

Franklin Handler Operator Manual

This document covers the basic operation of the Franklin Handler system using the Franklin Handler Control application shipped with each handler system. This user interface provides a very simple means of controlling the handler system in a production environment.

Operation of the system normally consists of only three operator dependent duties. The first is to place a cassette containing a number of wafers on the elevator platform. The second is to make slot selections based on the number of wafers and their locations within the cassette where they reside and finally, starting the cycle. Once the cycle has been started, operation is fully automatic to the point of requiring an exchange of cassettes. An option has been provided that allows the system to automatically restart the cycle after the exchange of cassettes thus reducing operator interaction to a bare minimum.

The operator interface consists of five main sections as shown below in figure 1. A short overview of each section will be given here. Typical operation follows.

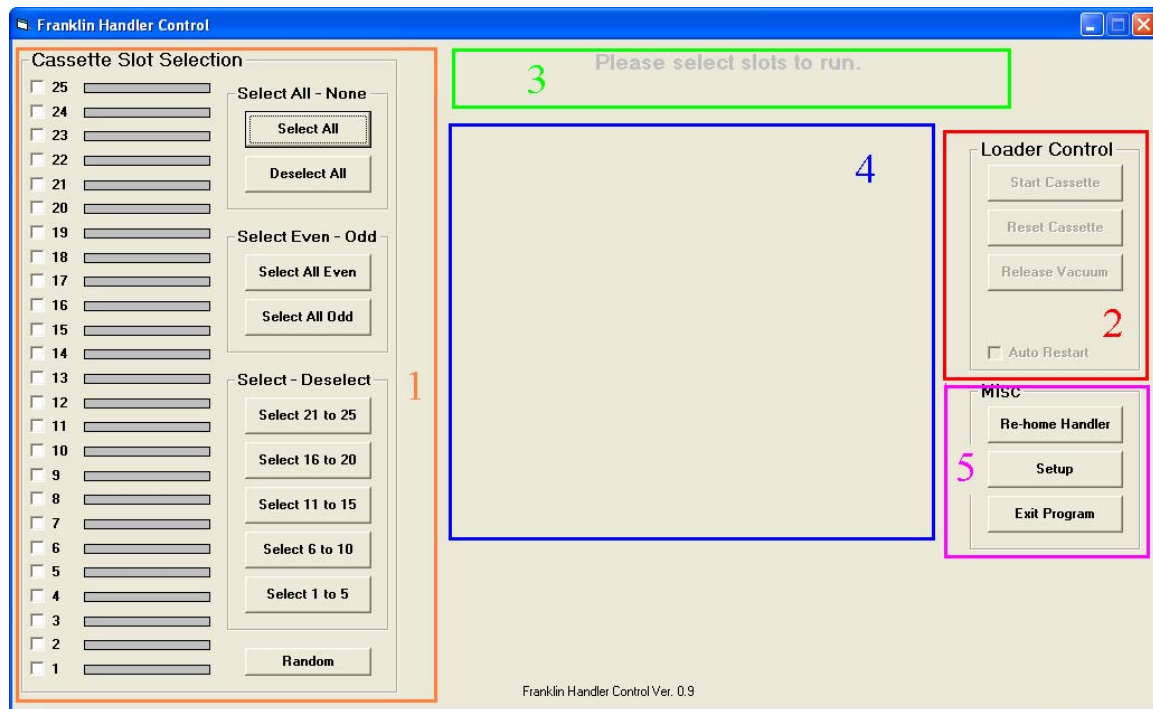


Figure 1.

Section 1. Cassette Slot Selection

Using the controls in this section allows very quick selections of the cassette slots. The various buttons can be used to pick all or none, all even, all odd, groups of five slots, or random selections. The check boxes at the left side of the control provide a means to select or deselect slots on an individual basis.

Section 2. Loader Control

These controls begin the cassette cycle, reset the cassette, release vacuum on the stage and end effector (in the event a wafer needs to be manually removed from the system) and allows the automatic restarting of the cassette cycle after cassette replacement.

Section 3. Operator Messages

This section of the control displays various messages during operation. Some pertain to the current operation such as fetching a wafer from a cassette slot and other operations. Others are operator instructions used to notify the operator to return the stage to the load/unload position or to exchange the cassette and other operator required actions.

Section 4. Error Display Area

This area of the interface is used for error messages and descriptions. In the event of an error, a message is given and options become available as to a course of action the operator can perform.

Section 5. Misc. Controls

Controls for re-homing the system, entering the system setup control and exiting to the Windows desktop are available within this section.

Typical Operation

After the handler system has been initialized and resting in an idle state, operation should begin with the operator placing a cassette containing at least one wafer on the cassette elevator platform.

The operator would then select the desired slot(s) of the cassette containing wafer(s) to inspect or "hand to" another process. This can be as simple as checking a single checkbox to select a single slot or selecting all slots using the "select all" button. In any case, the selected slot indicator turns green for each slot selected and remains gray for any that are unselected. When any slot is selected, the "Start Cassette" control becomes enabled.

When the slot selections are complete, the operator should ensure the inspection stage or other process is ready to accept a wafer by having the device located at the "load/unload" or "loading" position. If so, the "Start Cassette" button can be clicked and will begin the cycle. A wafer will be fetched from the first selected slot (starting from the lowest numbered slot selected and going upwards) and transfer it to the stage or device. The slot indicator turns yellow indicating the system no longer has the wafer and the system waits for operator action. A notification message appears stating, "Waiting for Operator".

If the stage or device is not properly located at the loading position when the "Start Cassette" button is clicked, a *notification message* will appear and the system waits for the operator to position the stage or device properly, at which point the system will automatically continue with the transfer.

In the event the stage or device was properly located at the loading position when the transfer operation had begun, but no longer remains there (stage bumped or repositioned inadvertently), the wafer *is returned to the slot from which it was fetched*, an *error message* (Figure 1, section 4) is generated and the system waits for operator action before proceeding. Details on this section are explained later.

Assuming the transfer was successful, the system waits for the "stage switch" to become inactive. Meaning, the stage or device has moved the wafer away from the loading position. This action signals the control application to now wait for the stage or device to return the wafer to the

loading position. When the “stage switch” again becomes active, the control will attempt to retrieve the wafer and return it to the cassette. If successful, the slot indicator turns black indicating the operation has been completed for that slot. The control will proceed to the next selected slot, fetch the wafer and attempt to hand it to the stage or device and repeat this process until all selected slots have been cycled through.

If the stage switch becomes inactive at any time the handler is attempting to retrieve a wafer, the end effector is retracted, a *notification message* appears, instructing the operator to return the stage to the loading position. The wafer *must remain at the loading position for three seconds* and after that delay, another attempt to retrieve the wafer will begin.

After successfully cycling through all the selected wafers of the cassette, the robot is positioned pointing towards the stage, the elevator is sent to its upper travel and a notification message appears stating, “Waiting for cassette to be placed/replaced on elevator”. The system waits for the removal of the cassette and when detected displays, “No Cassette Loaded” and continues waiting. When a new cassette is placed on the elevator, two messages appear. The first, “Cassette Loaded, click Start Cassette to continue” and “Changes to slot selections may be made at this time”. Slot selections are never changed or reset unless done so by the operator. It is the responsibility of the operator to select the proper slots to cycle through.

If it is desired, checking the “Auto Restart” checkbox of the Loader Control causes the control to automatically restart the cycle. This means the only operator action necessary to run multiple cassettes is, exchanging the cycled cassettes with un-cycled cassettes. If this option is chosen, after a cassette has been exchanged, a notification message will appear stating, “Restarting cassette in: 10 seconds” and counts down from ten seconds and then restarts the cycle automatically using the current slot selections.

Control Details

Detailed information pertaining to the controls of Sections one, two and five of the handler control follow.

Section 1. Cassette Slot Selection

The screenshot shows a control panel titled "Cassette Slot Selection". On the left, there is a vertical list of 25 slots, numbered 1 to 25 from bottom to top. Each slot has a small square checkbox to its left and a horizontal bar to its right. The checkboxes for slots 1 through 5 are checked, while the others are unchecked. To the right of the slot list, there are three distinct groups of controls. The first group, titled "Select All - None", contains a "Select All" button (highlighted with a dashed border) and a "Deselect All" button. The second group, titled "Select Even - Odd", contains a "Select All Even" button and a "Select All Odd" button. The third group, titled "Select - Deselect", contains five buttons for selecting ranges of five slots: "Select 21 to 25", "Select 16 to 20", "Select 11 to 15", "Select 6 to 10", and "Select 1 to 5". Below this group is a "Random" button.

There are several controls associated with this section. The design allows for very quick and easy slot selections. The controls are arranged in groups according to function. Some of these controls "toggle" slot selections, others do not. Check boxes toggle slot selection as either selected (checked) or unselected (unchecked). The group of "Select - Deselect" buttons allows selecting or unselecting groups of five slots at a time. These controls also toggle slot selections. The sections, "Select All - None" and "Select Even - Odd" do not toggle slot selections and their functions are implied along with the "Random" control which is also self-explanatory.

Horizontal “slot indicators” in the center of the control provide a type of visual status indication as to the status of the current cassette and operation in progress. By default, all slots are unselected and show as light gray in color. Whenever any slot becomes selected, the indicator for that slot turns green. In the course of operation, when a wafer has been transferred away from the handler system, the slot indicator will be yellow. Once the wafer has been returned to the cassette, the slot indicator will turn black indicating the wafer has been returned to the cassette.

If a wafer has been skipped over, the indicator for that slot will remain green. This situation could happen in the event of the handler system failing to fetch a wafer from the cassette because of vacuum issues and the operator has chosen to ignore that wafer.

Once the slots selections are made and the cassette cycle has been started, all controls in this section become disabled and unavailable for use until either the cycle is completed or the operator initiates a Reset Cassette command.

Section 2. Loader Control



The “Loader Control” could be considered the heart of the system operation. It contains three buttons and a check box. The “Start Cassette” button being the most important, begins the cassette cycle based on the slots currently selected. When this button is enabled, a cycle can be started. Once started, this button becomes disabled until the end of the cycle or, the cycle can be prematurely ended using the “Reset Cassette” control at any time it becomes enabled.

The “Reset Cassette” button serves only one purpose, which is to basically reset the system to an idle state. It becomes enabled at only two points of operation. The first is whenever a wafer has been transferred to the stage or other device and the system is in the idle state waiting for the “stage switch” to become activated indicating the handler should retrieve the wafer. When the “stage switch” again becomes active, the “Reset Cassette” becomes disabled. The second point is after the completion of a cassette cycle.

At the completion of a cycle, the “Cassette Slot Selection” control remains disabled thereby disallowing any changes to be made of selected slots. The “Reset Cassette” control will be enabled and a notification message will be displayed stating, “Waiting for cassette to be placed/replaced on elevator”. Two possibilities of operation can be made at this point. The first is to exchange the current cassette with a new one. This action re-enables the “Cassette Slot Selection” control thereby allowing slot selection changes to be made and the “Start Cassette” button will also become re-enabled. The second option is to click the “Reset Cassette” button, which achieves the same thing but does not require removal of the currently loaded cassette.

The “Release Vacuum” button causes the release of vacuum on both the stage chuck and end effector. It becomes active only when a wafer has been transferred to the stage or other device and while the handler is waiting for its return to the loading position. Generally speaking, this button should never need to be used, but does provide a means of releasing the vacuum if it should ever become necessary to manually remove a wafer.

The “Auto Restart” checkbox, controls whether or not the system will automatically begin the cassette cycle after the exchange of cassettes without the need to click the “Start Cassette” button. The default state is unchecked, which requires the operator to click the “Start Cassette” button every time the cassettes are exchanged. Checking this box enables a ten second timer that begins countdown at the time a new cassette is placed on the elevator platform. When the ten-second timer expires, the cassette cycle begins and the first selected wafer is fetched and transferred.

If the cassette is removed during the timer countdown, the timer is reset to ten seconds and the system waits for the cassette to be replaced, at which point the countdown resumes. This applies only to versions beginning after 0.9. With version 0.9 and earlier, the timer countdown continues until it expires. A notification message will be displayed and the cassette must be replaced and the “Start Cassette” button must be clicked to continue.

Section 5. Miscellaneous Controls.



The function of the “Re-home Handler” button is to provide a means of “resetting” all the axis of the system to their respective “home” positions. Normally, an operator should never need to re-home the system. If however, an axis were inadvertently bumped changing its current position or manually positioned as in while going through the setup procedure, this control makes it possible to recover from such an instance without having to power down the handler and restarting the control application.

The “Setup” button, when clicked, will bring up a dialog box asking for the setup password. If the correct password is entered, the system setup and configuration page will appear. Otherwise, the dialog box allows for six tries and if the correct password is still not entered, closes back to the main control. The system setup is beyond the scope of this document and therefore will not be covered here. Please refer to the “Elevator – Robot Setup” documentation for the setup details.

The “Exit Program” provides a way of closing the Franklin Handler Control application. Depending on the type of installation, two different operational modes are available. When installed as a standalone application running from a notebook computer attached to the system, the handler control is configured at Franklin to run in “full screen, secure mode” which denies access to the system desktop and other programs. Clicking the “Exit Program” button when running in this mode, brings up a password dialog box and an authorized individual, can enter the correct password to gain access to the system desktop. This password is different than the setup

password. When the Franklin Handler Control application is installed on a desktop computer, it is normally configured to run in a window and allows access to the system desktop. If the “Exit Program” button is clicked when the system is running in this mode, no password is required to end the application and the application closes.

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