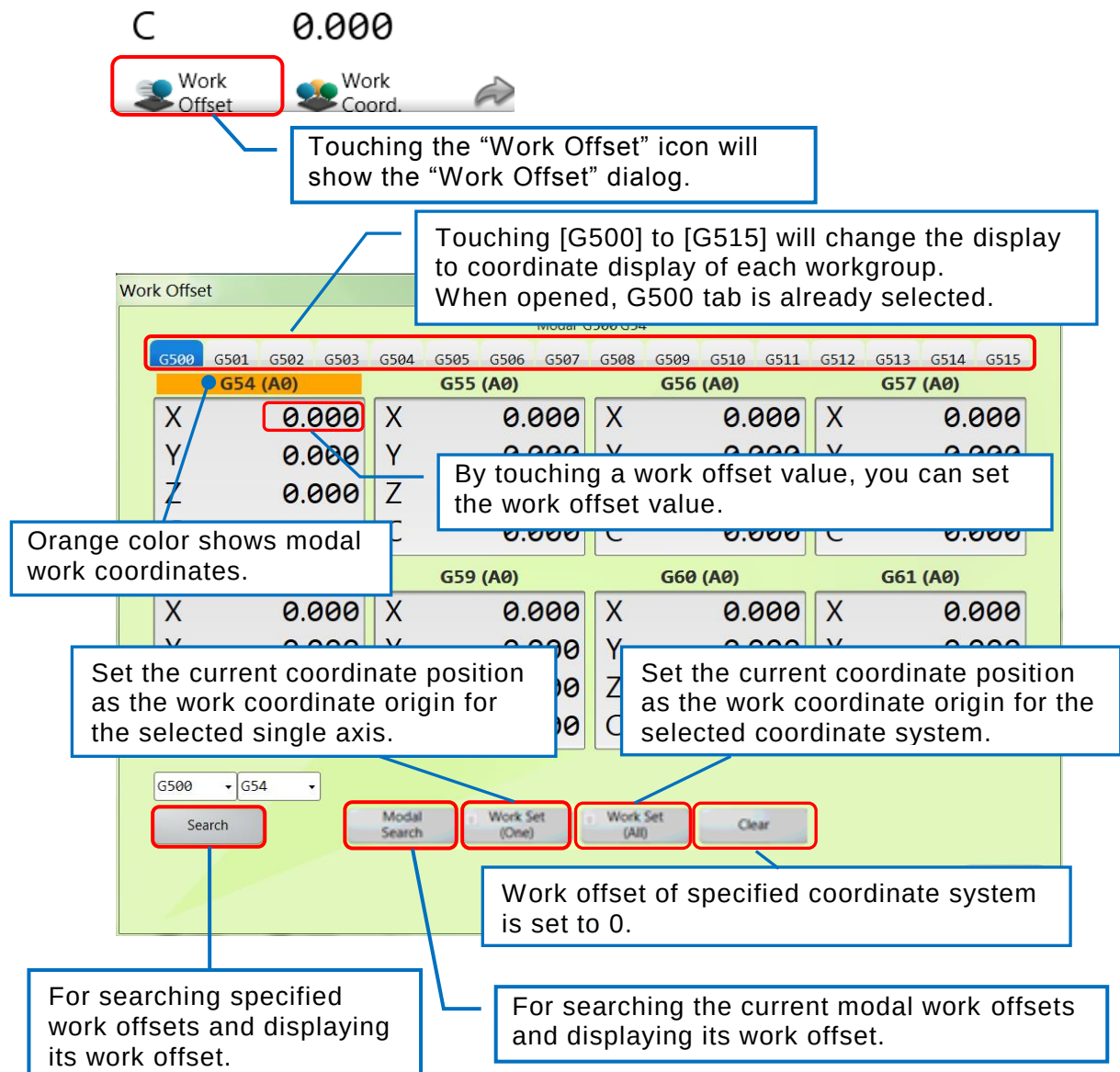


Figure 7-928 Work Offset Dialog

7.14.4. Work Coordinate

You can check all work coordinates for workgroup G500 to G510 and work coordinate system G54 to G61.

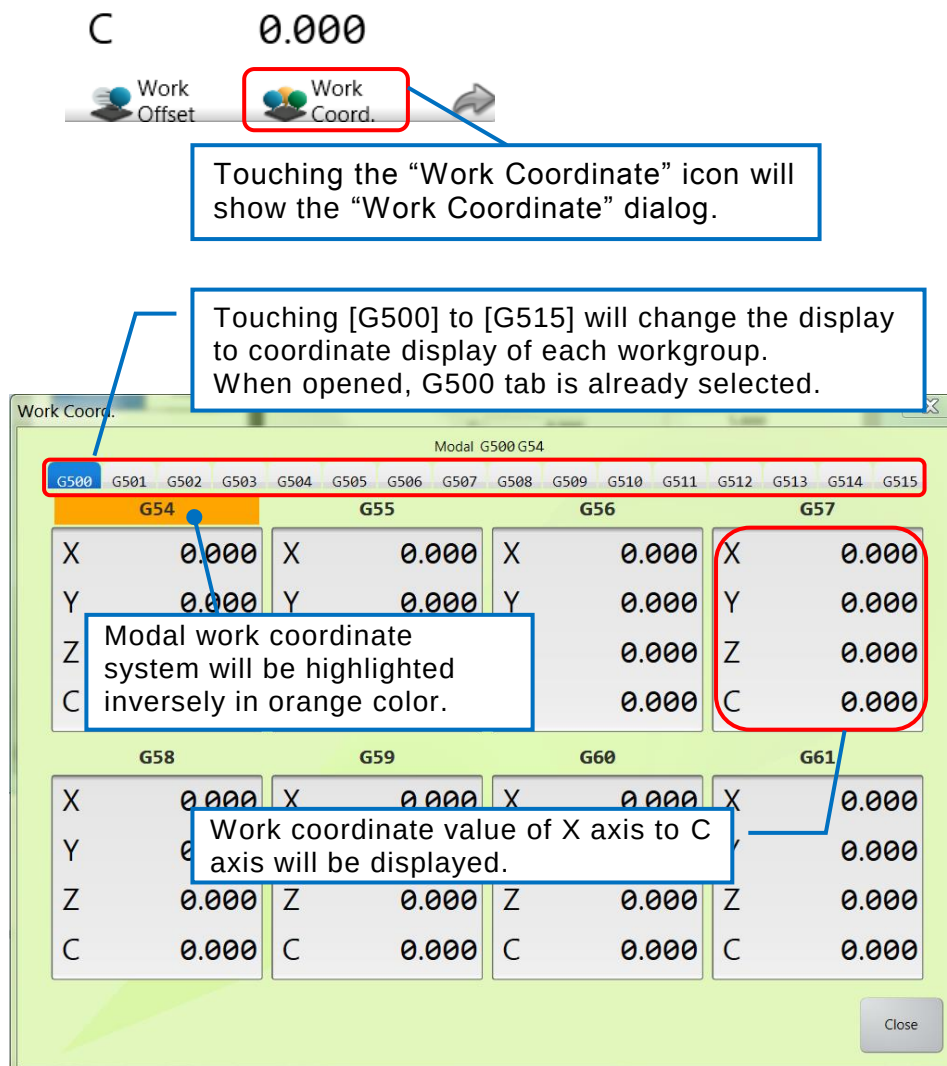


Figure 7-939 Work Coordinate Dialog

8.Run

On the Run Screen, startup program selection, graphically synchronized drawing for machining path, actual dry run check by the machine, and results checking can be performed here.

8.1Run Screen

There are four main sections on the Run Screen.

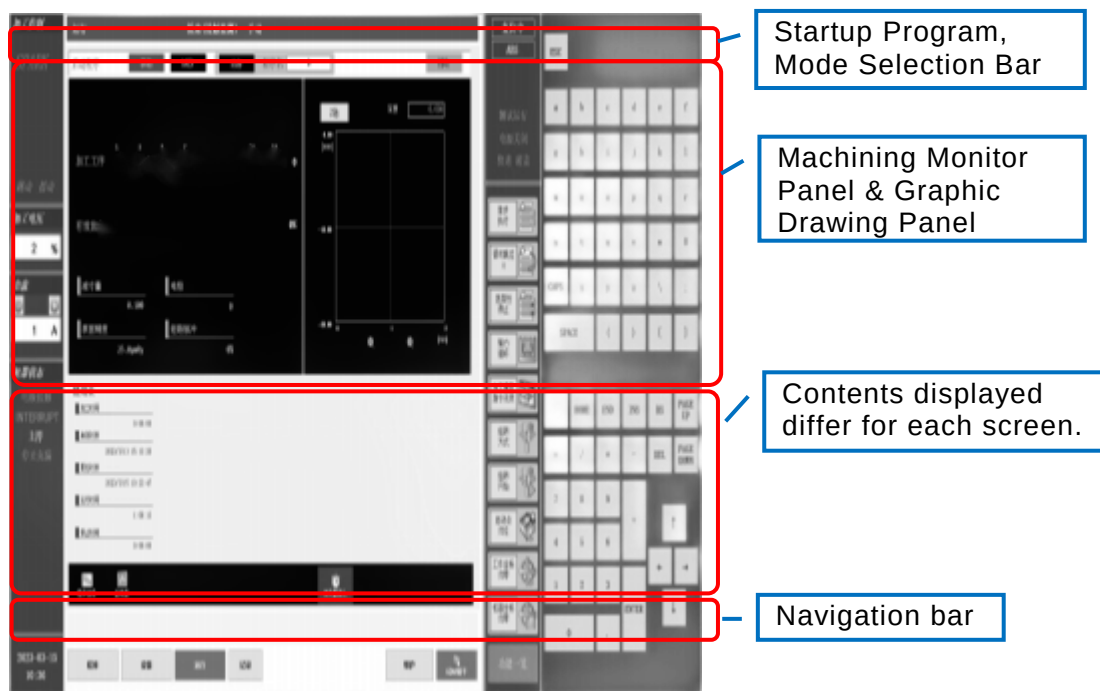


Figure 8-1 Run Screen (ex., Manual Run)

8.1.1 Startup Program, Mode Selection Bar

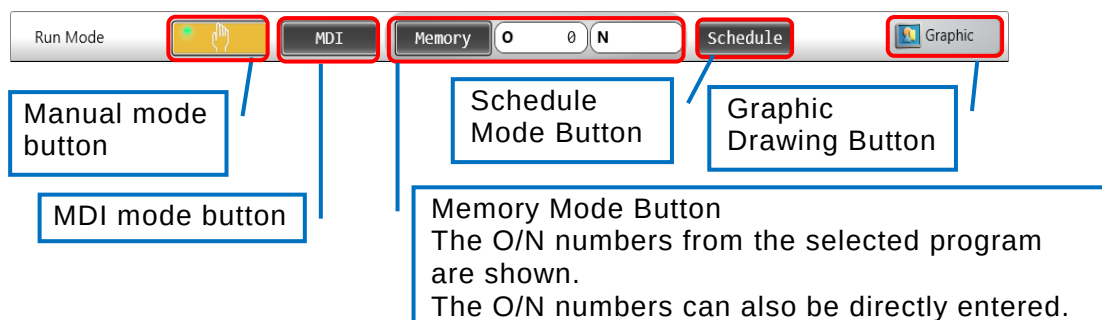
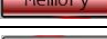
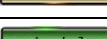
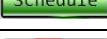
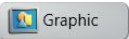
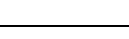


Figure 8-2 Startup Program, Mode Selection Bar

Table 8-1 Mode Button and Status

Mode	Button Status	Status Description
Manual		Manual Mode OFF
		Manual Mode ON
MDI		MDI Mode OFF
		MDI Mode ON
		MDI Mode running
		MDI Mode halted
	 Blink	Manual or Memory or Schedule interruption while in MDI Mode
		
Memory		Memory Mode OFF
		Memory Mode ON
		Memory Mode running
		Memory Mode halted
	 Blink	Manual or MDI or Schedule interruption while in Memory Mode
Schedule		Schedule Mode OFF
		Schedule Mode ON
		Schedule Mode running
		Schedule Mode halted
	 Blink	Manual or MDI or Memory interruption while in MDI Mode
Graphic		Graphic Drawing Panel Display OFF (Machining Monitor Display ON)
		Graphic Drawing Panel Display ON

8.1.2 Machining Monitor Panel

Check Machining State and Machining Graph.

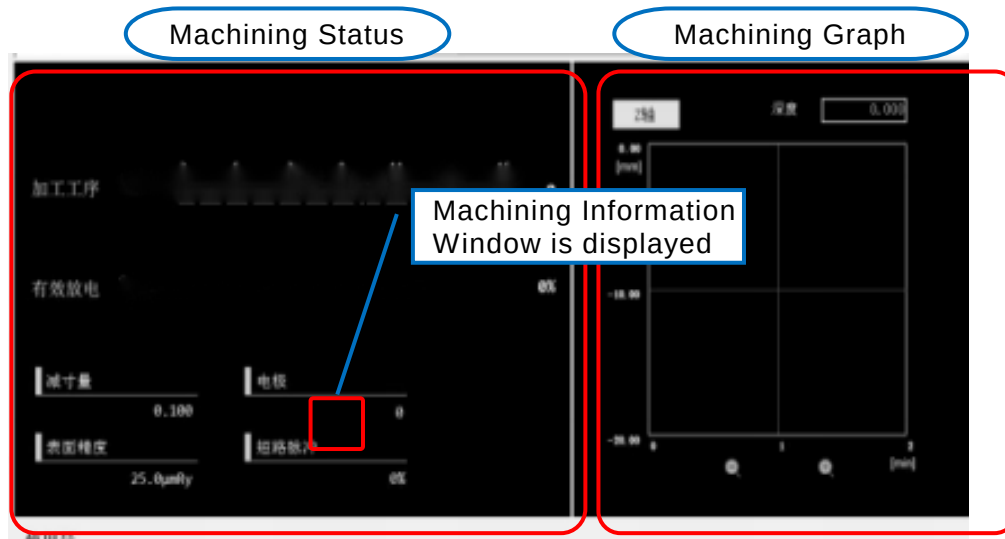


Figure 8-3 Machining Monitor Panel

- (B) Next
Displays the remaining control time when the time management machining (G83P_ command) is executed.



Figure 8-5 Next

- (C) Reduction
Display the electrode reduction of current process number.
- (D) Electrode Number
Display the electrode number of current process number.
- (E) Surface Finish
Display the surface Finish.
- (F) Short Pulse
Display the Short Pulse
- (G) Effective Pulse
Display the Effective Pulse
- (H) Machining Information Window
Check the machining information

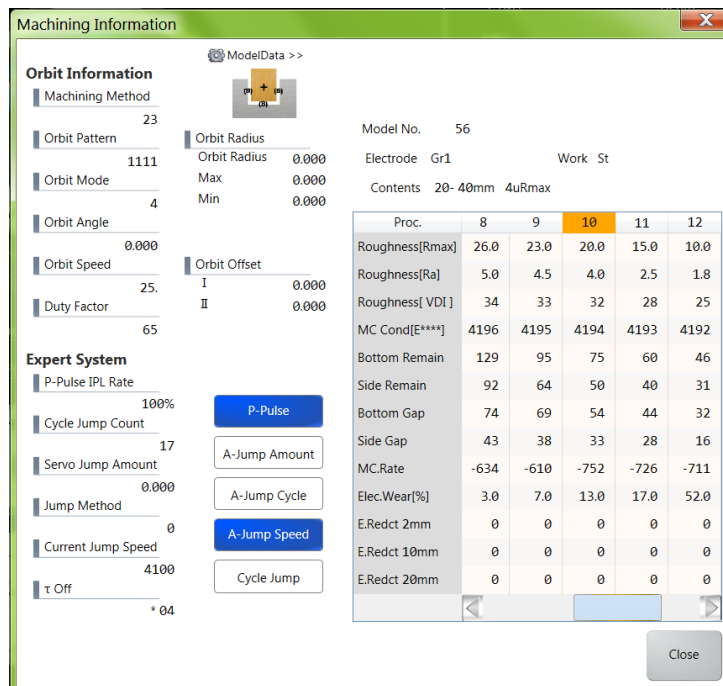


Figure 8-6 Machining Information

(2) Machining Graph Panel

Check displacement of Machining depth.



Figure 8-7 Machining Graph Panel

The scale of the time axis (transverse) and machining depth axis (vertical axis) can be changed.

【Time axis (transverse)】

When   is pressed, the maximum of time axis changes.



	Unit(min)									
Time axis Scale range	0~ 2	0~ 4	0~ 10	0~ 24	0~ 48	0~ 60	0~ 120	0~ 240	0~ 1200	0~ 2400

【Machining depth axis (vertical axis)】

When   is pressed, the minimum of machining depth axis changes.



Unit (mm)								
MC depth axis Scale range	0~ ±0.10	0~ ±0.40	0~ ±1.00	0~ ±4.00	0~ ±10.0	0~ ±40.0	0~ ±100.	0~ ±300.

8.1.3 Graphic Drawing Panel

Checking can be performed before machining with the drawing (draft) made from the specified O/N Number program and the NC settings. A machining path is also drawn during a test run or during machining.

In addition, enlargement/reduction of the drawn image, switching 2D/3D, and changing the angle of the X/Y axis in 3D is possible.

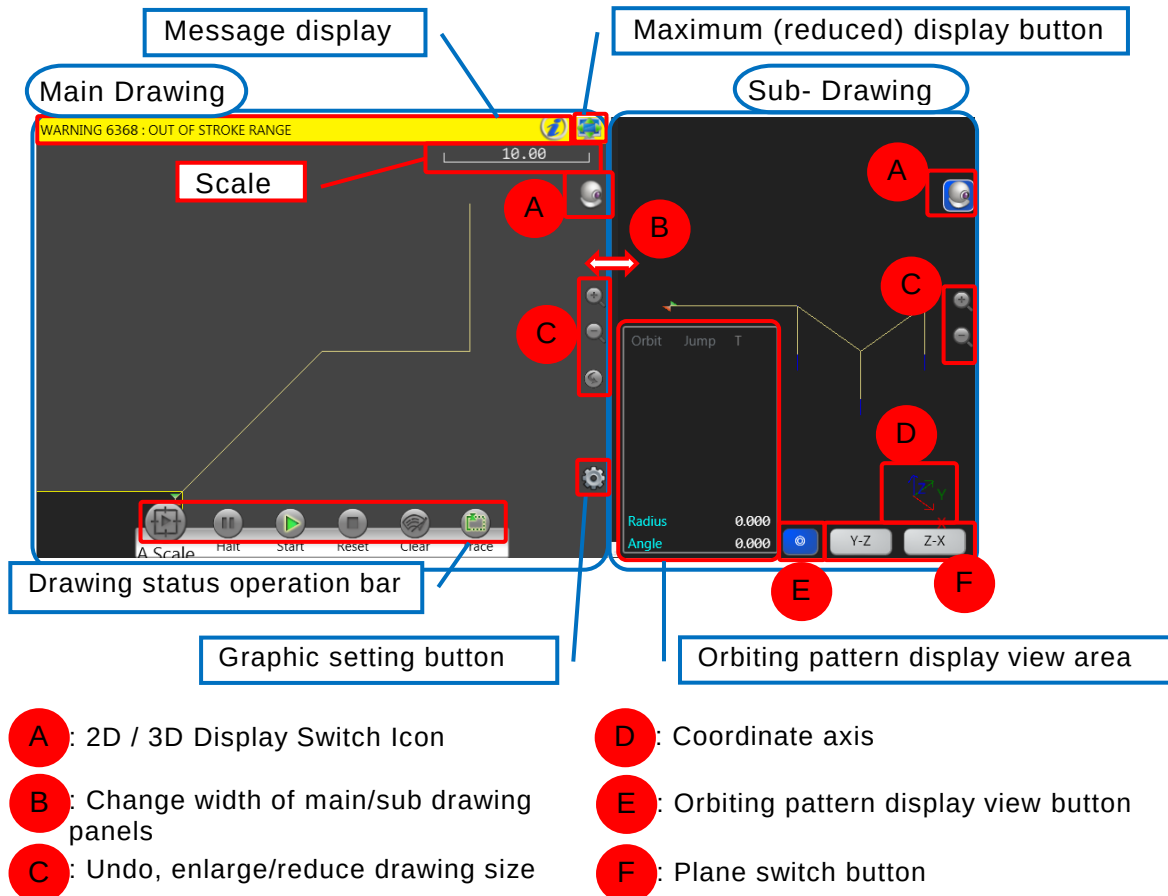


Figure 8-8 Graphic Drawing Panel

(1) Main Drawing Panel & Sub-Drawing Panel

Normally, the main drawing panel displays the 2D image (X axis rotation: 0°, Y axis rotation: 0°), and the sub-drawing panel displays the 3D image (X axis rotation: 45°, Y axis rotation: 45°).

By dragging/dropping to any spot on the drawing panel, the graphic image can be moved.

In addition, the size of the graphic can be enlarged by pinch-out (using two fingers to touch the screen and slide apart), or reduced by pinch-in (using two fingers to touch the screen and slide together).

(2) Message Display Area

Guide messages and alarm messages are displayed. When a message is being displayed, icons for showing EDM Assist are also displayed.

(3) Maximum (reduced) Display Button

Display of the main drawing panel is enlarged.

By using the Switch 2D / 3D display tool, it's possible to switch display of the graphic image.

Touch the maximum (reduced) display button on the enlarged main drawing screen panel will revert back to showing two panels, the main drawing and sub-drawing panel.

If the main drawing panel is quit while enlarged, it will still be enlarged the next time it is opened.

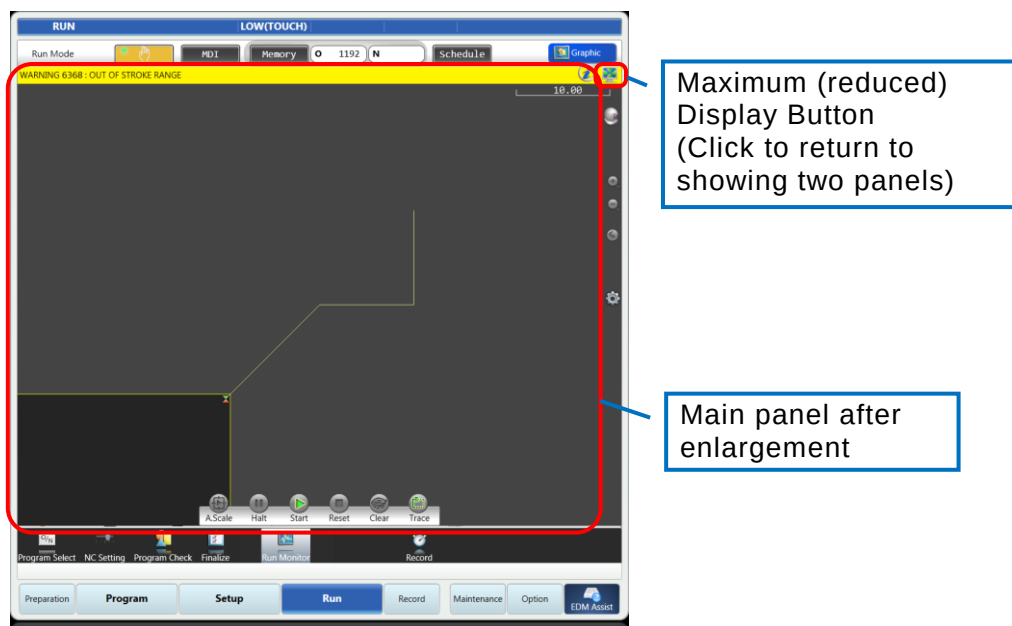


Figure 8-9 Main Drawing Panel after Enlargement

(4) Scale Display



Figure 8-10 Scale Display

When the graphic image shown on the main drawing panel and sub-drawing panel is in 2D, scale values and a scale line is shown to have a rough understanding of figure's dimensions.

In figure 8-10, Reduced Scale Display, the length of the scale line indicates around 1 mm.

The scale units displayed are specified in the [Units] window on the [Options] screen.

(5) 2D / 3D Display Switch Icon

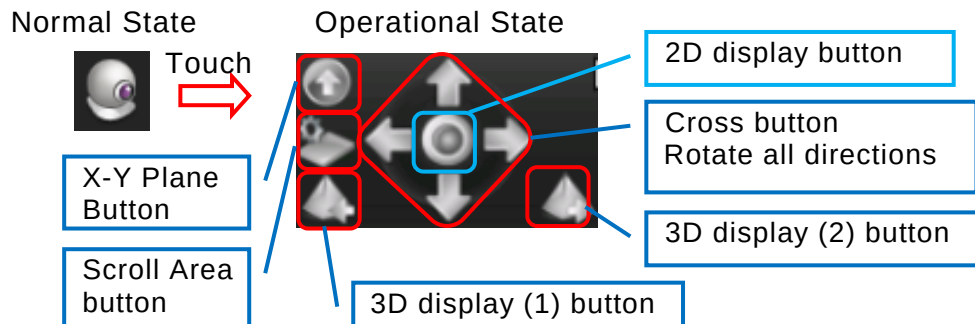


Figure 8-11 2D / 3D Display Switch Icon

- (A) Click the Normal State icon to switch to Operational State.
- (B) When the [Scroll Area] button is touched, soft stroke is used for the minimum and maximum positions to make the graphic image adjusted to the ideal size.
- (C) Click the [2D Display] button to display graphic image in 2D (X axis rotation: 0°, Z axis rotation: 0°).
- (D) Click the [3D Display (1)] button to display the graphic image in 3D (X axis rotation: 45°, Z axis rotation: 45°).
- (E) Click the [3D Display (2)] button to display the graphic image in 3D (X axis rotation: -45°, Z axis rotation: -45°).
- (F) Click the Cross Button to rotate the graphic in any direction.

Click the [↑] key or [↓] key once to rotate the X axis 15° or -15°.
 Click the [←] key or [→] key once to rotate the Z axis 15° or -15°.
 In addition, holding down the button will rotate the graphic image in the specified direction.

(6) Changing Width of the Main Drawing / Sub Drawing Panel

It's possible to change the border of the main and sub-drawing panels by drag and drop controls. The most recently changed panel width will be shown the next time it is opened.

(7) Drawing Size Enlargement / Reduction / Undo

(A) Enlargement / Reduction

Display of the 2D/3D graphic image can be altered by a factor of 0.01 ~ 5000.00. Enlarge the image with the [+] button, and reduce the size with the [-] button.

(B) UNDO

Cancel the previous action, and display the status as it was before.

(8) Coordinate Axis

Currently the X, Y, and Z coordinate axes are displayed for the image being drawn. When the figure has been rotated the coordinate axes from after rotation will be shown. It is not displayed for 2D.

(9) Drawing Status Operation Bar

With the drawing status operation bar on the main drawing panel the running status of the program drawing is displayed. Also, operation of program drawing can be performed here.



Figure 8-12 Drawing Status Operation Bar & Buttons

Table 8-3 Drawing Status Operation Button

Button name	Description
A. Scale	Turn ON the [A. Scale] button to display the ideal size for fitting the whole image in the drawing panel. This button can be clicked to redisplay the ideal size for the whole image, such as after enlarging parts of the image for checking.
Halt	Halt the program drawing and the [Halt] button will be turned ON. Since the drawing is temporarily halted, it's possible to check the trajectory of the drawing. Press the [Start] button to restart the drawing.
Start	Start the program drawing. Drawing is temporarily stopped when the program indicates a Halt Block (M00 and M01). If there are any warnings or alarms in the block, a message is displayed and drawing is halted. Drawing speed is adjusted with the [Speed Adjust] slider under [Graphic Drawing] on the [Graphic Settings] window.
Reset	Drawing actions can be interrupted.
Clear	Images drawn in the main or sub-drawing panels are cleared.
Trace	When Trace is turned ON, machining position and paths are drawn on the screen, allowing for checking of the machining status. Path colors change in accordance with the number of times machining has been performed. The display is suspended when this function is turned off, but when turned on again the machining paths will be redisplayed.

(10) Orbiting Pattern Display View Button

Display the Orbiting Pattern Display View Area

(11) Orbiting Pattern Display View Area

The orbiting pattern display view are displays the orbiting pattern data when the orbiting pattern is specified in the block.

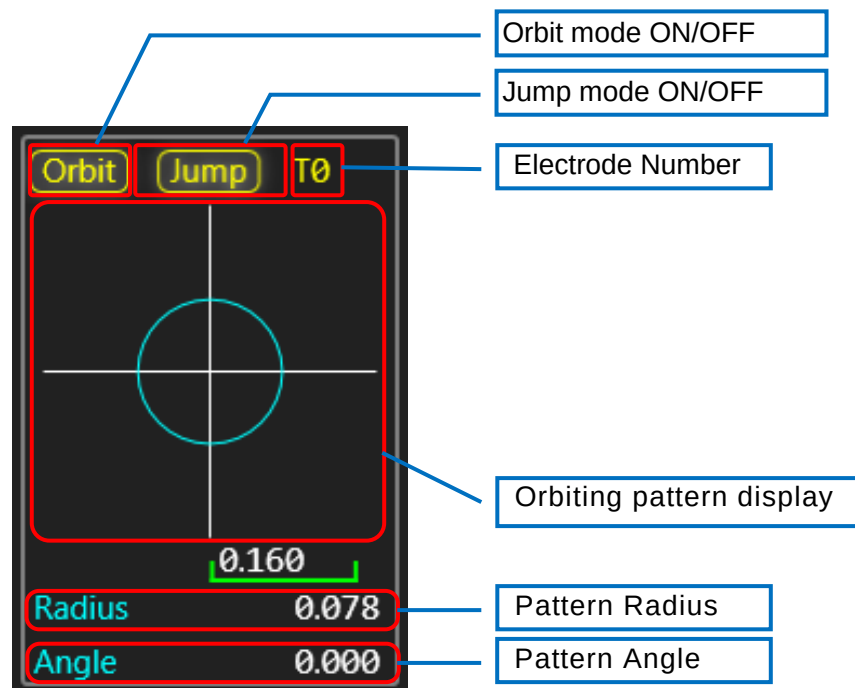


Figure 8-13 Orbiting Pattern Display View Area

(A) Orbit

In the ORBIT PATTERN mode, this PAT status is highlighted.

(B) Jump

In the JUMP mode, this JUMP status is highlighted.

(C) T_

Display the using electrode number.

(D) Orbiting pattern display

The orbiting pattern of the currently drawn block is displayed here.

(E) Radius

The orbiting radius of the currently drawn block is displayed here.

(F) Angle

The orbiting angle of the currently drawn block is displayed here.

(12) Plane switch Button

Graphic display on the sub-drawing panel can be switched between the YZ plane and the ZX plane.



Figure 8-14 Plane switch button

Using the 2D/3D display switch icon, the XY plane can be displayed.

(13) Graphic Setting Button

Various settings related to graphic drawing are performed here.

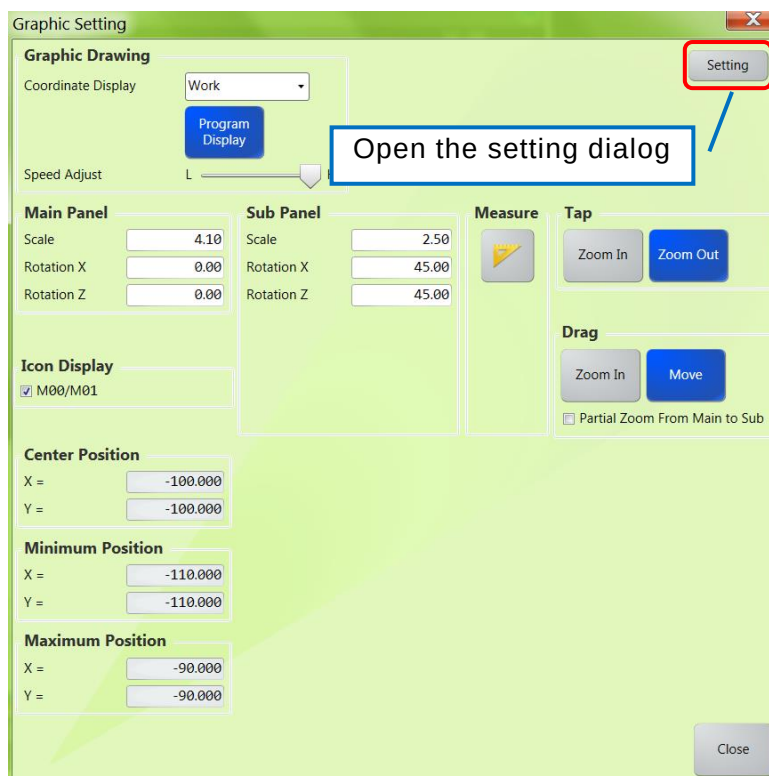


Figure 8-15 Graphic Setting Window

(A) Graphic Drawing

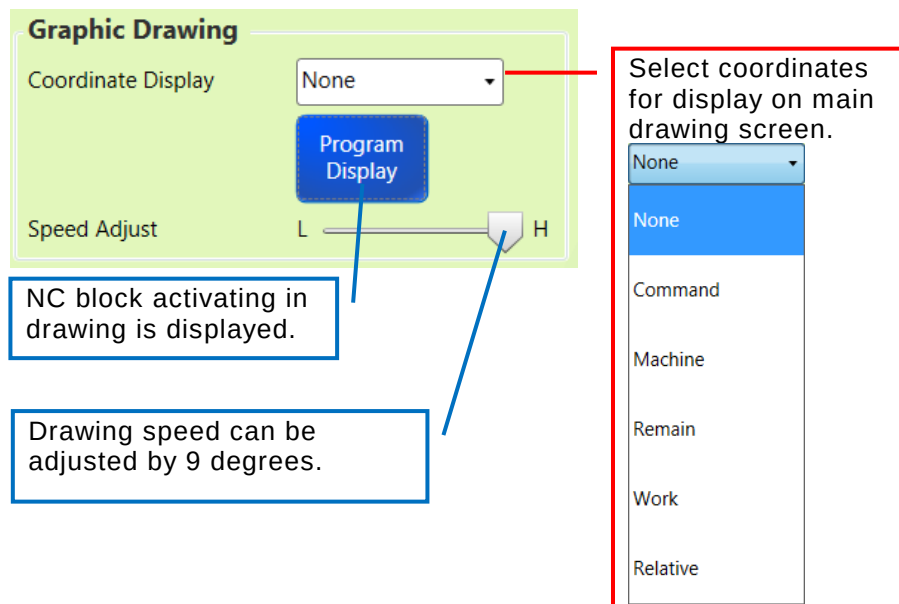


Figure 8-16 Graphic Setting - Graphic Drawing

(i) Coordinate-Example Display (Machine Coordinates)

On the main drawing panel the type of coordinates specified as in Fig 8-17 “Main Drawing Panel Coordinate-Example Display (Machine coordinates)” are displayed.

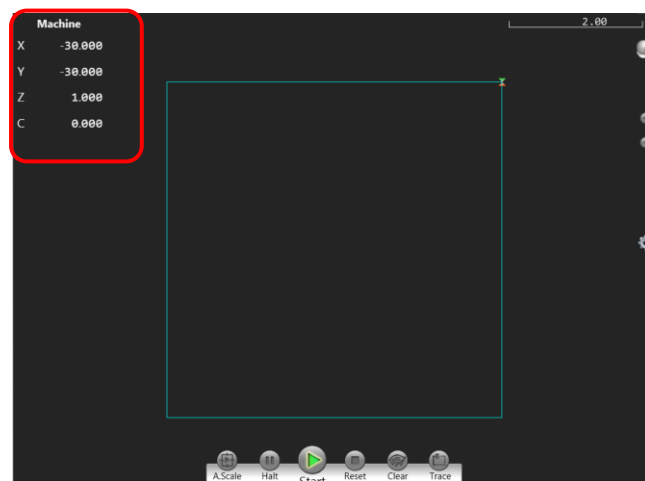


Figure 8-17 Main Drawing Panel Coordinate (ex. Machine coordinates)

(B) Main Drawing Panel / Sub-Drawing Panel

The drawing scale and rotation angles (X axis, Z axis) for the main drawing panel and sub-drawing panel can be set up here.

Main Panel		Sub Panel	
Scale	0.90	Scale	0.60
Rotation X	0.00	Rotation X	45.00
Rotation Z	0.00	Rotation Z	45.00

Figure 8-18 Each panel Settings

(i) Scale

Display scale for each drawing panel can be set.

(ii) Rotation X

Angle of rotation in the direction of the X axis of the drawing image can be set.

(iii) Rotation Z

Angle of rotation in the direction of the Z axis of the drawing image can be set.

(C) Measure

This function can measure the coordinate position from the touched spot to the work piece dimensions.

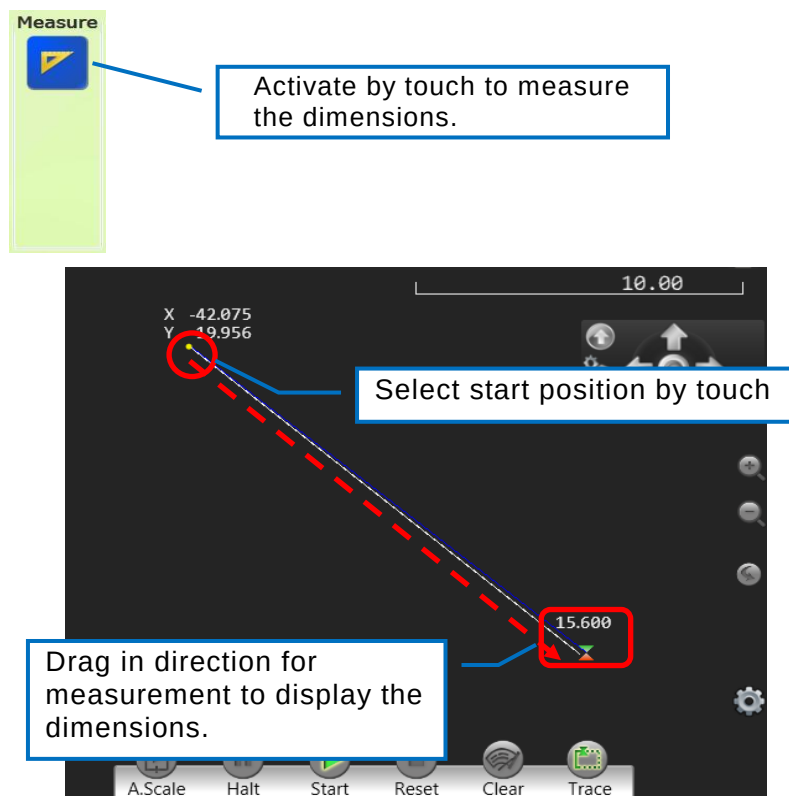


Figure 8-19 Graphic Setting- Measure

(D) Tap / Drag

Set display behaviors with Tap and Drag.

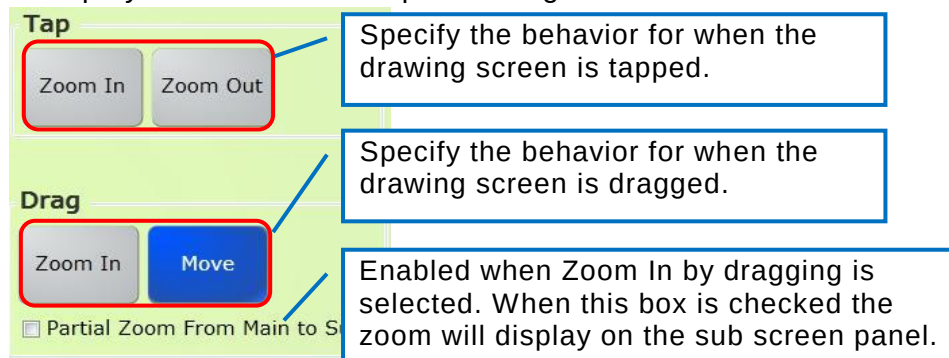


Figure 8-20 Graphic Setting- Tap & Drag

(E) Center Position / Minimum Position / Maximum Position

The center, minimum and maximum positions configured are displayed when the [Drawing Status Operation] and then the [Auto Scaling] buttons are touched.

Values cannot be changed.

Center Position

X = 0.000

Y = 0.000

Minimum Position

X = 0.000

Y = 0.000

Maximum Position

X = 0.000

Y = 0.000

Figure 8-21 Graphic Settings - Center, Minimum, Maximum Position

(F) Setting Window

In the [Graphic Setting] window, detailed setting for drawing is available in the window that appears when the [Set] button is touched.

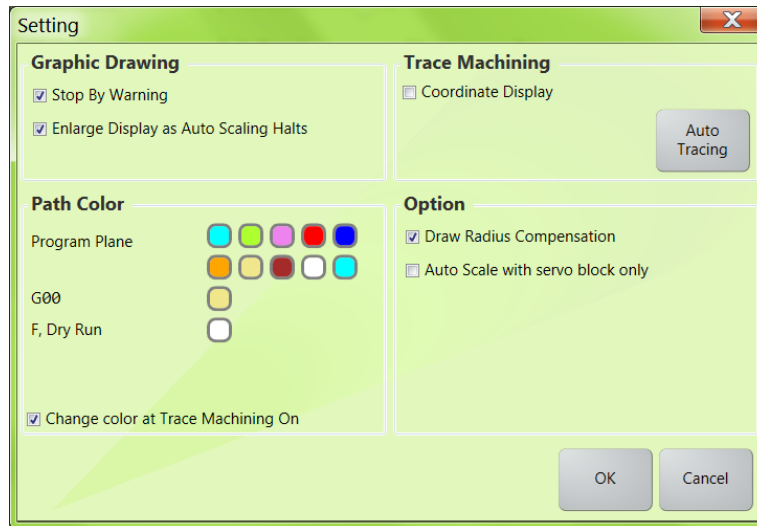


Figure 8-22 Graphic Drawing - Setting Window

(i) Graphic Drawing

[Stop By Warning]

When checked, drawing will stop when there is a warning or alarm block.

[Enlarge Display as Auto Scaling Halts]

When checked, display of the spot halted by alarm in auto scaling is enlarged.

(ii) Trace Machining

[Coordinate Display]

In graphic settings the coordinates to be displayed are setup, and when the Tracing button is activated the values for the specified coordinates are shown on the main draw panel.

[Draw Wire Tip when moving axes in Manual Mode]

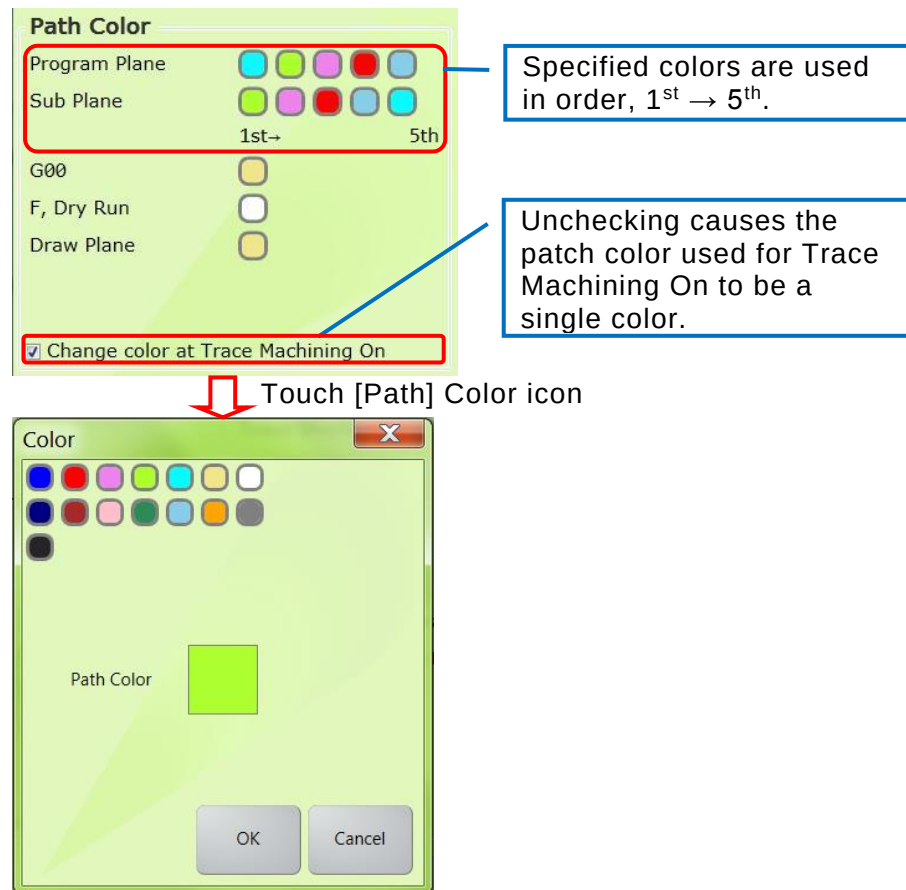
To always check the axis position on the draw area check the box. In manual mode the wire tip is shown regardless of tracing being on or off.

[Auto Tracing] Button

When the [Auto Tracing] button is activated and the [Draw Start] button is touched, the auto scaling and tracing functions are performed even if their buttons are not turned on.

(iii) Path Color

Path colors used when drawing can be selected. To change the color, use the colors window displayed when the Path Color icon is touched.



Color Window for setting path color

Figure 8-23 Graphic Setting - Path Color

(iv) Option

[Draw radius compensation]

When checked, the radius compensation and taper are added during drawing.

[Auto scale with servo block only]

When checked, auto scale is only performed with servo block.

(G) M00/M01 icons displayed on drawing path

To give a better understanding of stop point operations before and during machining, new icons indicating the M00/M01 stop points are shown in graphic area.

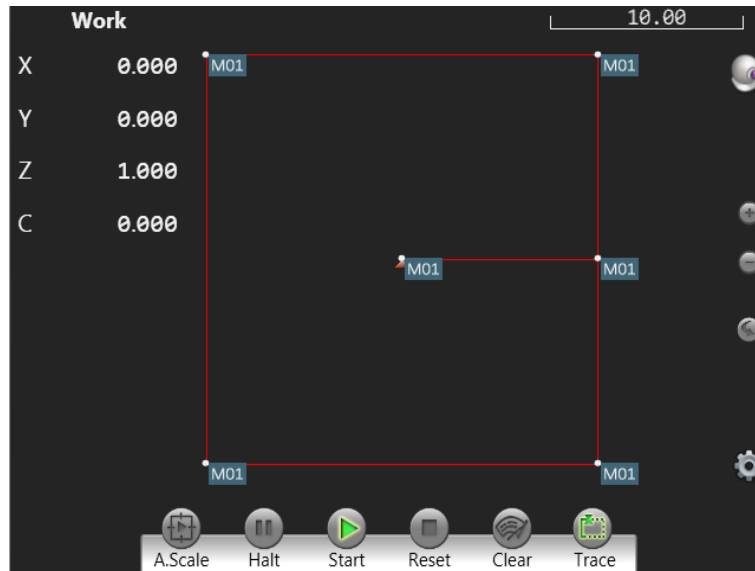


Figure 8-24 M00/M01 icons displayed on drawing path

M code	Icon	Content
M00		Stop
M01		Optional Stop

*This can also be used in Program screen - [Test Draw].

*The X-Y plane only is shown.

(a) Settings

(i) Touch the Setting icon (gear mark) on the Graphic screen.

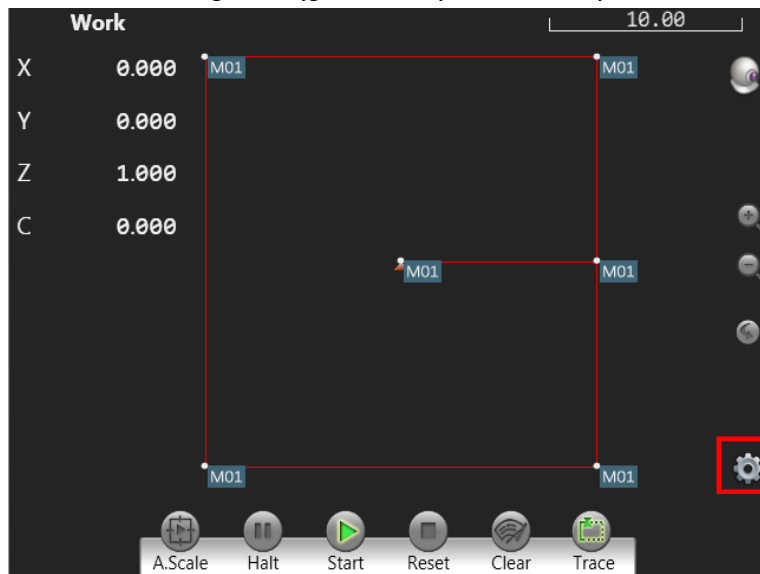


Figure 8-25 Graphic screen

(ii) This is enabled by inserting a check mark to the icon shown in the figure below (enabled in standard configuration).

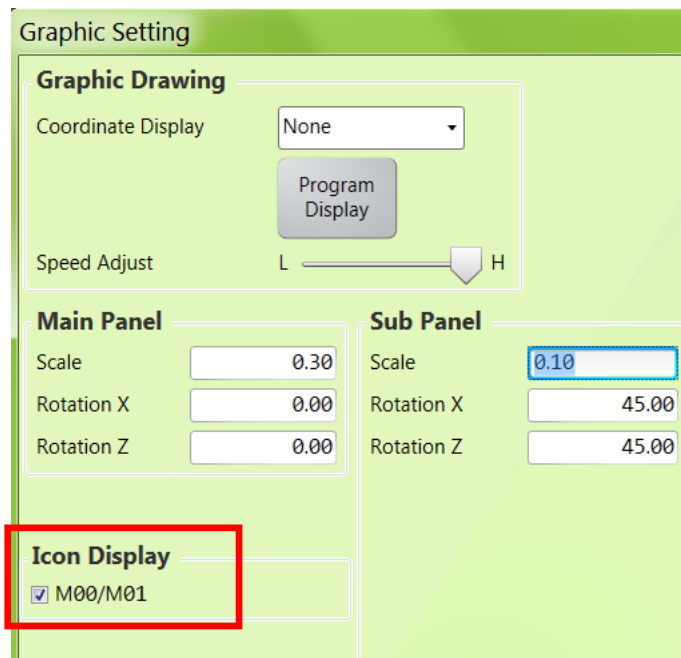


Figure 8-26 Graphic setting

8.1.4 Navigation Bar

Touch buttons to transition to screens from the Run Screen.

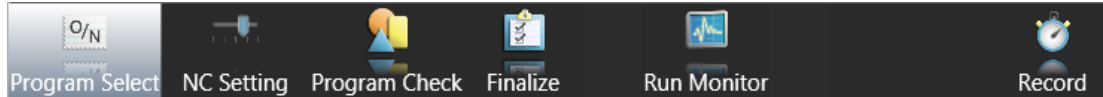


Figure 8-27 Navigation Bar

(1) Program Select

The program select screen displayed, allowing for selection of program to be started.

(2) NC Setting

The NC Setting screen displayed, allowing for configuration of coordinate set rotation.

(3) Program Check

Test Run Setting screen, allowing for configuration of Test Run.

(4) Finalize

The Finalize screen is displayed, allowing for checking enabled functions.

(5) Run Monitor

The Run Monitor screen is displayed, allowing for display and editing of the coordinate display, macros (manual mode), MDI (MDI run mode), programs (memory mode) and EZ-OffAdd.

(6) Record

The Record screen is displayed, allowing for checking the status of machining in operation and the last finished machining. In addition, estimated data from the graphic drawing can be compared.

8.2 Program Select

Select program for startup from the ones previously registered.

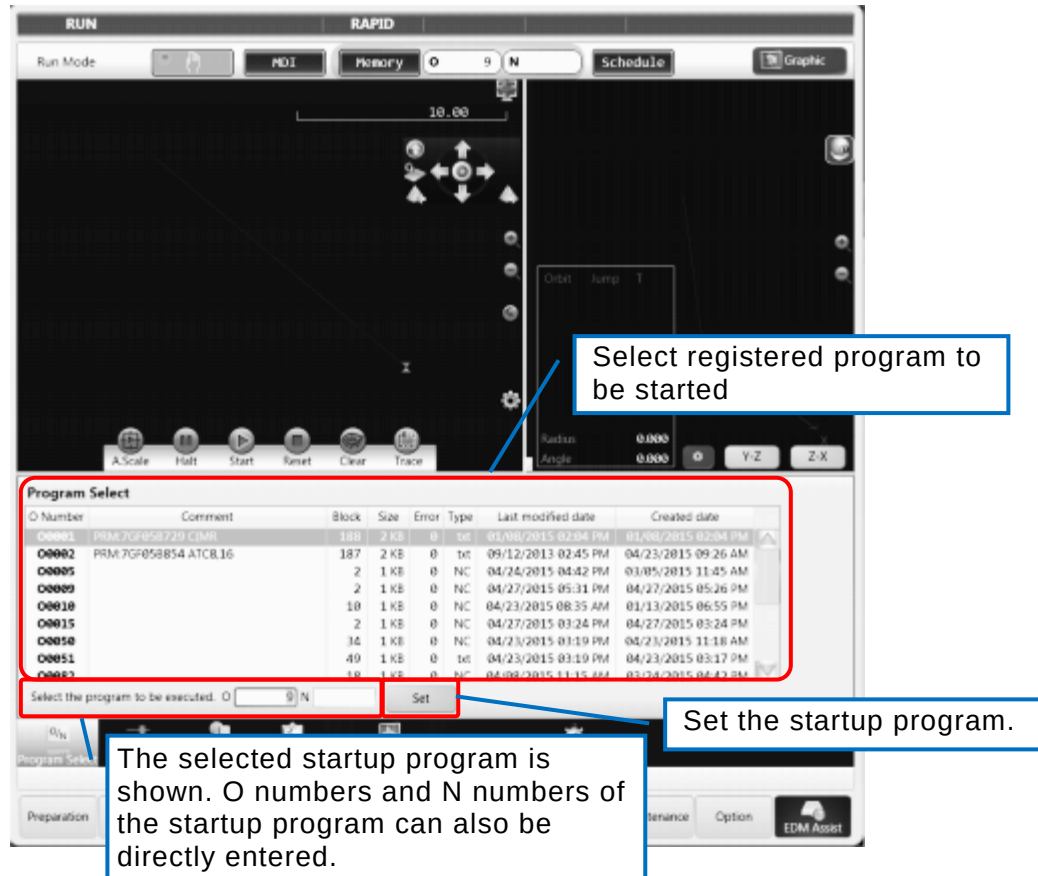


Figure 8-28 Program Select

8.3 NC Setting

After a program is selected, the coordinate system rotation panel, which is required before graphic drawing, is displayed to allow setting up the rotation angle of the coordinate system.

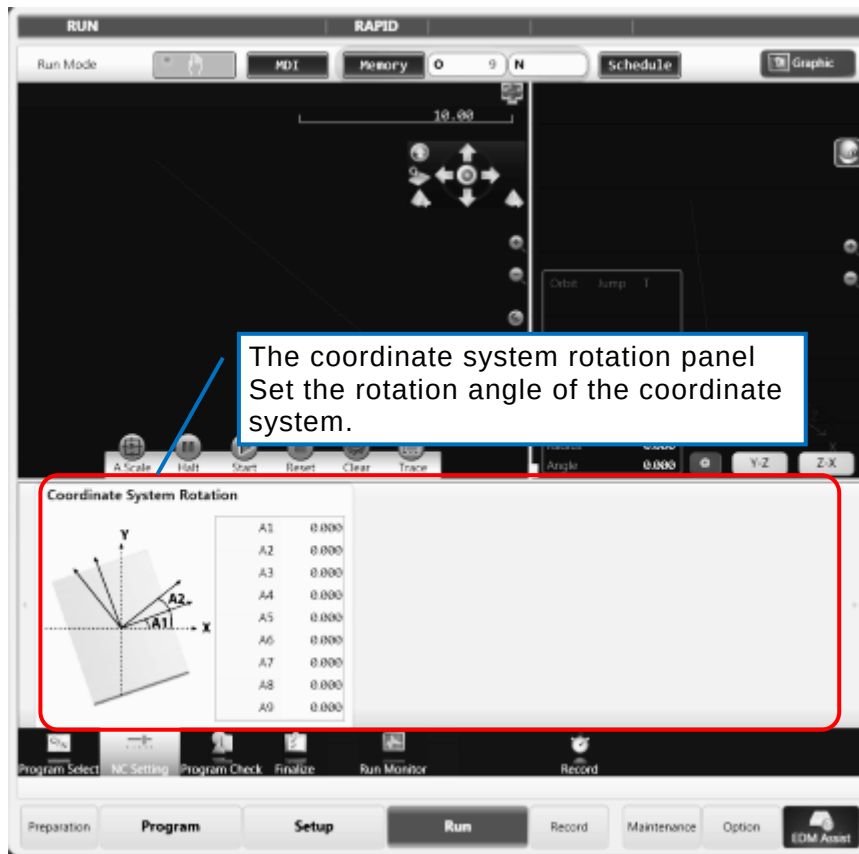


Figure 8-29 NC Setting

8.3.1 Coordinate System Rotation Panel

Values for G92 coordinate system rotation angles A1 ~ A9, set to parameter numbers [0091 ~ 0099] on the [Maintenance] – [Parameters] screen are displayed and values can be changed for each parameter.

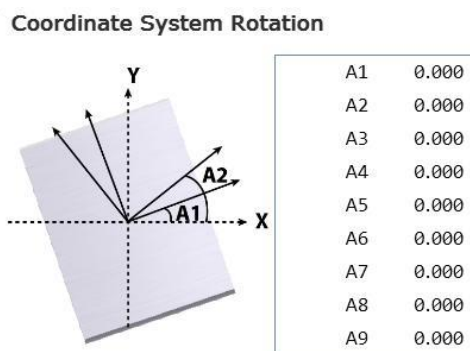


Figure 8-30 Coordinate System Rotation Panel

8.4 Program Check

Test Run Setting screen, allowing for configuration of Test Run.



Figure 8-31 Test Run Setting

8.5 Finalize

Check if NC functions are enables and Check HQSF status.



Figure 8-32 Finalize

8.5.1 Activated Status

Enabled NC functions are displayed.
Figure 8-33 Ex., enabled function is Test Run.

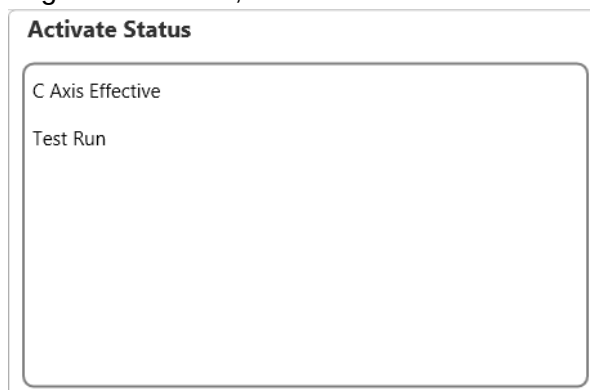


Figure 8-33 Activated Status

8.5.2 Time Limit Machining Fluid

When time limit machining fluid is started, the machining fluid can be turned on at a specified date and time or after a specified time period has elapsed.

- Setting for specifying date and time

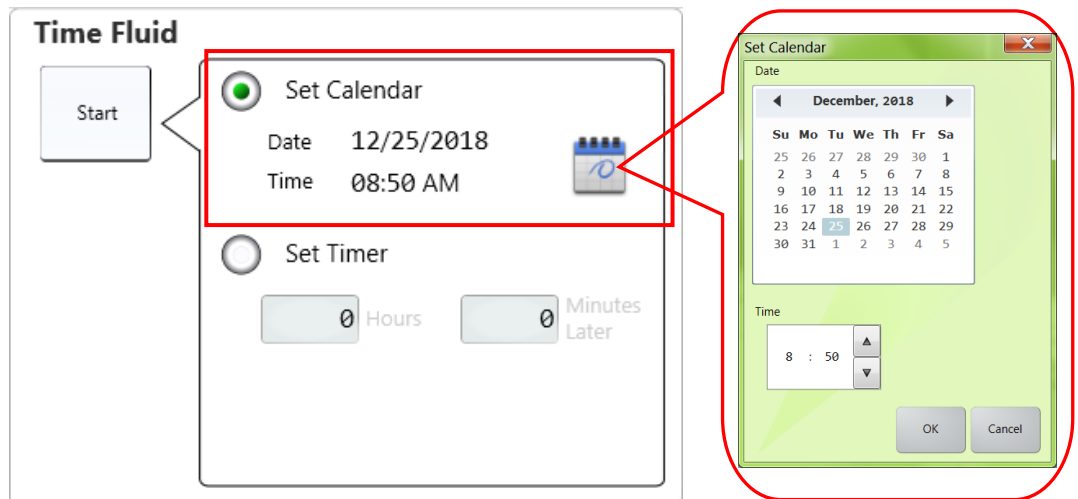


Figure 8-34 Setting for specifying date and time

- Timer setting for specifying time period

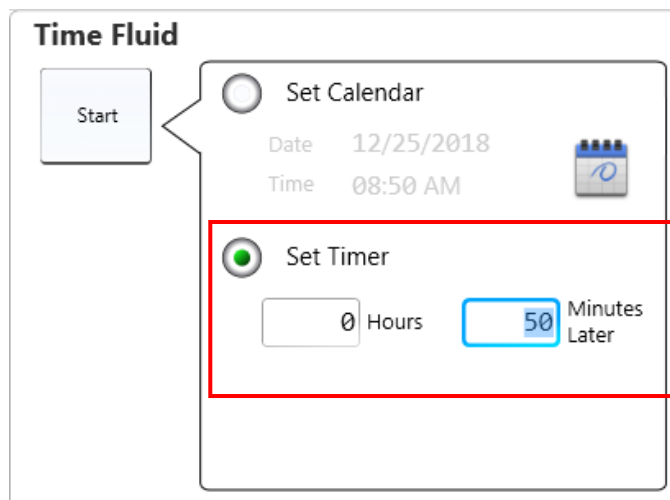


Figure 8-35 Timer setting for specifying time period

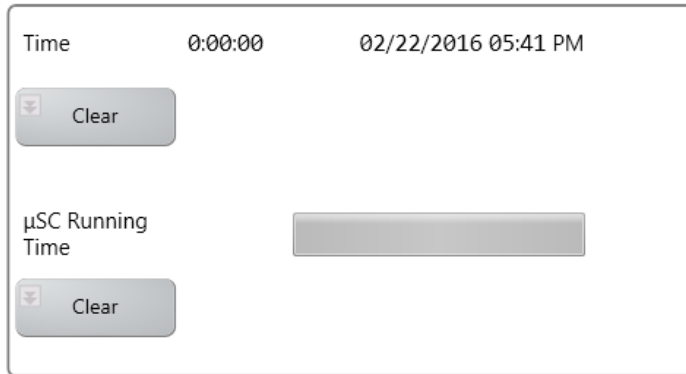
Pressing the [Start] button starts the time limit machining fluid. (The [Start] button turns blue.)

To cancel, press the [Start] button again.

8.5.3HQSF Status (Optional)

HQSF Machining Time and μ SC Running Time are displayed.

HQSF Status



The screenshot shows a window titled "HQSF Status". At the top, it displays "Time" with a value of "0:00:00" and a date/time "02/22/2016 05:41 PM". Below this is a button with a dropdown arrow and the text "Clear". Further down, it shows " μ SC Running Time" next to a horizontal progress bar. At the bottom, there is another button with a dropdown arrow and the text "Clear".

Figure 8-36 HQSF Status

8.6 Run Monitor

8.6.1 Monitor (Manual)

Activate the [Manual Mode] button, then manual mode is switched to and macro buttons are used for operation.

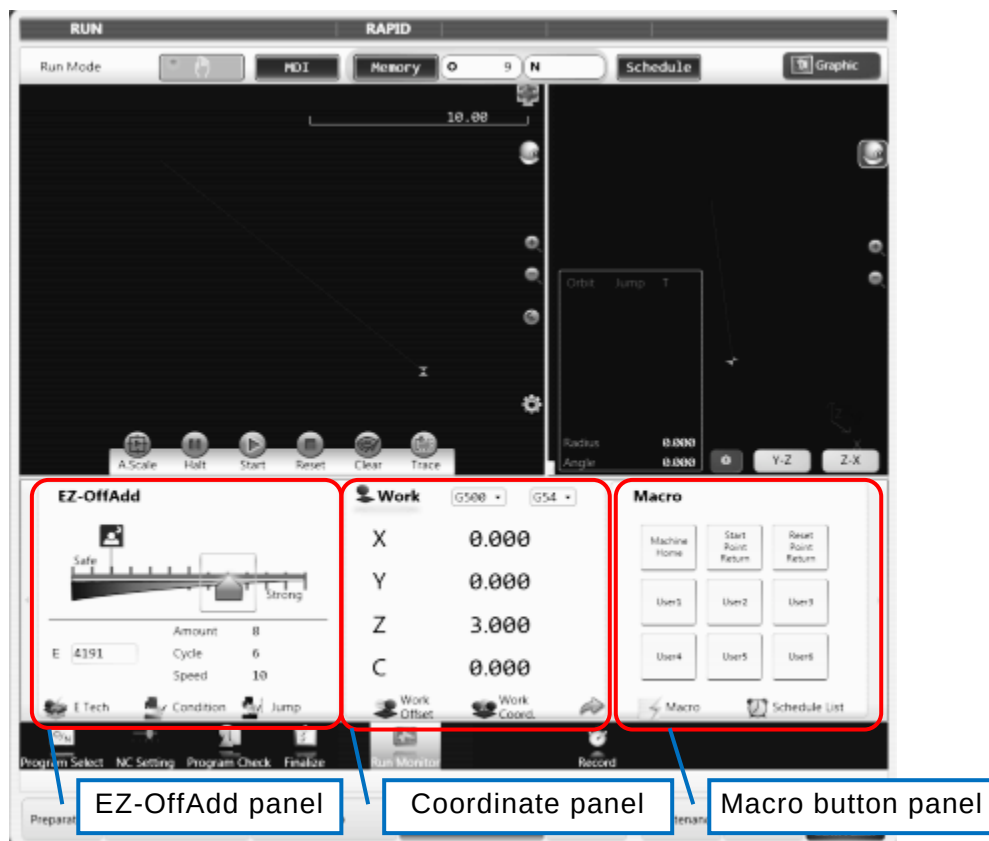


Figure 8-37 Run Monitor Screen (Manual)

8.6.2 Monitor (MDI)

MDI Mode is selected when efficiently running a simple program and the MDI program panel is displayed in the bottom center panel of the [Monitor] screen.

For more info on the MDI Program Panel, refer to 8.6.7 [MDI Program Panel].

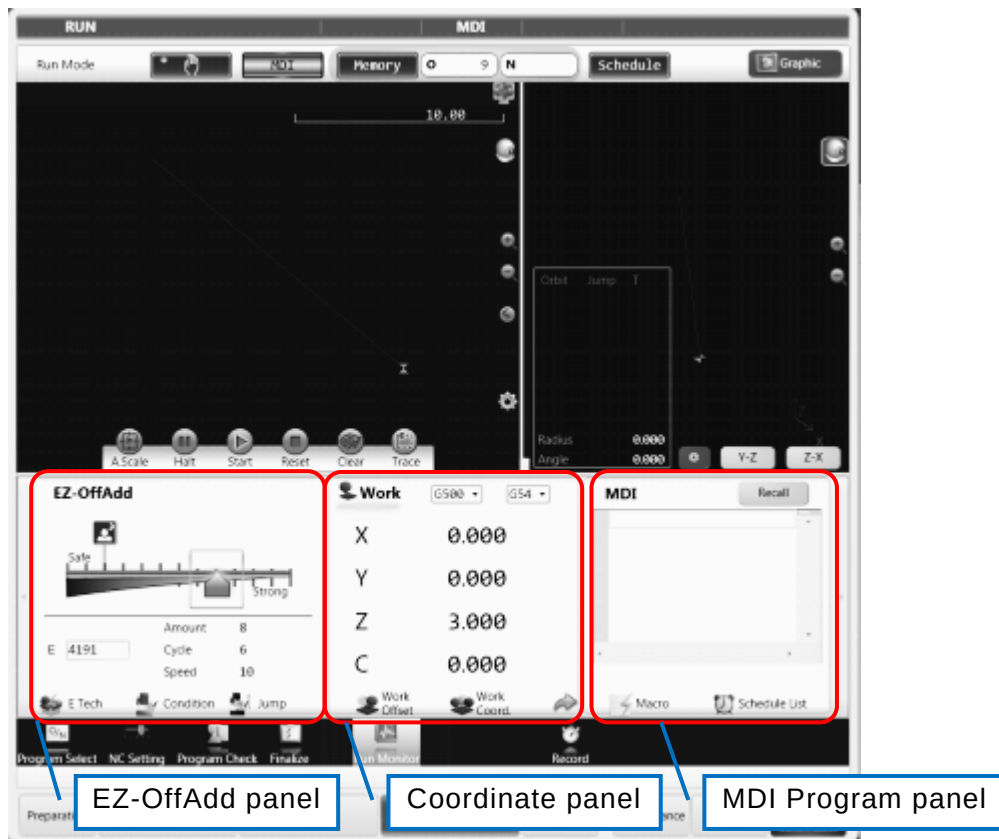


Figure 8-38 Monitor screen (MDI)

8.6.3 Monitor (Memory)

Memory Mode is selected when specifying the O number and N number to run a program.

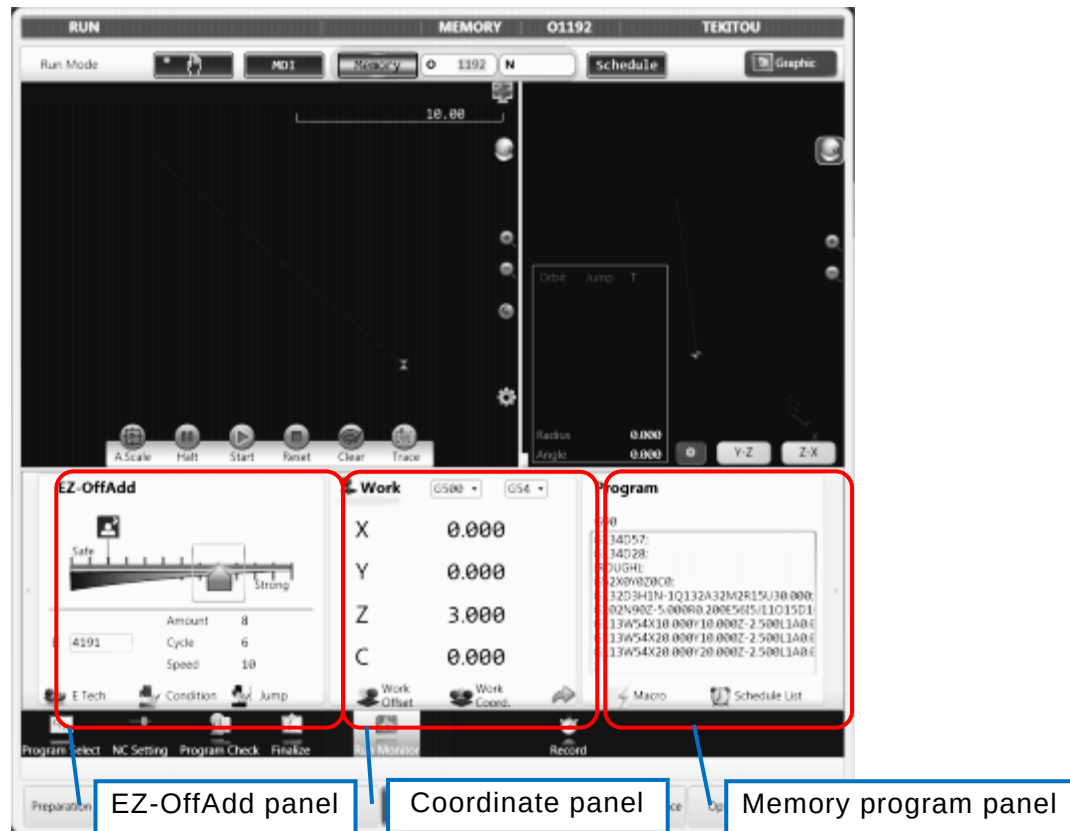


Figure 8-39 Monitor screen (Memory)

8.6.4 Monitor (Schedule)

Schedule mode is selected when the continuous run or ASAP are executed.
Refer to chapter 8.7 “Schedule Panel (Detailed explanation)” about Schedule Panel.

Figure 8-40 Monitor screen (Schedule)

8.6.5 Coordinates Panel (Work coordinates)

On the Monitor screen the work coordinates panel is displayed by standard, and information related to the work coordinates is shown.

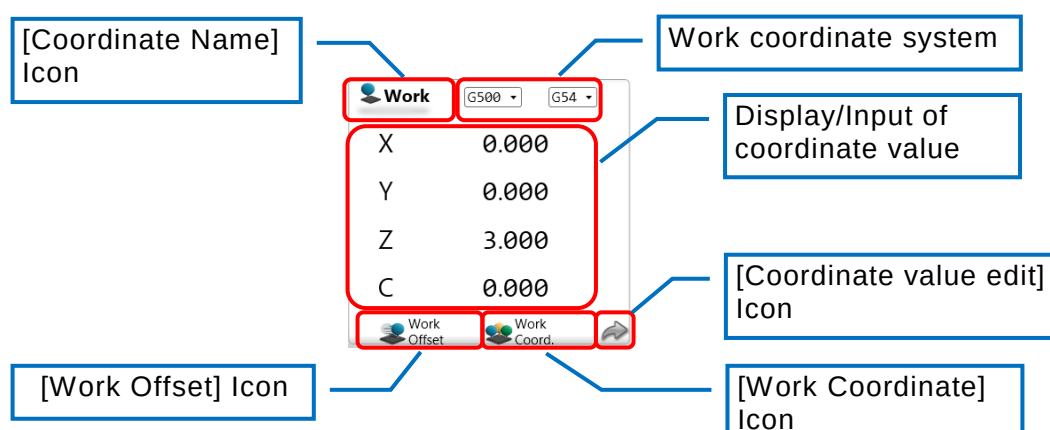


Figure 8-41 Coordinate Panel

Table 8-4 Coordinates Panel (Work coordinates)

Item Name	Description
[Coordinate Name] Icon	Name on coordinate panel as an icon. Touch to display coordinate selection window, and perform changes or additions to the coordinate panel.
Work coordinate system & Coordinate system rotation angle	Displayed for the work coordinates panel. The currently set work coordinate group, coordinate system and rotation angle are shown. The work coordinate group and work coordinate system can also be changed from the selection box.
Display/input of coordinate value	X, Y, Z and C axis coordinates value are displayed. The following coordinate values can be entered when the work coordinate panel or relative coordinate panel is display: Work coordinates : X ,Y, Z, C Relative coordinates : X, Y, Z, C
[Work Offset] Icon	Touch the icon to display the [Work Offset] window. Check and perform changes to work offset from work group G50 ~ G515 and work coordinate system G54 ~ G61.
[Work Coordinate] Icon	Touch the icon to display the [Work Coordinate] window, and check work coordinate for work group G500 ~ G515 and work coordinate system G54 ~ G61.
[Coordinate value edit] Icon	Touch the icon to enlarge the coordinate value panel, and display the [Coordinate value edit] button is displayed.

(1) Coordinate Selection Window

Touch the coordinate name icon to display the coordinate selection window, allowing for changes or additions to the coordinate panel according to the usage.

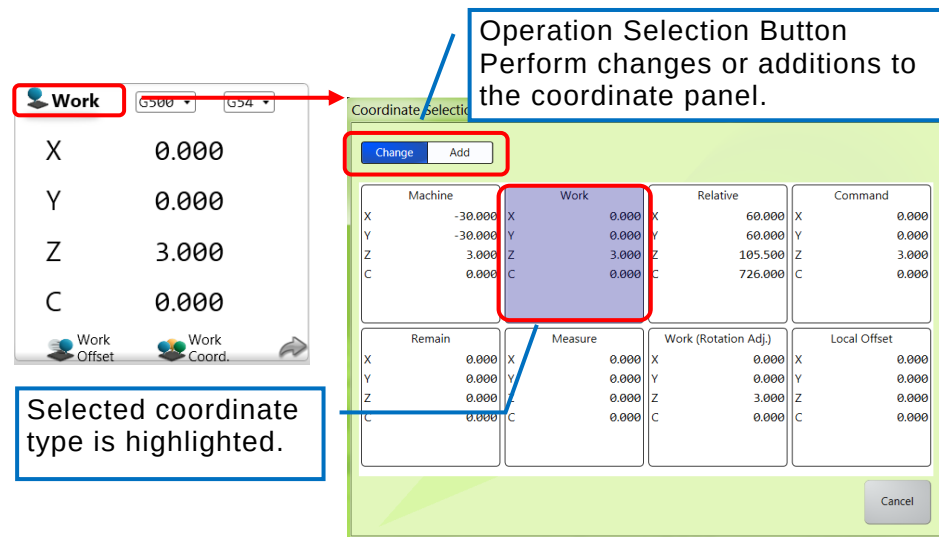


Figure 8-42 Coordinate Selection Window

(A) Coordinate Panel Alteration Operations

Touch [Change] on the operation selection button to select panel alteration operations.

Select the new coordinate values.

The current coordinate panel is changed, and return to the Monitor screen.

(B) Coordinate Panel Addition Operations

Touch [Add] on the operation selection button to select panel addition operations.

Select coordinate values to be added.

On the specified coordinate panel, the addition is made at the end of the coordinate panel, and return to the Monitor screen.

(2) Work Offset Window

Check work coordinates for work group G500-G515 or work coordinate system G54-G61, and perform changes to the work coordinates.

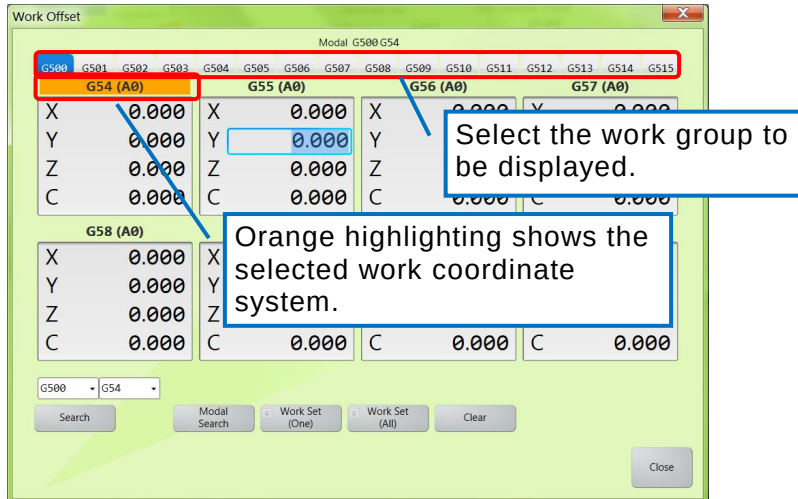


Figure 8-43 Work Offset Window

(A) [Search] Button

The specified work coordinates are searched and the work offset is displayed.

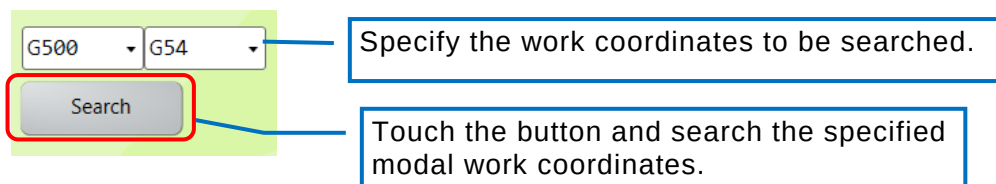


Figure 8-44 Work Offset Search

(B) [Modal Search] Button

Search through current modal work coordinates and display the work offsets.

(C) [Clear] Button

By touching the [Clear] button, the Clear Menu window appears so that the work coordinates within the specified range can be cleared.

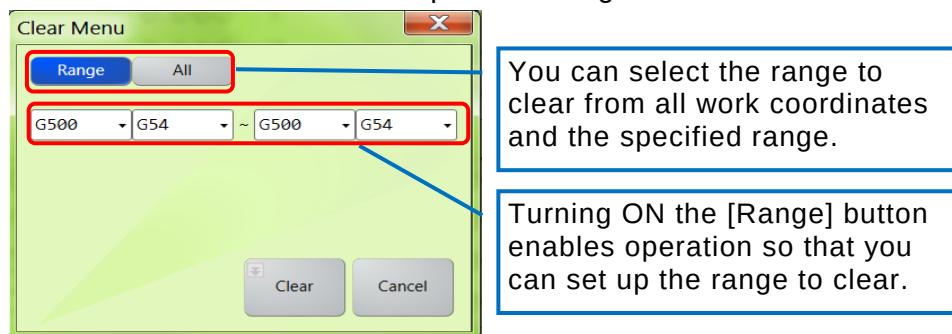


Figure 8-45 Clear Menu window

(3) Work Coordinates Window

Check work coordinates from work group G500 ~ G515 and work coordinate system G54 ~ G61.

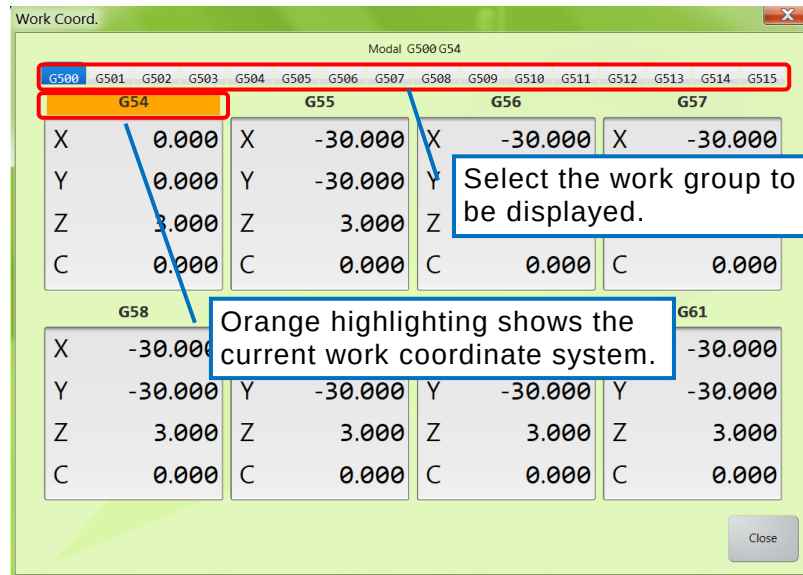


Figure 8-46 Work Coordinates Window

(4) Coordinate Edit Buttons

Touch the icon on the bottom right of the panel to show the work number and coordinate values operation buttons, to edit the coordinate values and work numbers.

For more info on the coordinate operation buttons, refer to Table 9-5 "Coordinate Value Operation Buttons".

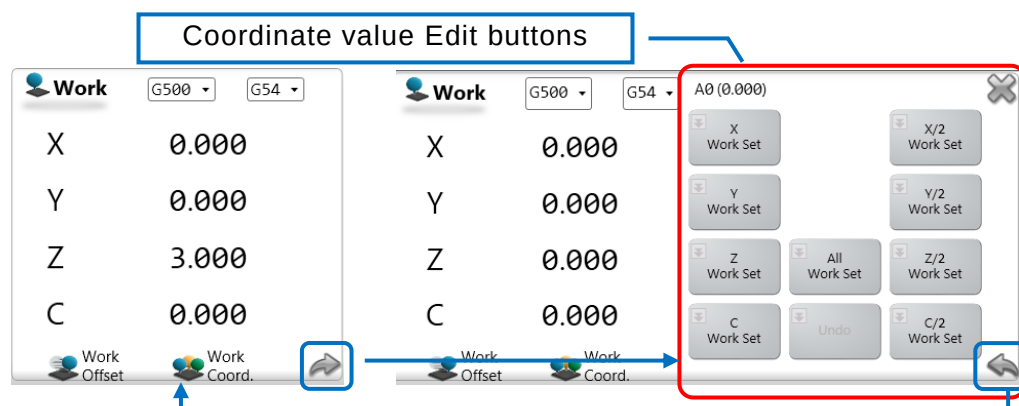


Figure 8-47 Work Coordinate Panel - Displaying Coordinate Edit Buttons

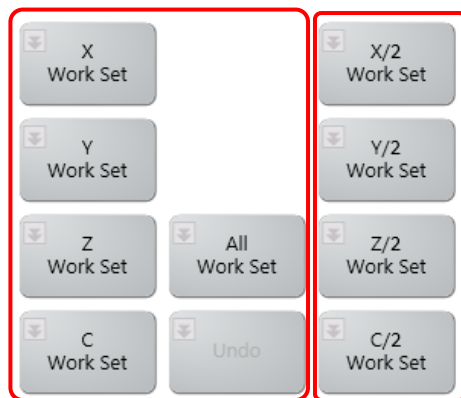


Figure 8-48 Selected ORG Button or 1/2 Button

Table 8-5 Coordinate Value Operation Buttons

Button name	Description
X Work Set	Sets the X axis coordinate value of work coordinate to 0.
Y Work Set	Sets the Y axis coordinate value of work coordinate to 0.
Z Work Set	Sets the Z axis coordinate value of work coordinate to 0.
C Work Set	Sets the C axis coordinate value of work coordinate to 0.
All Work Set	Sets X, Y, Z, C coordinate values of work coordinates to 0.
X/2 Work set	Sets the X axis coordinate value of work coordinate to 1/2. In case of a fraction number, it will be rounded off to four decimal places.
Y/2 Work set	Sets the Y axis coordinate value of work coordinate to 1/2. In case of a fraction number, it will be rounded off to four decimal places.
Z/2 Work set	Sets the Z axis coordinate value of work coordinate to 1/2. In case of a fraction number, it will be rounded off to four decimal places.
X Relative set	Sets the X axis coordinate value of relative coordinate to 0.
Y Relative set	Sets the Y axis coordinate value of relative coordinate to 0.
Z Relative set	Sets the Z axis coordinate value of relative coordinate to 0.
C Relative set	Sets the C axis coordinate value of relative coordinate to 0.
X/2 Relative set	Sets the X axis coordinate values of Relative coordinate to 1/2. In case of a fraction number, it will be rounded off to four decimal places.
Y/2 Relative set	Sets the Y axis coordinate values of Relative coordinate to 1/2. In case of a fraction number, it will be rounded off to four decimal places.
Z/2 Relative set	Sets the Z axis coordinate value of Relative coordinate to 1/2. In case of a fraction number, it will be rounded off to four decimal places.
All Relative set	Sets X, Y, Z, and C coordinate values of relative coordinates to 0.
Undo	Cancel the previous action and restore the original value.

8.6.6 Macro Buttons Panel

This panel is displayed when Manual Mode is selected.

Use macro buttons to perform frequently used operations without changing the screen.

For info on the macro buttons, refer to Chart 8-6 “Macro Buttons”.

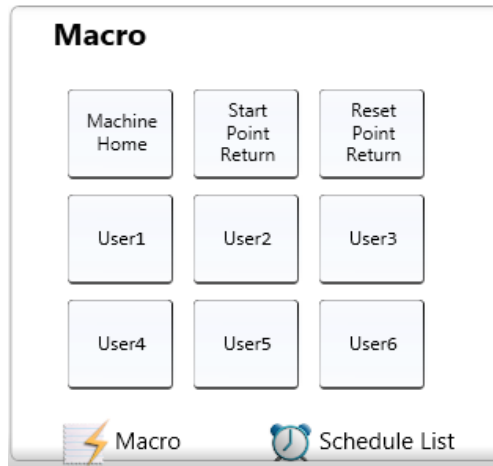


Figure 8-49 Macro Button Panel

Table 8-6 Macro Button

Macro Button Name	Description
Machine Home	Pressing the button will send the machine axes to the reference (Home) position.
Start Position Return	This will move the machine axes to the start location of the Memory Run operation.
Reset Position Return	This will move the machine axes to the reset location of the Memory Run operation.
User 1 - 6	By registering to O number specified a simple program that you create, you will be able to be startup by this button.

8.6.7 MDI Program Panel

Edits can be made to the MDI programs run in MDI Mode.

Use the [START] key after program editing to run the program.

If there are any errors in the NC program being edited, the NC block will appear in red font. Make sure editing is finished and that there are no errors before running.

The MDI program created before running is deleted, but touching the Recall button brings back the previously run MDI program. An MDI program which was run with an error can also be displayed by touching the Recall button.

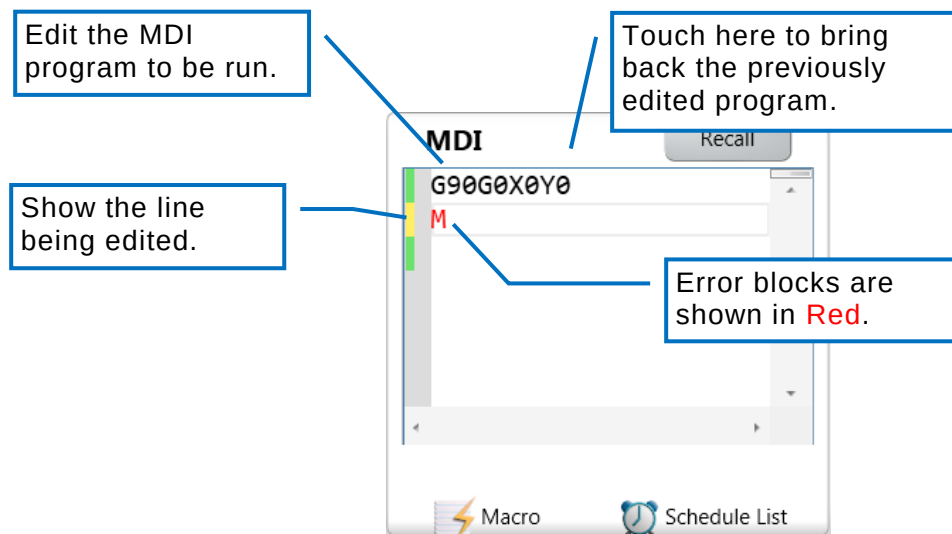


Figure 8-50 MDI Program Panel

8.6.8 Memory Program Panel

The NC program being run by Memory Run is displayed.

In addition, touching the [Macro] icon will bring up the Program window for checking used variables, and the NC program will be shown.

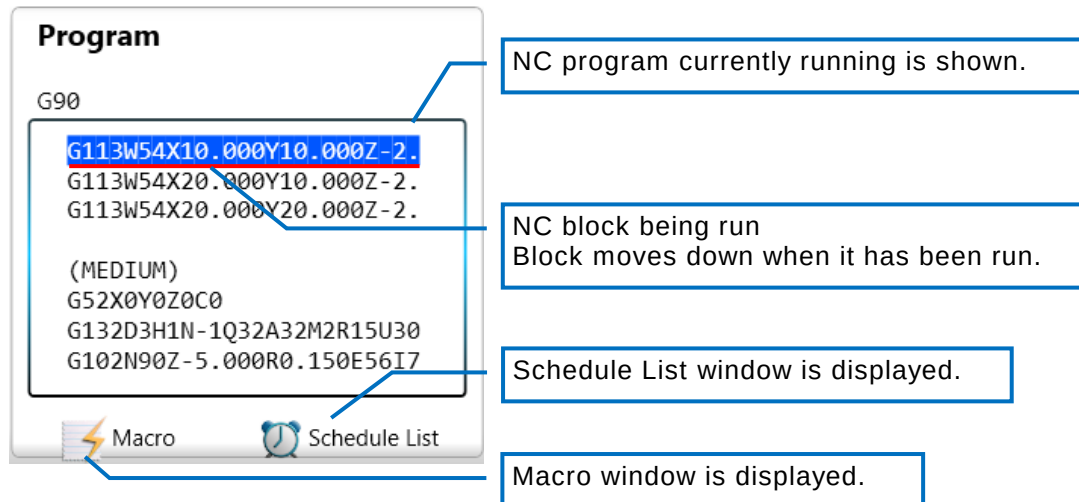


Figure 8-51 Memory Program Panel

(1) Macro Window

Macro variables can be shown or changed.

For the displayed macro variables display mode, [Manual], [MDI] and [Memory] are available in accordance with the mode selected.

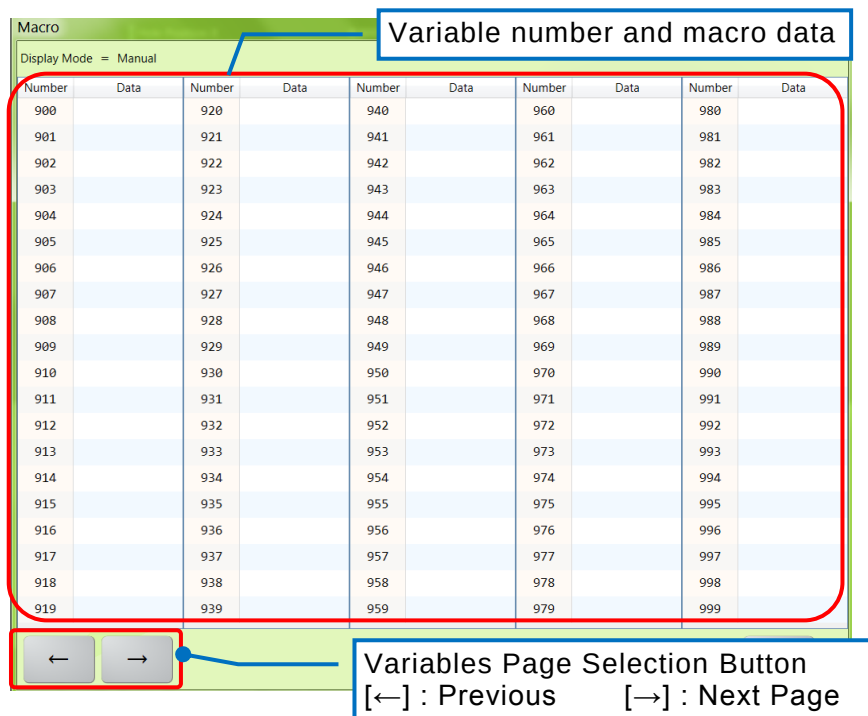


Figure 8-52 Running Program Window

Table 8-7 Type of Macro Variables

Variable No.	Variable Name	Variable type
1 ~ 33	Local variables	A
100 ~ 149		
150 ~ 249		
250 ~ 299		
300 ~ 399		
400 ~ 499	Non-hold type common variables	A, B
500 ~ 599		
600 ~ 699		
700 ~ 799		
800 ~ 899		
900 ~ 999	Hold type common variables	A, B
20000 ~ 20999	Hold type common variables	A

Table 8-8 Macro Variables - Variable Type

Variable type	Length	Type	Precision
A	Double precision (64 bits)	Real number	16 significant digits
B	Single precision (32 bits)	Real number	7 significant digits

8.6.9 EZ-OffAdd Panel

For checking information that requires monitoring during machining, such as checking if the selected machining conditions have been set or if the jump setting is correct.

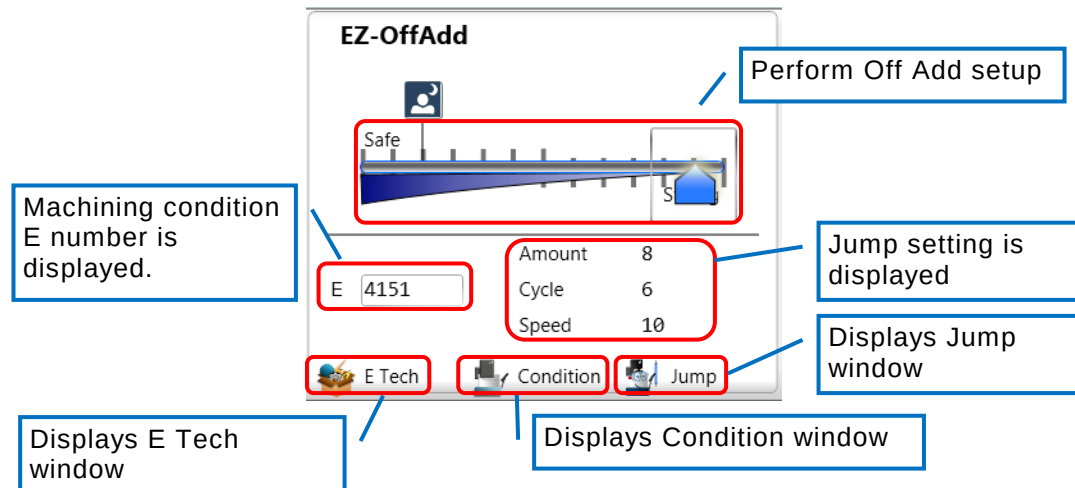


Figure 8-53 Machining Data Panel

(1) EZ-OffAdd

This function can adjust the off time for the machining conditions being run to prevent an unstable machining situation caused by rough machining conditions setup with complex machining accumulations.

The off time is extended when the slider is moved in the direction of [Safe], and is reduced when moved in the direction of [Strong].

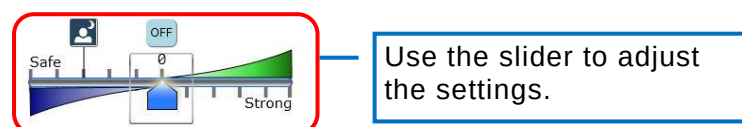


Figure 8-54 Machining Data- EZ-OffAdd

Dimensions may slightly differ after rough machining if the EZ-OffAdd function is used.

Please be cautious when doing high accuracy machining.

8.6.10 MINPULS Tech Window

This window is displayed when the [E Tech] icon is touched on the [EZ-OffAdd] panel.

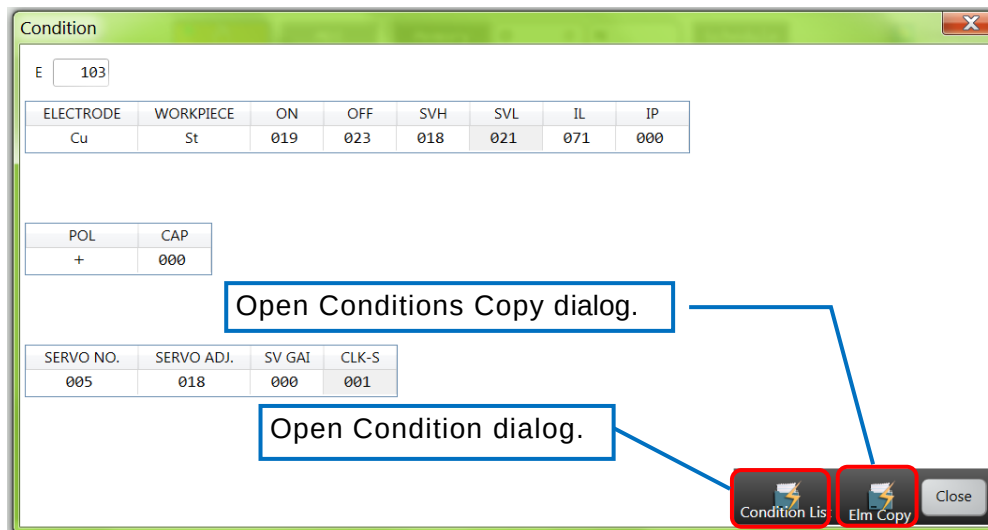
For details, refer to Chapter 7 “Program”.



Figure 8-55 E Tech Window

8.6.11 Condition List Window

Conditions can be displayed or have input changed here.



(1) Conditions List Window

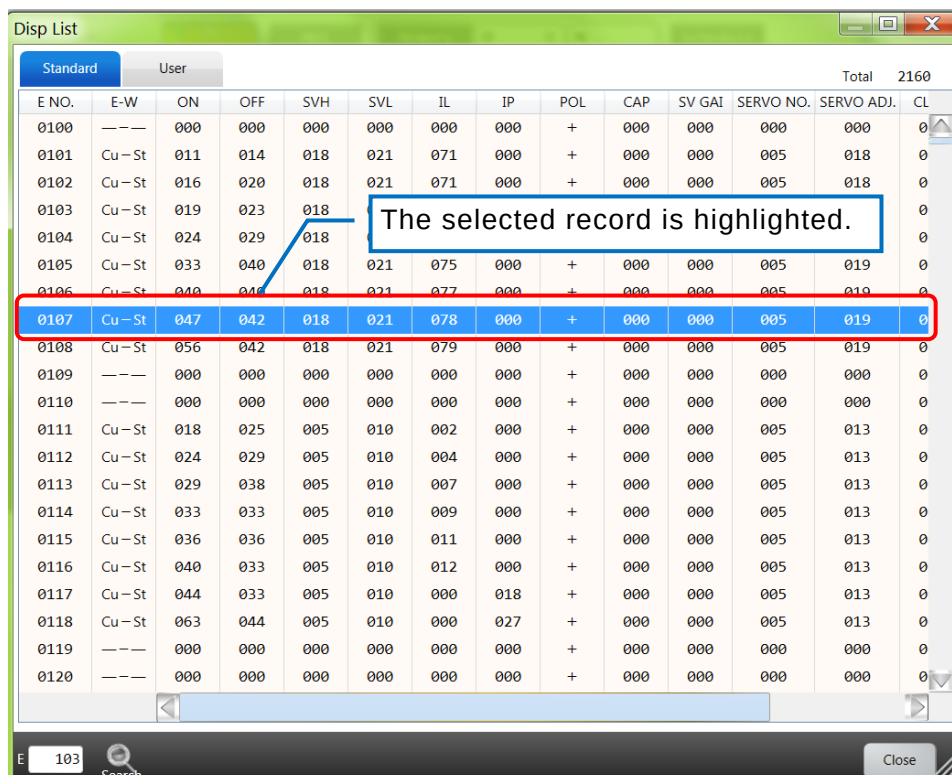


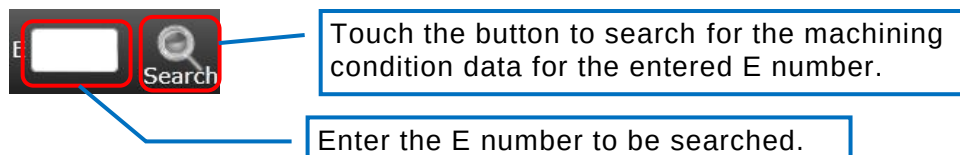
Figure 8-56 Condition Window – Standard

(2) Conditions List of user

E NO.	E-W	ON	OFF	SVH	SVL	IL	IP	POL	CAP	SV GAI	SERVO NO.	SERVO ADJ.	CL
9000	Cu-St	019	023	018	021	071	000	+	000	000	005	018	00
9001	Cu-St	024	029	018	021	073	000	+	000	000	005	018	00
9002	---	000	000	000	000	000	000	+	000	000	000	000	00
9003	---	000	000	000	000	000	000	+	000	000	000	000	00
9004	---	000	000	000	000	000	000	+	000	000	000	000	00
9005	---	000	000	000	000	000	000	+	000	000	000	000	00
9006	---	000	000	000	000	000	000	+	000	000	000	000	00
9007	---	000	000	000	000	000	000	+	000	000	000	000	00
9008	---	000	000	000	000	000	000	+	000	000	000	000	00
9009	---	000	000	000	000	000	000	+	000	000	000	000	00
9010	---	000	000	000	000	000	000	+	000	000	000	000	00
9011	---	000	000	000	000	000	000	+	000	000	000	000	00
9012	---	000	000	000	000	000	000	+	000	000	000	000	00
9013	---	000	000	000	000	000	000	+	000	000	000	000	00
9014	---	000	000	000	000	000	000	+	000	000	000	000	00
9015	---	000	000	000	000	000	000	+	000	000	000	000	00
9016	---	000	000	000	000	000	000	+	000	000	000	000	00
9017	---	000	000	000	000	000	000	+	000	000	000	000	00
9018	---	000	000	000	000	000	000	+	000	000	000	000	00
9019	---	000	000	000	000	000	000	+	000	000	000	000	00
9020	---	000	000	000	000	000	000	+	000	000	000	000	00

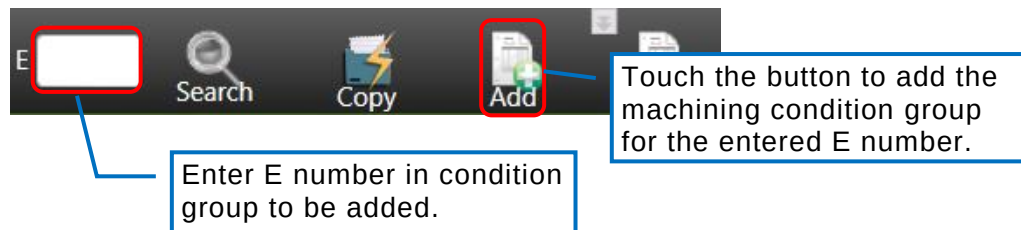
Figure 8-57 Condition Window – User

(A) Search



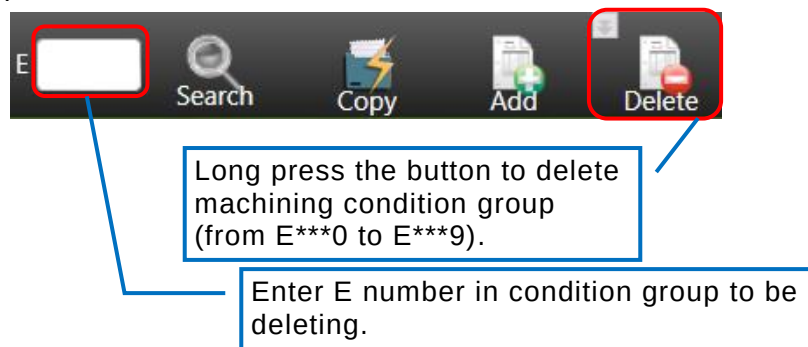
- (i) Enter the E number for the machining condition data to be searched.
- (ii) Touch the [Search] button to search for the machining condition data.
- (iii) Lines containing the machining condition data found for the entered E number are selected and highlighted.

(B) Add



- (i) Enter the E number for the machining condition group (from E***0 to E***9) to be adding.
- (ii) Touch the [Add] button to add the machining condition data.
- (iii) Added machining condition data for the E number is selected and highlighted.

(C) Delete



- (i) Select machining condition data for deletion by entering the E number or touching the machining condition data from the machining condition list.
- (ii) Touch (and long press) the [Delete] button to delete the machining condition data.
If an E number has been entered, the machining condition data for that number will be deleted. If no E number has been entered, the machining condition data selected from the machining condition list will be deleted.

(D) Copy

Specify an E number for the source and destination to copy machining condition data.

- (i) Click the [Copy] button to show the machining condition data Copy window.

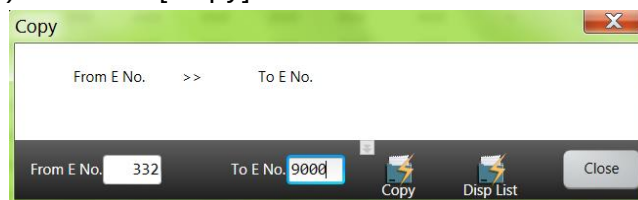


Figure 8-58 Machining Condition Copy Window

- (ii) Select an E number for the machining condition data to be used as a copy source.

You can also click the [Disp List] button and select from the E number list that appears.

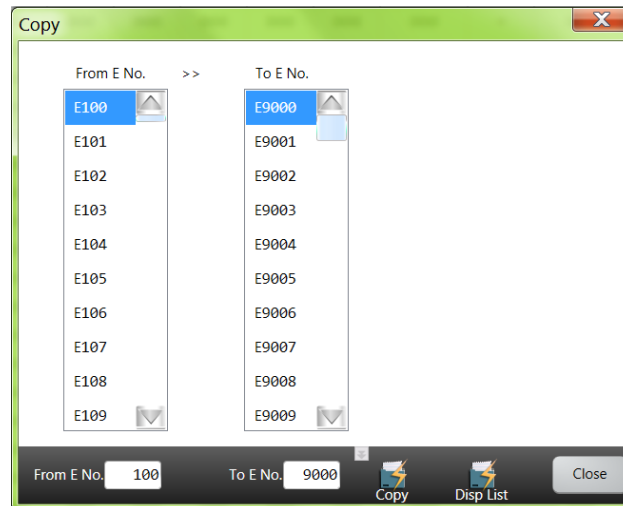


Figure 8-59 Machining Condition Copy E List

- (iii) Select an E number for the machining condition data to be used as a copy destination.

Copy destinations are selected from the registered machining condition data.

- (iv) Long press the [Copy] button to copy the machining condition data.

(E) Clear Button

Use this button to clear machining condition data.

Clearing is not possible for machining condition data if the write attribute is set to NO.

- (i) To select the machining condition data to be cleared, enter the E number or touch the machining condition list.

- (ii) Touch (long press) the [Clear] button to clear the selected machining condition data.

(3) Execution Conditions Copy

E number of the user condition is input or is selected at the copy destination and the execution condition is copied.

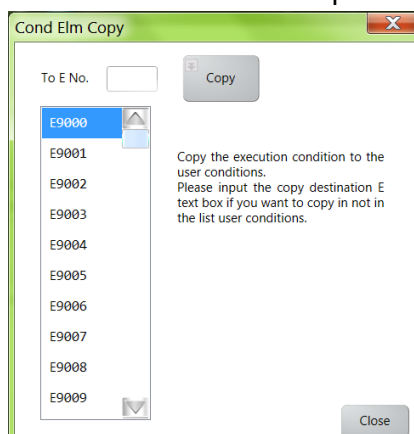


Figure 8-60 Execution Conditions Copy dialog

8.6.12 Jump Window

Jump setting can be displayed or have changed here.



Figure 8-61 Jump Window

- (1) Amount
The distance between the jump-start point and the jump-turn around point is specified.
- (2) Cycle
The discharging time during the jump cycle is specified.
- (3) Speed
The jump speed is specified.

8.7 Schedule Panel (Detailed explanation)

A schedule panel will be shown in the [Monitor] screen and information concerning continuous run and ASAP.

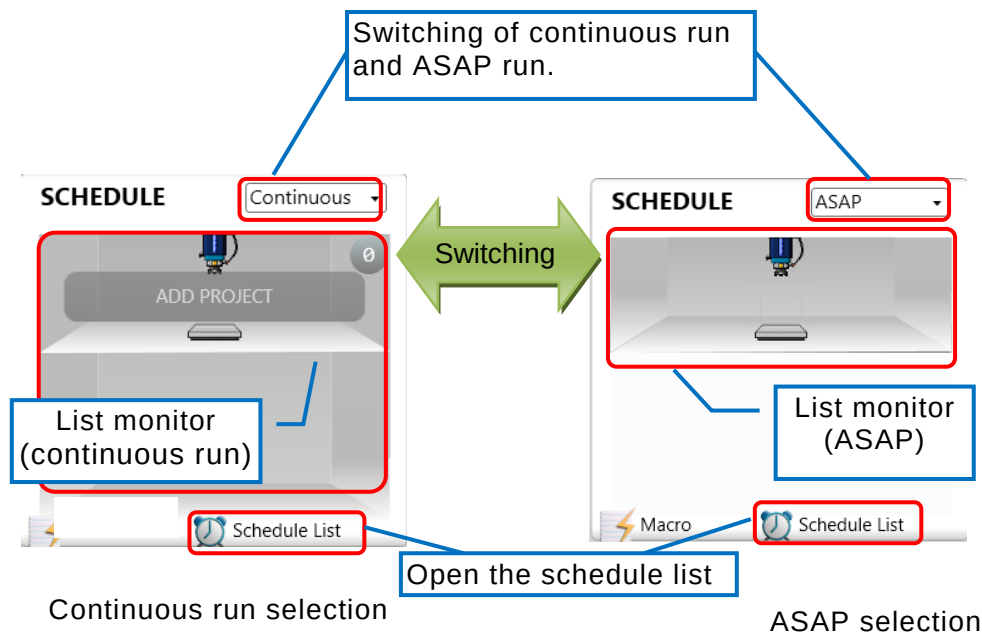


Figure 8-62 Switching the schedule panel.

Even in the closed state of the "Schedule list", you can check the activation status of the scheduled operation.

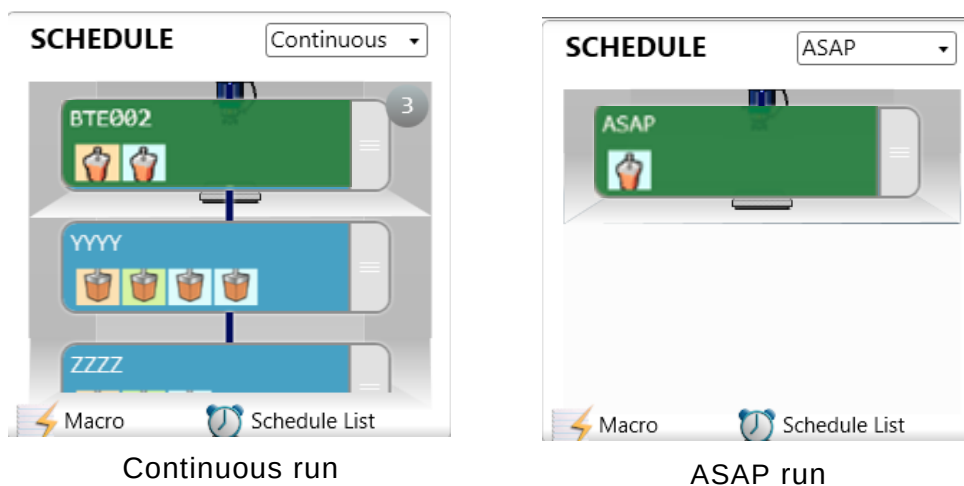


Figure 8-63 Schedule running

8.7.1 Schedule List Window (Continuous Run)



The Schedule List window will be opened by pressing the Schedule List button in the Schedule Panel.

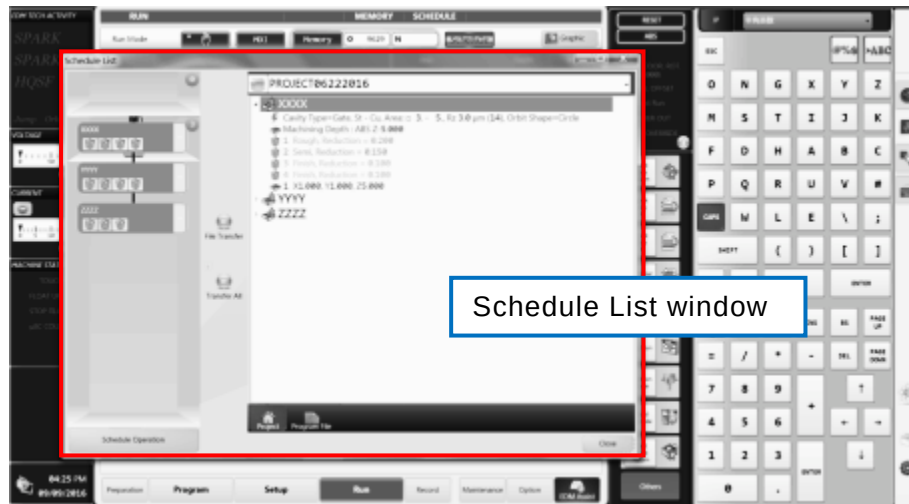


Figure 8-64 Schedule list window (Continuous Run)

8.7.1.1 Description of Screen (Schedule area, Data select area)

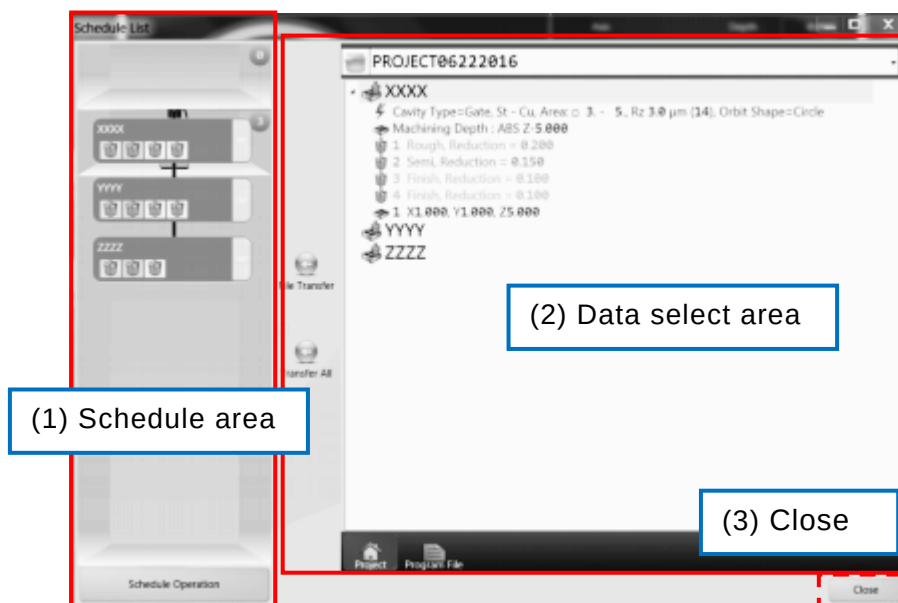


Figure 8-65 List area of schedule area and program

- (1) Schedule area
Display the list of machining waiting and end.
- (2) Data select area
Display the program to add to the schedule.
- (3) [Close] button
Close the schedule list.

8.7.1.2 Schedule area

Use the schedule area to confirm the registration, removal, and operating condition of programs that are used for schedule operation.
The schedule area is designed optimally for starting programs created in the project.

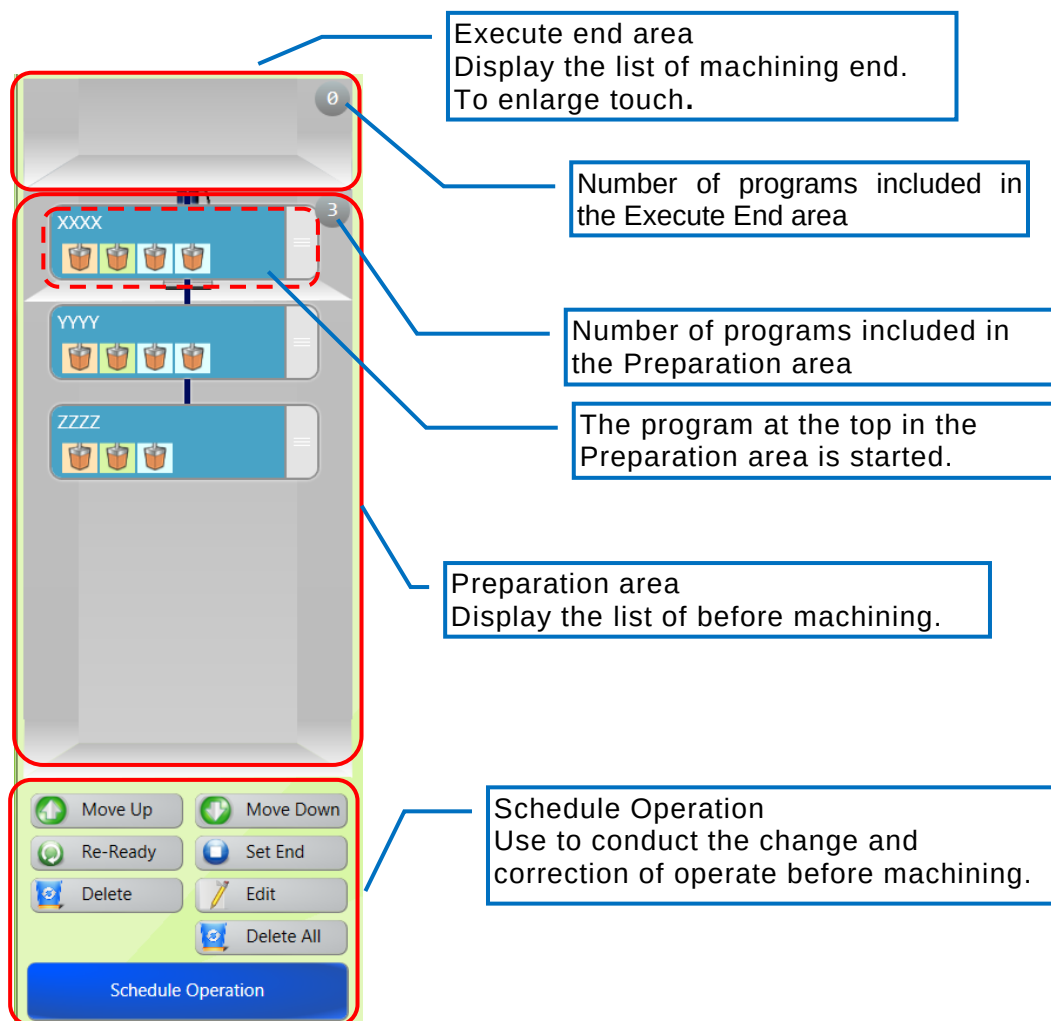


Figure 8-66 Schedule area

8.7.1.2.1 Preparation Area

The Preparation area is provided to register programs that are used for schedule operation. Registering programs, changing the program start order, and editing program contents can be done here.

The program status is indicated by a different color.

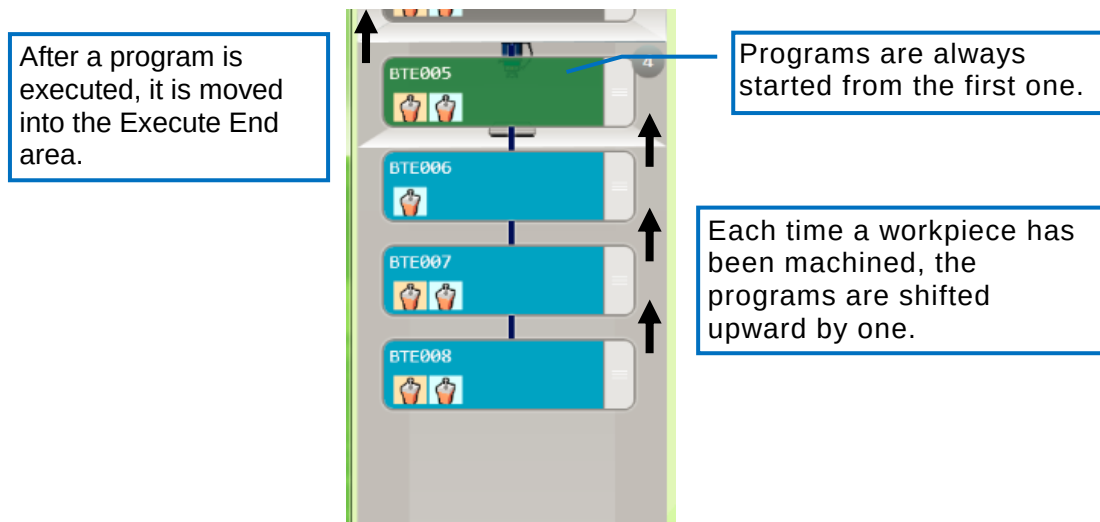
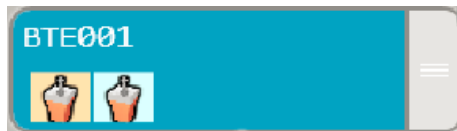


Figure 8-67 Preparation Area

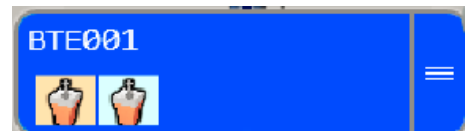
(A) Program status display

The status of each program in the Preparation area is indicated by a different color.

(a) Ready



(c) Selection



(b) Executing



(d) Interruption



Table 8-9 Run Status

Status	Description
(a) Ready	The program is ready and can be started.
(b) Executing	The program is running. Editing is not allowed.
(c) Selection	The program has been selected. The program is to be used for schedule operation.
(d) Interruption	Operation is reset when the program is running. The program cannot be restarted as it now stands. Register the program again or edit its contents, then it gets ready.

(B) Program display

The program name and the number of electrodes of each type are displayed for each program in the schedule list.

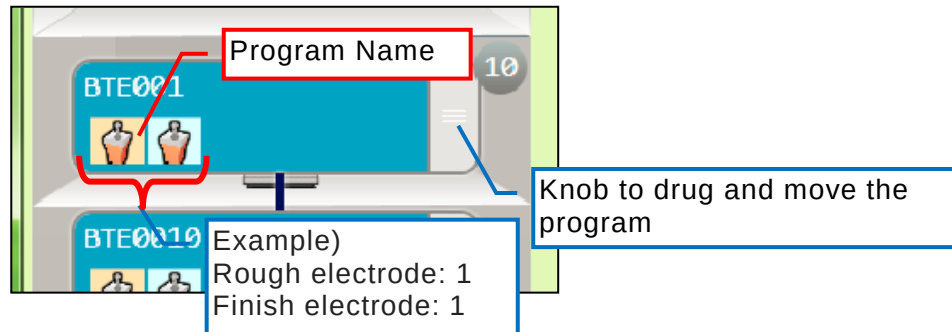


Figure 8-68 Program display

(C) Schedule Operation (Prepared Area display)

When you press the "Schedule Operation" button, you will see the following buttons.

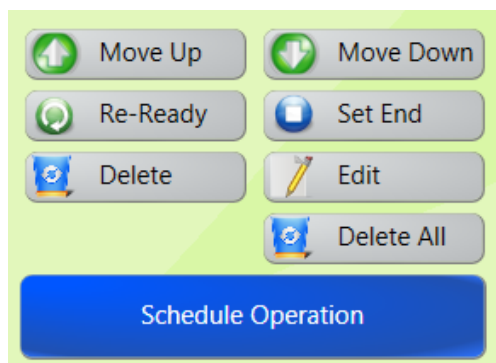


Table 8-10 Schedule Operation Buttons (Preparation area)

Item name	Description
Move Up	Switches the order of the selected data with the one above.
Move Down	Switches the order of the selected data with the one below.
Re-Ready	Re-register the Interrupted data and to prepare for the state.
Set End	Sets to end with the selected data.
Edit	Opens a screen to edit the selected data.
Delete	Deletes the selected data.
Delete All	Deletes all the data within the prepared area

8.7.1.2.2 Execute End Area

The Execute End area is minimized when the Preparation area is displayed. Touching the minimized Execute End area minimizes the Preparation area and displays the Execute End area in expanded format. The Execute End area contains programs that have already been executed in schedule operation.

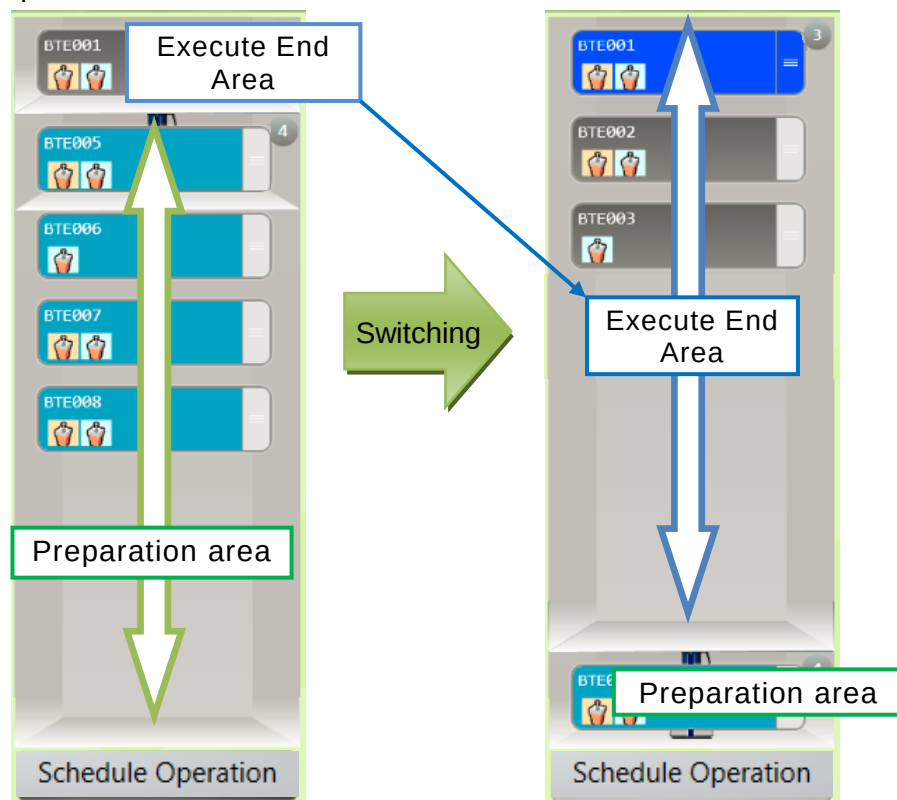


Figure 8-69 Switching of Execute End Area and Preparation Area

* Touching the minimized Preparation area displays the area in expanded format again.

(A) Status of Program

(a) Standard



(b) Selection state



Table 8-11 Status display

Status	Description
(a) Standard	Program is a standard state.
(b) Selection	The program is currently selected. The selected programs are subject to the schedule run.

(B) Schedule operation (when the Execute End area is displayed)

Press the "Schedule Operation" button at the bottom of the "schedule area," then a group of buttons shown in the following figure will appear.

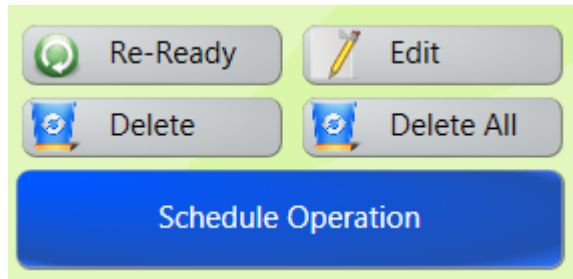


Table 8-12 Schedule Operation Buttons (Execute End Area))

Item name	Description
Re-Ready	Re-register the project which was interrupted machining halfway.
Edit	Edits the registered data.
Delete	Deletes a selected project area.
Delete All	Deletes all projects in the area.

8.7.1.3 Program Selection area

Displays the data created in the program screen and adds it to the schedule.

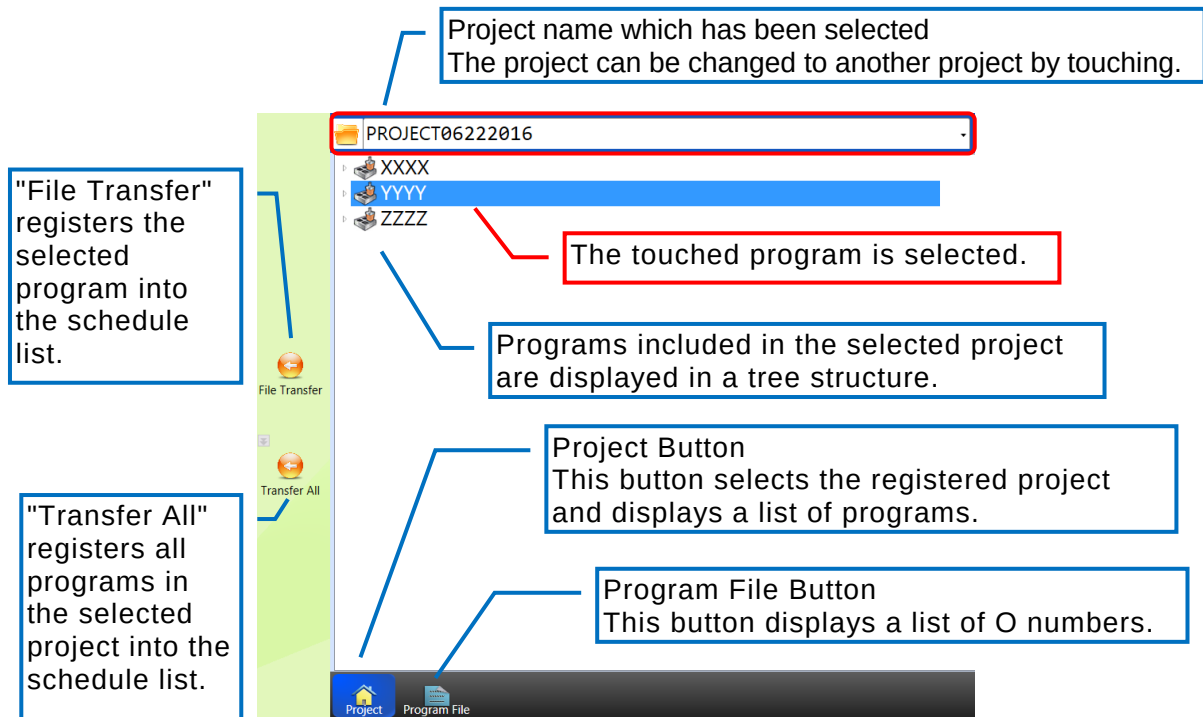


Figure 8-70 Program selection area

8.7.1.3.1 File Transfer, Transfer All

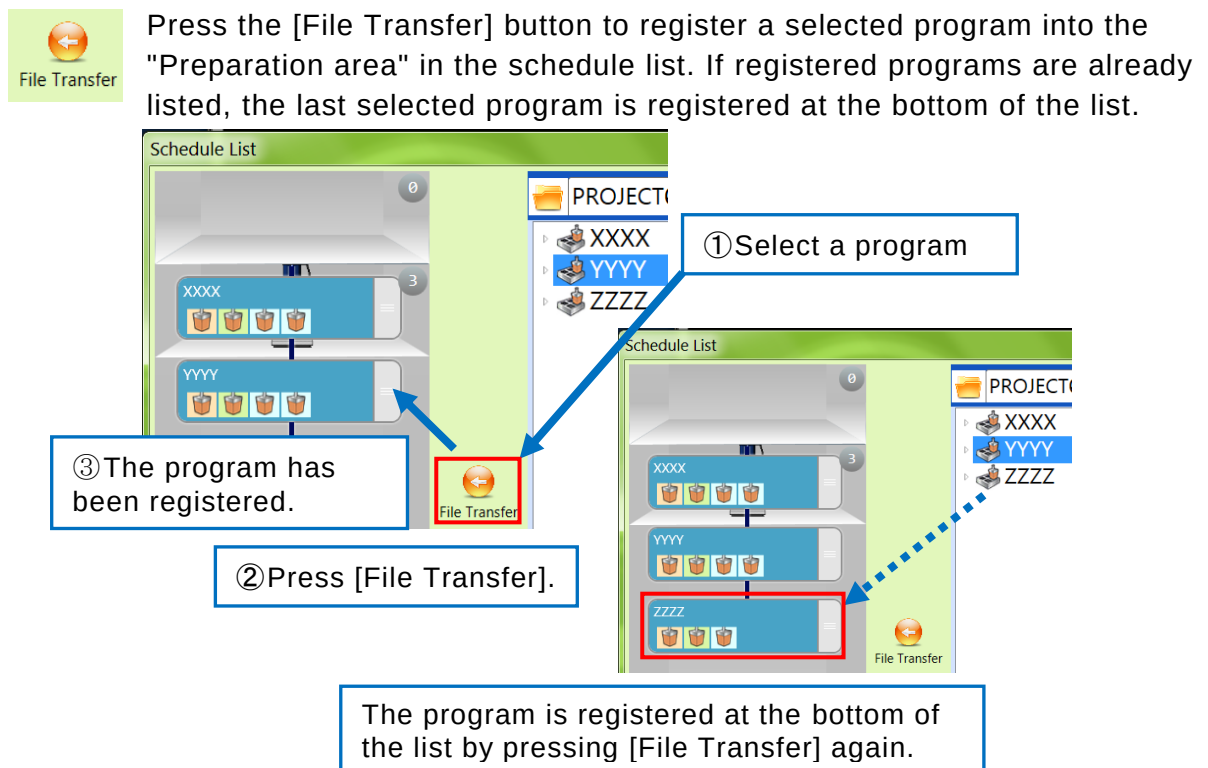
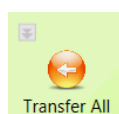


Figure 8-71 File Transfer

[Note]

Each program registered in the schedule list is a copy of the program in the original project. Deleting or editing a program in the schedule list does not influence the program in the original project.



Press the [Transfer All] button to register all programs in the displayed project into the schedule list.

8.7.1.4 Edit

The contents of a program in the schedule list can be changed.

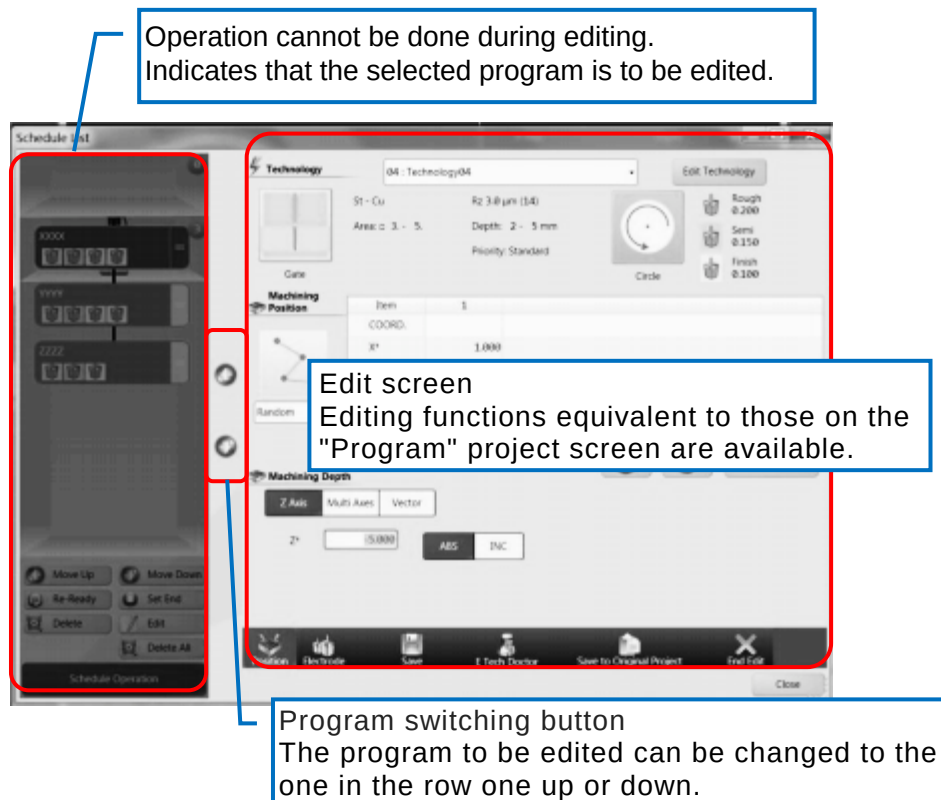


Figure 8-72 EDIT screen

The editing screen enables operations equivalent to those on the project screen. For details, see "6. Program".

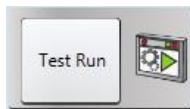
[Note]

Each program in the schedule list is a copy of the original program in the project. Keep in mind that editing can make the program contents different from the contents of the original program.

To reflect the edited contents into the original program in the project, press the [Save to Original Project] button.



8.7.1.5 Test mode (Continuos Run)



Programs can be started in test mode by starting schedule operation with [Test Run] ON.

Starting programs in test mode only positions each program in the "Preparation area" to the machining start position, and each program moves into the "Execute End Area".

Programs started in test mode are indicated with a "test end mark" shown in the "Execute End Area".

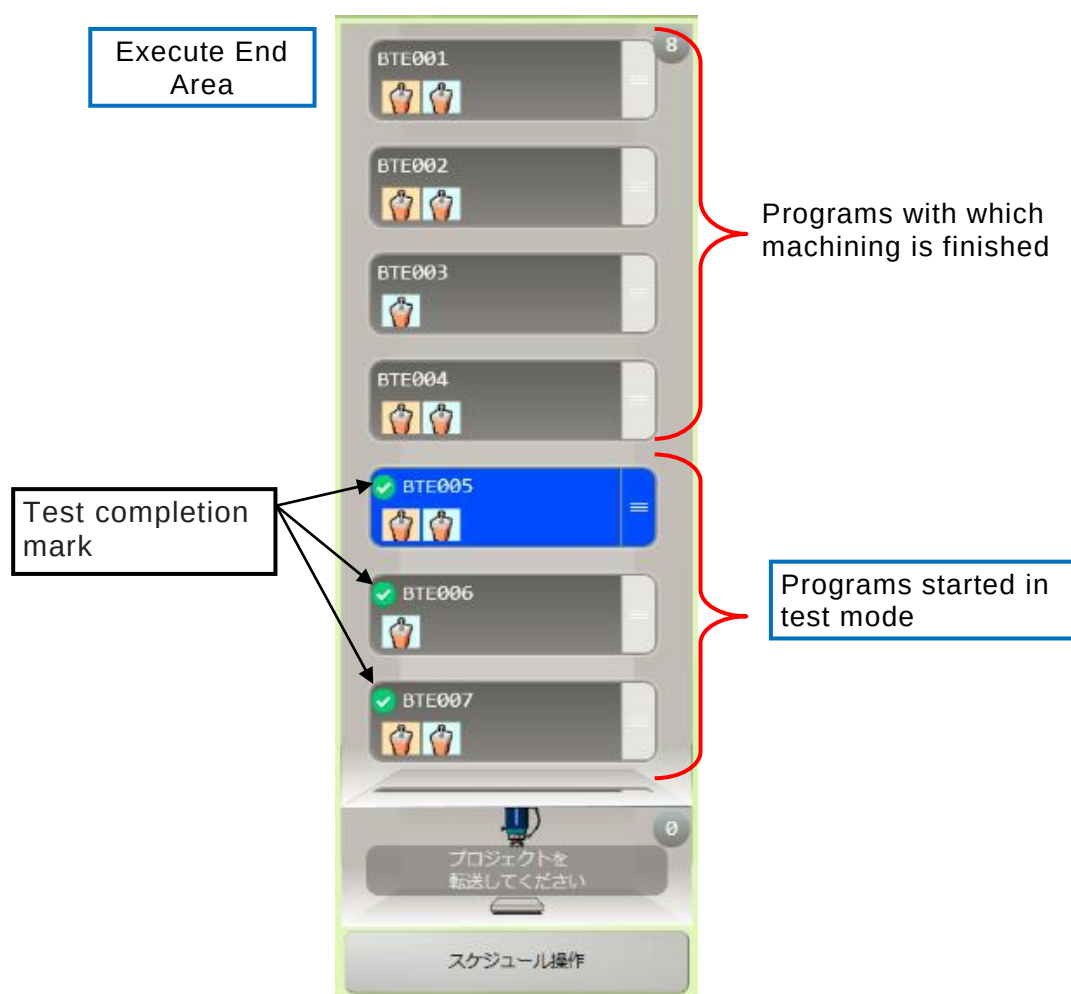


Figure 8-73 Test Run mode

In order to perform machining with test-finished programs, select the programs, and press [Re-Ready] button of "Schedule Operation" to move the programs from the "Execute End Area" into the "Preparation area". After that, turn off "Test Run" and perform schedule operation.

8.7.1.6 Example of Schedule operation

An example of a project used in the schedule operation is listed below.

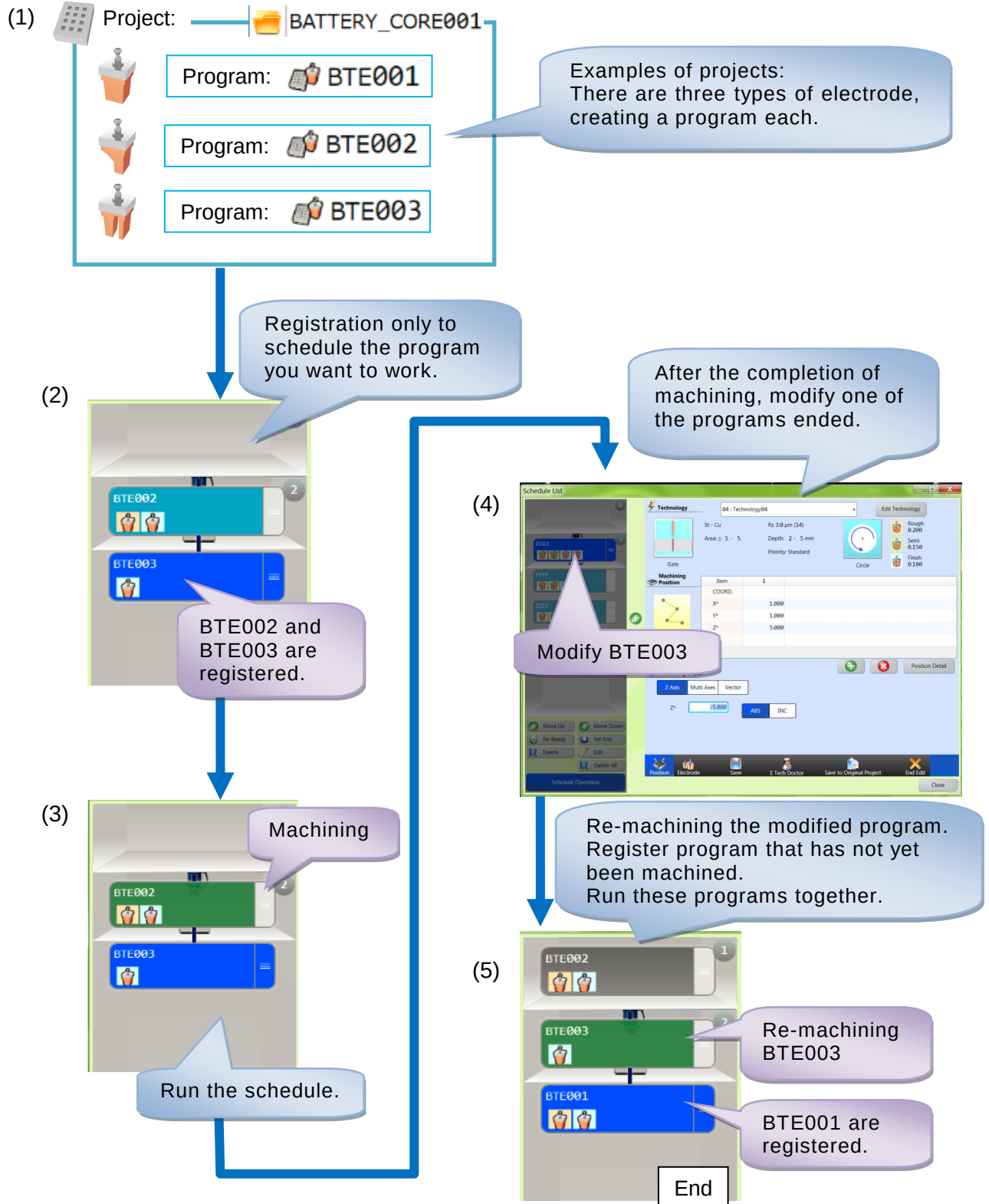


Figure 8-74 Scheduled operation example

8.7.2 Schedule List Window (ASAP Run)

The ASAP mode allows the machining to be started by a simple input, without requiring the programs to be prepared in advance. The mode does not automatically replace electrodes. Before the ASAP mode can be used, workpiece setup, electrode positioning, and machining must be done manually.

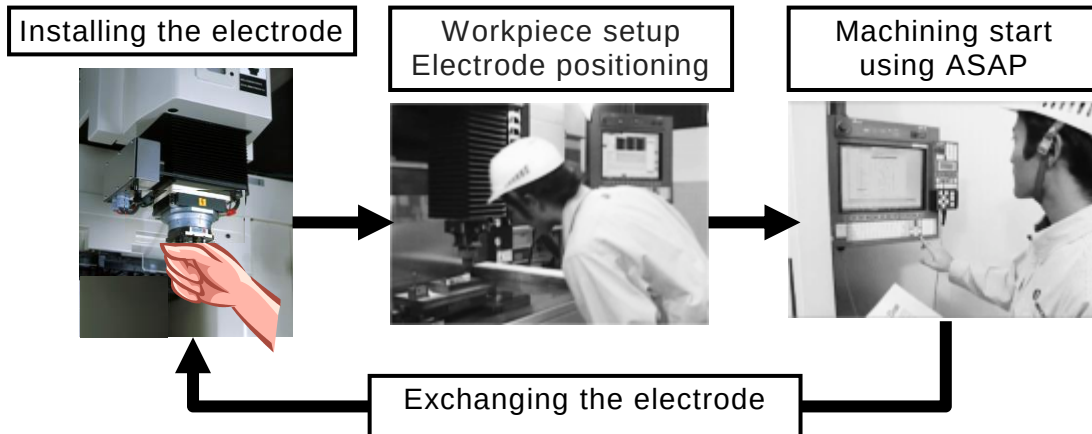


Figure 8-75 Work image of ASAP

8.7.2.1 Description of Screen (ASAP area, Data select area)



Figure 8-76 ASAP screen

- (1) ASAP area
This area shows the prepared data.
- (2) Data Display Area
This area displays the set data.
- (3) [Close] Button
Close the schedule list of ASAP.

8.7.2.2 ASAP area

The ASAP area shows the data readiness level.
Only a piece of data can be registered.

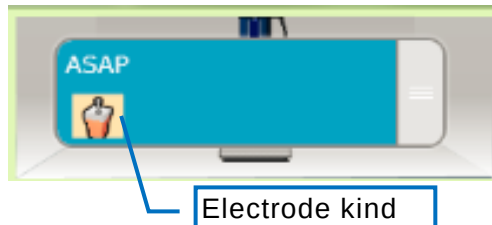


Figure 8-77 ASAP display

(A) Status display

The ASAP indicates the status by a different color as shown below.

(a) Unregistered



(b) Prepared wait



(c) Machining



(d) Interrupted state



Table 8-13 Status display

Status	Description
(a) Unregistered	ASAP has not registered any data.
(b) Prepared wait	ASAP is ready. It can be started.
(c) Machining	ASAP is running. Editing is not allowed.
(d) Interrupted state	Operation is reset when the ASAP is running. The ASAP cannot be restarted as it now stands. To have the ASAP ready, press the "ASAP Ready" button.

8.7.2.3 DATA area (ASAP)

Enter data in the data display area in accordance with the aim of machining.

The display contents shown when the "ASAP Ready" button is pressed is registered into the ASAP.

The contents in the data display area are retained even after the end of machining.

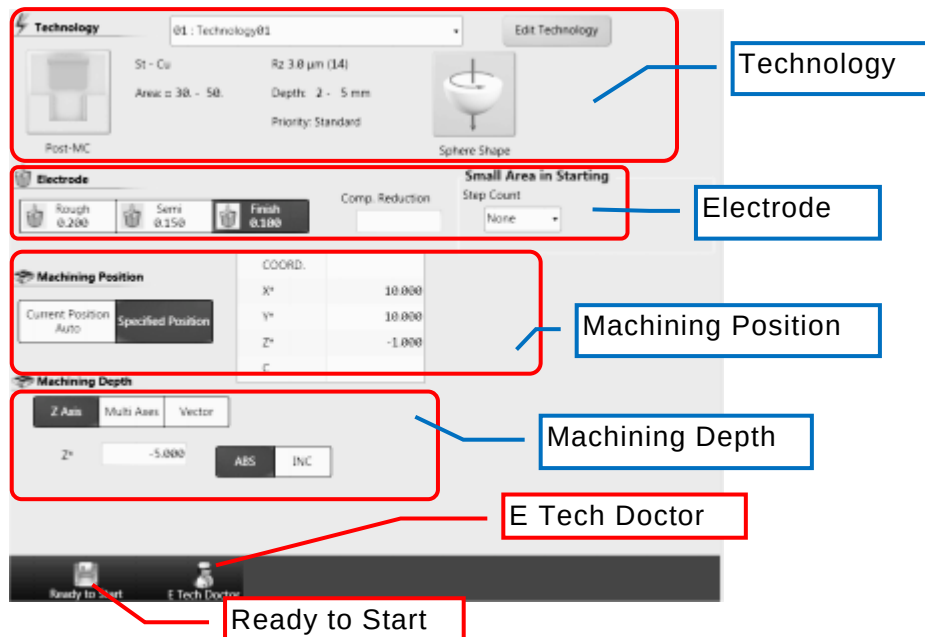


Figure 8-78 Data area (ASAP)

In the Data area screen, start entering from the top of the screen.

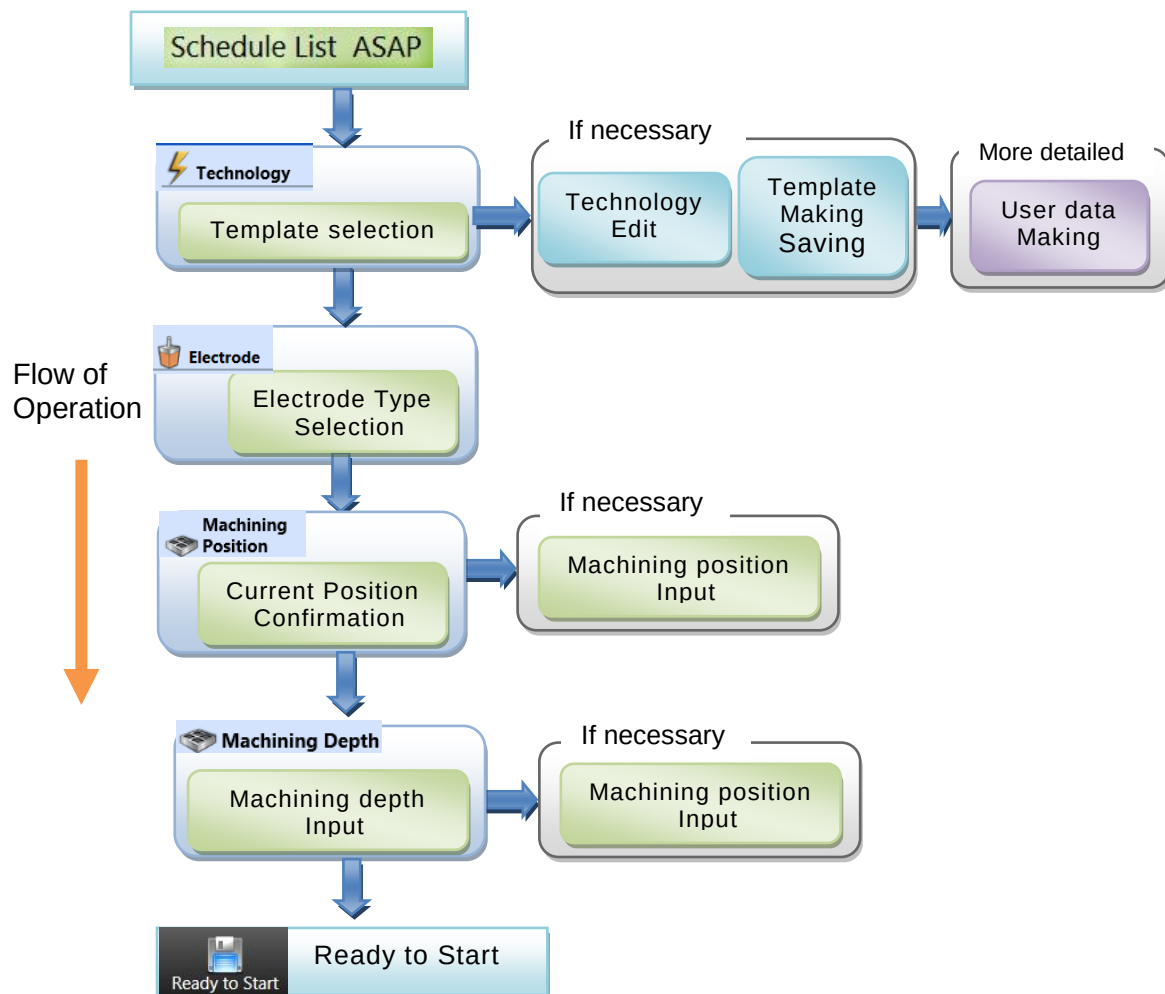
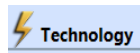


Figure 8-79 ASAP data

8.7.2.3.1 Technology



Details about current technology are displayed in the Technology area. The technology contains the following contents:

- Machining condition (Material, Spark area, Finish surface roughness)
- Machining priority (Five stages of Quality from Speed)
- Machining methods (Orbiting functions) etc.

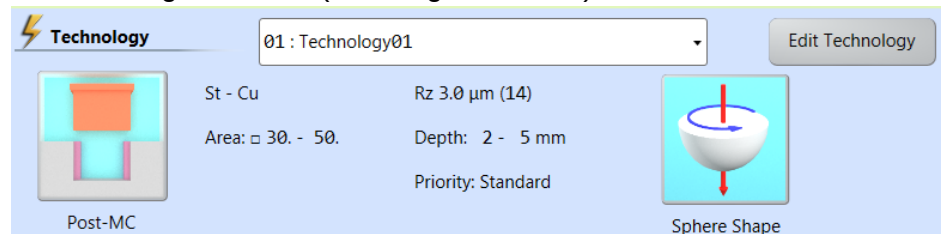


Figure 8-80 Technology (ASAP)

The content of the Technology area can be replaced completely using a template.

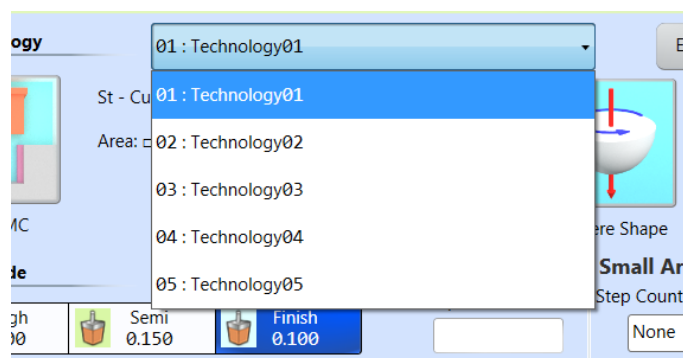
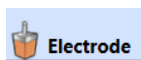


Figure 8-81 Template selection

To edit the detailed content of a template, press the [Edit Technology] button.

For more information, see "6.1.10 Edit Technology".

8.7.2.3.2 ELECTRODE



In the electrode area, select an electrode type registered in the Technology area.

Select the type of electrode to be used for machining.

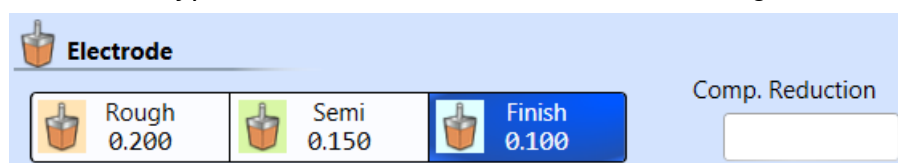
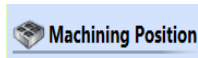


Figure 8-82 Electrode (ASAP)

Electrode reduction can be adjusted by entering a value in the "Comp. Reduction" input box.

Enter a value so that the "displayed reduction" + the "Comp. Reduction" value will not become zero or less.

8.7.2.3.3 Machining Position



The following two positioning methods are available for the machining position area.

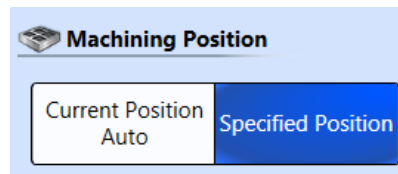


Figure 8-83 Positioning method

(1) Automatically acquiring the current position

This method acquires the spindle position (the work coordinate system number and the XYZ coordinates) on the machine, and defines the acquired position as the machining start position.

The machining starts from the position, so fully confirm the positional relationship between the workpiece (the work coordinate system number) and the electrode.

[Note]

The position effective when the "ASAP Ready" button is pressed is acquired.

(2) Entering a position

Use this method to specify a position with coordinate values. (Only one position)

COORD.	
X*	10.000
Y*	10.000
Z*	-1.000
C	

Figure 8-84 Input of machining position

8.7.2.3.4 Machining Depth

 **Machining Depth** Input the machining depth in this area.

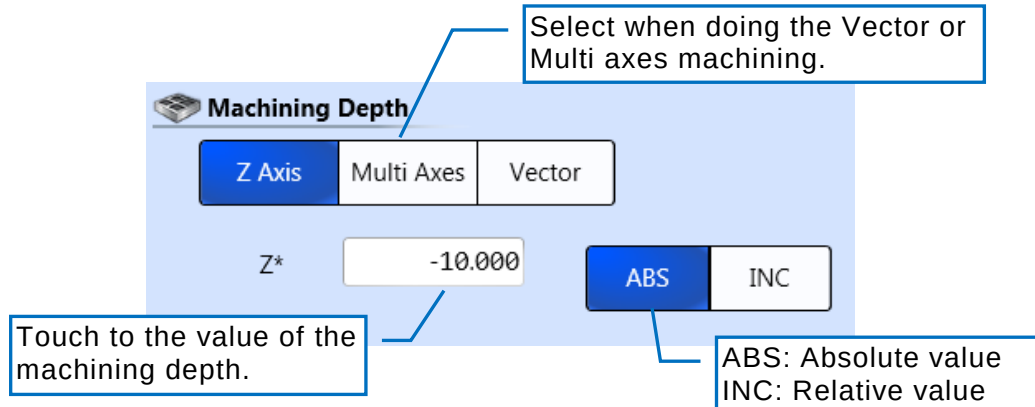


Figure 8-85 Machining Depth (Z axis)

When you select a multiple-axes machining or vector machining, input change accordingly.

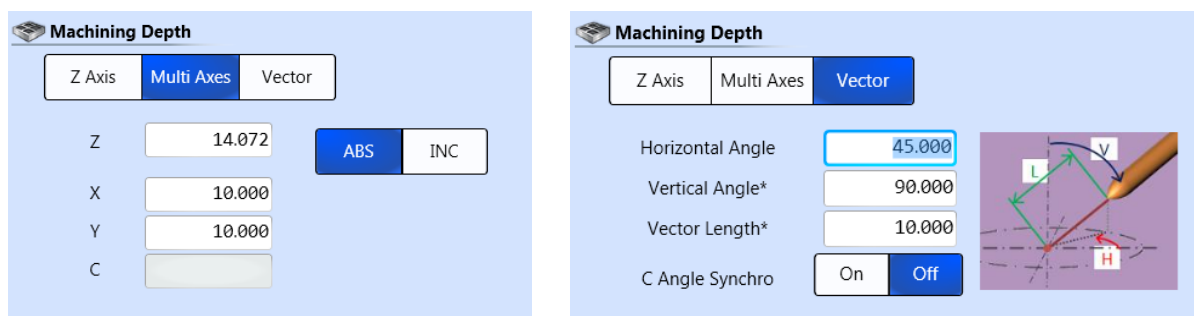


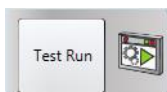
Figure 8-86 Machining Depth (Multi axes, Vector)

8.7.2.3.5 Ready to Start



Pressing the [Ready to Start] button registers the data display area contents at the time into the ASAP.
Operation can be started by selecting [Schedule Run].

8.7.2.3.6 Test mode



Programs can be started in test mode by starting the ASAP with [Test Run] ON.

To perform machining after starting the ASAP in test mode, press the [Ready to Start] button again to register the programs into the ASAP.

8.7.2.3.7 MINPULS Tech Doctor



Base on the machining result, settings can be made to improve the [MC Time], [Surface Roughness], and [Accuracy of form]. The displayed ASAP data is improved. Select the improvement from the three options in the Start screen, and press [Next].

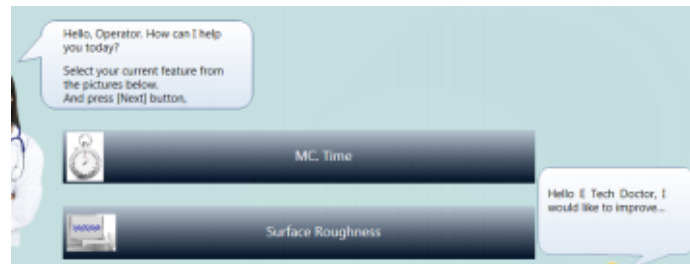


Figure 8-87 E Tech Doctor start screen

Enter or select the information by answering the questions in the E Tech Doctor.

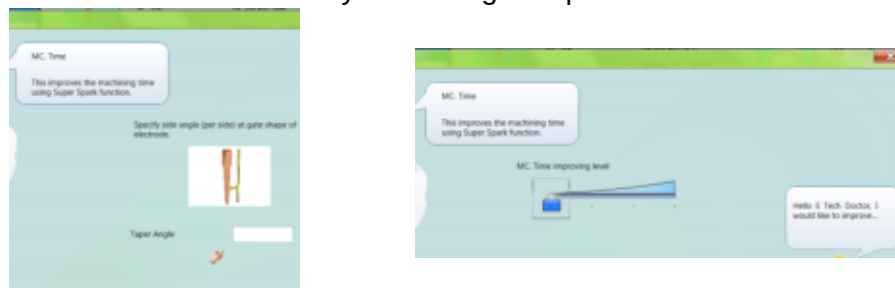


Figure 8-88 E Tech Doctor screen

Base on your answer to these questions, E Tech Doctor will make the improvement. When the [OK] button is pressed, it is applied to the program.

A doctor mark will be added near to the Technology icon if improvements are applied to the program.



Figure 8-89 After applying E Tech Doctor

8.8Record

The status of currently running machining or the last machining can be checked, and if machining is started correctly then the remaining machining time can be checked and it is possible to leave the machine until it is finished. In addition, estimation data for machining and result data are lined up on the screen, allowing for easy comparison.

Figure 8-90 Record Screen

8.8.1 Result Data

Results of current machining or the last machining are displayed and updated while working.
Information displayed is shown in Table 8-14 “Record Checking-Result Data Display Items”.

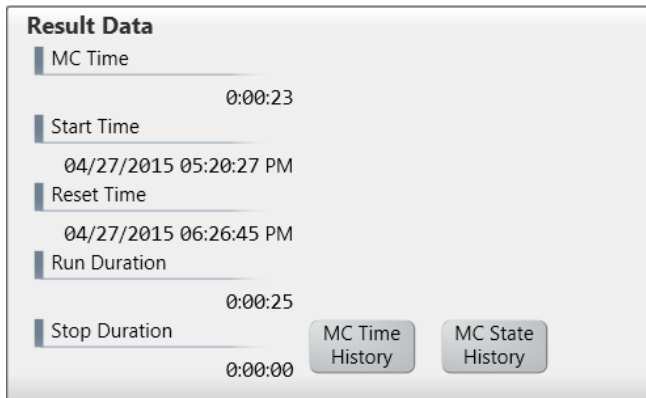


Figure 8-91 Record Checking- Result Data

Table 8-14 Record Checking- Result Data Display Items

Item	Description
MC Time	Machining time accumulated in machining units is displayed.
Start Date	Time when the program was started is displayed.
Reset Time	Displayed as [--:--:--] during startup. Will display the time from program command or manual reset.
Run Duration	Displays time elapsed since a program was started.
Stop Duration	Displays accumulated time that the Stop lamp was on from program startup.

8.8.2 MC Time History Window

The history of the last machining is displayed.

For info on what is displayed and window controls, refer to Chapter 9 “Records”.

MCTime History										
Occurred Time	O Number	N Number	State	Model No.	Process Number	E Number	MC Time	Total MC Time	ELECTRODE No.	Reduct Value
04/27/2015 05:20 PM	10			0	0	4191	0:00:05	0:00:23	0	
04/27/2015 05:20 PM	10			0	0	4191	0:00:05	0:00:18	0	
04/27/2015 05:20 PM	10			0	0	4191	0:00:05	0:00:13	0	
04/27/2015 05:20 PM	10			0	0	4191	0:00:05	0:00:08	0	
04/27/2015 05:20 PM	10			0	0	4191	0:00:03	0:00:03	0	

O No. Out

Export

Close

Figure 8-92 MC Time History Window

8.8.3 MC State History Window

State history for the last started machining data is displayed.

For info on what is displayed and window controls, refer to Chapter 9 “Records”

[illegible]

Figure 8-93 MC State History Window

9.Records

On the Record screen previous machining results can be checked.
It can be used for understanding the machining status.

Display the next record.

- (1) Execute History
- (2) MC Time History
- (3) MC History
- (4) Running Time

9.1Execute History

Machining results per startup can be browsed as a history.

It can be used for history data searching, totaling, or filtering of desired records and other uses.

For info on what is displayed, see Table 9-1 Execute History Display Items.

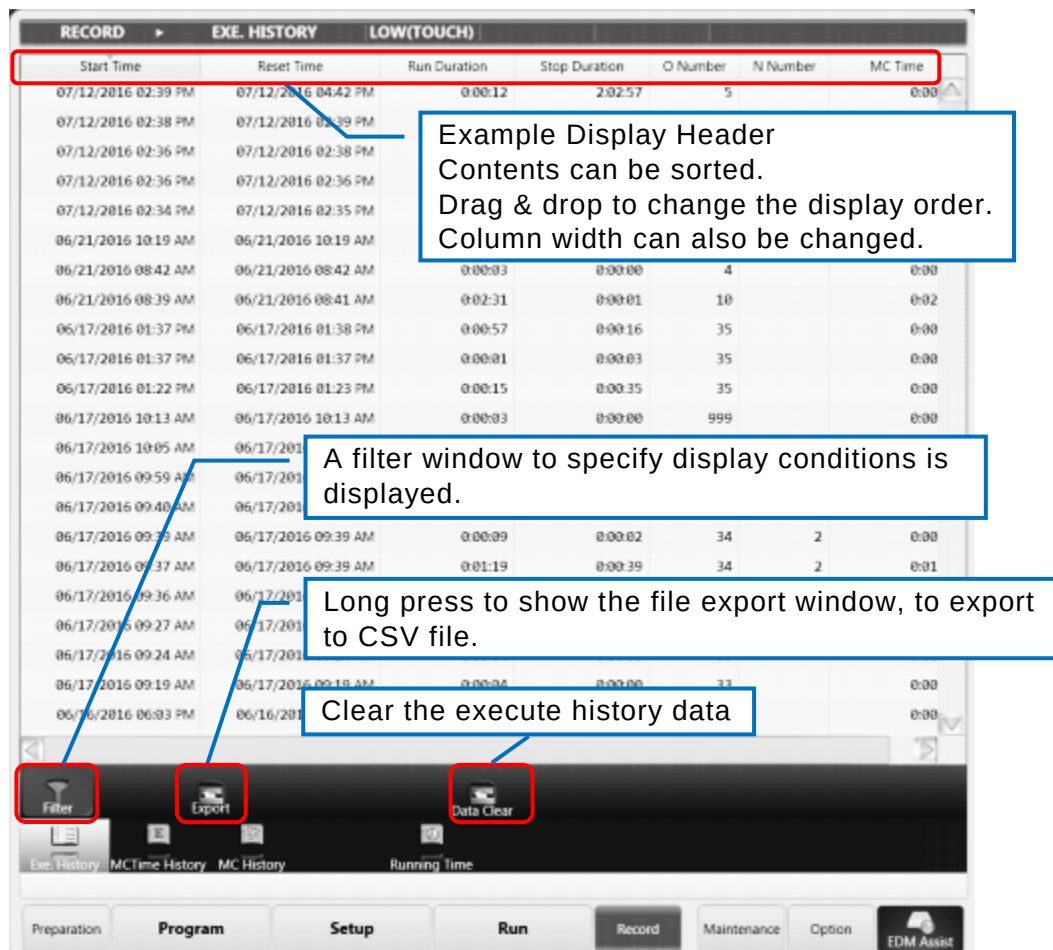


Figure 9-1 Execute History Screen

Table 9-1 Execute History Display Items

Item	Description
Start Date	Time/Date when Memory Mode was started is displayed.
Rest Time	Displays time when Memory Mode had a forced reset and closed due to M02 / M30 or a manual operation.
Run Duration	Displays total time that the Start lamp was ON from start to reset.
Stop Duration	Displays total time that the Stop lamp was ON from start to reset.
O Number	Displays the start O number.
N Number	Displays the start N number.
MC Time	Displays the total time that the Start lamp was ON from start to reset.

* The order shown in the description is the standard order on the system.

9.1.1 Filter

Execution history data conditions for display can be specified.

For info on selection items and displayed execution history data, see Table9-2 “Filter Specifications

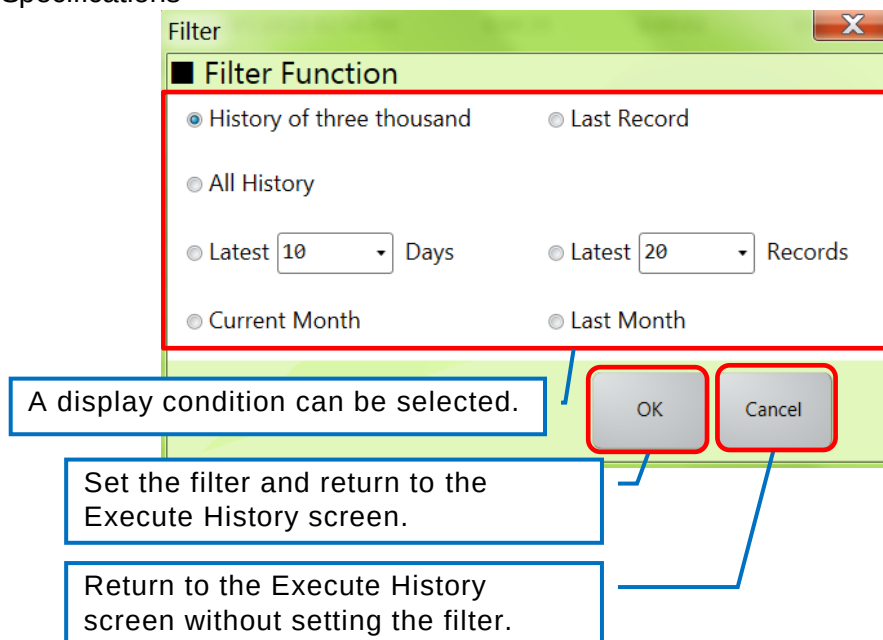


Figure 9-2 Filter dialog

Table 9-2 Filter Specifications

Selection Items	Description
History of three thousand	Display 3000 cases of execution history data.
All History	Display all execution history data.
Last Record	Display the latest execution history for one execution.
Latest *** Days	Display execution data for the specified number of days.
Latest *** Records	Display execution data for the specified number.
Current Month	Display all execution data for the current month.
Last Month	Display all execution data for the last month.

9.1.2 File Export

Specify the destination drive, folder, and file name to export the displayed execution history data to a CSV file.

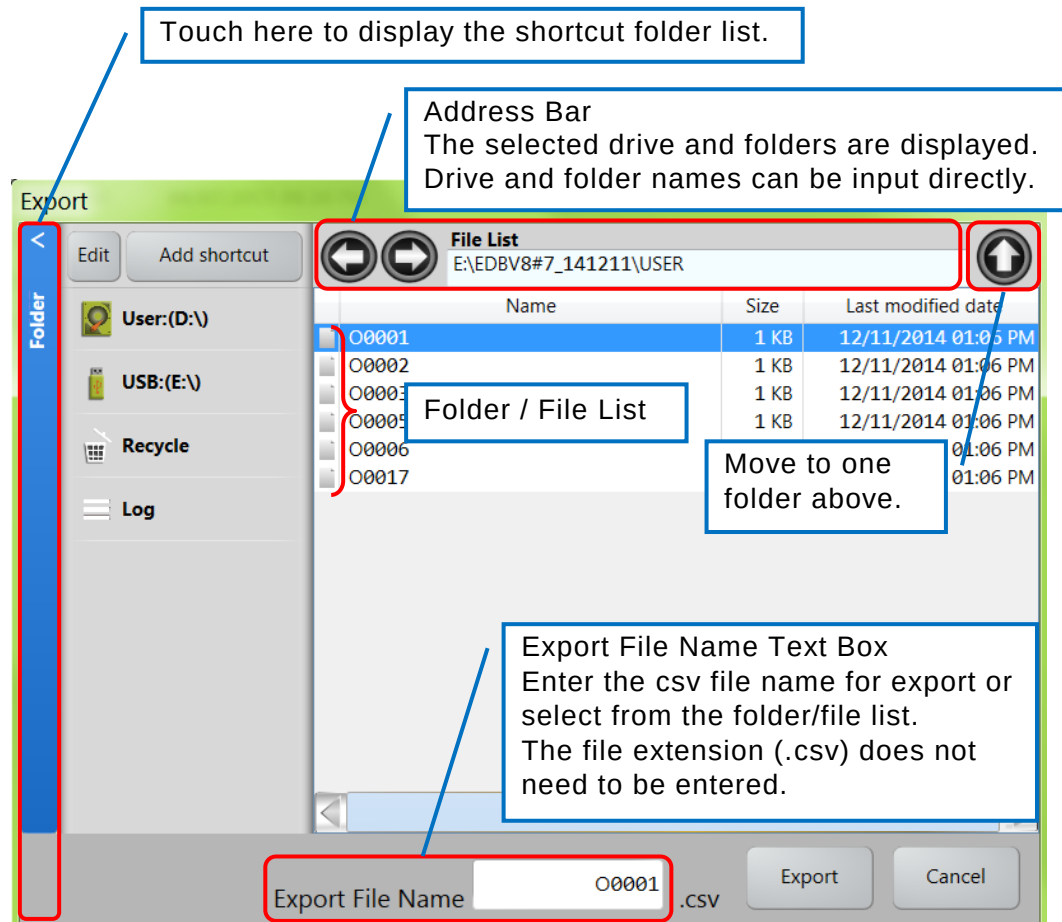


Figure 9-3 File Exporting Window

(1) File Export Operations

- Enter the drive or folder for export, or place the drive or folder for export in the address bar, selecting from the folder/file list.
- Enter the file name for export in the file name text box. The file extension does not need to be entered, since it is added by the system.
- Touch the [Save] button to save the displayed data.
- To cancel the save, touch the [Cancel] button or the [×] button and the Output window will close.

* The following single byte characters cannot be used for the folder or file name:

/ ¥ * ? < > | # { } % & ~

(2) Shortcut Folder List

Frequently used drives or folders for export can be registered as shortcuts. Registered shortcuts can also be used for other file output windows, not just the one for execution history. They can also be used after restarting the system.

(A) Show or hide the shortcut folder list.

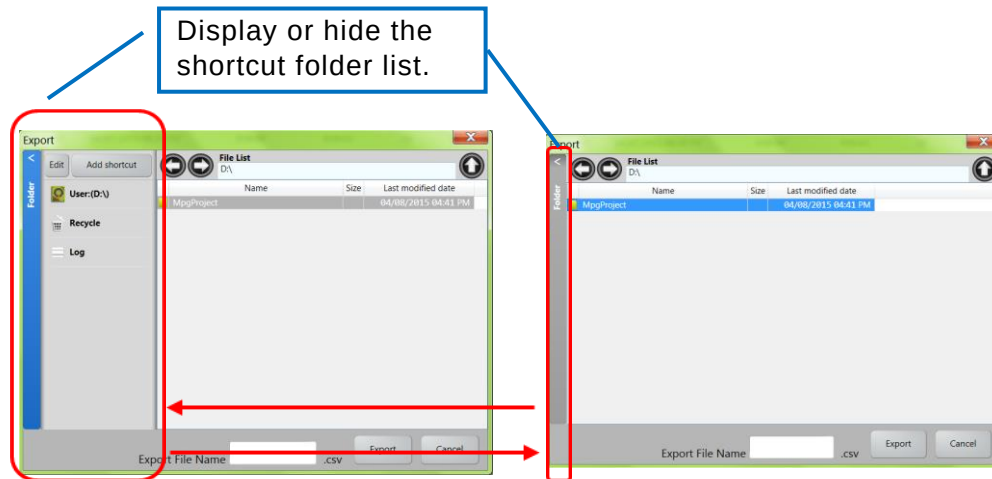


Figure 9-4 Shortcut Folder List

(B) Adding to the Shortcut Folder List

- (i) Enter to the address bar the drive and folder for adding, or select it from the folder/file list.
- (ii) Touch the [Add Shortcut] button to add to the shortcut folder list.

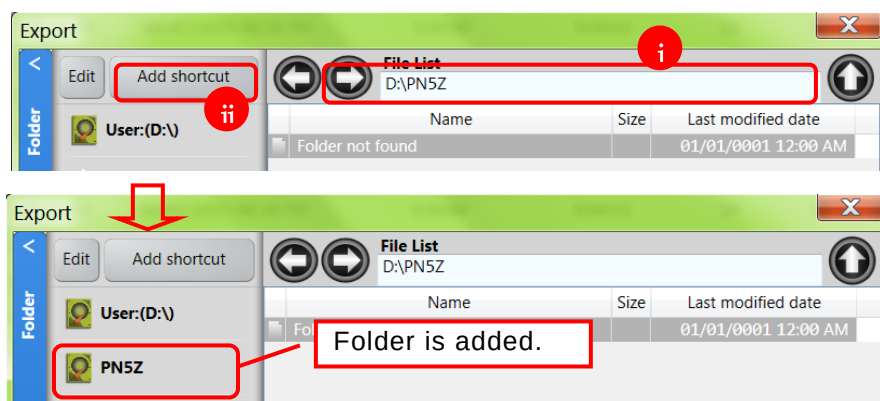


Figure 9-5 Adding to the Shortcut Folder List

(C) Deleting in Shortcut Folder List

- (i) Touch the [Edit] button to switch to editing mode.
- (ii) Touch the [×] next to the folder to be deleted from the shortcut folder list.
- (iii) When the [Delete] dialog appears touch the [OK] button to execute deletion.

* The Delete function is for the shortcut folder list.
The folder will not be deleted from the hard disk drive or media.

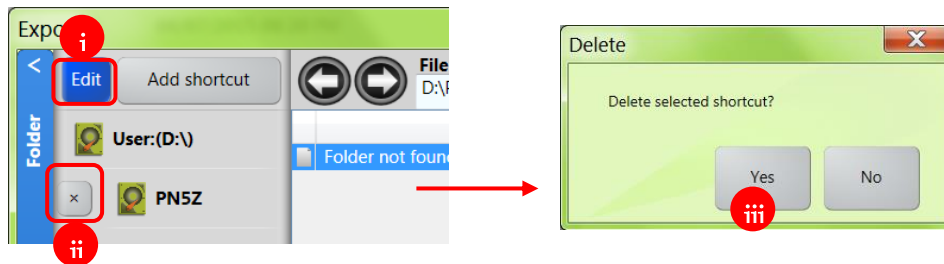


Figure 9-6 Deleting in Shortcut Folder List

9.1.3 Data Clear

Execution history can be cleared.

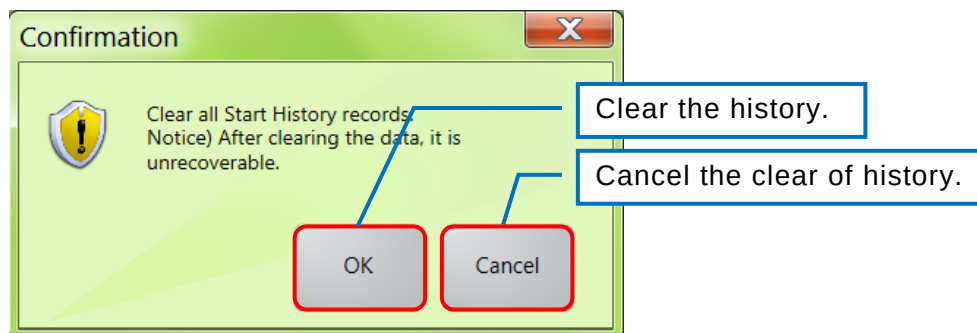


Figure 9-7 Data Clear

9.2 MC Time History

The machining model number for each machining, machining condition number and machining time, among others, can be referenced as history data. Additionally, search and tally of history data and filtering of records to be displayed can also be performed. For info on what is displayed, see Table 9-3 “MC History Display Items”.

The screenshot shows the 'MC TIME HISTORY' screen with a table of machining records. The table has columns: Occurred Time, O Number, N Number, State, Model No., Process Number, E Number, MC Time, Total MC Time, and ELE. The records show dates from 04/27/2015 and times from 01:03 AM to 01:27 AM. Below the table is a toolbar with buttons: Filter, O No. Out, Export, and DATA CLEAR. At the bottom are tabs: Preparation, Program, Setup, Run, Record, Maintenance, Option, and EDM Assist.

Example Display Header
Contents can be sorted.
Drag & drop to change the display order.
Column width can also be changed.

A filter window to specify display conditions is opened.

Long press to transfer the selected machine coordinates to the positioning screen.

Long press to show the file export window, to export to CSV files.

Long press to clear the MC Time history.

Figure 9-8 MC Time History Screen

Table 9-3 MC Time History Displayed Items

Items	Description
Occurred Time	Displays the date/time of event.
O Number	Displays the O number running when the event occurred.
N Number	Displays the N number running when the event occurred.
State	Displays the name of the event.
Model Number	Displays the Model number running when the event occurred. It is displayed as [0] for the direct E number command.
Process Number	The process No. of the model data number is displayed. It is displayed as [0] for the direct E number command.
E Number	Displays the E number running when the event occurred.
Machining time	The machining condition E number used by the program or the machining time for each of M26 (machining ON) and M27 (machining OFF) are displayed.
Total MC time	The machining time cumulated for each O number is displayed.
Electrode No.	The electrode number in use is displayed. It is displayed as [0] if no electrode number has been set.
Reduce Value	The amount of size reduction is displayed.
Work Coord. Number	Work Coord. Number is displayed.
Jump Amount	Jump Amount is displayed.
Jump cycle	Jump cycle is displayed.
Jump Speed	Jump Speed is displayed.
τOFF ADJ SETTING	τOFF ADJ is displayed.
Machine method	Machine method is displayed.

* The order shown in the description is the standard order on the system.

9.2.1 Filter

MC Time history data conditions for display can be specified.

For info on selection items and displayed MC Time history data, see Table 9-4 “Filter Specifications”.

For operation methods, also refer to 9.2.3 “File Export” in E Number History.

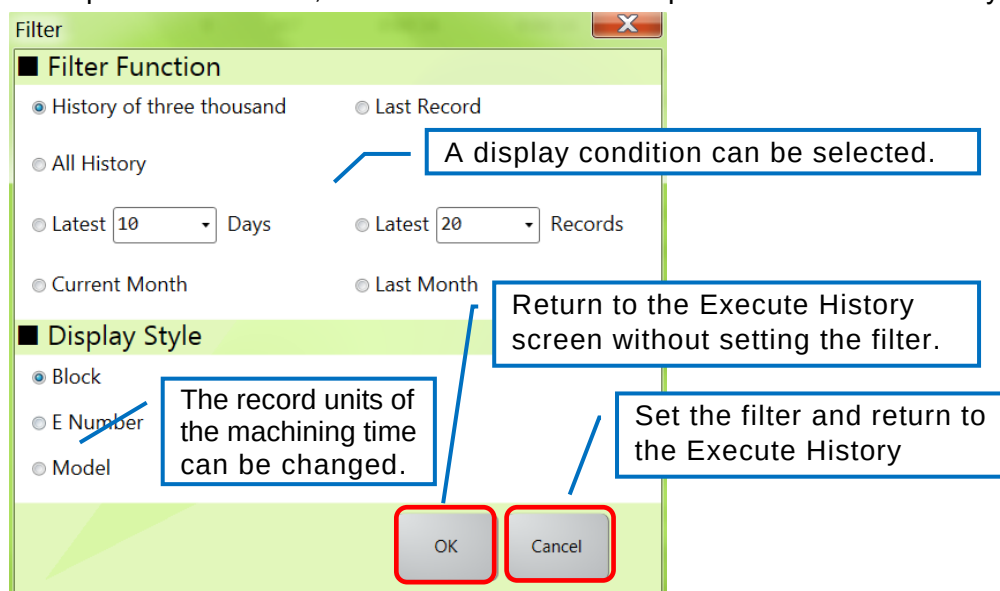


Figure 9-9 Filter dialog

Table 9-4 Filter Specifications

Selection Items	Description
History of three thousand	Display 3000 cases of execution history data.
All History	Display all MC time history data.
Last Record	Display the latest MC time history for one execution.
Latest *** Days	Display MC time for the specified number of days.
Latest *** Records	Display MC time for the specified number.
Current Month	Display all MC time for the current month.
Last Month	Display all MC time for the last month.

Table 9-5 Record units

Selection Items	Description
Block	The machining time of each machining block is recorded.
MC Cond. (E No.)	The machining time is recorded every E number.
Model (G100-G109)	The machining time by the model plan is recorded.

9.2.2 O Number Output

It is now possible to output all displayed data or selected data.

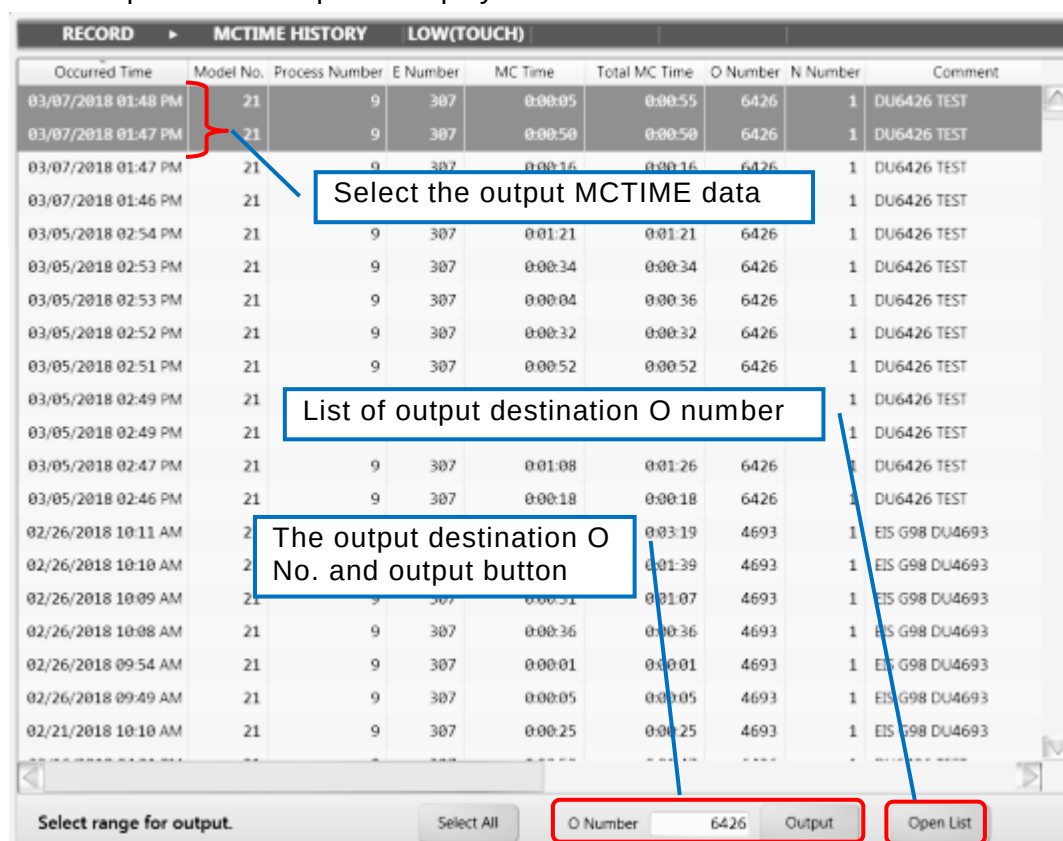


Figure 9-10 O number output window

(1) All output operation

To output all displayed data, press the [Select All] button to specify the output target O numbers, and then press the [Output] button.

(2) Selected row output operation

Select data to output, specify the output target O numbers and then press the [Output] button.

When one of the displayed lists is pressed, the data to be output can be selected or deselected in single start units.

(3)Output operation by list display

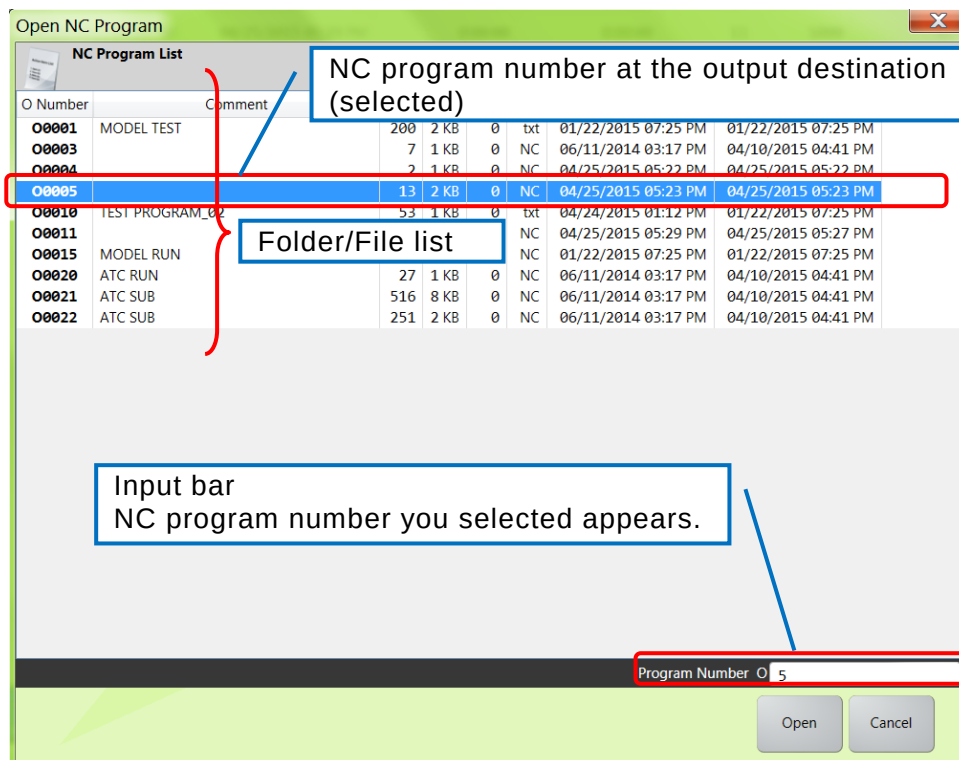


Figure 9-11 File output window

Select the number of the existing NC program you want to output or enter a new NC program number in the input bar.

The guide [10615: FILE WRITING SUCCEEDED] appears and the startup history data is output to the NC program whose number you have specified at the output destination.

9.2.3 File Export

Specify the destination drive, folder, and file name to export the displayed MC Time History data to a CSV file.

Since the operation method is the same as file exporting for execute history, refer to 9.1.2 “File Export”.

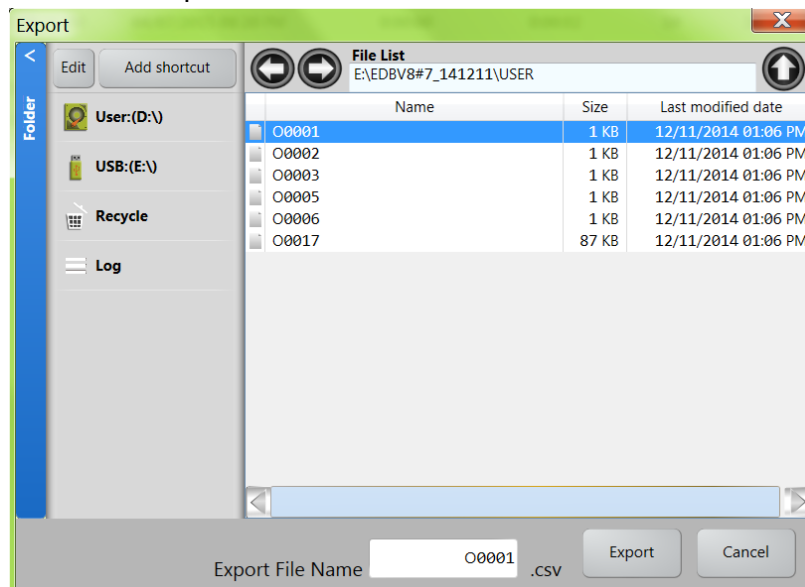


Figure 9-12 File Export Window

9.2.4 Data Clear

MC Time History can be cleared.

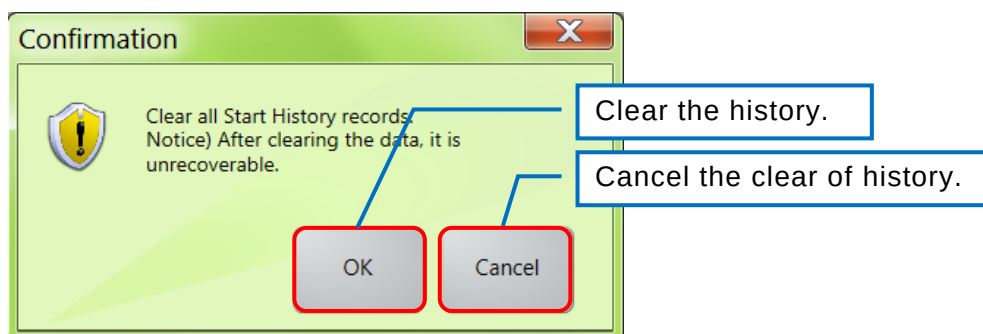


Figure 9-13 Data Clear

9.3 MC History

This screen shows events that occurred during machining, such as wire breaks, machining skips, warnings, and alarms.

For info on what is displayed, see Table 9-6 “MC History Display Items”.

The screenshot shows the MC History screen with a table of events. The table has columns: Occurred Time, State, Content, O Number, Comment, Line Number, E Number, X Machine Coord., and Y Machine Coord. The table contains several rows of data, including events like 'Start', 'Reset Key', and 'Alarm'. Callouts point to various features: 'Example Display Header Contents can be sorted. Drag & drop to change the display order. Column width can also be changed.' points to the header row; 'A filter window to specify display conditions is opened.' points to the 'Filter' button; 'Long press to show the file export window, to export to csv files.' points to the 'Export' button; and 'Long press to clear the MC history.' points to the 'Data Clear' button. The bottom of the screen shows a navigation bar with buttons: Preparation, Program, Setup, Run, Record, Maintenance, Option, and EDM Assist.

Occurred Time	State	Content	O Number	Comment	Line Number	E Number	X Machine Coord.	Y Machine Coord.
03/19/2018 04:01 PM	M30/M02		2	ALL PARAMETERS	4280	2894	-100.000	
03/19/2018 04:01 PM	Start							
03/19/2018 11:38 AM	M30/M02							
03/19/2018 11:38 AM	Start							
03/19/2018 11:38 AM	Reset Key		0					
03/19/2018 11:35 AM	M30/M02							
03/19/2018 11:34 AM	Start							
03/19/2018 11:18 AM	Reset Key		6615	DU6615	0	333	-100.000	
03/19/2018 11:18 AM	Alarm	6445	6615	DU6615	0	333	-100.000	
03/19/2018 11:18 AM	Start		6615					
03/19/2018 11:18 AM	Reset Key		6615					
03/19/2018 11:18 AM	Alarm	6444	6615					
03/19/2018 11:18 AM	Start		6615	DU6615	0	333	-100.000	
03/19/2018 11:16 AM	M30/M02		6615	DU6615	0	333	-100.000	
03/19/2018 11:16 AM	Start		6615	DU6615	0	333	-100.000	
03/19/2018 11:16 AM	M30/M02		6615					
03/19/2018 11:16 AM	Start		6615					
03/19/2018 11:16 AM	M30/M02		6615	DU6615	0	333	-100.000	
03/19/2018 11:16 AM	Start		6615	DU6615	0	333	-100.000	
03/19/2018 11:16 AM	M30/M02		6615	DU6615	0	333	-100.000	
03/19/2018 11:16 AM	Start		6615	DU6615	0	333	-100.000	
03/19/2018 11:15 AM	M30/M02		MDI					

Figure 9-14 MC History Screen

Table 9-6 MC History Displayed Items

Items	Description
Occurred Time	Displays the date/time of event.
State	Displays the name of the event. For details, see Table 10-6 MC History state list.
Content	Displays the alarm and warning message number for the event. (0 ~ 99999)
O Number	Displays the O number running when the event occurred. [MDI] is displayed in the case of O14999.
Line Number	Displays the program line number running when the event occurred. (0 ~ 999999)
Indirect E/State	Displays Indirect E number if the E number is an indirect E number command, but blank for direct E number commands.
E Number	Displays Indirect E number E1 ~ E100 if the E number is an indirect E number command, direct E number commands.
X machine Coord.	Displays the X machine coordinate when the event occurred.
Y machine Coord.	Displays the Y machine coordinate when the event occurred.
Z machine Coord.	Displays the Z machine coordinate when the event occurred.
C machine Coord.	Displays the C machine coordinate when the event occurred.
X axis work piece	Displays the X work coordinate when the event occurred.
Y axis work piece	Displays the Y work coordinate when the event occurred.
Z axis work piece	Displays the Z work coordinate when the event occurred.
C axis work piece	Displays the C work coordinate when the event occurred.

* The order shown in the description is the standard order on the system.

Table 9-7 MC History State List

State display content	Content
Start	Memory Operation started by [START] key
Reset	Operation reset by the [RESET] key
Warning	Warning during processing
Alarm	Alarm during processing
G92	Execution of G92

9.3.1 Filter

MC history data conditions for display can be specified.

For info on selection items and displayed MC history data, see Table 10-7 “Filter Specifications”.

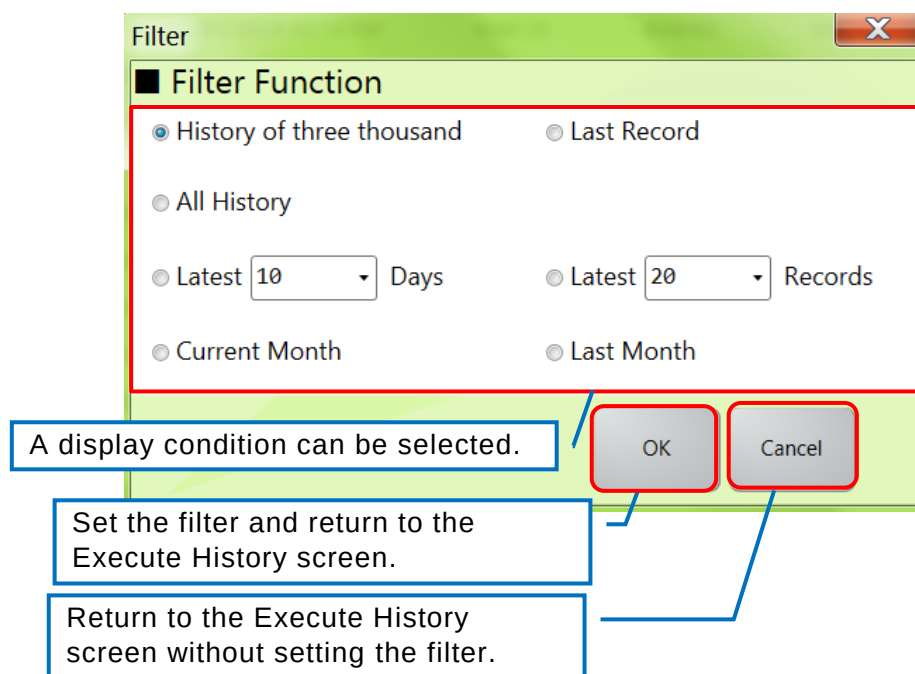


Figure 9-15 Filter dialog

Table 9-8 Filter Specifications

Selection Items	Description
History of three thousand	Display 3000 cases of execution history data.
All History	Display all execution history data.
Last Record	Display the latest execution history for one execution.
Latest *** Days	Display execution data for the specified number of days.
Latest *** Records	Display execution data for the specified number.
Current Month	Display all execution data for the current month.
Last Month	Display all execution data for the last month.

9.3.2 File Export

Specify the destination drive, folder, and file name to export the displayed MC History data to a csv file.

Since the operation method is the same as file exporting for execute history, please refer to 9.1.2 “File Export”.

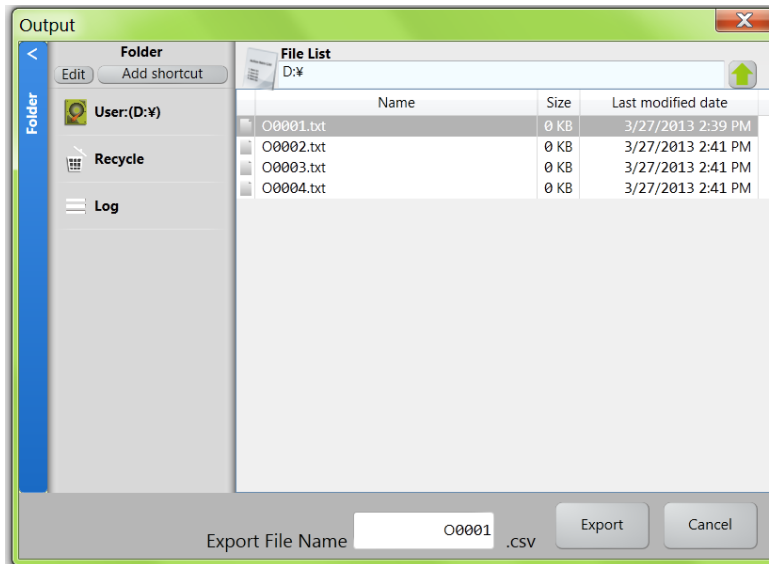


Figure 9-16 File Export Window

9.3.3 Data Clear

MC History can be cleared.

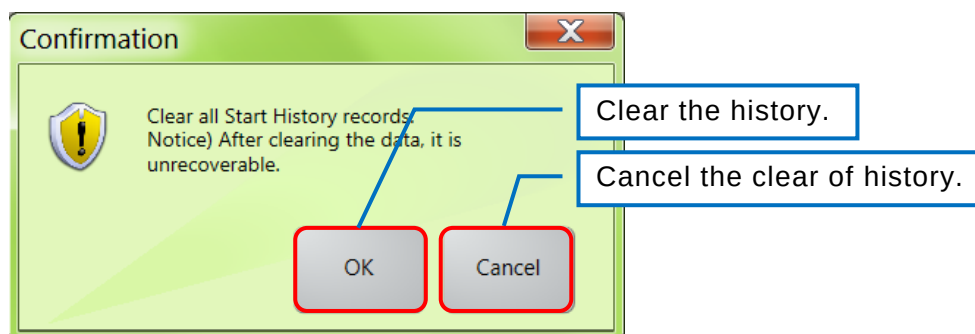


Figure 9-17 Data Clear

9.4 Running Time

Machine running time is shown with graphs and numbers.

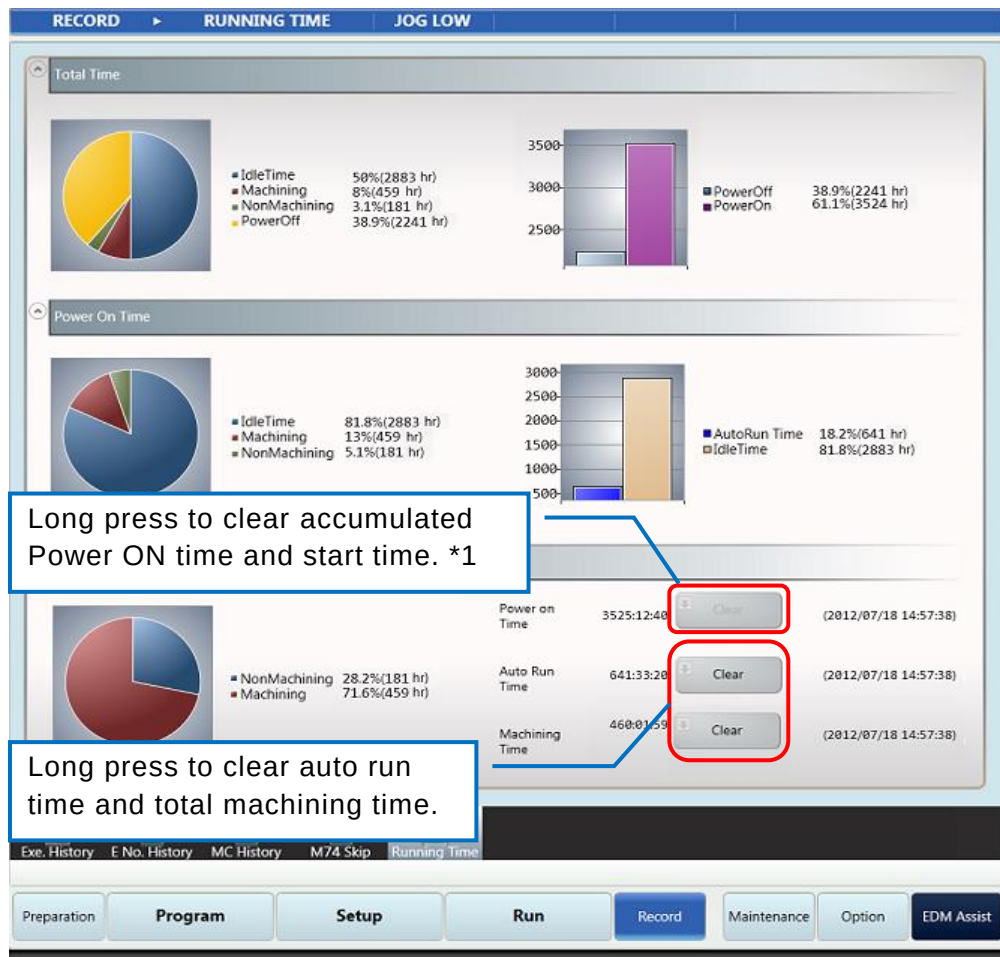


Figure 9-18 Running Time Screen

- (1) Idle Time
Power On time except auto run
- (2) Machining
Total machining time for accumulated auto run time
- (3) Non Machining
Accumulated non-machining time in auto run
- (4) Power OFF Time
Time that power has been off since being turned on the first time

*1: To clear the accumulated power ON time, on the [Maintenance] - [Parameter] Screen it is necessary to change Parameter: 180 bit 2 to 1.

9.4.1 Total Time

The time in which the machine was running from the date/time of first powering ON (date/time right of the Clear button) until the current time.

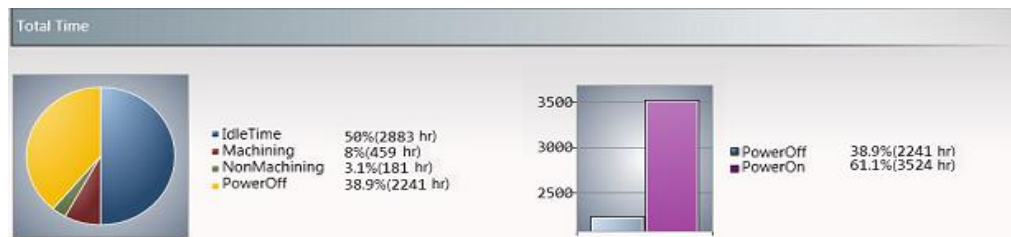


Figure 9-19 Total Times

9.4.2 Power ON

Time that power was ON or OFF from the time of first turning power ON.

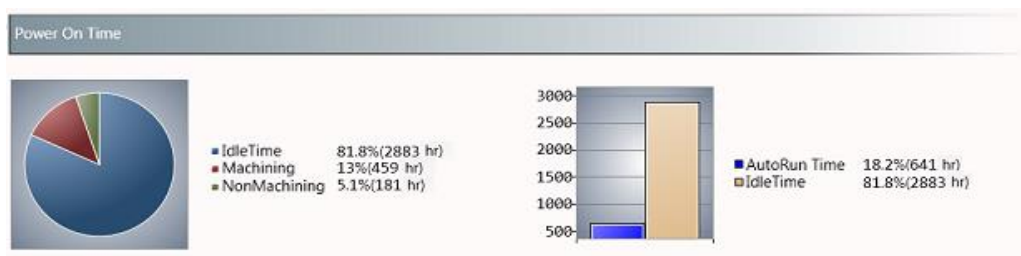


Figure 9-20 Power ON

9.4.3 Auto Run Time

Auto run time during power ON is displayed.



Figure 9-21 Auto Run Times

10. Maintenance

On the Maintenance screen trouble can be checked and resolved promptly. Therefore, browsing / setting the necessary diagnostic information below can be done here.

- (1) Parameter
- (2) Alarm Warning
- (3) EIO
- (4) Memory
- (5) Version Info
- (6) Machine Control
- (7) IMC (Optional)

10.1 Parameters

Perform the display and setting of each parameter.

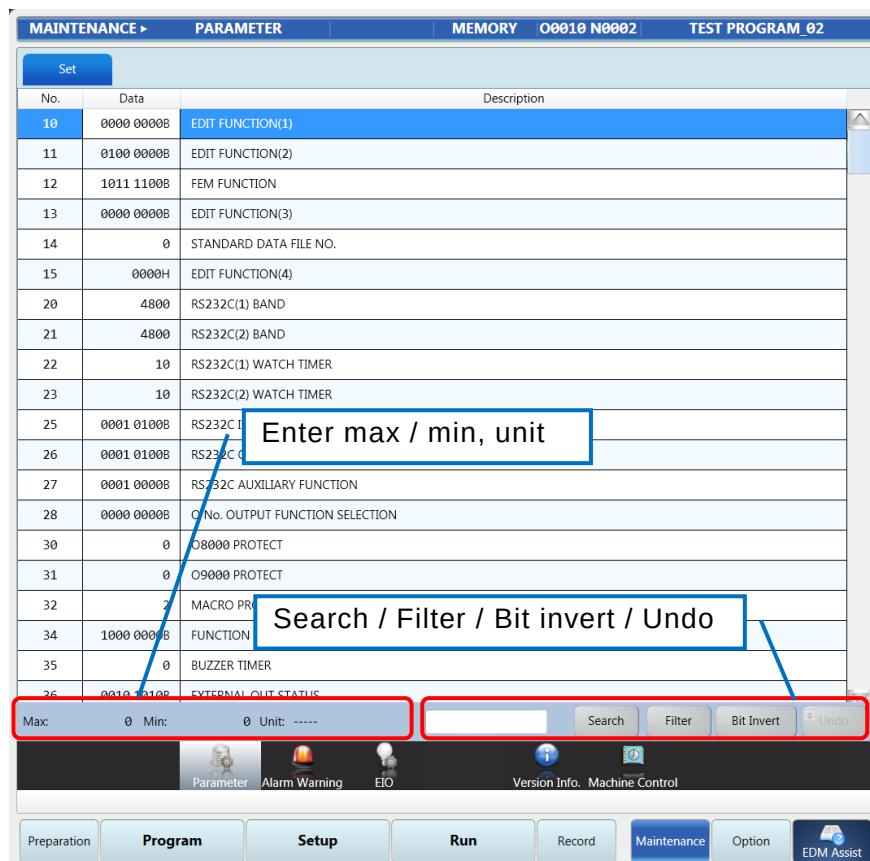


Figure 10-1 Parameter Screen

1) Search / Filter / Bit Invert

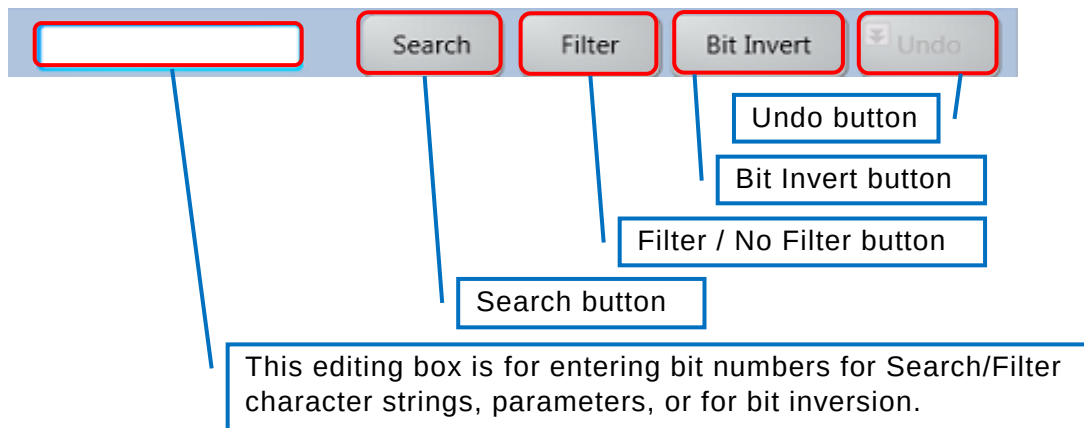


Figure 10-2 Search / Filter Setting (In the case of standard)

(A) Search method (e.g., Parameter No. 180: Time Counter Function)

(i) Enter search character string in the [Edit Box].



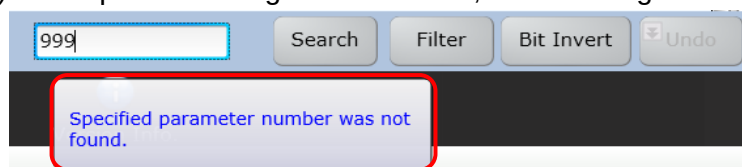
(ii) Click [Specify Search Direction] to search by specifying search direction. Search by parameter number is performed in the example.



(iii) If the specified string was found, the screen moves to where it was found and it is highlighted.

175	8000	MACRO DRAWING SCREEN DRAWING O N°(1)
176	8000	MACRO DRAWING SCREEN DRAWING O N°(2)
177	0	USER MESSAGE O NUMBER
180	0001 10118	TIME COUNTER FUNCTION
185	540	TIME ZONE INFORMATION

(iv) If the specified string was not found, the following message appears.



(v) Lines for searching are numbers or names.

(B) Filtering Method (e.g., Filter string: Filtered by buzzer)

(i) Lines for searching are numbers or names.

Filtering is performed by parameter number and character string. In the example, filtering is performed for [buzzer] –related parameters.

(ii) Enter a filter string in the [Edit Box].



(iii) Click the [Filter] button to perform filtering.



(iv) If the filtered character string is found, only the relevant lines will be displayed.

MAINTENANCE ▶		
PARAMETER		MEMORY 00010 N0002 TEST PROGRAM 02
Set		
No.	Data	Description
35	0	BUZZER TIMER
37	0000H	BUZZER FUNCTION SELECTION

(v) The [Filter] button changes to [Unfilter]. Click [Unfilter] to remove the filter.



(vi) If the specified string was not found, the following message appears.



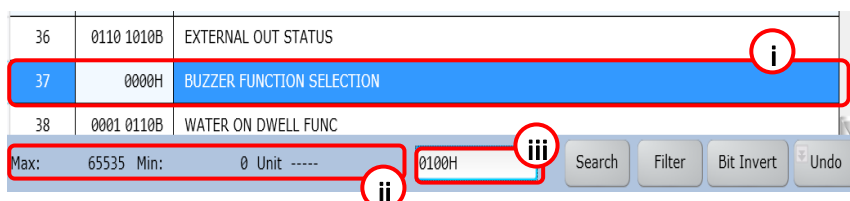
(C) How to Change Parameters 1 : decimal input

(e.g., Entering Parameter Number: 35 Buzzer Timer)

(i) To make a selection, scroll the parameters list, search, or click parameter lines to be changed with the filter. Selected lines are highlighted.

(ii) Parameter maximums/minimums and units are displayed.

(iii) Enter the new value in the edit box.



(iv) Press the [Enter] key and make sure that the new contents are displayed.

34	1000 0001B	FUNC BY AUTO RUN COMPLETED
35	0	BUZZER TIMER
36	0110 1010B	EXTERNAL OUT STATUS
37	0000H	BUZZER FUNCTION SELECTION

(D) How to Change Parameters 2 : 16 Hexadecimal input

(Parameter Number: 37 - Enter example of Buzzer Timer)

(i) To make a selection, scroll the parameters list, search, or click parameter lines to be changed with the filter. Selected lines are highlighted.

(ii) Parameter maximums/minimums and units are displayed.

(iii) Enter the new value in the edit box.

In the example, the buzzer time for when the key is pressed is set to 20msec.

* In that case, the allowed entry values are 0100H, 0100, 100H, or 100.

(The first digit, 0, can be omitted.)

36	0110 1010B	EXTERNAL OUT STATUS
37	0000H	BUZZER FUNCTION SELECTION
38	0001 0110B	WATER ON DWELL FUNC

Max: 65535 Min: 0 Unit: ---- 0100H

Search Filter Bit Invert Undo

(iv) Press the [Enter] key and make sure that the new contents are displayed.

36	0110 1010B	EXTERNAL OUT STATUS
37	0100H	BUZZER FUNCTION SELECTION
38	0001 0110B	WATER ON DWELL FUNC

Max: 65535 Min: 0 Unit: ----

Search Filter Bit Invert Undo

(E) How to Change Parameters 3 : Bit value input

(Parameter Number: 66 Enter example of initialization settings of the machine coordinate with power ON)

(i) To make a selection, scroll the parameters list, search, or click parameter lines to be changed with the filter. Selected lines are highlighted.

(ii) Enter the new value in the edit box. In the example, it is set for machine coordinate initialization at the time of 0 bit power ON.

* In that case, the allowed entry values are 00000001B, 00000001, 1B, or 1.

(The first digit, 0, can be omitted.)

65	0000H	M MODAL AT RESET
66	0000 0000B	INTLZE AT POWER ON
67	0002H	MODAL VALUE AT POWER ON

Max: 255 Min: 0 Unit: ---- 00000001B

Search Filter Bit Invert Undo

(iii) Press the [Enter] key and make sure that the new contents are displayed.

65	0000H	M MODAL AT RESET
66	0000 0001B	INTLZE AT POWER ON
67	0002H	MODAL VALUE AT POWER ON

Max: 255 Min: 0 Unit: ----

Search Filter Bit Invert Undo

(F) How to Change Parameters 4 : Bit Invert input

(Parameter Number: 66 Enter example of initialization settings of the machine coordinate with power ON)

- (i) To make a selection, scroll the parameters list, search, or click parameter lines to be changed with the filter. Selected lines are highlighted.
- (ii) Enter the bit number to be inverted. Bit numbers entered are from 0 to 7.
- (iii) Click the [Bit Invert] button to invert the specified bit (0 → 1, 1 → 0).

66	0000 0001B	INTLZE AT POWER ON
67	0002H	MODAL VALUE AT POWER ON

Max: 255 Min: 0 Unit: ----

0 Search Filter Bit Invert Undo

(iv) The bit inverted parameter is shown.

65	0000H	M MODAL AT RESET
66	0000 0001B	INTLZE AT POWER ON
67	0002H	MODAL VALUE AT POWER ON

Max: 255 Min: 0 Unit: ----

Search Filter Bit Invert Undo

(G) How to Restore Previously Entered Parameter

(Parameter Number: 35 - Enter example of Buzzer Timer)

- (i) To make a selection, scroll the parameters list, search, or click parameter lines to be changed with the filter. Selected lines are highlighted.
- (ii) Parameter maximums/minimums and units are displayed.
- (iii) Enter the new value in the edit box.

35	10	BUZZER TIMER
36	0110 1010B	EXTERNAL OUT STATUS
37	0100H	BUZZER FUNCTION SELECTION

Max: 127 Min: 0 Unit: ----

15 Search Filter Bit Invert Undo

(iv) Press the [Enter] key to confirm the change, and at the same time as the changed content is shown the [Undo] button will be enabled.

34	1000 00	FUNC BY AUTO RUN COMPLETED
35	15	BUZZER TIMER
36	0110 1010B	EXTERNAL OUT STATUS
37	0100H	BUZZER FUNCTION SELECTION

Max: 127 Min: 0 Unit: ----

Search Filter Bit Invert Undo

(v) Long press the [Undo] button.

(vi) The previous parameter value is restored.

34	1000 00	FUNC BY AUTO RUN COMPLETED
35	10	BUZZER TIMER
36	0110 1010B	EXTERNAL OUT STATUS
37	0100H	BUZZER FUNCTION SELECTION

Max: 127 Min: 0 Unit: ----

Search Filter Bit Invert Undo

*For general parameters the value can be undone up to five times.

10.2 Alarm Warning

The numbers and description of alarms and warnings are shown in order of occurrence.

When another screen is open the most recent alarm warning is displayed in the latest alarm and guidance column. To check the time of multiple alarms and warnings open this screen.

For info on what is displayed, refer to Table 10-1 “Alarm Warnings Display Items”.

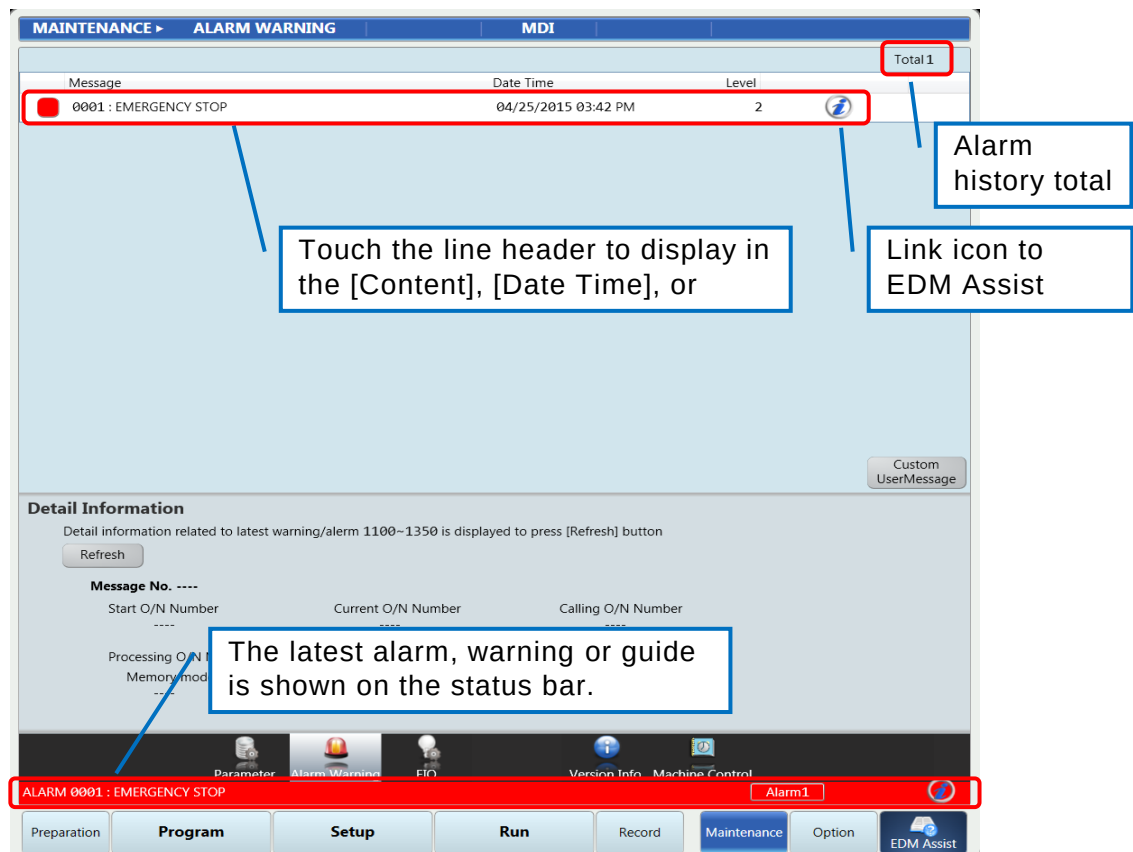


Figure 10-3 Alarm Warning Screen

Table 10-1 Alarm Warning Display Items

Items	Description
Content	The alarm or warning icon, number and description of contents are displayed. There are three types of icons: Alarm :  Warning (Level 3) :  Warning (Level 2 or lower): 
Date and Time of Occurrence	The date and time of when the alarm or warning occurred is displayed.
Level	Level number from 1 ~ 3 will be displayed depending on the details of the alarm warning.
Link icon to EDM Assist	When pressed the page for the target number from the EDM Assist alarm messages is opened.

10.2.1 Releasing Alarm

There are three ways below to release the alarm, depending on the alarm content.

- (1) Press the [RESET] key. Alarm will be canceled
- (2) Releasing the cause of alarm will cancel the alarm automatically.
- (3) After release the cause of alarm, pressing [RESET] key will also cancel the alarm.

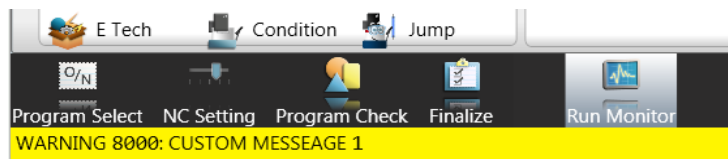
10.2.2 Releasing Warning

There are five ways below to release the warning, depending on the warning content.

- (1) Press the [RESET] key. Warning will be canceled.
- (2) Pressing [START] key will also cancel the warning.
- (3) Release the cause of warning will cancel the warning automatically.
- (4) After release the cause of the warning, pressing [RESET] key will cancel the warning.
- (5) Pressing [WARN RESET] key will also cancel the warning.

10.3 User message registration

This function displays warnings and alarms of message numbers from 8000 through 8191 using arbitrary character strings.



(1) Creating a definition file

(A) Open Notepad or other text editor on your PC and define the message numbers and character strings you want to register.

- Delimit the message number and the character string with a single-byte colon (:).
- Define one message per line.

Example)

8000: Custom message1

8001: Custom message2

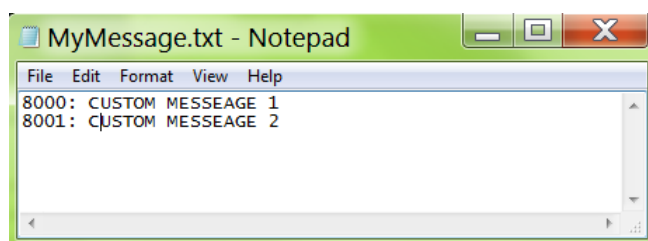
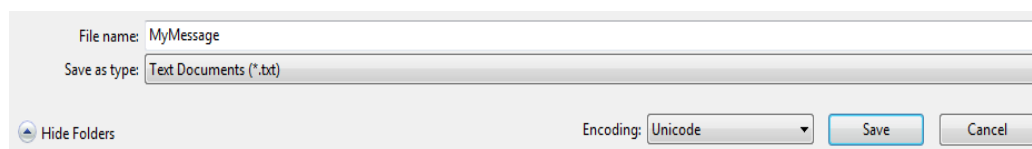


Figure 10-4 Notepad

(B) Select the file type of "Text Document (.txt)" and the character code of "Unicode" and then save.

Example) When Notepad is used



(C) Copy the file to a USB memory stick.

(2) Registering a definition file

(A) Insert the USB memory stick to which you have copied the definition file into the machine.

(B) In [Maintenance] - [Alarm] screen, press the [Custom User Message] button.

(C) Press the [Import File] button.

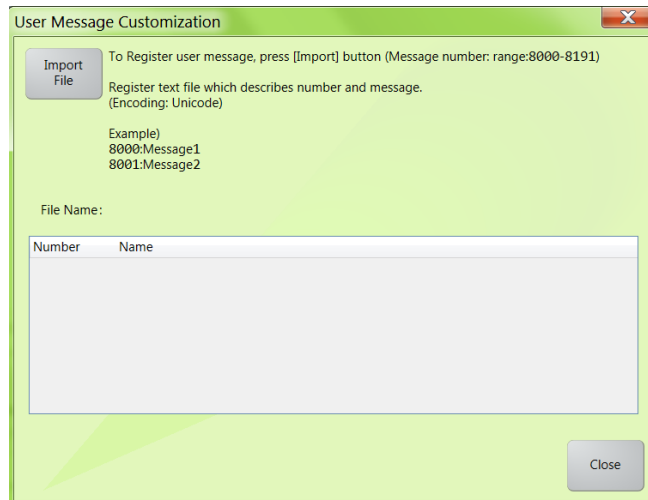


Figure 10-5 Registering a definition file dialog

(D) Select the definition file on the USB memory stick and then press the [Start] button.

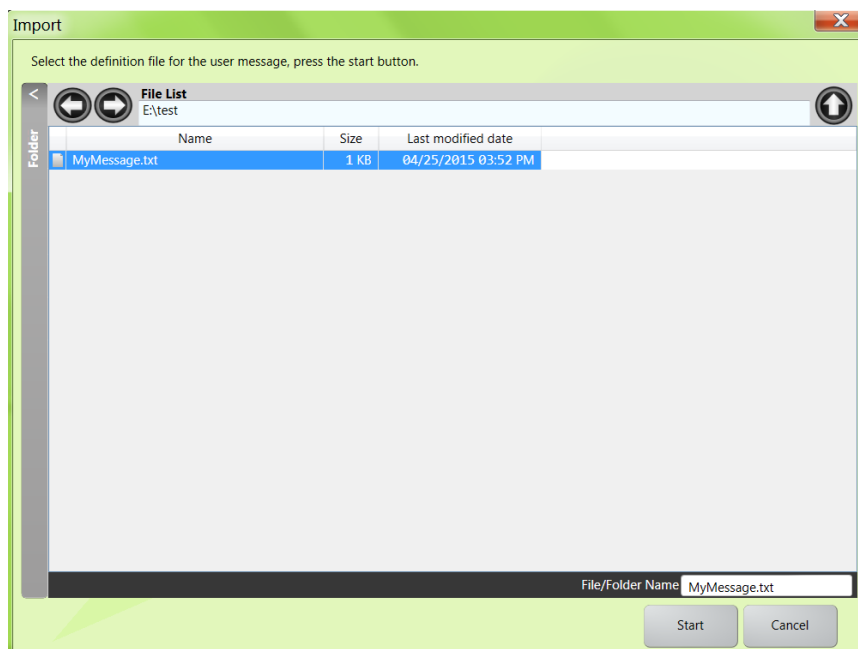


Figure 10-6 Selecting a definition file dialog

(E) The definitions are displayed. This completes registration.

To Register user message, press [Import] button (Message number: range:8000-8191)

Register text file which describes number and message.
(Encoding: Unicode)

Example)
8000:Message1
8001:Message2

File Name: MyMessage.txt

Number	Name
8000	CUSTOM MESSEAGE 1
8001	CUSTOM MESSEAGE 2

Figure 10-7 Finish a definition file dialog

(3) Displaying user messages

Command message display with an arbitrary NC program or a custom macro program.

Example)

Example program	Content
#3000=8000	Display the message numbered 8000 as an alarm message. The operating state will be set to the alarm pause state.
#3001=8000	The operating state will be set to the pause state. (If [Buzzer] is ON, the buzzer will sound.)
#3002=8000	The operating state will be set to the pause state. (The buzzer will not sound.)

10.4 EIO

This screen is for displaying and setting the machine I / O data.
Multiple machine I / O areas can also be displayed or set.

< Caution >

Incorrect I/O output from this screen may cause malfunction and can be potentially dangerous. Please do not carry out any changes without directions from MINPULS.

10.4.1 EIO (List)

This list is for displaying or setting the two VMC / EIS bit data viewers.

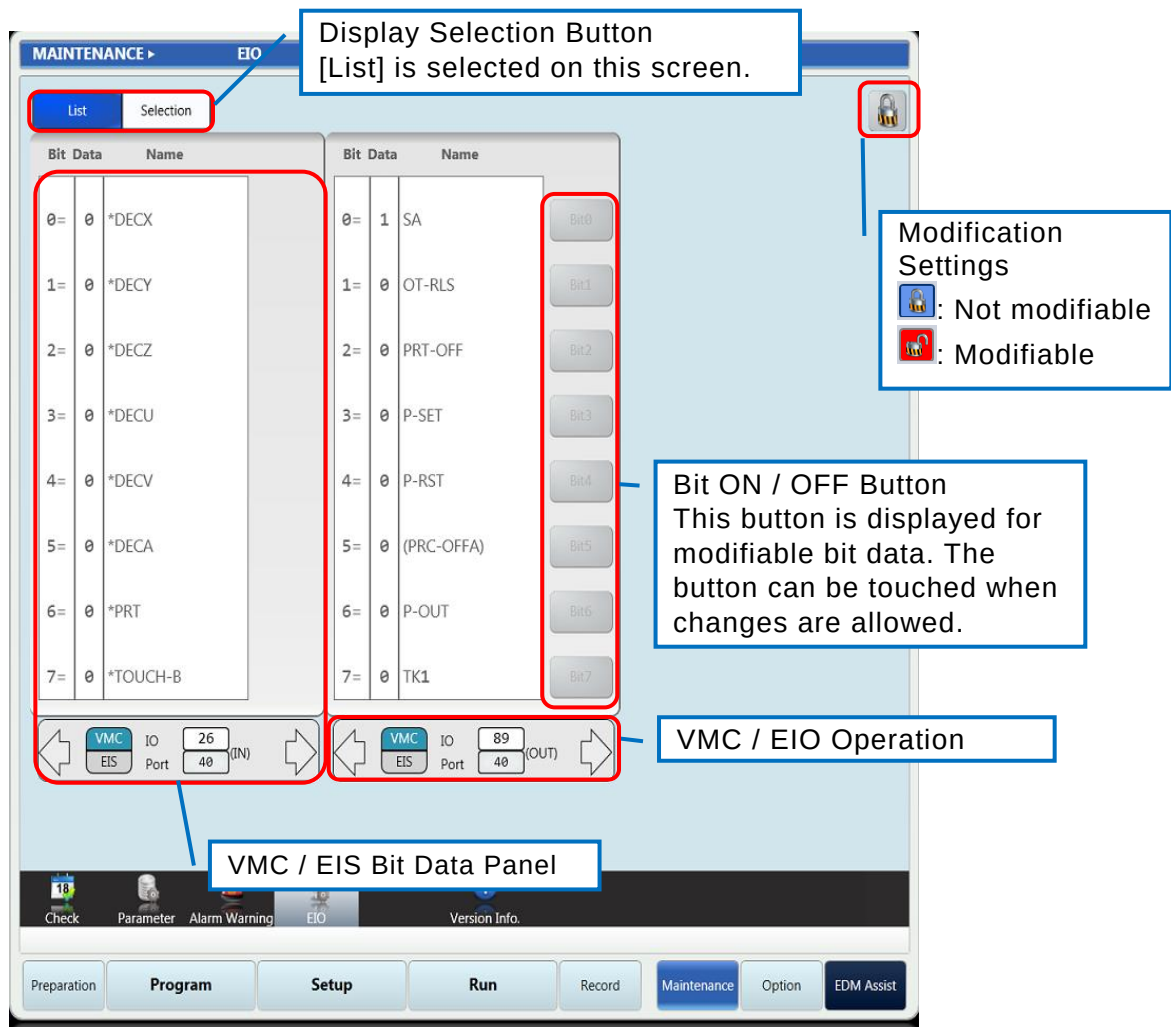


Figure 10-8 EIO (List)

(1) VMC / EIS Operation Panel

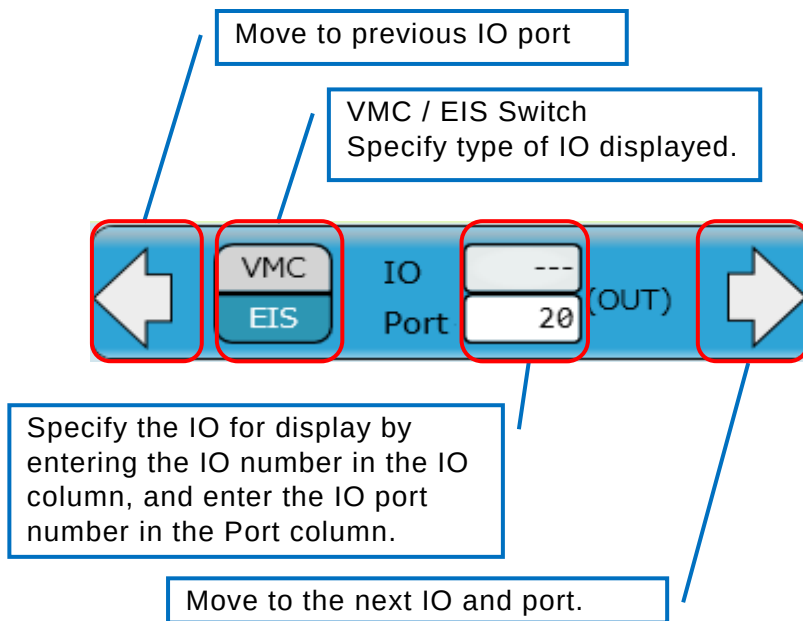


Figure 10-9 VMC/EIO Operation Panel

10.4.2 EIO (Selection)

Touch the Add EIO Panel button to display or edit multiple bit panels.

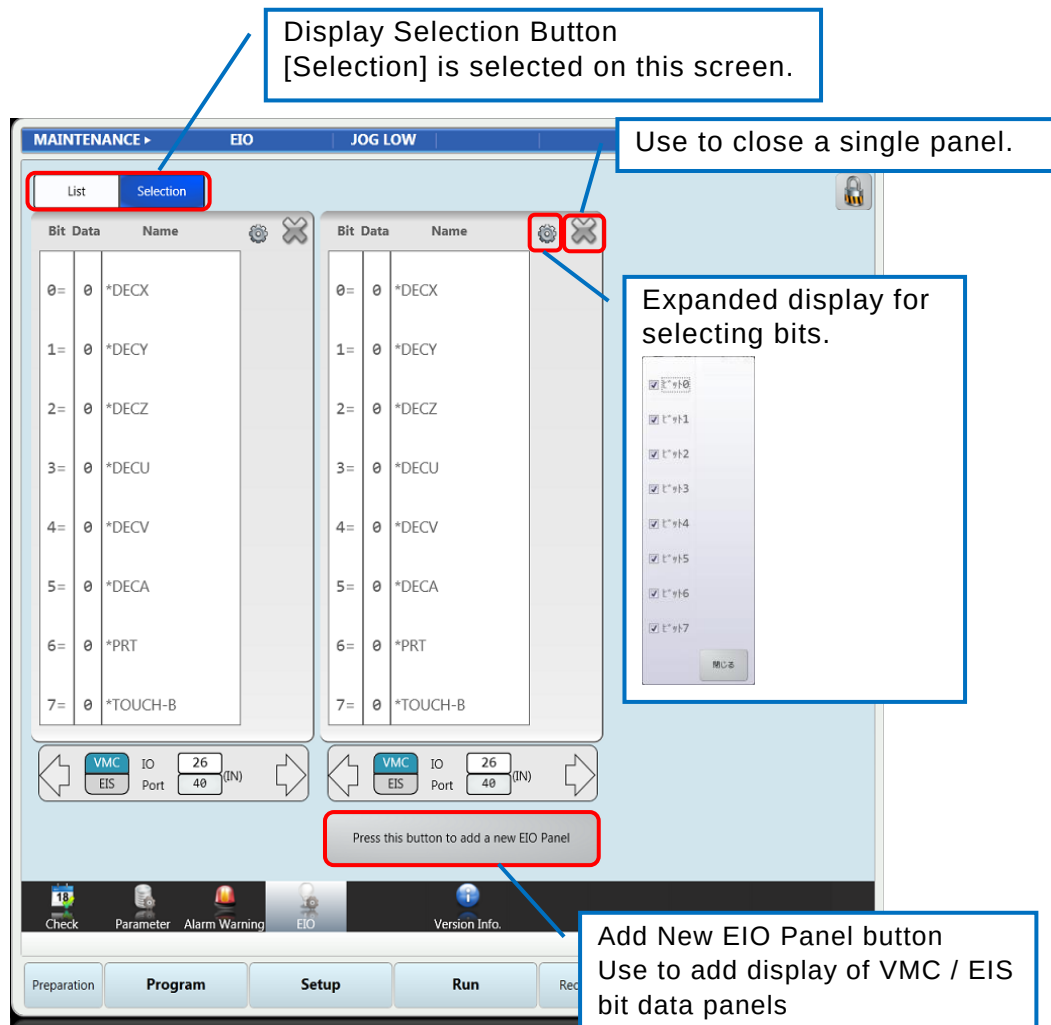


Figure 10-10 EIO (Selection)

10.5 Memory

The operation in this window is mainly catered to MINPULS's engineers.

It is used for the maintenance of the machine, which is not necessary to be used for regular operation.

To display the contents of memory, select the type of display memory (Step 1), enter the display memory address (Step 2) and then press the [Add] button.

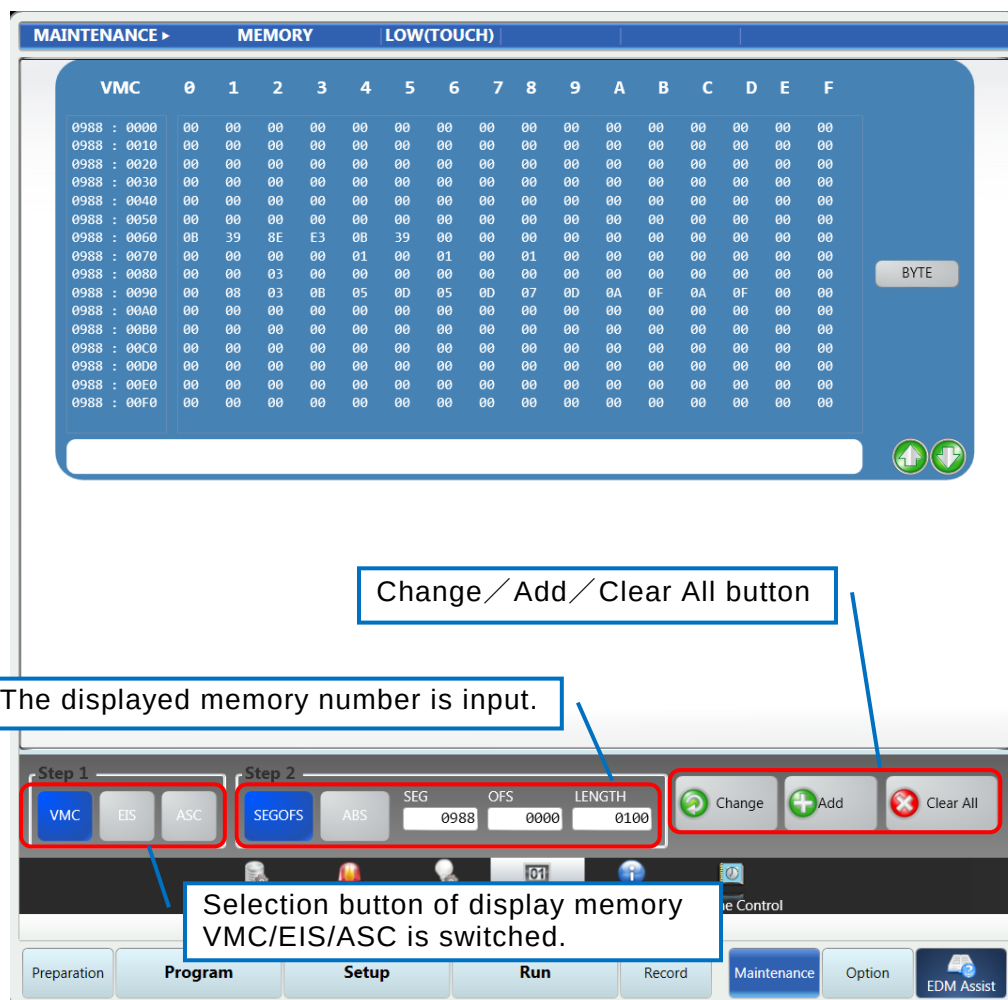
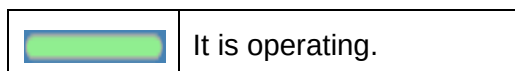


Figure 10-11 Memory



(4) Control Button

The operations of ATC and ATC position check are enabled.

(A) ATC Position Information

The ATC position is displayed by the button turning on the lamp.



Figure 10-27 Arm Lower Position



Figure 10-28 ATC-Unit Lower Position (Machine: BX3)

(B) ATC Control

The operations of the ATC are enabled.

Table 10-5 Arm Button Function

Button Name	Status Description
Retract	Retracts (moves backward) the arm.
Advance	Advances (moves forward) the arm.
Magazine Side	Rotates the arm towards the magazine. The arm stops moving when the button is released.
Spindle Side	Rotates the arm towards the spindle. The arm stops moving when the button is released.
Up	Moves the arm or ATC-Unit upwards.
Down	Moves the arm or ATC-Unit downwards.

Table 10-6 Gripper Button Function

Button Name	Status Description
Clamp	Clamps (closes) the gripper.
Unclamp	Unclamps (opens) the gripper.
Retract	Retracts the gripper.
Advance	Advances the gripper.

11. Options

On the Options screen the following system usage conditions can be configured:

- (1) Devices
 - (A) Network
 - (B) Volume
 - (C) Keyboard
 - (D) Mouse
 - (E) Display
- (2) System
 - (A) Culture
 - (B) Time Zone
 - (C) Date Time
 - (D) Unit
- (3) Applications
 - (A) EDM Explorer (File Sharing)
 - (B) EDM Assist
 - (C) E Mail (Optional)
 - (D) HyperConnect
- (4) User Profile
 - (A) Manage User
 - (B) Privilege
- (5) Manage
 - (A) Install Option

11.1 Control Panel

Touch the icon for the item to be configured, which will display the corresponding window.

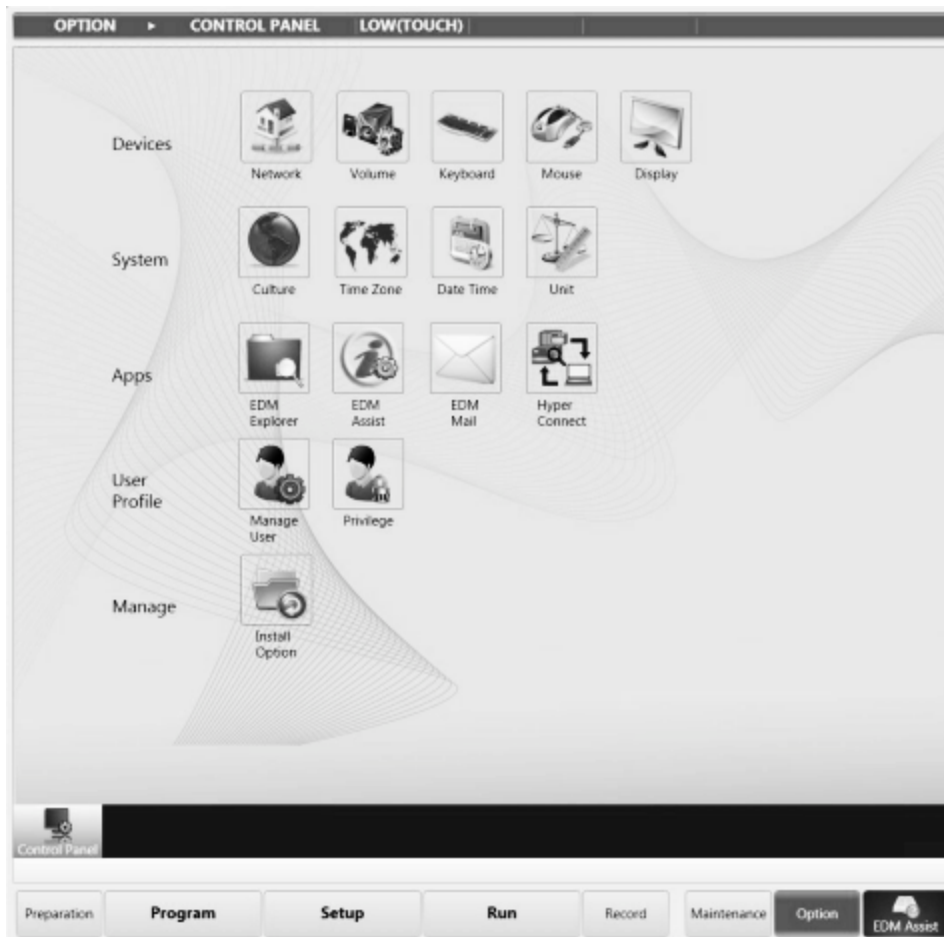


Figure 11-1 Option - Control Panel Screen

11.2.2. Volume

The volume can be adjusted.

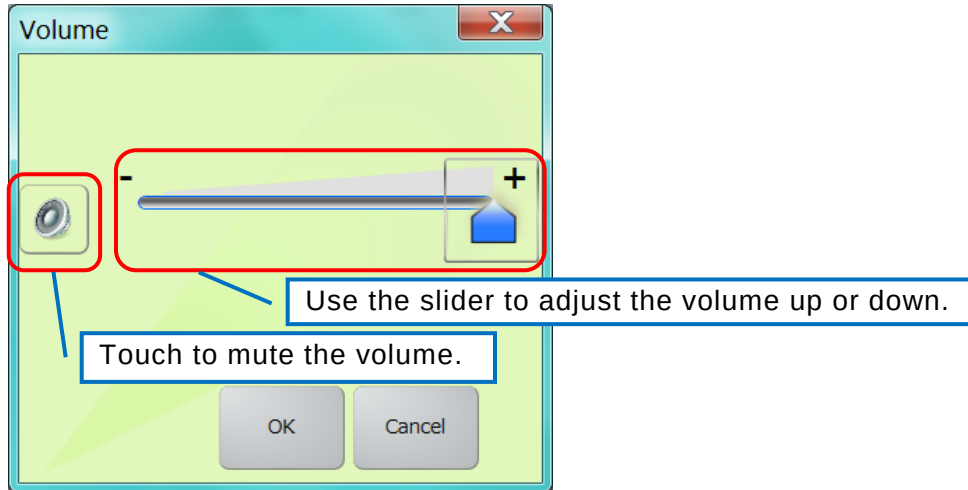


Figure 11-3 Devices Volume

11.2.3. Keyboard

Keyboard settings can be configured.

11.2.4. Mouse

The mouse pointer speed and double click interval can be set here.

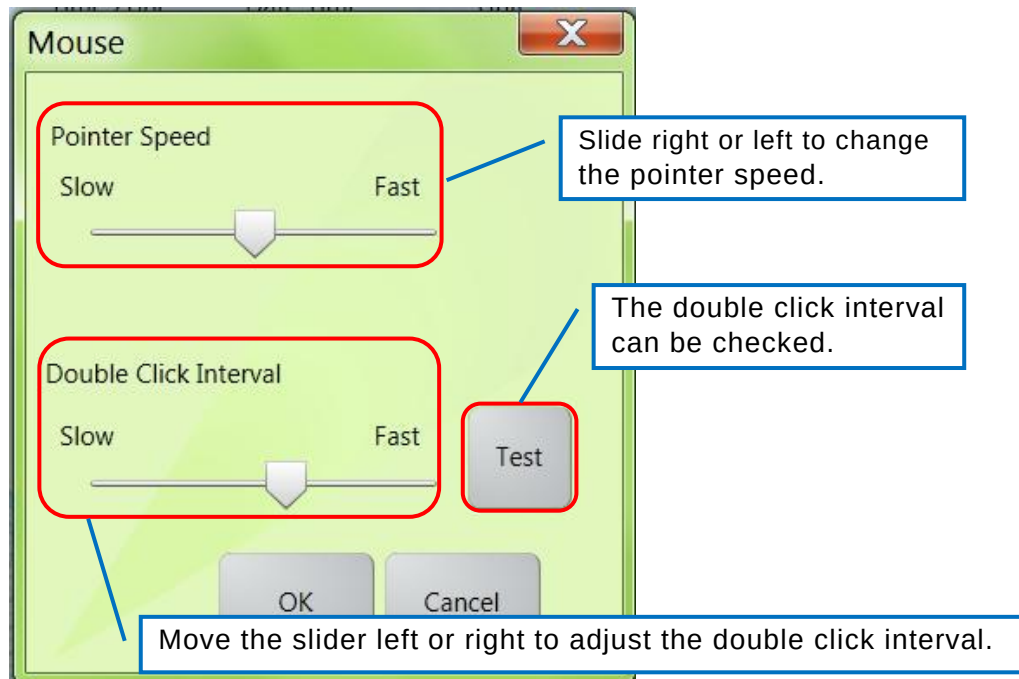


Figure 11-5 Devices Mouse

11.2.5. Display

You can set up backlighting and the time to turn OFF the power to the display when an alarm/warning is generated.

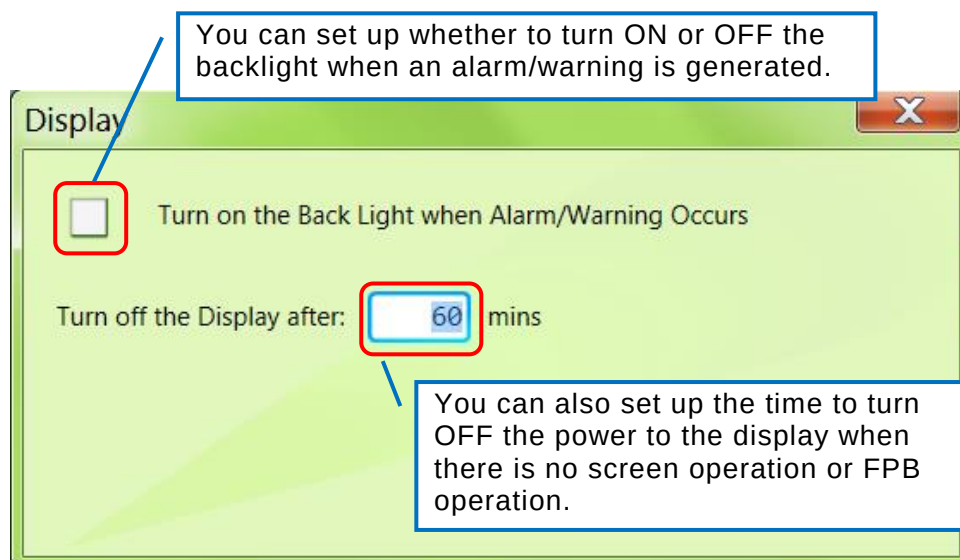


Figure 11-6 Devices Display

11.3 System

11.3.1. Culture

Language, Culture, Currency, Long Date/Time, and Short Date/Time can be configured for use.

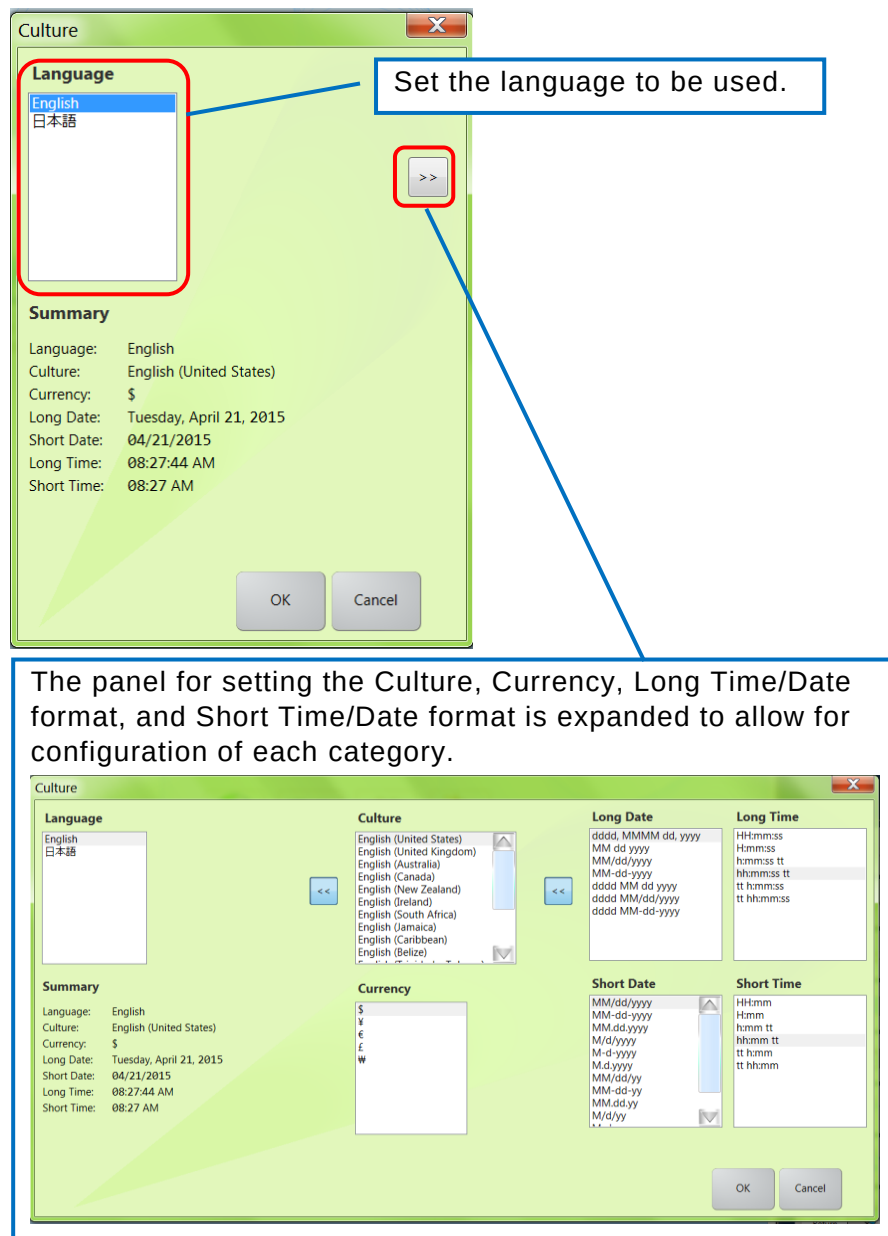
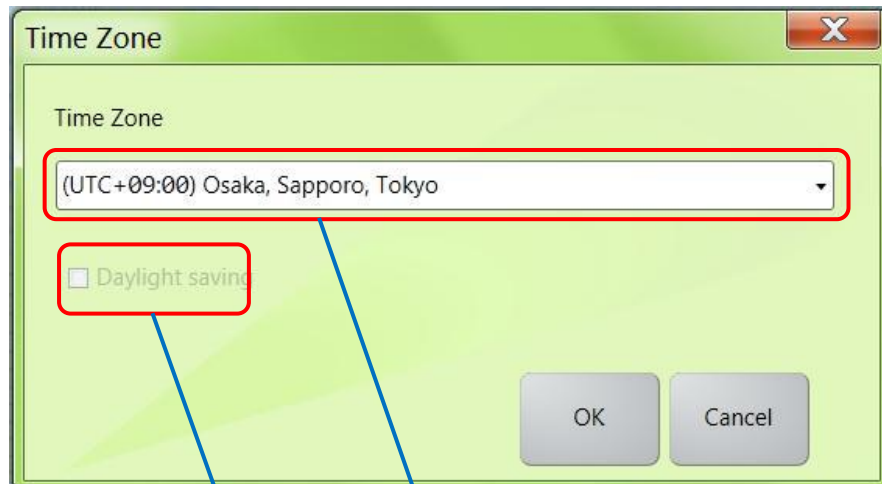


Figure 11-7 System Culture

11.3.2. Time Zone

Select the time zone for the system time.



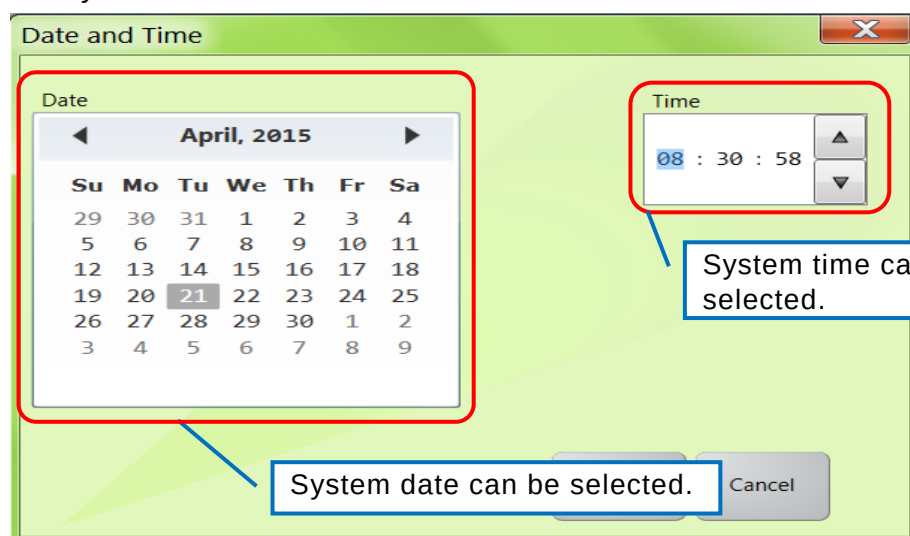
The time zone for the system time can be selected.

Daylight saving time can be set up for locations where it is used.

Figure 11-8 System Time Zone

11.3.3. Date and Time

The system date and time can be selected.



System time can be selected.

System date can be selected.

Figure 11-9 System Date and Time

11.3.4. Unit and Precision

Units and precision for system use can be selected.
Changes are activated after restarting.

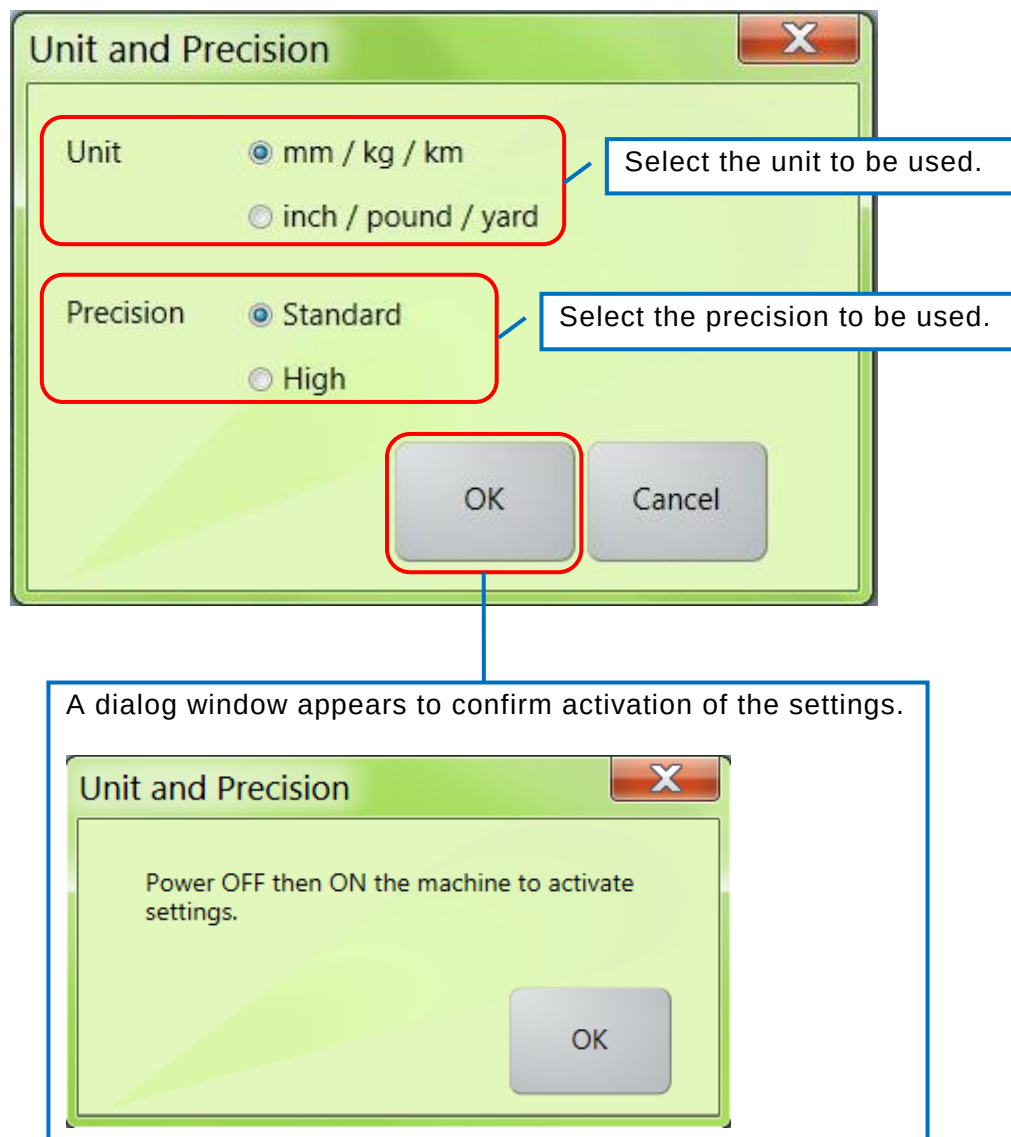


Figure 11-10 System Unit and Precision

11.4 Applications

11.4.1. EDM Explorer

You can set up to share the user drive (D drive) of the machine. Once the sharing of the user drive is set up, files can be input to/output from the user drive of the machine on PCs being connected via the network.

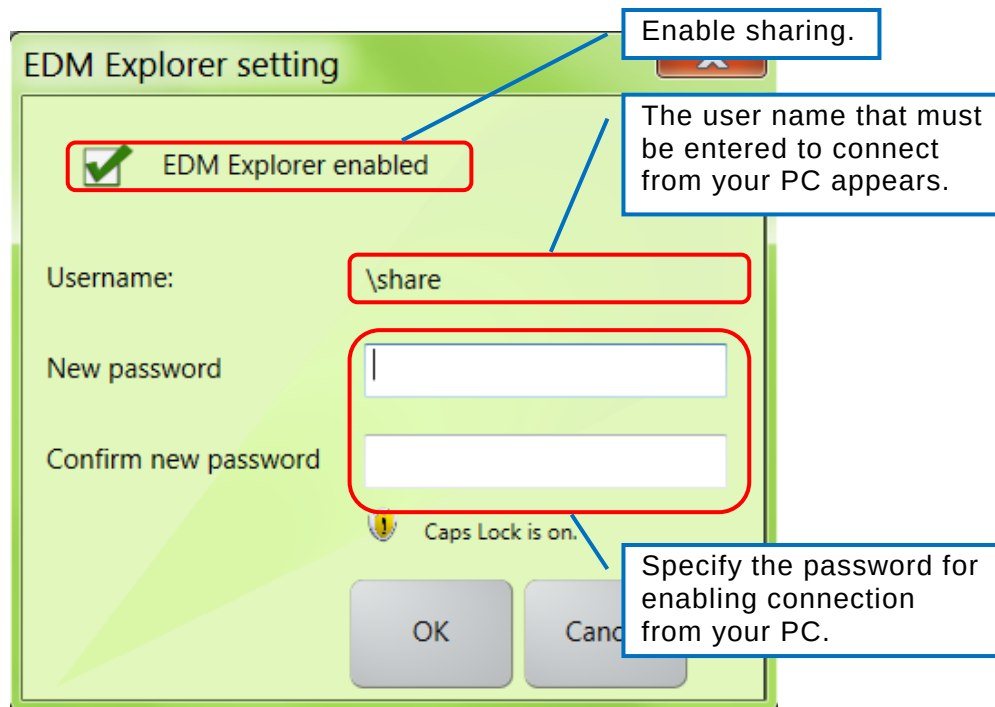


Figure 11-11 Sharing of the User Drive

Tip: It is necessary to set up network connection.

The user name is automatically assigned as "machine name¥share" according to the setting of [Machine Name] in Network Settings.

Operating Procedure of the User Drive from a PC

- 1) On a Windows PC, start Windows Explorer.
- 2) Enter the machine name or IP address of the connection destination in the address bar.

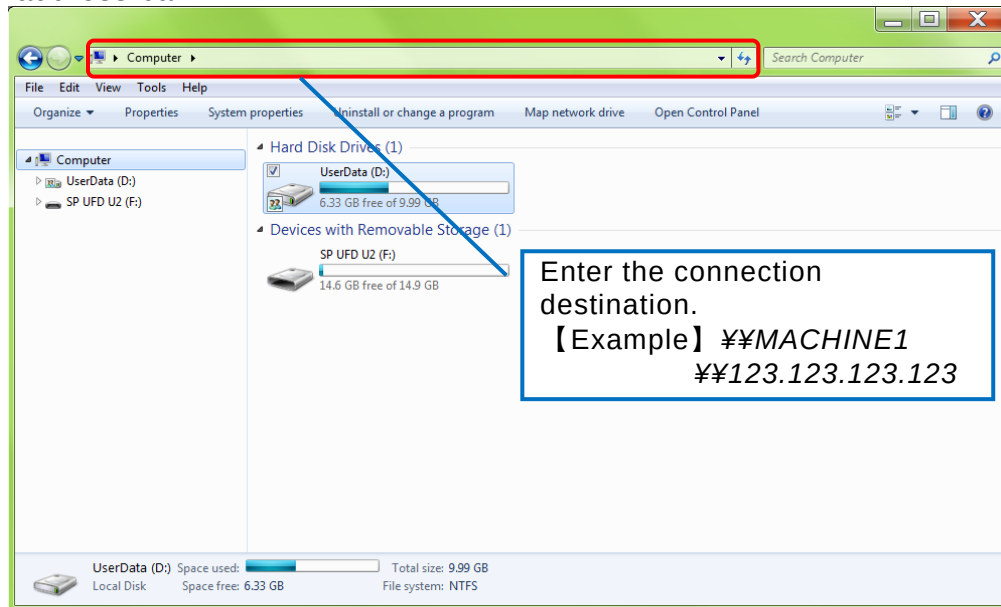


Figure 11-12 Operation of Windows Explorer

- 3) When connecting for the first time, the Windows Security dialog box appears. Enter the user name (machine name¥share) and the password.

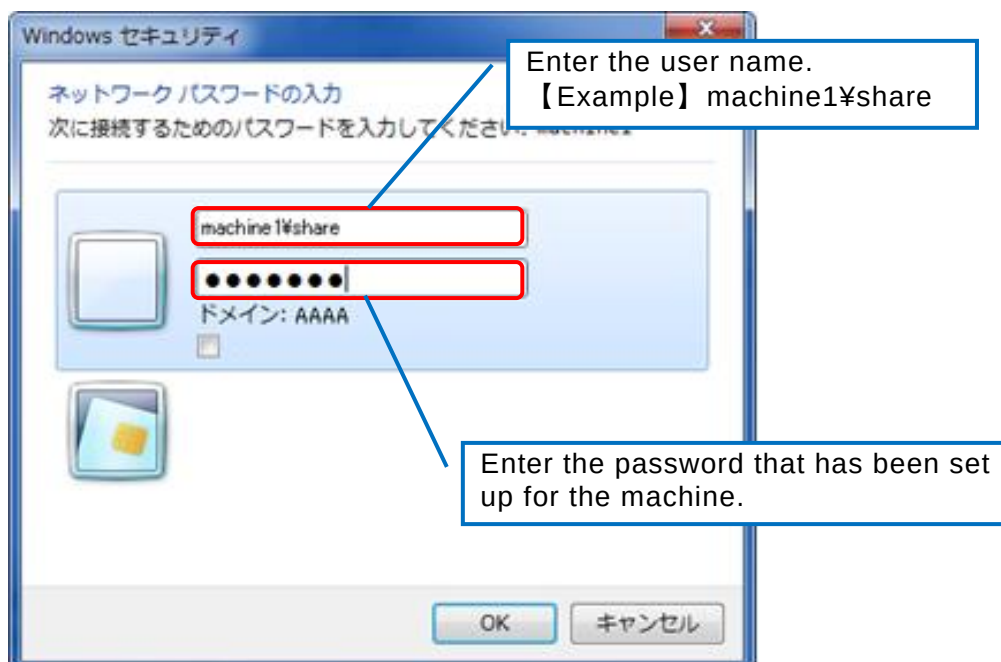


Figure 11-13 Windows Security

- 4) The drive of the machine at the connection destination appears. Double-click the D drive to display the user drive.

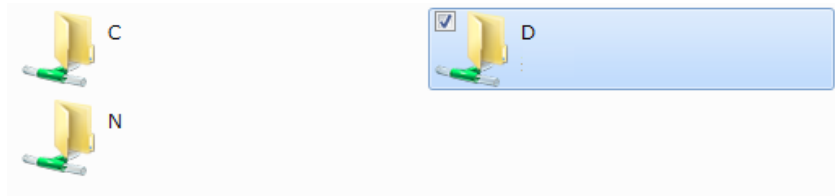


Figure 11-14 Selecting the User Drive

- 5) Using the functions of Windows Explorer (Copy, Paste, Delete, Drag & Drop), manipulate the user drive that appears.

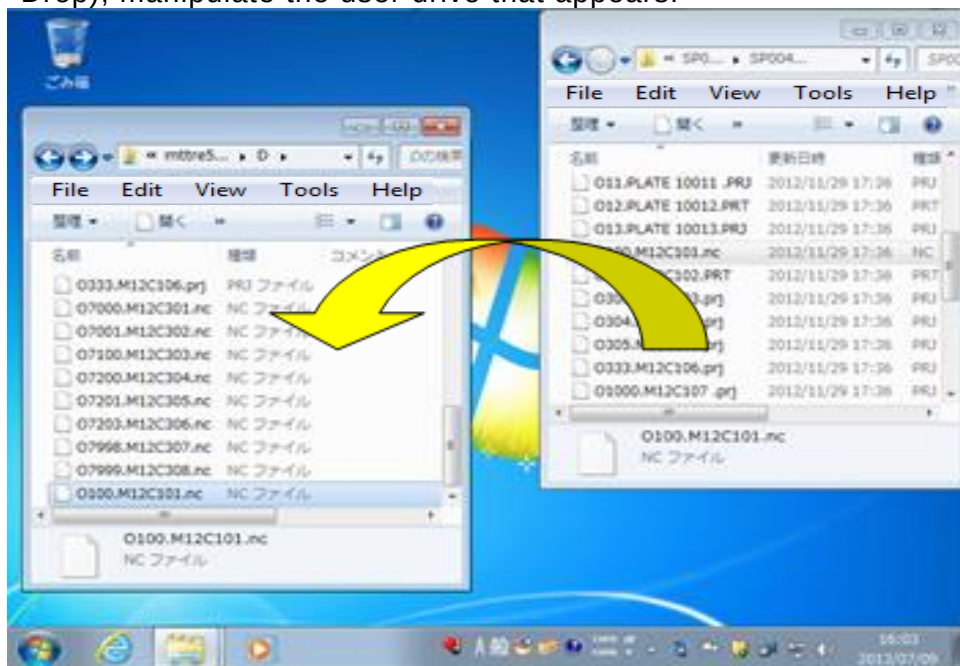


Figure 11-15 Manipulating the User Drive

Tip: Files copied to the user drive can be transferred to the NC program list through operation in the File Management window of the machine.

11.4.2. EDM Assist

You can select the display language of [Manual].
It takes effect when the manual is provided in multiple languages as an option.

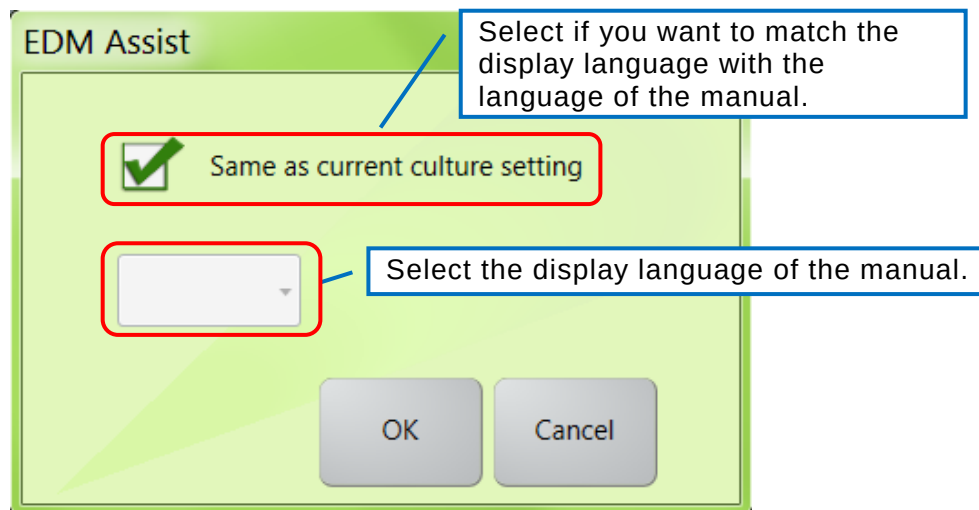


Figure 11-16 Selecting the Display Language of the Manual

11.4.3. E Mail (Optional)

As an option, you can set up E-mail Notification function.
For more details please refer to the E-mail Notification Function Operation Manual.
If the option is not attached, the Product Key dialog box appears.
If the option is added to the machine later, the product key is used to activate the added function.

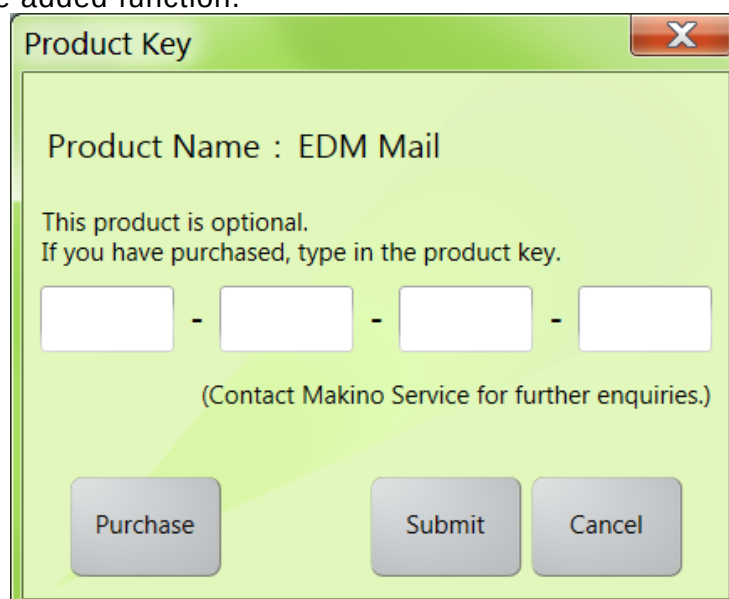
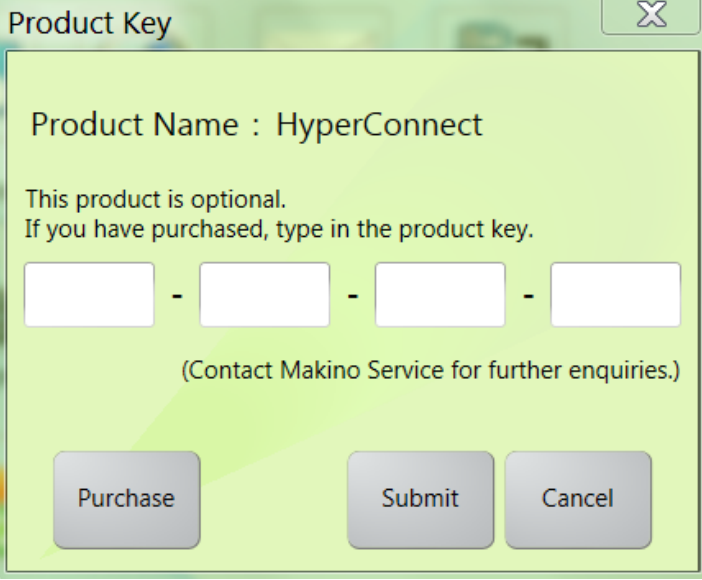


Figure 11-17 Entering the Product Key

11.4.4. HyperConnect

HyperConnect function is an option.

For more details please refer to HyperConnect Function Operation Manual.
This dialog is used to validate the function when this option is added to machine.

A screenshot of a software dialog box titled "Product Key". The dialog has a light green background and a standard Windows-style title bar with a close button (X). Inside the dialog, the text "Product Name : HyperConnect" is displayed. Below this, a message states: "This product is optional. If you have purchased, type in the product key." Underneath the message is a form for entering a product key, consisting of four white rectangular input boxes separated by hyphens. Below the input fields, a note in parentheses says: "(Contact Makino Service for further enquiries.)". At the bottom of the dialog, there are three buttons: "Purchase", "Submit", and "Cancel".

Product Key

Product Name : HyperConnect

This product is optional.
If you have purchased, type in the product key.

- - -

(Contact Makino Service for further enquiries.)

Purchase Submit Cancel

Figure 11-18 Entering the Product Key

- 2) [Admin Settings] dialog appears. Uncheck [Disable User Profile]. This will unmask the [Change Password] textbox to allow admin to modify the password.

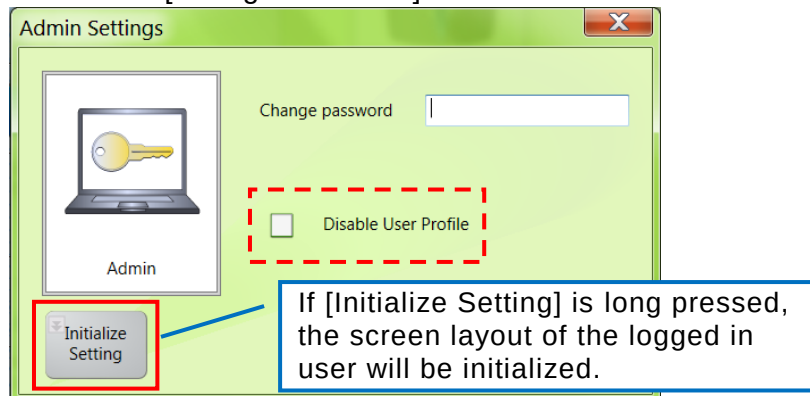


Figure 11-22 Admin Setting dialog

- 3) Key in "Admin" password. Press ENTER.

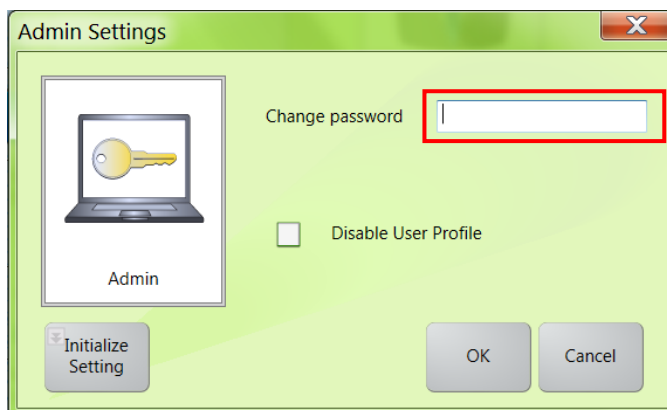


Figure 11-23 Key in Password

- 4) Confirm the password again. Press ENTER.



Figure 11-24 Password confirmation

5) Press [OK] button.



Figure 11-25 Password confirmation Success

※If the confirmation of password failed, the admin has to enter the new password again from the start.

11.5.2. User registration

Register users after setting the Admin password.

The maximum number of account that can be created by administrator is 20 users.

- 1) Press on  button to open the [New User] dialog.
- 2) In the [New User] dialog, select an avatar.

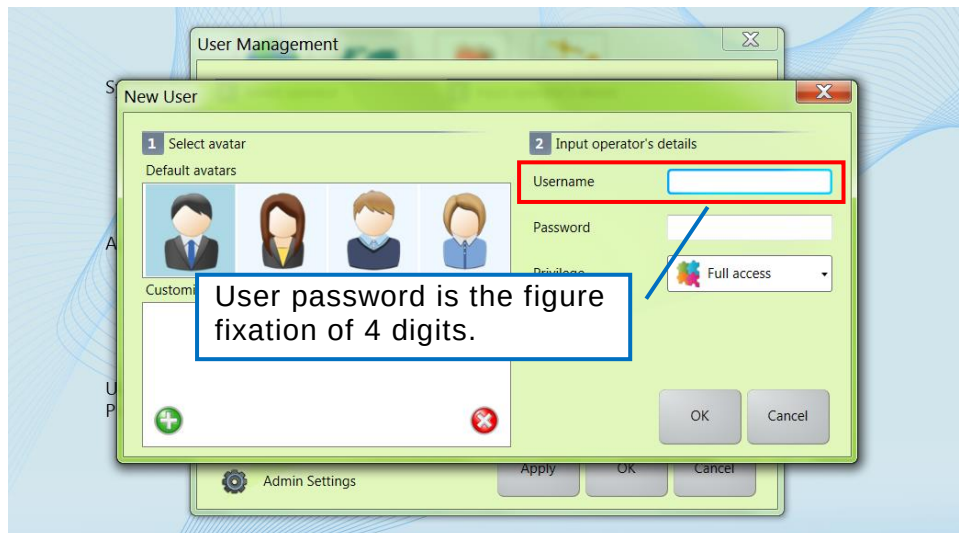


Figure 11-26 New User registration

- 3) After input password, [Confirm Password] edit box will appear. If the confirm password is the same as previous input password, green check appears next to the password.
- 4) Press [OK] for confirmation of new user creation or [Cancel] for operation discard.

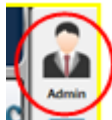
11.5.3. Auto login

To sign in automatically with this particular user after machine start up, check [Auto login] check box. Press [OK].

11.5.4. Sign in screen

After initial setting, Admin will be logged in. First of all, change the signed in user.

Touch the top right button on the layout bar to switch user.



Sign in screen appears.

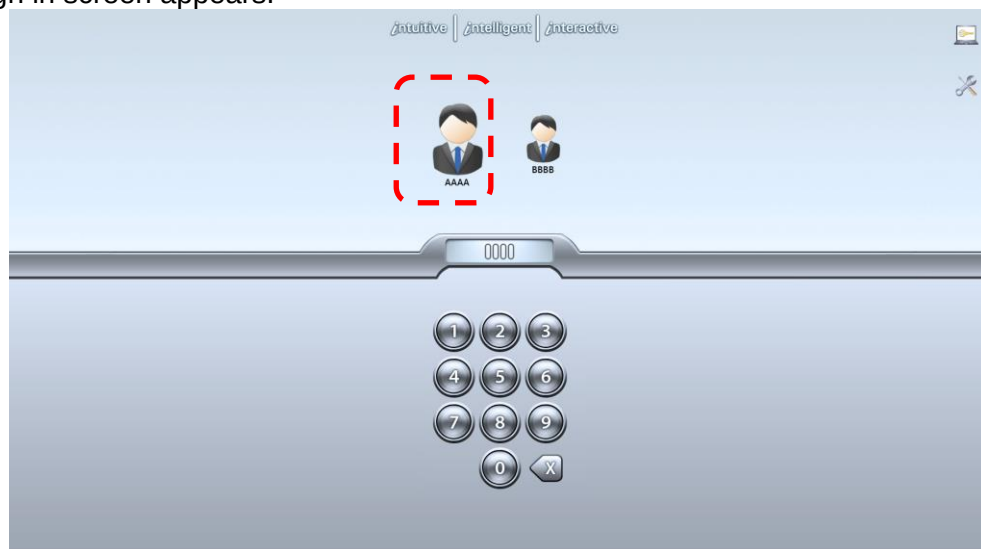


Figure 11-27 User Log in screen

Select user and key in the 4-digits password. After successful user authentication, Hyper i screen appears.

11.5.5. User Customized Layout

Each user can customize windows, screens layout according to preference. It will make operation more convenient and more user-friendly.

- 1) Quick buttons, screen layout settings, screen customization, layout detail setting.
- 2) Coordinates display on Setup screen and Run screen.
- 3) Culture and language settings.

11.6 Privilege (Optional)

Privilege function is an option.

For more details please refer to Privilege Function Operation Manual.

This dialog is used to validate the function when this option is added to machine.

A screenshot of a software dialog box titled "Product Key". The dialog has a light green background and a standard Windows-style title bar with a close button (X) in the top right corner. Inside the dialog, the text "Product Name : User Privilege" is displayed. Below this, a message states: "This product is optional. If you have purchased, type in the product key." Underneath the message is a form for entering a product key, consisting of four white rectangular input boxes separated by hyphens. Below the input fields, the text "(Contact Makino Service for further enquiries.)" is shown. At the bottom of the dialog, there are three buttons: "Purchase", "Submit", and "Cancel", all with a grey gradient and rounded corners.

Figure 11-28 Entering the Product Key

11.7 Install Option

Install or upgrade the optional software.

(1) Go to [Option] – [Manage] – [Install Option].



Figure 11-29 Install Option Button

(2) Press [Install] button in the Install Option dialog displayed.

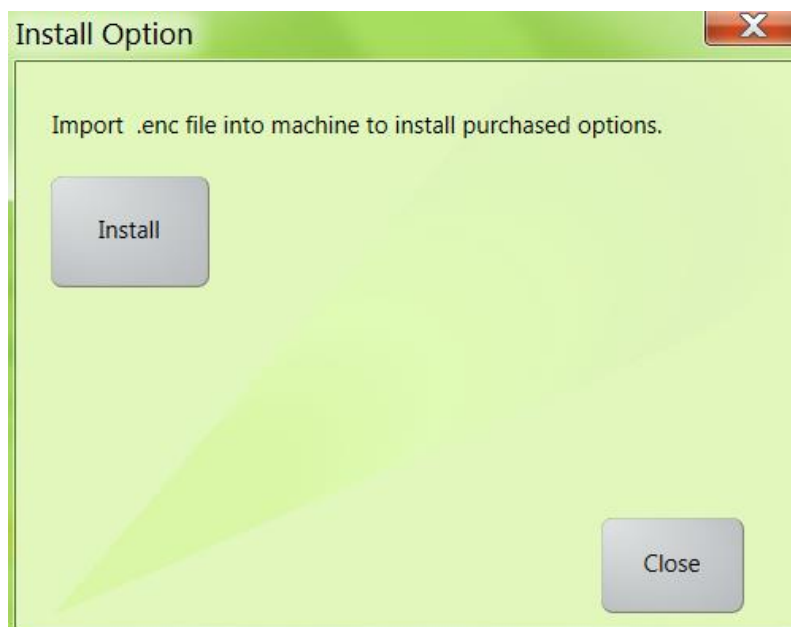


Figure 11-30 Installing Option dialog

- (3) In the displayed file selection dialog, select the file to be installed or updated.

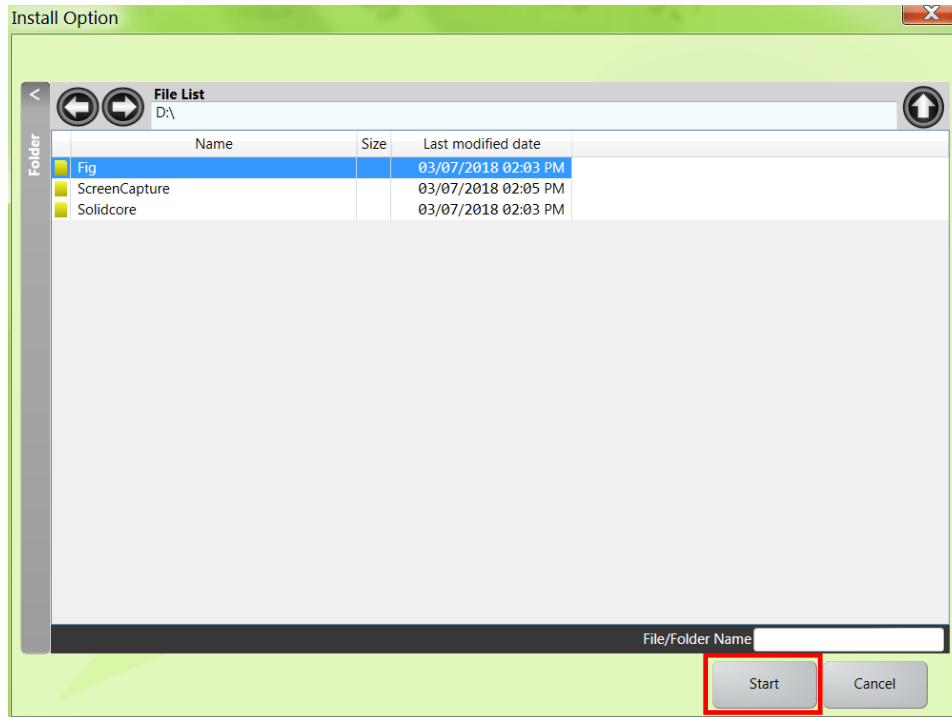


Figure 11-31 Option file selection dialog

- (4) Press [Start] button in the dialog box, installation or version upgrade begins.

12. Basic Operation EDM Assist

12.1 Start

The initial screen as in figure 12-1 is shown when the [EDM Assist] function button is touched or when the power is turned ON.

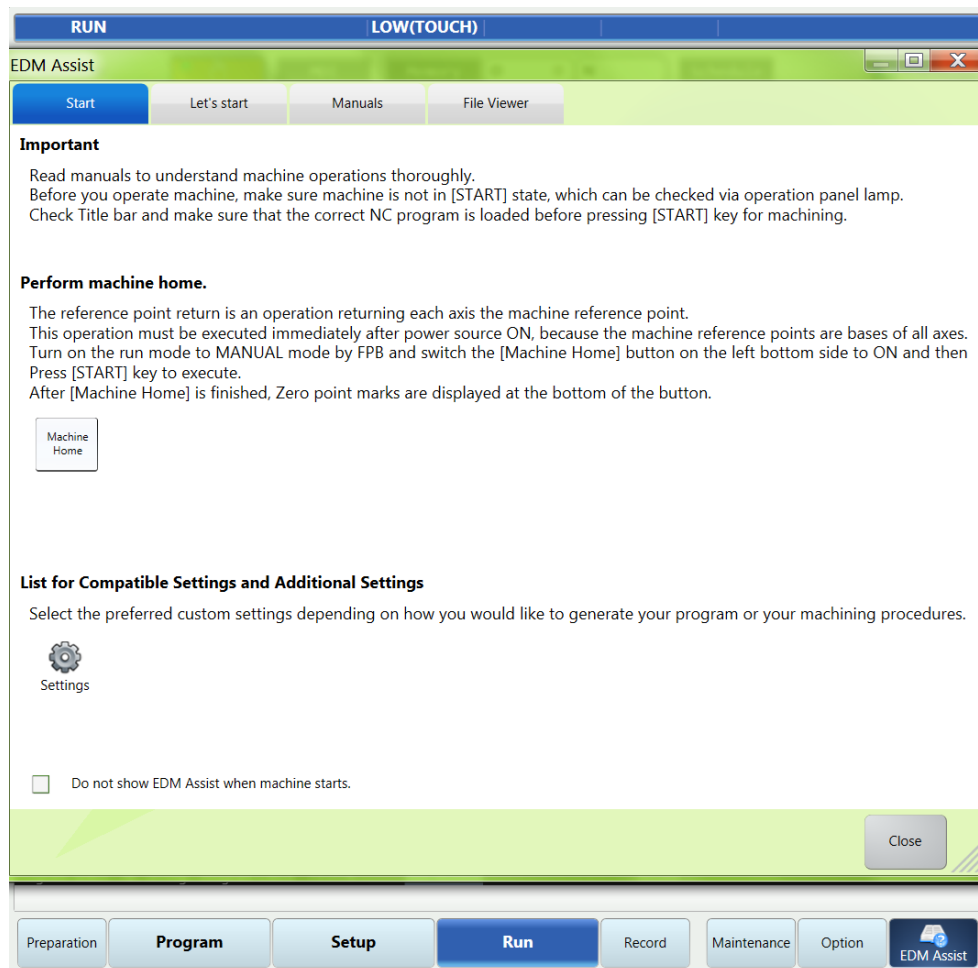


Figure 12-1 Start

When the EDM Assist window appears after startup, uncheck the box [Do not show EDM Assist when machine starts].

Machine Home can also be performed with the [Machine Home] button on the macro panel in the [Others] window.

12.1.1 Machine Home

Perform machine home.

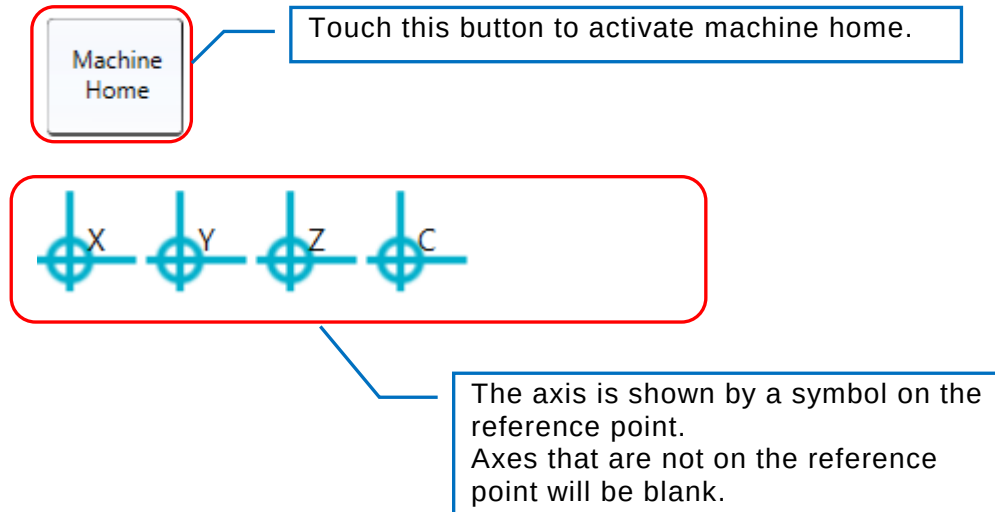


Figure 12-2 Machine Home

After turning the power ON it is necessary to perform machine home once in order to recreate the machine coordinates.

- 1) Activate the [Manual Run] key on the FPB to switch to Manual Mode.
(If the mode is already ON the key does not need to be pressed.)
- 2) Touch and activate the [Machine Home] button on the Start window.
- 3) Press the [Start] key on the FPB to run.

12.1.2 Addition of the Function Selection (Model Plan settings) dialog box

The [Function Selection] dialog box has been added in EDM Assist for customizing the setting used with the machining procedure and/or program format.

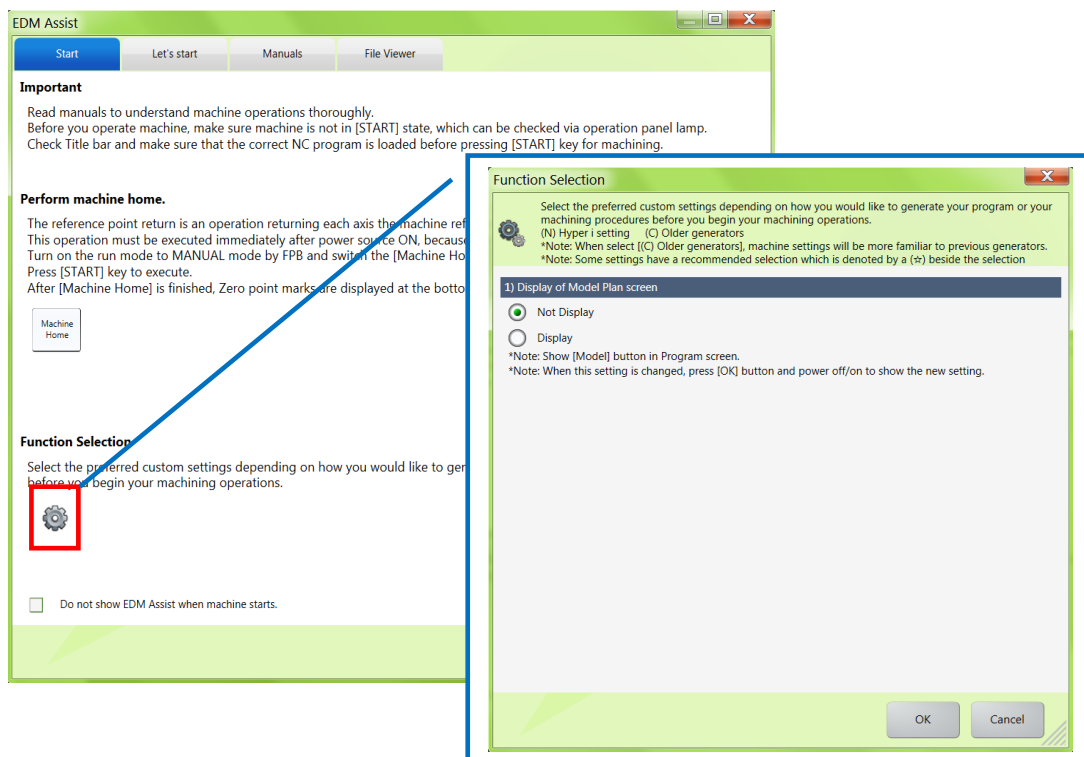


Figure 12-3 Function Selection

Display of the Model Plan screen can be selected.

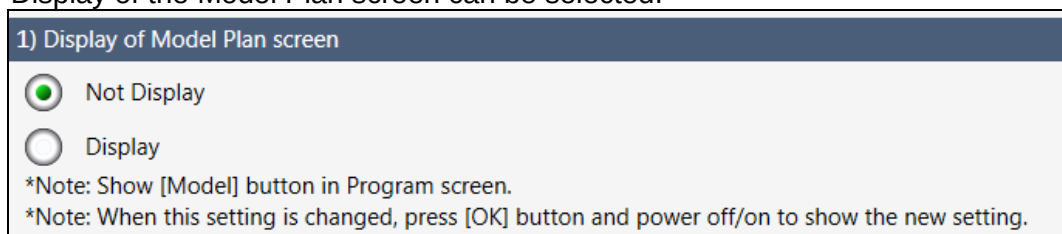


Figure 12-4 Select Model Plan screen display

12.2 Let's Start

[Part: Introduction] had been added to EDM assist so that operation up to machining can be learned interactively.



Figure 12-5 Let's Start

12.2.1 Switching Pages

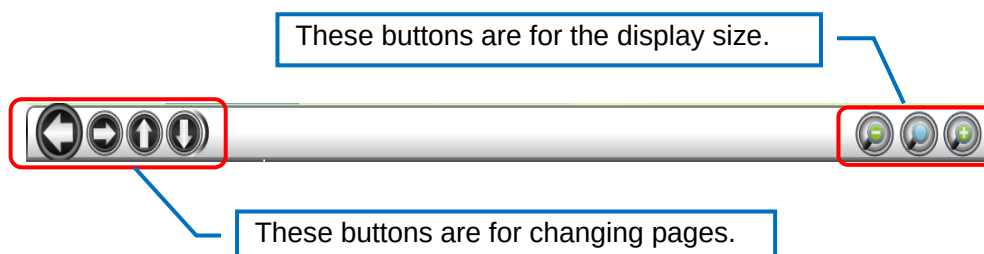


Figure 12-6 Switching Buttons

Table12-1 Description of Buttons

Button Name	Description
Back 	This button goes back to previous places in the manual in reverse order. Each touch will go back in the reverse order of operations.
Forward 	Operations reversed with the Back button are advanced in order. Advance in order each time the button is touched.
Return to previous item 	Move to the previous item.
Advance to next item 	Move to the next item.
Enlarge 	Enlarge the general display of the manual. Gradually gets larger with each press.
Normal Size 	Return display of the manual to the original size after enlarging or reducing the size .
Reduce 	Shrink the general display size of the manual. Gradually gets smaller with each press.

12.3 Manual

12.3.1 Content

These are contents of the mounted manual.

Displayed contents are different depending on the machine model.

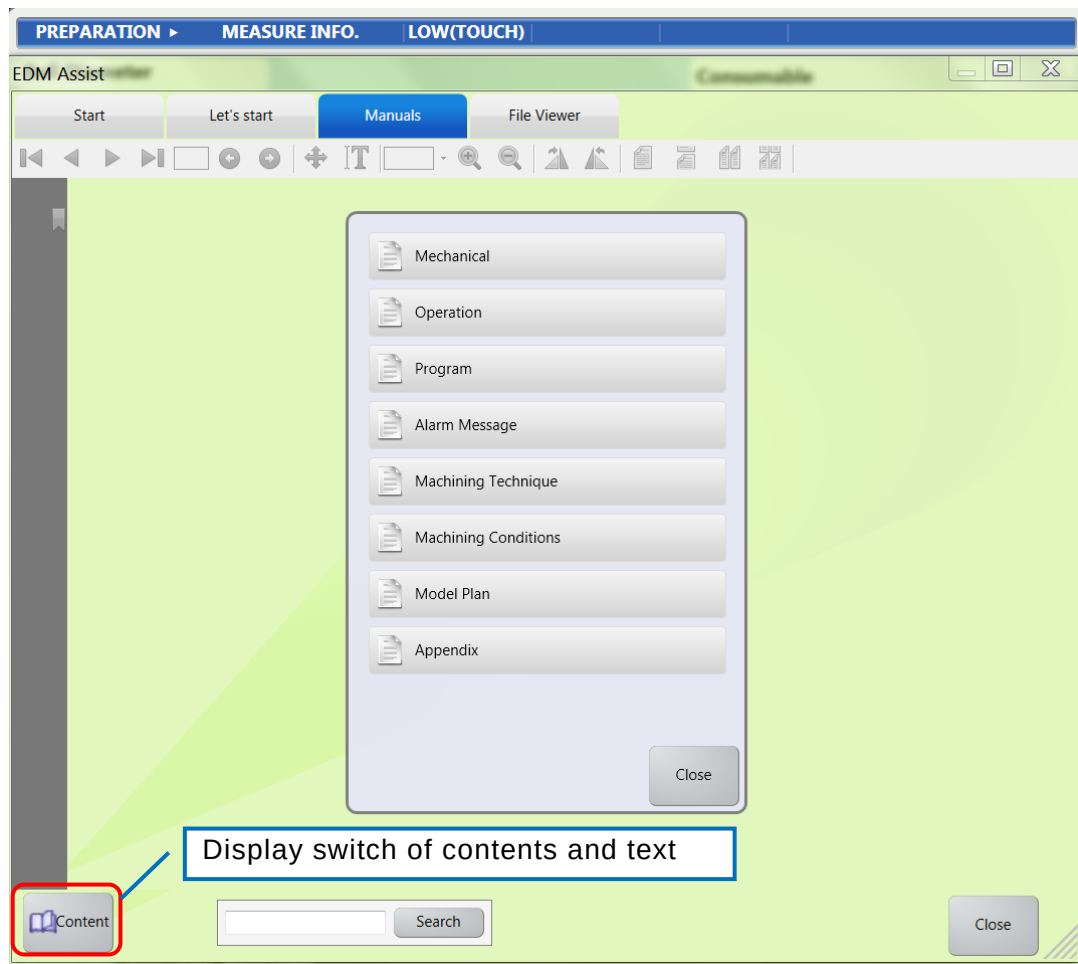


Figure 12-7 Contents of manual

Table12-2 Description of Button

Button Name	Description
Move to the head page 	Move to the head page of the manual.
Return to previous page 	Move to the previous page.
Advance to next page 	Move to the page.
Move to the final page 	Move to the final page of the manual.
Back 	This button goes back to previous places in the manual in reverse order. Each touch will go back in the reverse order of operations.
Forward 	Operations reversed with the Back button are advanced in order. Advance in order each time the button is touched.
Enlarge 	Enlarge the general display of the manual. Gradually gets larger with each press.
Reduce 	Shrink the general display size of the manual. Gradually gets smaller with each press.
Clockwise rotation 	This button rotates clockwise the manual. Each touch will rotates 90 degree.
Counterclockwise rotation 	This button rotates counterclockwise the manual. Each touch will rotates 90 degree.

12.3.3 Search

This is used to search the character of the manual.

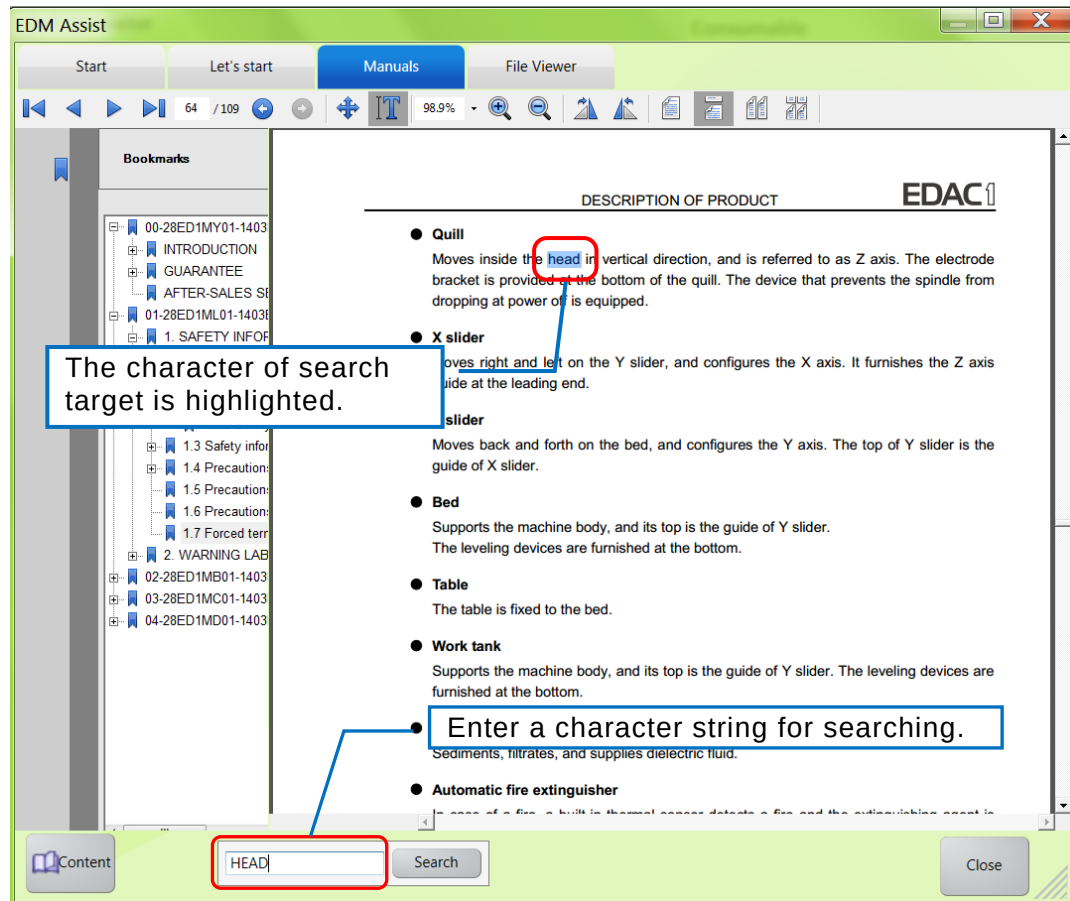
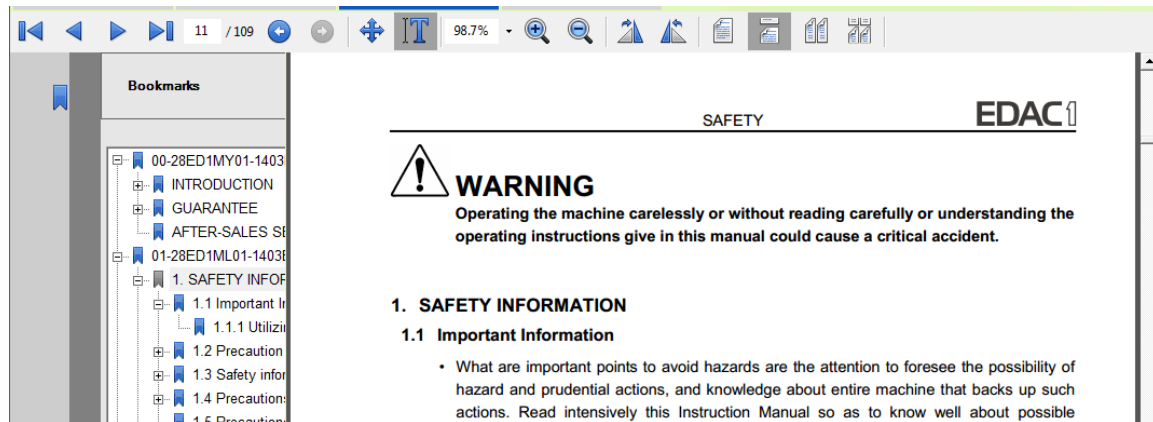


Figure 12-9 Search

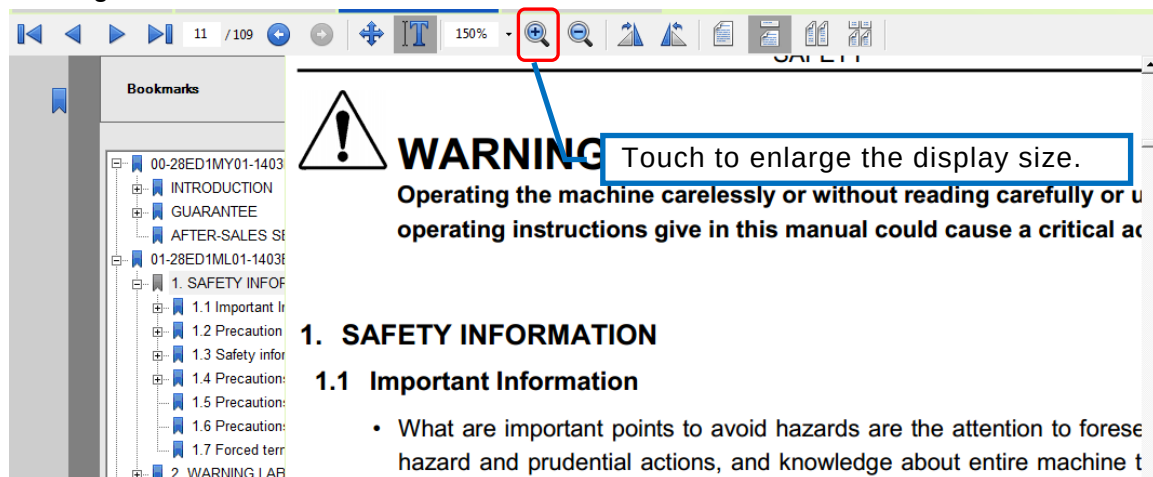
12.3.4 Changing Display Size

These buttons are used to enlarge or reduce the display size of the manual.

<Normal 100%>



<Enlarge 150%>



<Reduce 75%>

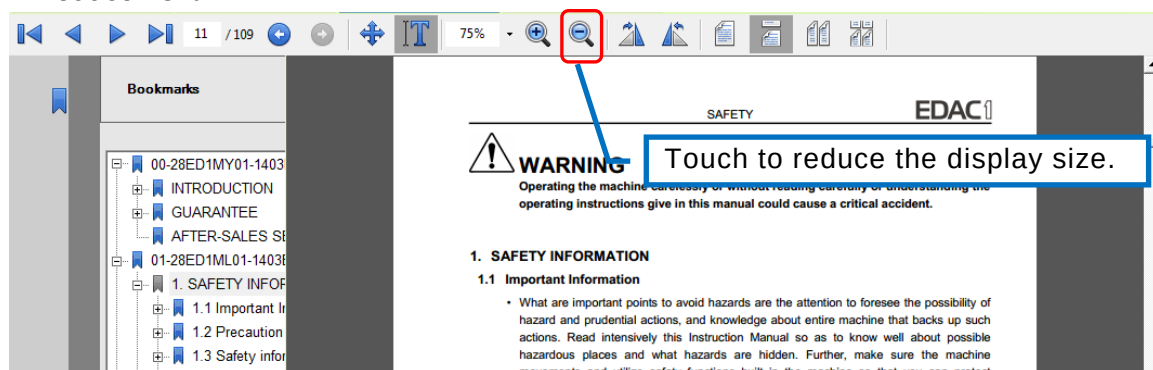


Figure 12-10 Changing Display Size

12.4 File Viewer

In the [File Viewer], any user-selected PDF file can be opened.

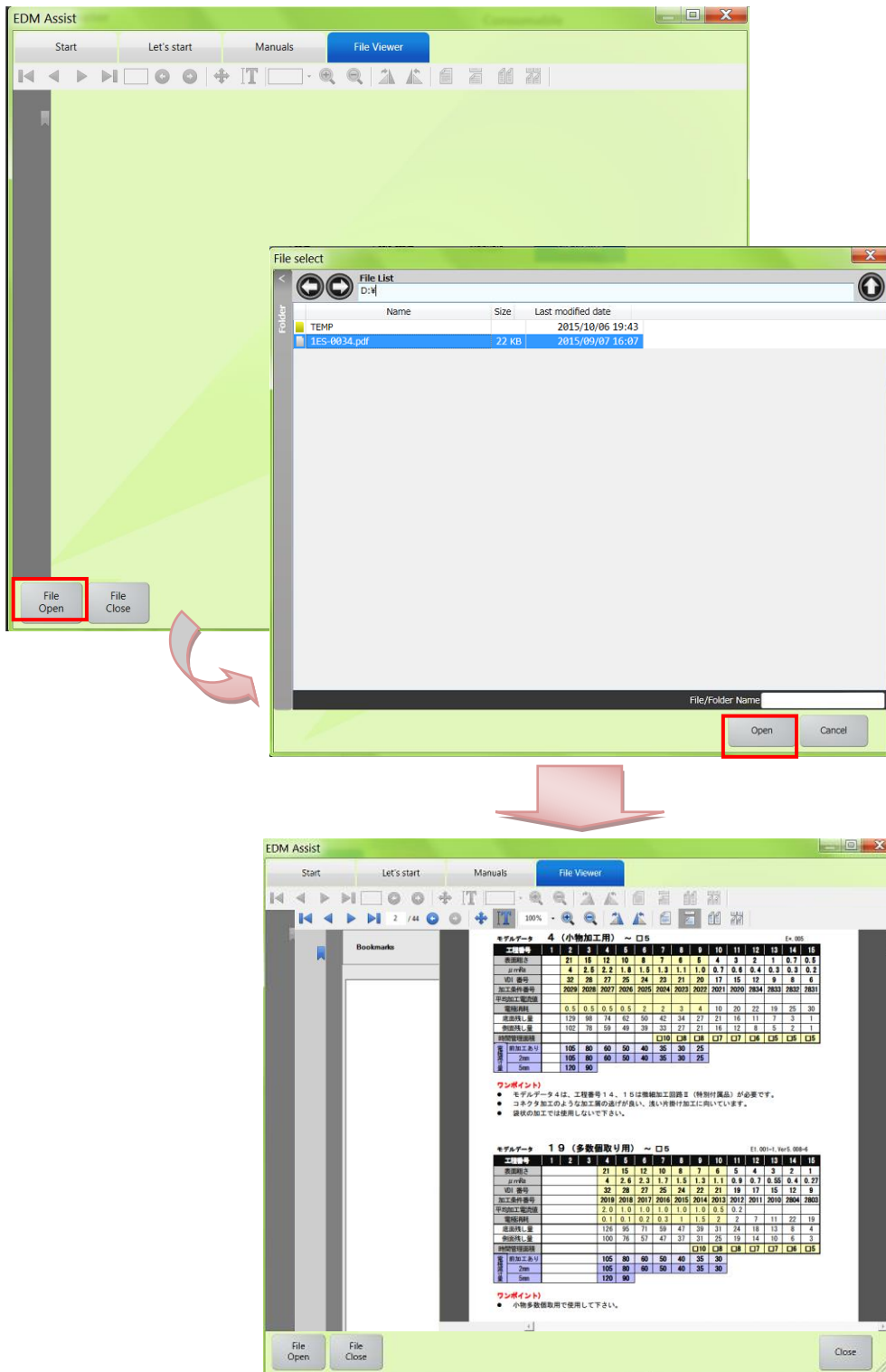


Figure 12-11 Display of PDF file

13.1 LAN cable connection

Open the back or side door of the power cabinet. Now, you can access the LAN cable connection port on the door back panel board.

Warning: Works with the power supply door opened is dangerous. Be sure to turn off the main switch and conduct works according to instructions from the MINPULS Service Engineer.

