13. DIGISPENSE STRIPER STYLE B CONTROLLER MODULE
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13.1 DESCRIPTION

The Digispense Striper Style B Controller Module, hereafter referred to as the Controller Module, contains all the control, monitoring, and interface components for the striping operations. The operator indicators, controls, and interface connections are located on the front and rear panels. The Controller Module measures 197mm (7.8”) tall, 364mm (14.3”) wide and 391mm (15.4”) deep and weighs approximately 9.6 kg (21.0 lbs).

13.1.1 Front Panel Detail (Figure 13.1)

The front panel contains the operator interface for controlling the system. The following items are located on the front panel.

1. Power Indicator
2. Touchscreen

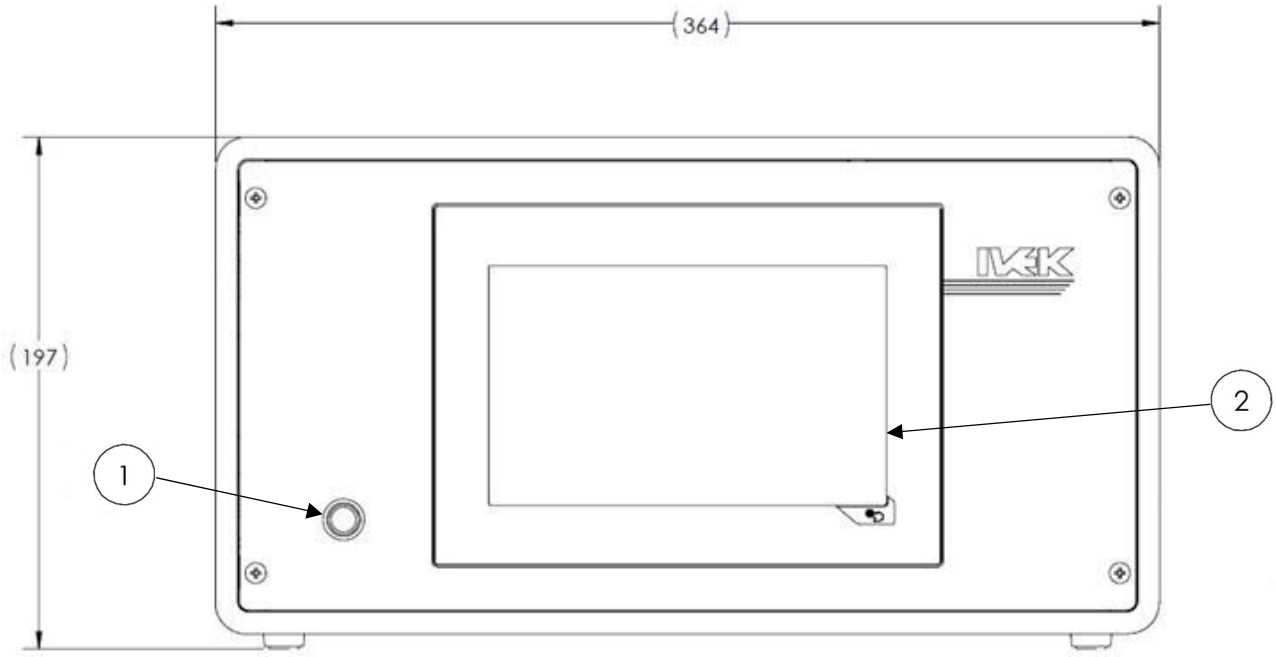

Figure 13.1 – Digispense Striper Style B Controller Module Front Panel

13.1.1.1 Power Indicator (Figure 13.1 Item 1)

The power indicator illuminates green when the power is ON and is not illuminated when the power is OFF.

13.1.1.2 Touchscreen (Figure 13.1 Item 2)

The touchscreen is the operator interface for controlling the system. Multiple screens are provided for setting and monitoring system parameters. With a touch of the screen, parameters can be viewed and changed to meet specific requirements.

13.1.2 Rear Panel Detail (Figure 13.2)

The rear panel contains the interface connections for controlling the system. The following components are located on the rear panel.

1. Power Entry Module
2. Fan
3. STRIPER BED Connector
4. TIP GANTRY Connector
5. I/O FUSE
6. PUMP1-8 Connectors
7. CC TRIGGERS Connector
8. RS232 Connector
9. USB Connector
10. ETHERNET Connector

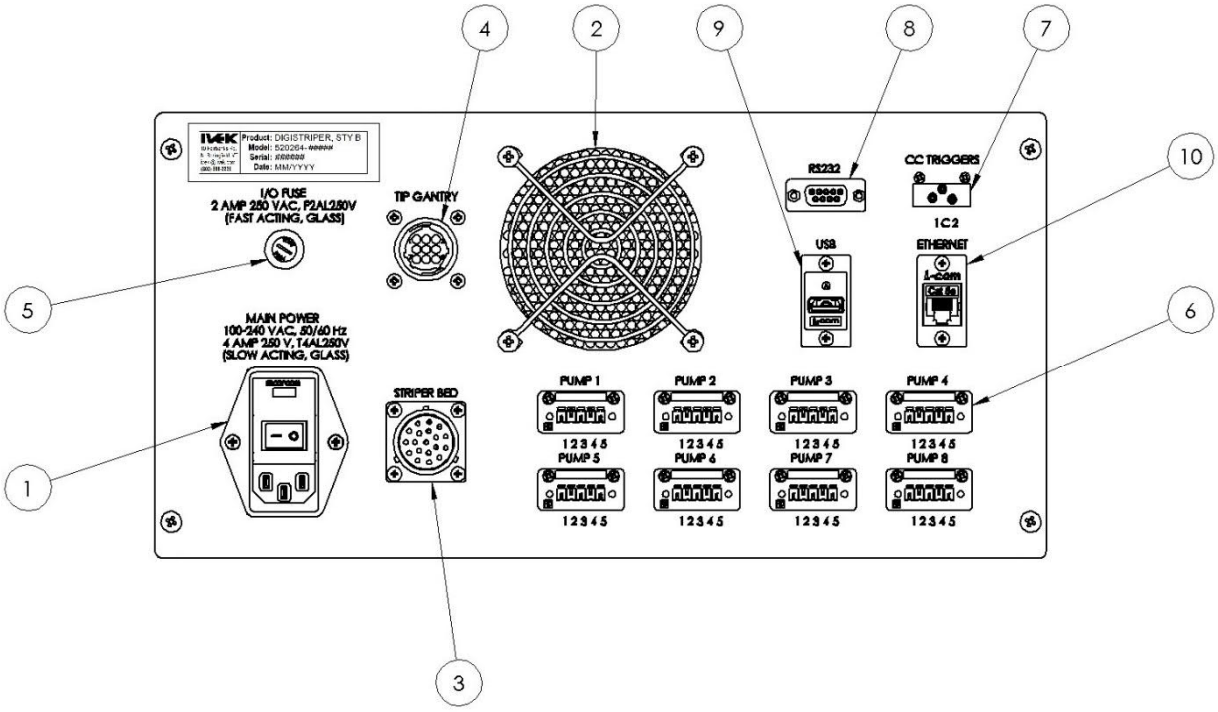

Figure 13.2 – Digispense Striper Style B Controller Module Rear Panel

13.1.2.1 Power Entry Module (Figure 13.2 – Digispense Striper Style B Controller Module Rear Panel Item 1)

The power entry module contains a receptacle for a standard IEC power cord, an On (1) Off (0) switch, fuse holder and fuses.

The design of the power entry module requires the line cord be disconnected before the fuse holder is removed.

13.1.2.2 Fan (Figure 13.2 – Digispense Striper Style B Controller Module Rear Panel Item 2)

The fan keeps the devices in the Controller Module from getting too hot. Make sure the area around the fan is clear of obstructions.

13.1.2.3 Striper Bed Connector (Figure 13.2 – Digispense Striper Style B Controller Module Rear Panel Item 3)

The Striper Bed Connector connects the Controller Module to the Striper Bed Module. The connector contains the signals for the motor, sensors, triggers, emergency stop switches, and limit switches.

Pin	Description	Pin	Description
A	Motor A	L	Vacuum Enable +
B	Motor B	M	Motor /A
C	Motor /B	N	E-Stop +
D	Key	P	E-Stop -
E	Vacuum Enable-	R	None
F	+24V I/O	S	Reserved
G	Right Position Sensor	T	Reserved
H	Left Position Sensor	U	+24V E-Stop
J	+24V Common	V	Functional Ground
K	Stripe Trigger +		

CAUTION

Never connect or disconnect the cable from this connector while power is on. Damage to the equipment may result.

13.1.2.4 Tip Gantry Connector (Figure 13.2 – Digispense Striper Style B Controller Module Rear Panel Item 4)

The Tip Gantry Connector connects the Controller Module to the Striper Bed Tip Gantry. The connector contains the signals for the tip solenoids.

Pin	Description	Pin	Description
1	Tip 1-	6	Tip 6-
2	Tip 2-	7	Tip 7-
3	Tip 3-	8	Tip 8-
4	Tip 4-	9	+24V Tips
5	Tip 5-		

CAUTION

Never connect or disconnect the cable from this connector while power is on. Damage to the equipment may result.

13.1.2.5 I/O Fuse (Figure 13.2 – Digispense Striper Style B Controller Module Rear Panel Item 5)

The I/O Fuse offers protection to the +24V signal that supplies power to the tip solenoids, vacuum, and I/O signals.

13.1.2.6 Pump 1-8 Connectors (Figure 13.2 – Digispense Striper Style B Controller Module Rear Panel Item 6)

The Pump 1-8 Connectors provide the interface to the Digispense Controller Modules (e.g., DS2000, DS3020, DS4000BT). The signals consist of a Trigger signal to start dispensing operations as well as a Ready input to monitor the status of each Controller. IVEK offers cable assemblies for connection to each type of Digispense controller.

Pin	Striper Signal	Connect to Digispense Signal
1	Pump Trigger Out +	CC In + configured for Production Trigger In +
2	Pump Trigger Out –	CC In – configured for Production Trigger In -
3	Pump Ready In +	Aux Out + configured for Ready Out +

4	Pump Ready In –	Aux Out – configured for Ready Out -
5	Functional Earth Ground (Shield)	N/A

13.1.2.7 Contact Closure Triggers (Fig. 3.2 – Digispense Striper Style B Controller Module Rear Panel Item 7)

The Contact Closure Triggers connector provides an interface to the Stripe Trigger signal and the Vacuum Enable signal. These signals may be activated by contact closure devices such as relays and switches.

Pin	Description
1	Stripe Trigger +
2	Common
3	Vacuum Enable +

13.1.2.8 RS232 Connector (Figure 3.2 – Digispense Striper Style B Controller Module Rear Panel Item 8)

The RS232 Connector is presently unused.

Pin	Description
2	RS232 RxD
3	RS232 TxD
5	COMMON

13.1.2.9 USB Connector (Figure 3.2 – Digispense Striper Style B Controller Module Rear Panel Item 9)

The USB Connector is presently unused.

13.1.2.10 Ethernet Connector (Figure 3.2 – Digispense Striper Style B Controller Module Rear Panel Item 10)

The Ethernet Connector is presently unused.

13.2 OPERATION

The Striper Module incorporates IVEK's quantitative Digispense Linear Dispenser technology into a semiautomatic positioning and dispensing system intended for continuous, precision fluid dispensing onto membrane substrates. A vacuum plate securely holds membrane substrates during travel under the dispense tips. The precisely controlled motions of the vacuum plate slide carriage and IVEK Digispense Controller Modules combine to give extremely precise and consistent reagent line impregnation. The Controller Module interfaces between the Striper Module and Pump Modules and the Digispense Controller Modules which control the Actuator and Pump Modules. The Controller Module controls the tip and bed movements on the Striper Module and the triggering of the Digispense Controller Modules for the striping operation.

The profile of the movement of the vacuum plate through the striping sequence is determined by, and changeable through, the use of Parameters. Various Parameters that impact the motion profile of the plate as well as the operating sequence determine the resulting plate movements during the striping sequence. The quality of the striped reagent on the membrane also depends on the fluidic Parameters which are configurable on the Digispense Controller Modules. In order to achieve desired fluidic behavior in a specific application, it is important to determine the proper values for various Parameters, in combination with proper fluidic components (reservoir, tubing, tips, etc.).

Most Parameters are stored in non-volatile memory. There are also a few Parameters that are volatile, most of these contain status information.

13.2.1 Striping Operation

A Striping Operation is the primary operating mode of the Striper System. This operation causes the Vacuum plate to move in a sequence beneath the tips while commanding the Digispense Controller Modules to dispense fluid (typically the Digispense Controller is configured for Meter mode). There are several parameters that affect the Striping operation which may therefore affect the quality of the stripe. These parameters, in conjunction with the fluidic parameters (configured at the Digispense Controller Modules), affect the quality of the resulting stripes and need to be experimented with in each application to determine the best combination for that specific application.

Upon a Start Stripe command, the plate moves to the stripe start position at a rate determined by the Return Speed parameter. The stripe start position is determined by the Margin Distance, the Striping Direction, and the Plate Offset. Once the plate is at the stripe start position, the tip solenoids are activated (in Auto Up/Down Tip Mode), placing the tips in the down position, and a dwell occurs as determined by the Tip Dwell parameter (in Always Down Tip Mode the tips are already down and the tip dwell parameter is ignored). After the tip dwell expires, the pumps are activated for a period of time, determined by the Pump Pre-dwell parameter, while the plate remains stationary. After the Pump Pre-dwell expires, the table starts moving at a rate determined by the Stripe Speed parameter.

Once the plate has moved the distance determined by the Stripe Length parameter, the pumps are deactivated and the plate continues to move the distance determined by the Wipe Length parameter at a rate determined by the Stripe Speed parameter. After the plate has moved the distance determined by the Wipe Length parameter, the table continues moving to the Return position at a rate determined by the Return Speed. After the plate reaches the Return position, the operation changes to idle at which point the membrane may be removed and a new one inserted in its place.

The vacuum to hold the membrane is controlled independently from the Striping operation. Typically, the vacuum is disabled while changing the membrane on the plate, and then enabled once the membrane is in place. A footswitch interface is provided to ease the operator control of the vacuum during the membrane change.

13.2.1.1 Striping Direction

There are three Striping Direction options: Right Only, Left Only, or Both. The Striping Direction offers flexibility in the production flow. The different options should be evaluated for each specific application.

Right Only allows for striping operations to be performed only as the plate moves from left to right. In this mode, the Return position will always be at the left reference sensor position. After the Striping operation completes, the plate will return to the left reference sensor position. The advantage of this option is that the stripe begins near the plate reference line and the tip is visible to the operator while the striping operation is in process.

Left Only allows for striping operation to be performed only as the plate moves from right to left. In this mode, the Return position will always be at the right reference sensor position. After the Striping operation completes, the plate will return to the right reference sensor position. The advantage of this option is that the plate returns to a position with the most room to change the membrane.

Both allows for striping operations to be performed as the plate moves in either direction. In this mode, the Return position will alternate between the left reference sensor position and the right reference sensor position. The advantage of this operation is that it can achieve the fastest cycle time when the membrane is nearly the length of the plate. The disadvantage is that the Return location (and hence the membrane change location) alternates between two positions.

13.2.1.2 Stripe Length

The Stripe Length parameter determines the total distance the plate moves underneath the tip while commanding the Digispense Controller Modules to pump fluid. Often the very beginning of the stripe and the very end will have inconsistent fluid flow due to the starting and stopping of the pump, as well as the acceleration of the plate. Therefore, it is often necessary to have a Stripe Length slightly larger than the desired final stripe.

13.2.1.3 Margin Distance

The Margin Distance parameter adjusts the stripe starting point away from the zero reference line on the plate. Often a little bit of margin is necessary to move the tip in a bit from the membrane edge as the membrane edge can often curl a little bit. Stripe Length plus Margin Distance cannot exceed 450 mm, see diagram in section 13.14.

13.2.1.4 Wipe Length

The Wipe Length parameter causes the plate to continue to move after the pumps stop dispensing. This allows any excess fluid to wipe off onto the membrane in preparation for the next striping operation.

13.2.1.5 Stripe Speed

The Stripe Speed determines the speed the plate moves during the Stripe Length distance. The speed of the plate in combination of the pump dispense rate determines the thickness of the resulting stripe.

13.2.1.6 Return Speed

The Return Speed parameter determines the speed of the plate when moving to and from the Return position. The Return Speed does not determine the speed during either a Reference operation or a Tip Adjust operation.

13.2.1.7 Tip Mode

There are two Tip Modes: Auto Up/Down and Down Always.

Auto Up/Down Tip Mode is the typical mode. In this mode, the tips are place in the down position when the stripe start position is reached in a Striping operation, and placed back into the up position at the end of the stripe (after the table has moved the Stripe Length and Wipe Length distances).

Down Only Tip Mode allows the tips to stay down during the entire Striping operation, including the movement to the Return position. Also in this mode, the Tip Dwell is bypassed.

CAUTION

If the Tips are in the down position, and the Striper Bed has a white roller guard belt that is higher than the plate, the tips may crash into the belt causing damage to the tips or belt. To help protect against this occurrence, the Always Down mode is not available when the Guard Belt is configured for "Above Plate".

13.2.1.8 Tip Dwell

The Tip Dwell parameter determines the length of time the tips dwell when transitioning from up to down before the plate continues moving.

13.2.1.9 Pump Pre-dwell

The Pump Pre-dwell parameter determines how long the pumps pump at the start stripe position before the plate starts to move. Some applications may require a bit of pumping before plate movement to properly prepare the fluidics at the tip.

13.2.1.10 Enable Pumps

The Enable Pumps buttons determine which pumps will dispense fluid during the Striping operation. The Ready Out signal from the Digispense Controller must indicate a ready status for each pump that is enabled. If a Digispense Controller indicates that it is not Ready, the Striping operation will be inhibited until all enabled pumps indicate a ready status.

13.2.2 Tip Adjust Operation

The Tip Adjust operation is useful to set the height of the tips of the Striper Bed Module to maintain a proper gap between the tips and the vacuum plate. The gap between the tips and the plate are configured by mechanically adjusting the tips relative to the plate (see chapter 15). To help facilitate this, the Tip Adjust operation moves the plate to a position determined by the Tip Adjust Position. Once in position, individual tips may be raised up and lowered down using buttons on the Touchscreen (Striper Adjust screen) or by using one of the Start Striping Trigger signals.

While the Tip Adjust operation is active, and when the tips are in the tips up position, the plate may be moved by changing the Tip Adjust Position. Upon changing this parameter, the plate moves to the new position.

The Tip Adjust operation is stopped pressing either the Stop Tip Adjust button, the Stop button, or by leaving the Striper Adjust screen.

13.2.2.1 Absolute Position

The Absolute Position parameter indicates the position of the plate relative to the left reference sensor. The Absolute Position is 0.00mm when the plate is at the edge of the left reference sensor. As the plate moves towards the right reference sensor, the Absolute Position increases.

13.2.2.2 Plate Offset

The Plate Offset parameter is used to inform the Controller of the position of the plate that causes the zero reference line of the plate to be directly underneath the tips. This value is configured by IVEK and should not require modification.

13.2.2.3 Referenced Distance

The Referenced Distance parameter indicates the measured distance between the left reference sensor and the right reference sensor. This is for information purposes only.

13.2.2.4 Present Speed Target

The Present Speed Target parameter indicates the target speed of the plate movement. This parameter does not indicate the actual instantaneous speed as there is acceleration and deacceleration involved with starting and stopping the plate.

13.2.2.5 Relative Position

The Relative Position indicates the position of the tips relative to the reference lines (zero and max) of the plate. When the tips are between these two reference lines, the Relative Position indicates the distance of the tips from the zero reference line. When the tips are to the right of the zero reference line of the plate, the Relative Position indicates 0.00mm. When the tips are to the left of the max reference line of the plate, the Relative Position indicates the Vacuum Plate Length.

13.2.2.6 Tip Adjust Position

The Tip Adjust Position parameter is used to determine the location of the tips relative to the zero reference line of the plate during the Tip Adjust operation. Typically, the position is configured so that the tips are at a spot relative to the plate where feeler gauges may be slid between the tips and the plate in the process of mechanically adjusting the tips.

13.2.3 Reference Operation

A Reference operation is required when the Striper Bed plate is in an unknown position. This occurs after power-up as well as after a fault condition. The referencing sequence consists of moving the motor, and hence the plate, in the necessary sequence to detect the end of travel sensors. The Reference Start command initiates the Reference operation.

Upon initiation, the plate moves to find the edge of the left reference sensor. After finding this edge, the table move to the right to find the edge of the right reference sensor. After finding this edge, the table returns to the left reference sensor position. This position is considered 0.00mm in regard to Absolution Position.

If a sensor is not found or is an unexpected location, the Reference operation will terminate and indicate a fault condition. After a Reference operation successfully completes, the Striper Bed is ready to begin either Striping or Tip Adjust operations.

13.2.4 Return Operation

A Return operation is required when the Striper Bed is referenced, but stopped in a position other than the reference position. For example, after terminating a Tip Adjust operation, it is necessary to initiate a Return operation to return the plate to the proper reference position before starting a Striping Operation.

13.2.5 I/O Test Operation

The I/O Test operation provides indicators and buttons to verify the status of certain I/O signals on the Striper Module. An I/O Test operation may be initiated by pressing the Start I/O Test button on the System Logic screen. While in I/O Test mode, the Pump Trigger signals may be forced active and the status of the Pump Ready signals, Start Triggers, and Vacuum Enable signals may be monitor.

13.3 TOUCHSCREEN

The Touchscreen provides an operator interface to all operating parameters in the Controller Module. New values can be entered and current values displayed for all the functions of the system. The present operating mode and system status are shown on the screen. The touchscreen contains multiple interface screens each providing information to the operator.

13.3.1 Introduction

The touchscreen employs various features to interact with the operator and communicate information.

Buttons - A button initiates a command being sent to the Controller Module. The "Start Stripe" and "Stop" area in the Main Screen (Figure 13.3) are examples of buttons. Some buttons will lock based on the present state. For example, the “Stop” button locks when the Controller is in the Idle state. A button is activated by pressing the touchscreen in the area near the button.

Output Boxes – An output box looks like a button but provides information only (grey background color). Pressing a box will have no effect on the system. The "Total Cycles” area in the Main Screen (Figure 13.3) is an example of an output box.

Input Boxes – An input box looks like a button providing information and allowing for modification of values (white background color). Pressing the screen in the area around the box will open up a keypad which will allow modification of the value. The "Stripe Length Remaining” area in the Setup Screen (Figure 13.3) is an example of an input box.

Screens – There are six screens used to setup and operate the Controller Module as shown in Figure 13.4. Each screen contains information relating to operating the system. The system status is displayed on each screen and the ability to stop the current operation is available on each screen. The screens and a brief description are as follows:

Main Screen - The system can be operated from this screen.
Setup Screen –The most common system parameters are set on this screen.
Striper Screen - The Striper type is displayed along with several of the Striper Bed’s characteristics.
Striper Adjust Screen – The ability to adjust the tips and plate offset are on this screen.
System Screen – The part number, serial number, firmware version, and other information are on this screen.
System Logic Screen – The ability to monitor the Controller I/O and operate the I/O Test are on this screen.

13.3.2 Operating Status

Each screen contains two combined text areas that show the present operating status of the controller. The two areas are called the Major Status and Minor Status. The background color of each status areas indicates the Ready status of the Controller. When there is a fault condition, the main screen does not display the Major Status and Minor Status. Instead, the screen contains the type of Fault in the Major Status area and more information about the fault in the Minor Status area.

Major Background Color	Minor Background Color	Ready Status
Black	Green	Idle, Ready
Black	Blue	Idle, Not Ready
White	White	Busy
Black	Blue	Faulted

Major Status	Background Color	Minor Status	Background Color	Description
Initializing	White	Initializing Motor	White	The Controller is initializing or changing parameters in the Motor Driver.
Idle	Black	Ready	Green	The Striper Bed is ready to receive a Start Stripe command.
	Black	NOT CONFIGURED	Blue	The Striper Bed parameter has not been configured.
	Black	REFERENCE REQUIRED	Blue	The Striper Bed must be referenced before a Striping operation may be initiated.
	Black	RETURN REQUIRED	Blue	The Striper Bed must be returned to the starting position before a Striping operation may be initiated.
	Black	Pump Not Ready	Blue	At least one of the enabled Pumps is indicating that it is not ready.
Referencing	White		White	A Reference operation is in progress.
Returning	White		White	A Return operation is in progress.
Striping	White	Moving to Start Position	White	A Striping operation is in progress, the plate is moving to the Start Stripe position, the pump is not dispensing fluid, the Stripe Remaining parameter is equal to the Stripe Length parameter.
	White	Tips Down	White	A Striping operation is in progress, the plate is not moving, the tips are moving to the down position, the pump is not dispensing fluid.
	White	Tip Dwelling	White	A Striping operation is in progress, the plate is not moving, the tips are in the down position and the dwell timer has not yet expired.

	White	Pump Dwelling	White	A Striping operation is in progress, the plate is not moving, the tips are in the down position, the pump is dispensing fluid.
	White	Dispensing	White	A Striping operation is in progress, the plate is moving, the tips are in the down position, the pump is dispensing fluid, the Stripe Remaining parameter is decrementing.
	White	Wiping	White	A Striping operation is in progress, the plate is moving, the tips are in the down position, the pump is not dispensing fluid, Stripe Remaining parameter is 0.00mm.
	White	Tips Up	White	A Striping operation is in progress, the plate is not moving, the tips are moving to the up position, the pump is not dispensing fluid.
	White	Returning	White	A Striping operation is in progress, the plate is moving to the Return position, the pump is not dispensing fluid.
Tips Adjust	White	Moving to Tip Adjust	White	A Tips Adjust operation is in progress, the plate is moving to the Tip Adjust position, the tips are in the up position.
	White	Moving to Tip Zero	White	A Tips Adjust operation is in progress, the plate is moving to the plate zero reference position, the tips are in the up position.
	White	Tips Down	White	A Tips Adjust operation is in progress, the plate is not moving, the enabled tips are in the down position, the disabled tips are in the up position.
	White	Tips Up	White	A Tips Adjust operation is in progress, the plate is not moving, all of the tips are in the up position.
I/O Test	White		White	The I/O Test operation is in progress, the plate is not moving. The System Logic screen contains buttons to activate the Logic output signals.
Idle	Black	FAULT	Blue	A fault condition exists in the controller. The fault must be cleared before other operation are possible.
Idle	White	Clearing Fault	White	A fault condition is attempting to be cleared.

13.3.3 Permission Levels

There are four levels of permission (listed from lowest to highest); Operator, I/O Test, Supervisor and Keylock. Each level allows access authority to certain items on the display. The permission level can be changed by entering the correct password using the Password entry box.

The typical use case for permissions is to modify the parameters while at the Supervisor permission level and afterwards limiting modification of those parameters by lowering the permission level to Operator. This reduces the possibility that an Operator will modify a parameter while giving the operator the ability to initiate operations.

The I/O Test level allows access to the same items as the Operator except it also allows access to the I/O Test screen. The Operator level does not allow changing system parameters.

The Keylock level allows for modification of some more advanced parameters. It is generally recommended to only modify such values while being guided by IVEK's technical service personnel.

13.3.4 Screens

There are six screens used to configure and control the system. Table 13.1 lists each screen alphabetically and provides a brief overview of its function. Figures 13.3 through 13.8 show the screens and provides a map of how to get to each screen. Each screen contains navigation buttons to traverse the screens. The Striper Screen has an up/down button set to move between the Striper screen and the Striper Adjust screen. The System Screen has an up/down button to move between the System screen and the System Logic screen.

Screen	Description
Main	The primary screen used while performing Striping operations.
Setup	Provides parameters to modify the Striping operation.
Striper	Allows selection of the proper Striper Bed and number of pumps/tips attached.
Striper Adjust	Allows the operator to perform Tip Adjust operations.
System	Displays the version information and other status information.
System Logic	Allows the operator to perform I/O Test operations.

Table 13.1 - Screen Descriptions

13.3.5 Power Up

The touchscreen will "boot" when the power to the Controller Module is turned on. The "boot' sequence will be visible on the touchscreen and take approximately one minute.

After the "boot" sequence has completed, the touchscreen displays the Main screen. The screen is displayed each time power is turned on.

13.3.6 Main Screen

The Main screen is normally used to operate the system. The Setup, Striper and System screens are accessible from this screen. The status of the Controller Module is displayed on this screen. The Major Status area (e.g., "Idle" with black background) shows the present state of the Controller. The Minor Status area (e.g., "Ready" with green background) shows additional status information.

DIGISPENSE STRIPER STYLE B CONTROLLER MODULE

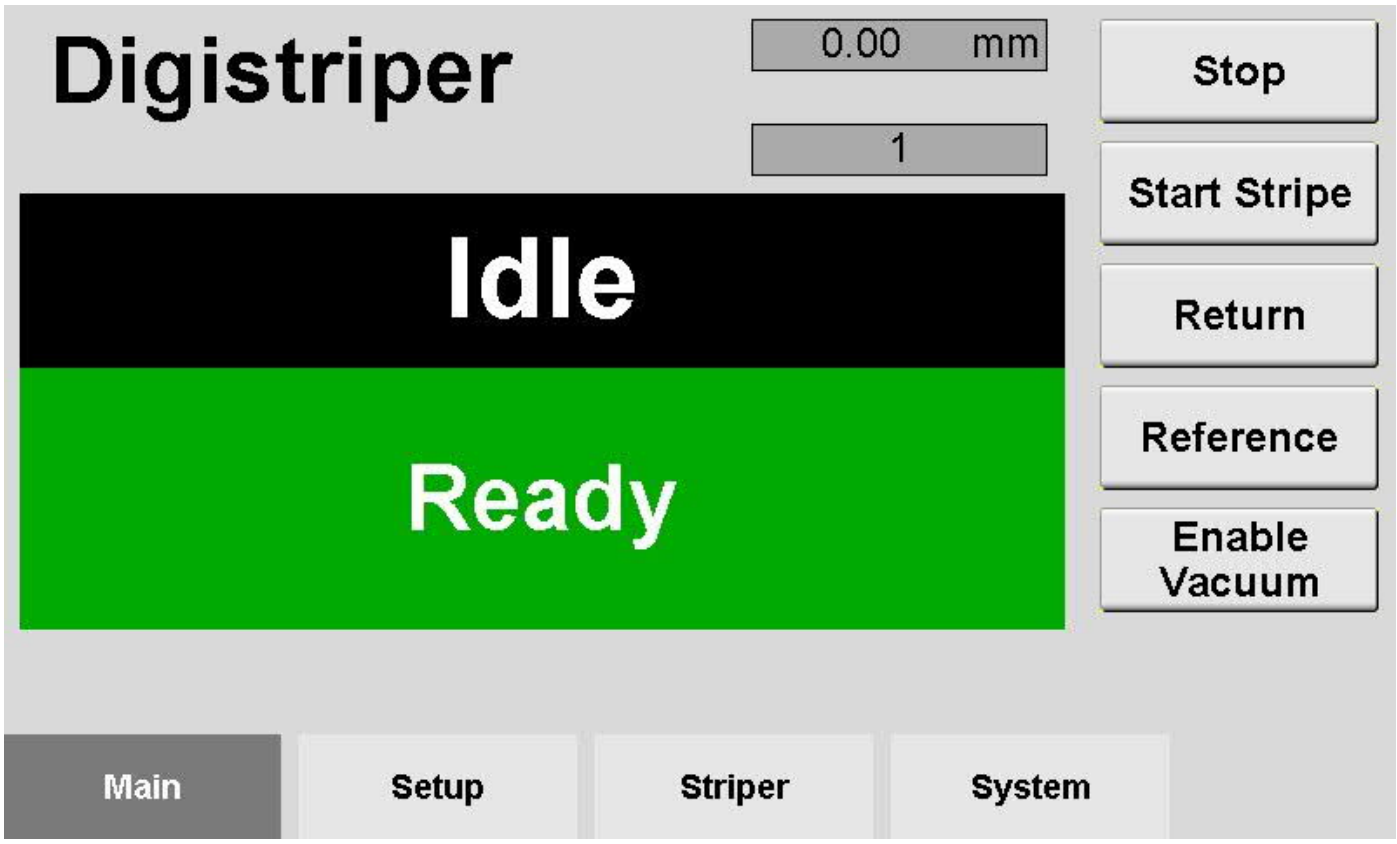

Figure 13.3 – Digispense Striper Style B Controller Module Main Screen

13.3.6.1 Parameters

The following parameters are available on the Main screen: Remaining Stripe Distance, Total Cycles.

Parameter	Description	Values	Permission to Modify
Remaining Stripe Distance	The length of stripe remaining. When a Striping operation begins, this number is set to the Stripe Length and then decrements as the Stripe is traversed, ending at 0.00mm when the Stripe is complete.	0.00mm = Min 450.00mm = Max	None
Total Cycles	The total number of times a Striping operation has been initiated. The Total Cycles increments at the beginning of the Striping operation.	0 = Min 200,000,000 = Max	Keylock to clear

13.3.6.2 Buttons

The following buttons are available on the Main screen: Stop, Start Stripe, Return, Reference, Enable Vacuum, Clear Fault.

Button	Description	Visible	Locked	Permission to Activate
Stop	Stops the present operation	Always	When Idle or Faulted	Operator
Start Stripe	Starts a Striping operation	When no fault	When not Idle or Ready	Operator
Return	Starts a Return operation	Always	When a Return is not required	Operator
Reference	Starts a Reference operation	Always	When not Idle	Operator
Enable Vacuum	Enables the Vacuum	Always	When vacuum enabled by I/O signal	Operator
Clear Fault	Clears a Fault	When faulted	When not faulted	Operator

13.3.7 Setup Screen

The Setup screen contains the parameters that are most commonly changed to affect the Striping operation. The Main, Striper, and System screens are accessible from this screen. The Major status and Minor Status of the Controller Module is displayed on the top of this screen. The present Permission level and Password input box are underneath the Status.

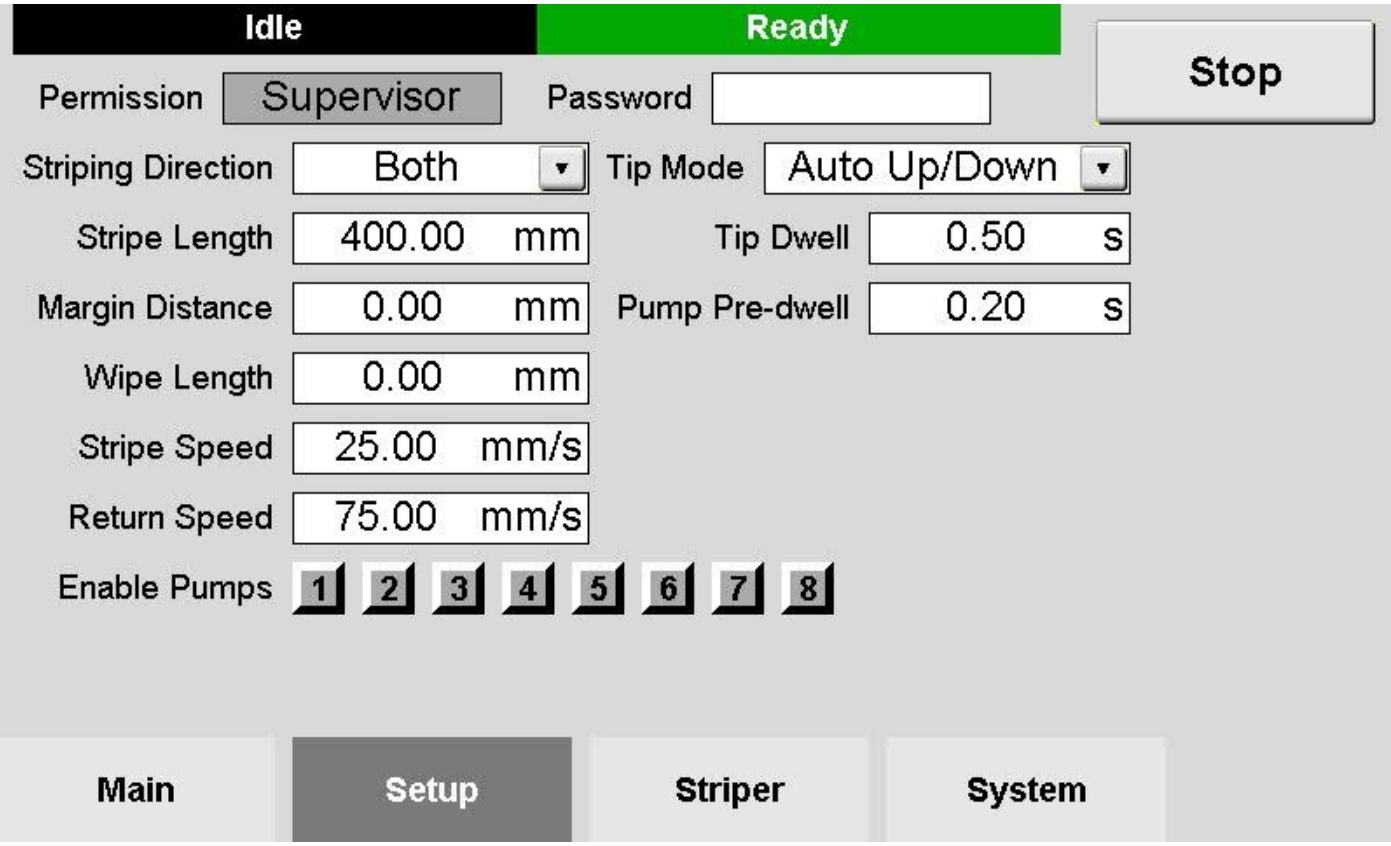

Figure 13.4 – Digispense Striper Style B Controller Module Setup Screen

13.3.7.1 Parameters

The following parameters are available on the Setup screen: Striping Direction, Stripe Length, Margin Distance, Wipe Length, Stripe Speed, Return Speed, Tip Mode, Tip Dwell, Pump Pre-dwell.

Parameter	Description	Values	Permission to Modify
Striping Direction	The direction the plate moves while dispensing fluid during a Striping operation.	0 = Both (Default) 1 = Right Only 2 = Left Only	Supervisor
Stripe Length	The distance the plate moves while dispensing fluid.	0.01mm = Min 450.00mm = Max 400.00mm = Default	Supervisor
Margin Distance	The distance from the plate zero reference to start the Stripe.	0.00mm = Min 100.00mm = Max 0.00mm = Default	Supervisor
Wipe Length	The distance to move the plate with the tips down, after dispensing fluid, in order to wipe excess fluid from the tips.	0.00mm = Min 100.00mm = Max 0.00mm = Default	Supervisor

Stripe Speed	The speed to move the plate while dispensing fluid.	0.01mm/s = Min 100.00mm/s = Max 25.00mm/s = Default	Supervisor
Return Speed	The speed to move the plate when moving to and from the Return position.	0.01mm/s = Min 100.00mm/s = Max 75.00mm/s = Default	Supervisor
Tip Mode	The sequence of the tips during Striping and Return operations.	= Auto Up/Down (Default) = Always Down	Supervisor
Tip Dwell	The time to dwell after putting the tips in the tip down position to give time for the tips to settle.	0.00 s = Min 60.00 s = Max 0.50 s = Default	Supervisor
Pump Pre-dwell	The time to dispense fluid before moving the plate in a Striping operation.	0.00 s = Min 60.00 s = Max 0.20 s = Default	Supervisor

13.3.7.2 Buttons

The following buttons are available on the Setup screen: Stop, Enable Pumps 1-8.

Button	Description	Visible	Locked	Permission to Activate
Stop	Stops the present operation	Always	When Idle or Faulted	Operator
Enable Pumps 1-8	The pumps to enable for the Striping operation. Striping operations will be inhibited if any of the enabled pumps are indicating that they are not ready.	Always	Never	Operator

13.3.8 Striper Screen

The Striper screen contains the parameters that are related to the attached Striper Bed Module. The Main, Setup, and System screens are accessible from this screen. Also, the Striper Adjust screen (Figure 13.6) is accessible by pressing the up arrow button. The status of the Controller Module is displayed on the top of this screen. The present Permission level and Password input box are underneath the Status.

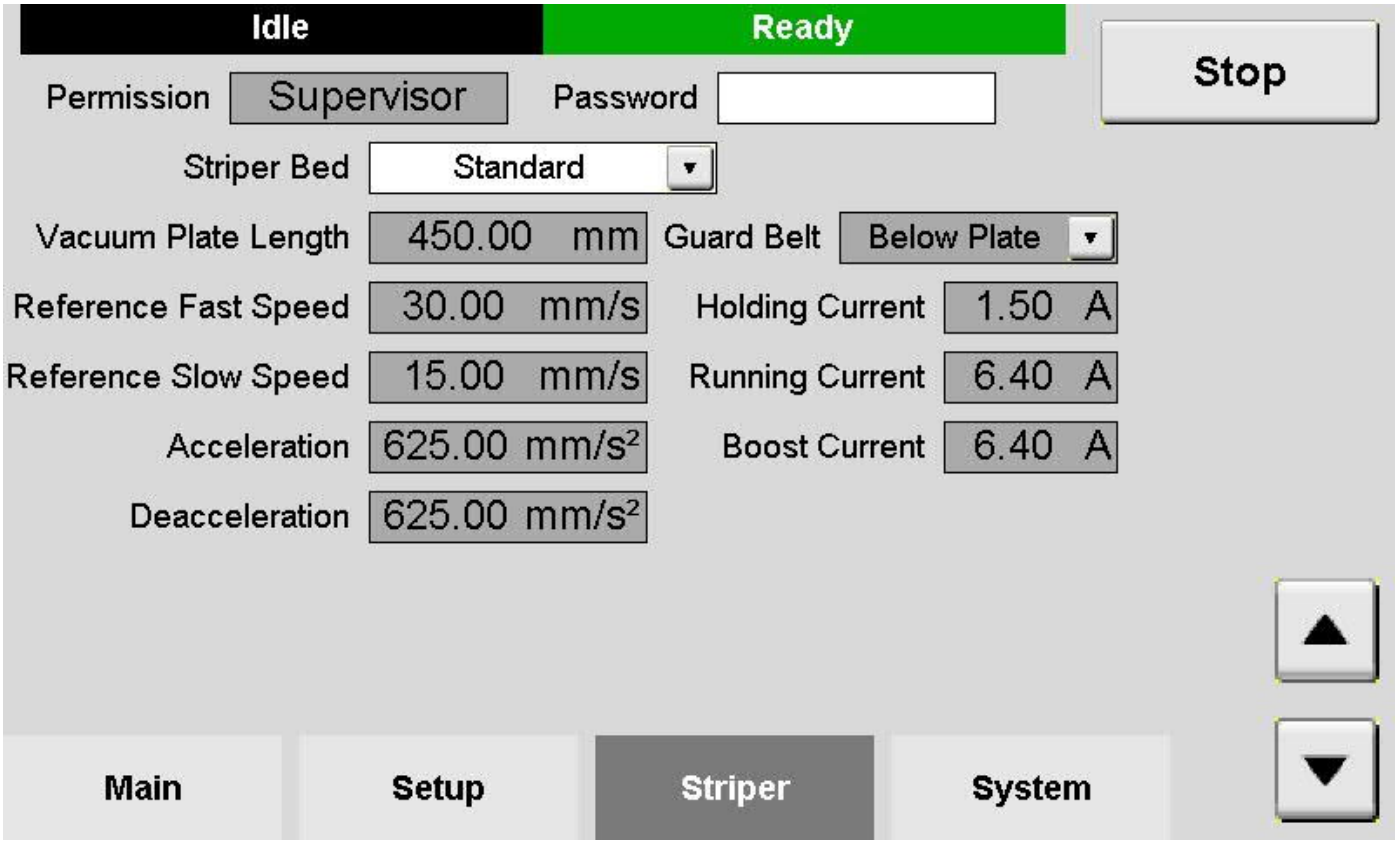

Figure 13.5 – Digispense Striper Style B Controller Module Striper Screen

13.3.8.1 Parameters

The following parameters are available on the Striper screen: Striper Bed, Vacuum Plate Length, Reference Fast Speed, Reference Slow Speed, Acceleration, Deacceleration, Guard Belt, Holding Current, Running Current, Boost Current. Many of these parameters are not modifiable at Supervisor permission level or lower. Such parameters should only be modified under guidance by IVEK Technical Service personnel. It is important that the Striper Bed parameters match the actual Striper Bed that is attached to the Controller.

Parameter	Description	Values	Permission to Modify
Striper Bed	The striper bed presently connected to the Striper Controller module.	0 = None (default) 1 = Standard	Supervisor
Vacuum Plate Length	The length of the vacuum plate that holds the membrane.	0.01mm = Min 1000.00mm = Max 450.00mm = Default	Ivek
Reference Fast Speed	The speed the vacuum plate moves during a reference operation after the reference sensor locations are known.	0.01mm/s = Min 100.00mm/s = Max 30.00mm/s = Default	Keylock

Reference Slow Speed	The speed the vacuum plate moves during a reference while searching for the reference sensor position.	0.01mm/s = Min 100.00mm/s = Max 15.00mm/s = Default	Keylock
Acceleration	The acceleration of the vacuum plate as it increases its speed towards the target speed.	0.01mm/s^2 = Min 2,500.00mm/s^2 = Max 625.00mm/s^2 = Default	Keylock
Deacceleration	The deacceleration of the vacuum plate as it stops.	0.01mm/s^2 = Min 2,500.00mm/s^2 = Max 625.00mm/s^2 = Default	Keylock
Guard Belt	The position of the guard belt relative to the vacuum plate. When the Guard belt is above the vacuum plate, the Always Down Tip Mode is not available as the guard belt would interfere with the tips.	0 = None (None) 1 = Below Plate 2 = Above Plate	Keylock
Holding Current	The current through the motor when the motor is not moving.	0.00 A = Min 10.00 A = Max 1.50 A = Default	Keylock
Running Current	The commanded current through the motor when the motor is moving.	0.00 A = Min 10.00 A = Max 6.40 A = Default	Keylock
Boost Current	The commanded current through the motor during high load times (e.g., during acceleration).	0.00 A = Min 10.00 A = Max 6.40 A = Default	Keylock

13.3.8.2 Buttons

The following buttons are available on the Striper screen: Stop.

Button	Description	Visible	Locked	Permission to Activate
Stop	Stops the present operation	Always	When Idle or Faulted	Operator

13.3.9 Striper Adjust Screen

The Striper Adjust screen contains the parameters that are related to the attached Striper Bed Tip Adjust operation. The Main, Setup, and System screens are accessible from this screen. Also, the Striper screen (figure 13.5) is accessible by pressing either the down arrow button or the Striper button. The status of the Controller Module is displayed on the top of this screen.

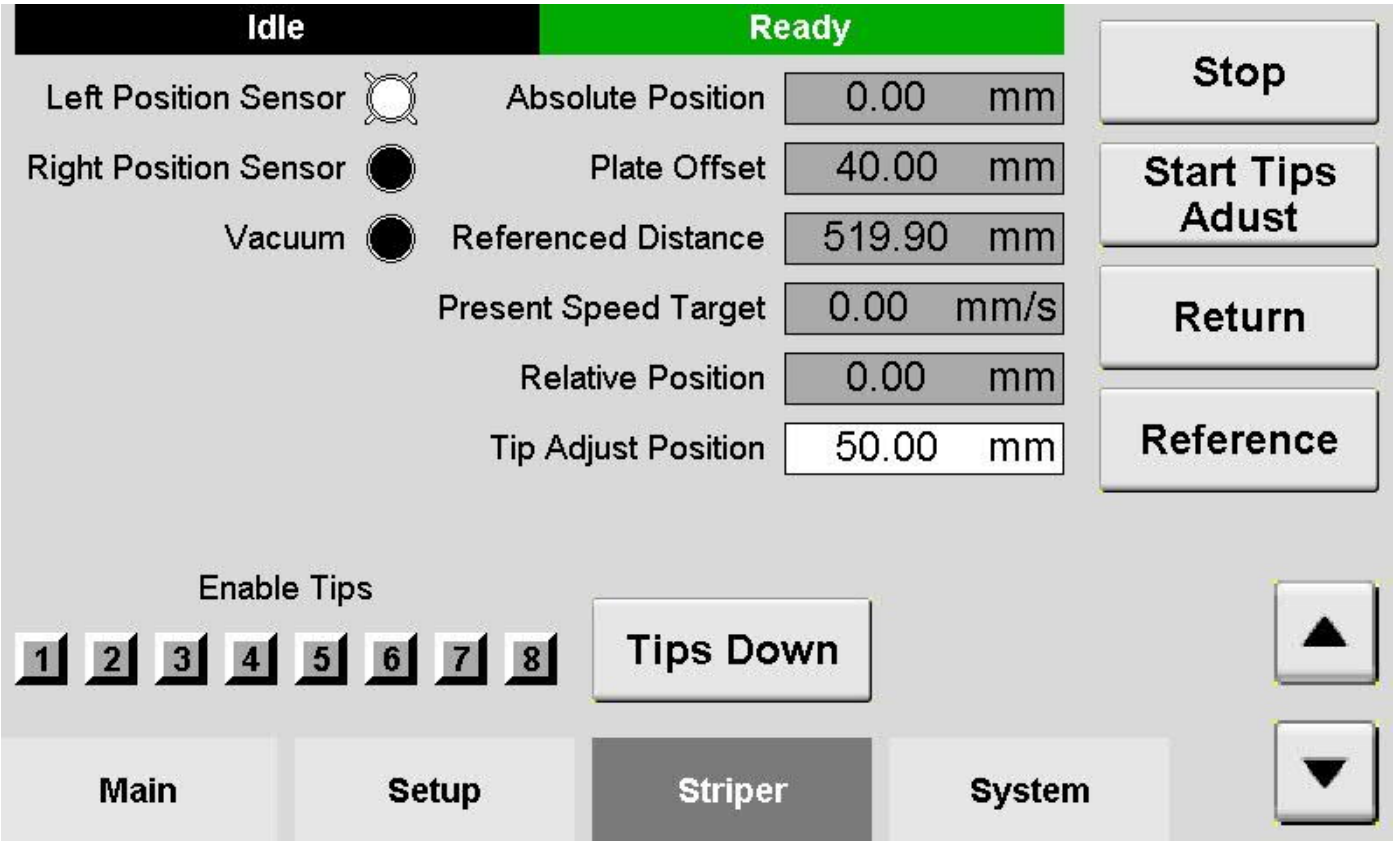

Figure 13.6 – Digispense Striper Style B Controller Module Striper Adjust Screen

13.3.9.1 Parameters

The following parameters are available on the Striper Adjust screen: Plate Offset, Tip Adjust Position. The Plate Offset parameter is not modifiable at Supervisor permission level or lower. This parameter should only be modified under guidance by IVEK Technical Service personnel. It is important that the Striper Bed parameters match the actual Striper Bed that is attached to the Controller.

The following status parameters are available on this screen: Absolute Position, Plate Offset, Referenced Distance, Present Speed Target, Relative Position, Tip Adjust Position.

The following status indicators are available on this screen: Left Position Sensor, Right Position Sensor, Vacuum.

Parameter	Description	Values	Permission to Modify
Absolute Position	The position of the vacuum plate relative to the left reference sensor.	0.00mm = Min 1000.00mm = Max	None
Plate Offset	The absolute position of the plate that causes the tips to align with the zero reference line of the plate.	0.00mm = Min 1000.00mm = Max	Keylock

Referenced Distance	The measured distance between the left reference sensor and the right reference sensor.	0.00mm = Min 1000.00mm = Max	None
Present Speed Target	The target speed of the vacuum plate.	0.01mm/s = Min 100.00mm/s = Max	None
Relative Position	The position of the tips relative to the zero reference line of the plate. When the tips are to the right of the zero reference line, the relative position saturates to 0.00mm. When the tips are to the left of the end of the plate, the relative position saturates to the Vacuum Plate Length.	0.00mm = Min 450.00mm = Max	None
Tip Adjust Position	The position to move the tips, relative to the zero reference line, during tip adjust mode.	0.00mm = Min 450.00mm = Max	Operator

13.3.9.2 Buttons

The following buttons are available on the Striper screen: Stop, Start Tips Adjust, Stop Tips Adjust, Return, Tips Down, Tips Up, Move to Zero, Move to Tip Adjust, Enable Tips 1-8.

Pressing the “Stop” button, or leaving the screen also stops the Tip Adjust operation.

In Keylock permission level the Move To Zero button becomes unhidden and allows the operator to move the plate to the Plate Offset position. At this location, the tip should line up with the line scribed near the edge of the plate. The Plate Offset parameter may be modified until the tip lines up with the scribed line. The plate will move as the Plate Offset parameter is adjusted, as long as the tips are in the Tips Up position. When the plate is at the Plate Offset position, the button changes to Move to Tip Adjust to allow the operator to return the plate to the Tip Adjust Position. Note that the Plate Offset is adjusted at the factory, and it should only be modified under the guidance of IVEK’s Technical Service personnel.

Button	Description	Visible	Locked	Permission to Activate
Stop	Stops the present operation	Always	When Idle or Faulted	Operator
Start Tips Adjust	Start the Tips Adjust operation	When not in Tips Adjust operation	When not: Idle, Return Required	Operator
Stop Tips Adjust	Stop the Tips Adjust operation	During Tips Adjust operation	When not in Tips Adjust operation	Operator
Return	Start a Return operation	Always	When not Return Required	Operator
Reference	Start a Reference operation	Always	When not Idle	Operator

Tips Down	Move the enabled tips into the tips down position	When the tips are not in the tips up position during Tips Adjust operation	When not in Tips Up state	Operator
Tips Up	Move the enabled tips into the tips up position	When the tips are in the tips down position during Tips Adjust operation	When the button is not visible	Operator
Move To Zero	Move the vacuum plate to the Plate Offset position	When the plate is not in the Plate Offset position	When not in the Tip Adjust position with the tips up	Keylock
Move To Tip Adjust	Move the vacuum plate from the Plate offset position back to the Tip Adjust position	When the plate is in the Plate offset position	When not visible	Keylock
Enable Tips 1-8	Enable the tip to move into the down position when the tips are placed into the tips down position during a Tip Adjust Test. While the Tips Adjust operation is in the Tips Down position, pressing the button will toggle the specific tip between the up and down position.	Always	When not in the Tips Adjust test	Operator

13.3.10 System Screen

The System screen contains the parameters that are related to system. The Main, Setup, and Striper screens are accessible from this screen. Also, the System Logic screen (Figure 13.8) is accessible by pressing the up arrow button. The status of the Controller Module is displayed on the top of this screen. The present Permission level and Password input box are underneath the Status.

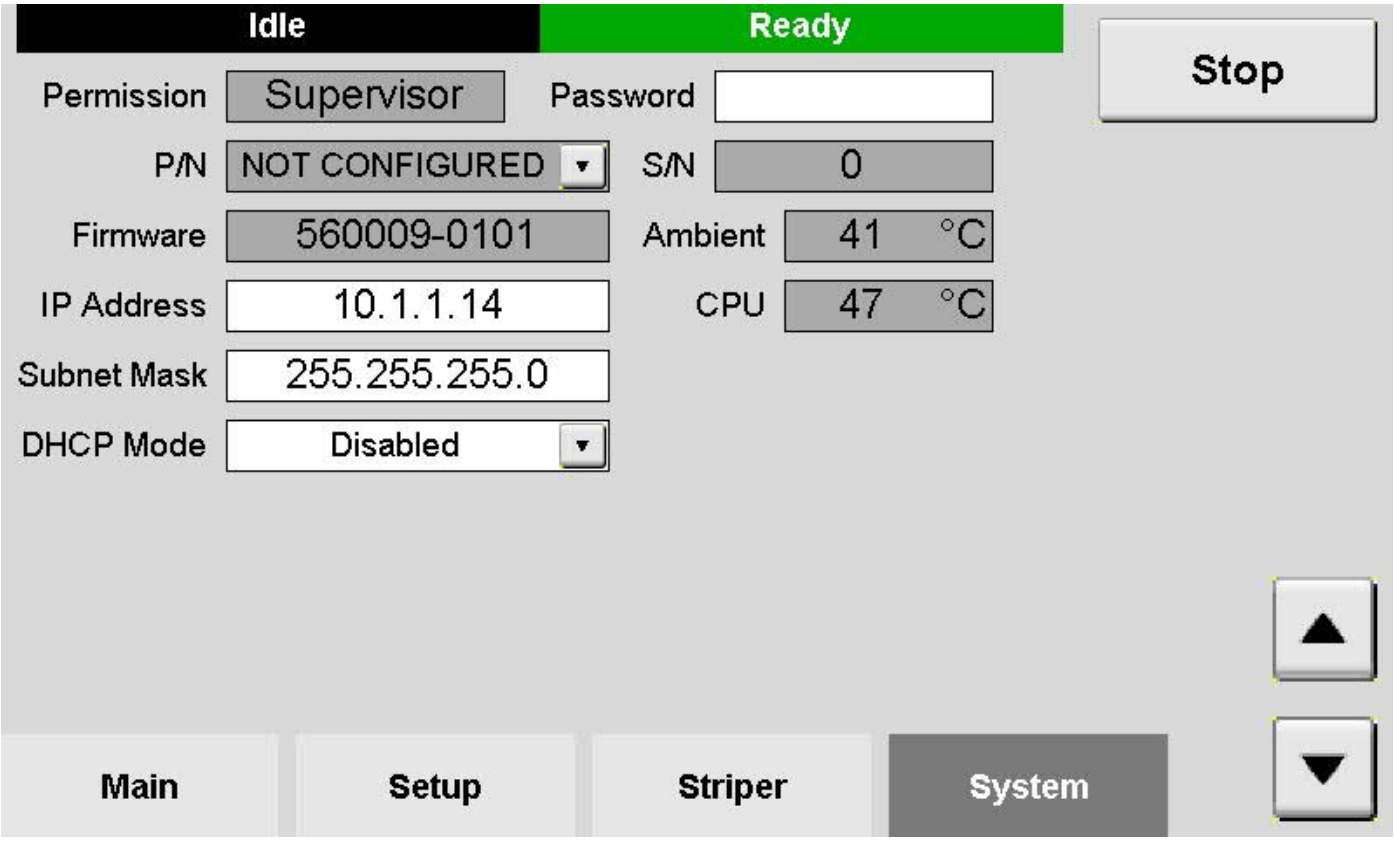

Figure 13.7 – Digispense Striper Style B Controller Module System Screen

13.3.10.1 Parameters

The following parameters are available on the System screen: P/N, S/N, Firmware, IP Address, Subnet Mask, DHCP Mode, Ambient, CPU. The Ethernet parameters are intended for future use. However, there is a VNC server available on the Ethernet port which is available to remotely control and monitor the Controller using a VNC client.

Parameter	Description	Values	Permission to Modify
P/N	The part number of the Digispense Striper Controller module. Should match the part number on the label on the back of the module.	0 = Not Configured 1 = 520264-AAAAA 2 = 520264-AAAAB	IVEK
S/N	The serial number of the Digispense Striper Controller module. Should match the serial number on the label on the back of the module.	Varies	IVEK
Firmware	The firmware part number and revision.	560009-0101 (typical)	None
IP Address	The IP address of the Ethernet connection.	Valid IP address range	Supervisor
Subnet Mask	The subnet mask of the Ethernet connection	Valid subnet mask range	Supervisor

DHCP Mode	Whether the Ethernet connection is configured for a DHCP client or uses a static IP address	0 = Disabled 1 = Enabled	Supervisor
Ambient	The ambient temperature measured inside of the Touchscreen interface of the Controller module	Varies	None
CPU	The temperature measured at the CPU of the Touchscreen interface of the Controller module	Varies	None

13.3.10.2 Buttons

The System Screen contains the following buttons: Stop, Clear Totals, Reset Params.

Button	Description	Visible	Locked	Permission to Activate
Stop	Stops the present operation	Always	When Idle or Faulted	Operator
Clear Totals	Clears the Total Cycles parameter	When permission is Keylock or higher	When permission is Supervisor or lower	Keylock
Reset Params	Resets most parameters back to factory default values	When permission is Keylock or higher and Striper Bed parameter is None	When permission is Keylock or higher and Striper Bed parameter is None	Keylock

13.3.11 System Logic Screen

The System Logic screen contains the status indicators for the Pump interface signals, the Start Stripe Triggers, and the Vacuum enable signals. The Main, Setup, and Striper screens are accessible from this screen. Also, the System screen (Figure 13.7) is accessible by pressing either the down arrow button or the System button. The status of the Controller Module is displayed on the top of this screen. The present Permission level and Password input box are underneath the Status.

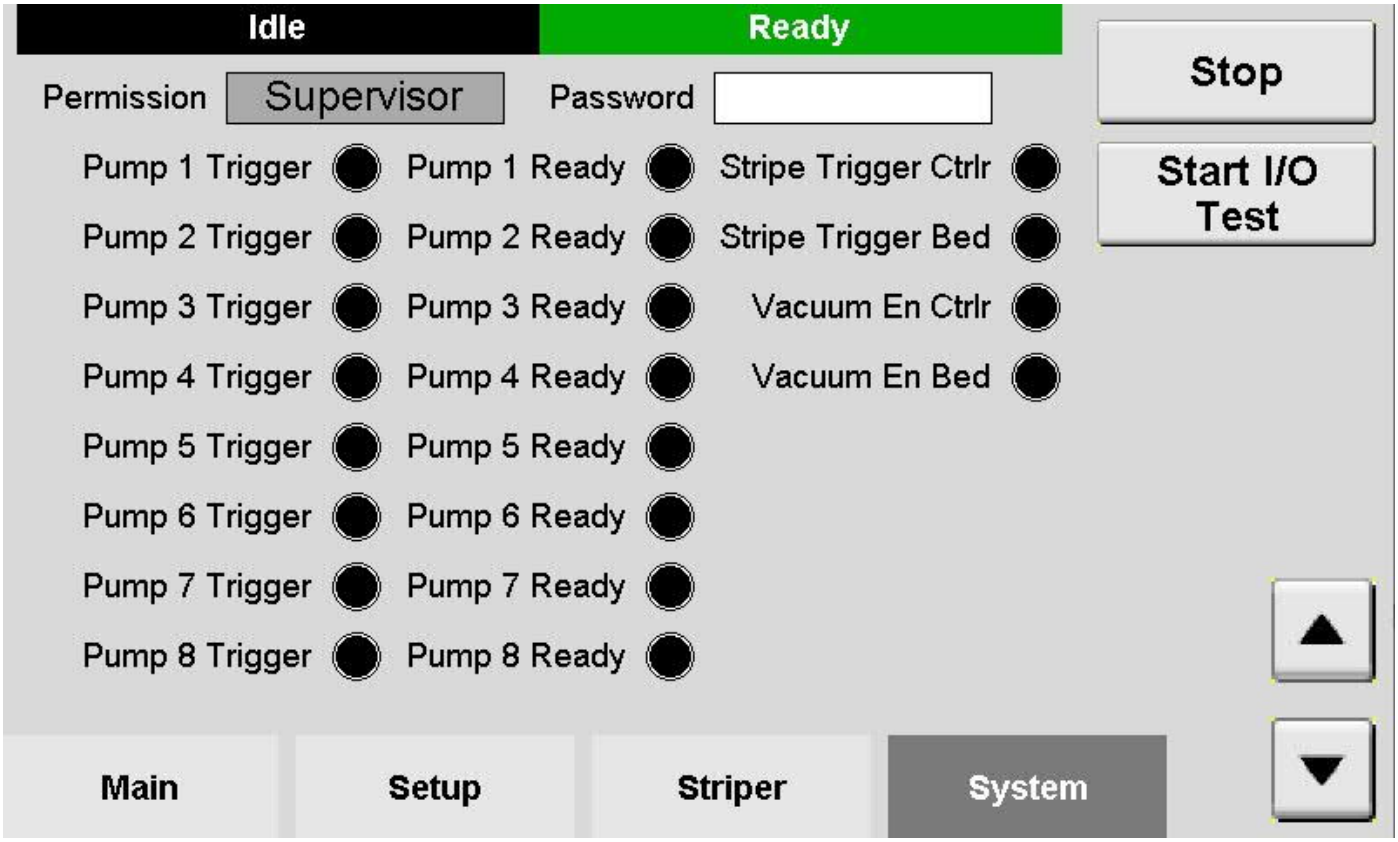

Figure 13.8 – Digispense Striper Style B Controller Module System Logic Screen

13.3.11.1 Parameters

The following parameters are available on the System Logic screen: None.

The following status indicators are available on the System Logic screen: Pump 1-8 Trigger, Pump 1-8 Ready, Stripe Trigger (Controller connector), Stripe Trigger (Bed connector), Vacuum Enable (Controller connector), Vacuum Enable (Bed connector). The status indicators are illuminated when the signal is active, and de-illuminated when the signal is inactive.

13.3.11.2 Buttons

The System Logic screen (Figure 13.8) contains the following buttons: Stop, Start I/O Test, Stop I/O Test, Pump 1-8 Trigger Force. Pressing the Start I/O Test button initiates the I/O Test operation. This causes buttons to be visible next to each Pump Trigger to allow the operator to toggle the state of these signals. When the I/O Test operation begins, the Start I/O Test button will transition to Stop I/O Test which may be used to stop the I/O Test operation.

Pressing the Stop button, or leaving the screen also stops the I/O Test operation.

Button	Description	Visible	Locked	Permission to Activate
Stop	Stops the present operation	Always	When Idle or Faulted	Operator
Start I/O Test	Start the I/O test operation	When not in I/O Test operation	When not Idle	I/O Test
Stop I/O Test	Stop the I/O test operation	When in I/O Test operation	When not in I/O operation	I/O Test
Pump 1-8 Trigger Force	Toggle the Pump Trigger signal	When in I/O Test operation	When not in I/O operation	I/O Test

13.4 INSTALLATION

General operating practices provide the best guidelines for locating the components of the system. The Controller Module should be located for ease of use during all phases of operation and maintenance.

13.5 OPTIONS

13.5.1 RS-232

Not offered at this time.

13.5.2 USB Interfaces

Not offered at this time.

13.5.3 Ethernet Interface

Not offered at this time.

13.6 ALERTS

Alerts are a result of the system detecting an issue with a parameter. The Striper Controller Module does not have any alerts.

13.7 FAULTS

Faults are a result of the system detecting improper operation of the Striper Bed Module. When a fault occurs, the status will indicate “FAULT” and the Main screen will provide information about the fault. Faults must be cleared and addressed before staring additional operations.

The ‘clear faults’ command must be used before any subsequent operation of the affected channel is performed.

If a fault occurs, the type of fault will be displayed on the screen. Once the problem is corrected the pump must be referenced.

After a fault, the normal action is to "CLEAR FAULT”. If repeated "CLEAR FAULTS" all result in faults, contact IVEK Technical Service for assistance.

13.8 MAINTENACE

No periodic maintenance is required on the Controller Module, beyond standard practices for electronic equipment.

13.8.1 Assembly/Disassembly Procedures

The Controller Module contains the following replaceable parts.

- Main Power Fuse
- I/O Fuse

13.8.1.1 Main Power Fuses

The main power fuses are located in the Power Entry Module on the rear panel is replaceable. The proper fuse value is described in the Title Page section of this manual.

Disassembly

1. Confirm that the controller is “Off”.
2. Remove the power cord.
3. Using a small flat blade screwdriver, open the power entry module's cover.
4. Slide the fuse tray out and remove the fuse.

Assembly

1. Install the new fuses into the fuse tray and slide the tray in.
2. Close the power entry module's cover.
3. Connect the power cord.

13.8.1.2 I/O Fuse

The I/O Fuse is located in the I/O Fuse holder. Power the controller off and then twist the cover until the cover and fuse pop out of the holder. Replace the fuse, re-insert the fuse and cover, and twist the cover until it secured in the holder.

13.9 PROBLEM GUIDE

Table 3.4 contains a list of possible problems, causes and solutions for the Controller Module.

WARNING

Hazardous voltages exist inside the Controller Module. Under no circumstances should the Controller Module be opened. There are no user serviceable parts inside the Controller Module. Any unauthorized access to the inside will void the warranty.

Table 3.2 - Common Operational Problems and Solutions

PROBLEM	PROBABLE CAUSE	POSSIBLE SOLUTION
No power, nothing works.	AC power may be absent or inadequate. Unit not plugged in.	Ensure AC power cord is plugged into a properly grounded three-prong outlet capable of supplying100 - 240 VAC, 50/60 Hz, rated at 4.0 amps.
	Fuse is blown.	Unplug main power cord from outlet. Remove fuse from rear panel fuse holder. Test fuse conductivity. Install good fuse in rear panel fuse holder.
	Supply Breaker is tripped.	Check or reset breaker at panel.

Power is on, controller accepts a trigger, table fails to move.	Motor Cable malfunction or not connected.	Check the cable connection between the Controller Module and Striper Bed Module. Inspect and repair faulty cable.
Power is on, controller accepts a trigger, table fails to move.	Motor malfunction.	Turn off controller power. Check to ensure Actuator or Motor/Base Module is properly connected to controller. Turn on controller and try again. If the motor operates incorrectly, servicing may be necessary to the motor or the controller. Return complete system to IVEK Corporation for repair.
Power is on, controller indicates a Motor Driver fault	E-Stop switch is activated	Check each E-stop switch to make sure they are not activated.
	Overtravel limit switch is activated.	This should only happen if a reference sensor has failed or other unusual condition. Remove all power from the Striper Bed Module and remove the cover near the motor connector. Turn the hand wheel to move the plate towards the center of the Striper Bed. Reinstall cover and re attach Controller Module and try a reference operation.
	I/O Fuse is blown	Check the connectivity of the I/O fuse and replace if necessary.
Certain parameters cannot be modified using the HMI.	Permission level too low.	Change permission to a higher level.
Membrane does not stick to plate	Vacuum is not enabled	Make sure one of the Vacuum Enable signals is active.
	Improper air supply	Make sure an adequate air supply is attached to the Striper Bed. See Chapter 15 for details.
Internal Operation Fault	Internal software error	Clear fault and cycle power.
If none of the above solves the problem, contact IVEK technical support for assistance.		

13.10 SPECIFICATIONS

13.10.1.1 INPUT POWER Requirements:

Voltage: 100 – 240 VAC, 50 or 60 Hz
Maximum current: 4A

13.10.1.2 CC TRIG Signal Requirements:

Compatible with relay and switch type connections.

Nominal voltage: 24 VDC
Maximum voltage: 28.8 VDC
Active Threshold: >15 VDC
Inactive Threshold: < 5VDC
Nominal Current: 4mA
Isolation Voltage: 500 Veff

13.10.1.3 Pump Ready In Signal Requirements:

Compatible with Digispense 2000, Digispense 3020 Aux Out signals, and Digispense 4000BT Aux Out signals. Compatible with relay and switch type connections.

Nominal voltage: 24 VDC
Maximum voltage: 28.8 VDC
Active Threshold: >15 VDC
Inactive Threshold: < 5VDC
Nominal Current: 4mA
Isolation Voltage: 500 Veff

13.10.1.4 Pump Trigger Out Signal Requirements:

Compatible with Digispense 2000, Digispense 3020 CC In signals, and Digispense 4000BT CC In signals. Signals are a normally open relay contact.

Switched voltage: 10mV - 30 VDC
Switched current: 0.01 mA -1 A

13.11 MODEL NUMBER

The model number provides important information about the specifics of your Controller Module at time of order. Refer to this number when calling IVEK Technical support. The model number for your Controller Module is located in the Title Page section of this manual and on the rear of the Controller Module.

520264 # # # # #

Drive Interface
A – 1200 RPM, 48 VDC, 5A output

Logic I/O
A – Standard Logic

Fieldbus Module
A – Standard Communication

Front Panel
A – Touchscreen

Power Cord
A – North American Line Cord
B – International Line Cord

13.12 ILLUSTRATED PARTS BREAKDOWN

There are no replaceable parts on the Striper Controller Module.

13.13 ACCESSORIES

The following accessories are available for your Controller Module.

Striper Bed Motor Cables

540289-### Cable Assembly, Digistriper Controller Style B to Striper Bed Style A; ### = Length in decimeters (010 = 1 meter)
540290-### Cable Assembly, Digistriper Controller Style B to Striper Bed Style B; ### = Length in decimeters (010 = 1 meter)

Striper Bed Tip Solenoids Cable

540055-## Cable Assembly, Digistriper Controller to Striper Bed Tip Solenoids; ## = Length in feet (08 = 8 Feet)

Digispense Controller Interface Cables

540307-01### Cable Assembly, Digispense Striper Controller to Controller, Style A; Digispense 2000 ### = Length in decimeters
540307-02### Cable Assembly, Digispense Striper Controller to Controller, Style A; Digispense 3020 ### = Length in decimeters
540307-03### Cable Assembly, Digispense Striper Controller to Controller, Style A; Digispense 4000BT ### = Length in decimeters

Striper Controller Footswitches

540267-L01 Footswitch Assembly, Cable with Wire Ferrules, Style A; Locking, 8 Feet
540267-L02 Footswitch Assembly, Cable with Wire Ferrules, Style A; Locking, 12 Feet
540267-M01 Footswitch Assembly, Cable with Wire Ferrules, Style A; Momentary, 8 Feet
540267-M02 Footswitch Assembly, Cable with Wire Ferrules, Style A; Momentary, 12 Feet

Bed Footswitches

540119-1	Footswitch Assembly, Cable with 4-pin Circular Plastic Connector; Momentary, 8 Feet
540119-2	Footswitch Assembly, Cable with 4-pin Circular Plastic Connector; Locking, 8 Feet

13.14 LINEAR STRIPER VISUAL GUIDE

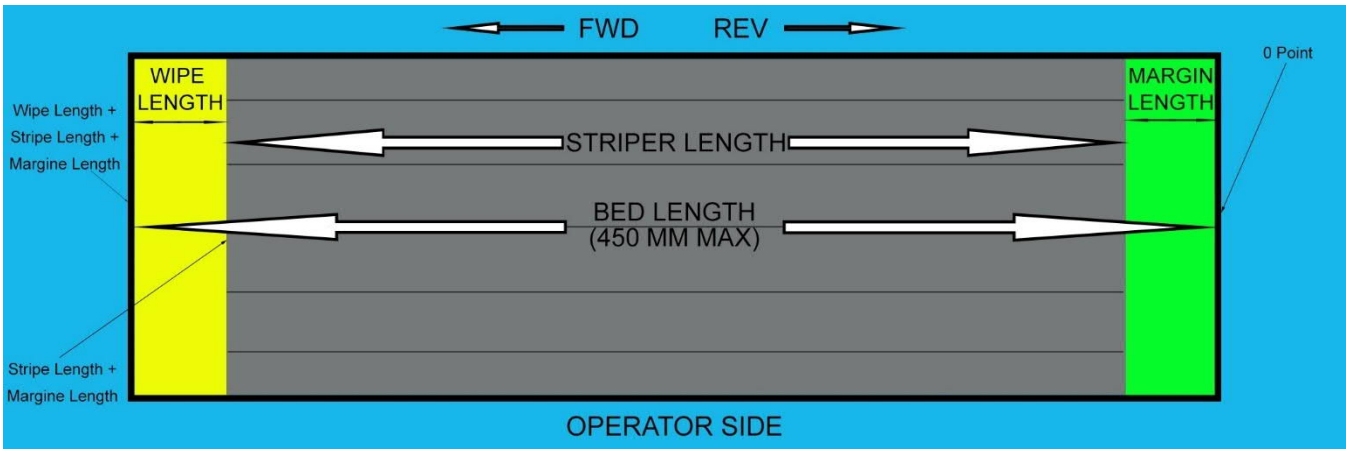

Figure 13.9 – Digispense Striper Bed Diagram

Stripe Length + Margin Distance (Length) + Wipe Length cannot be greater than 450 mm.

Margin Distance (Length): The length in which the bed will move from “0 Point” to dispense.

Wipe Length: The length in which the pump will stop dispensing fluid, while the striper bed will continue to move, allowing for a smooth stripe ending.

Stripe Length: The total length of the Stripe Length – Margin Distance (Length) - Wipe Length.

13.15 CONFIGURATION EXAMPLES:

Line Density = Pump Rate/Bed Speed.

For a 15µL volume on a 150mm substrate, the line density would be:

15µL / 150mm = 0.1µL/mm or 1.0µL/cm.

With a Bed speed of 30mm/sec, the necessary pump rate would be:

0.1µL x 30mm/sec = 3.0µL/sec

For a 60µL volume on a 300mm substrate, the line density would be:

60µL / 300mm = 0.2µL/mm or 2.0µL/cm

With a Bed speed of 50mm/sec, the necessary pump rate would be:

0.2µL/mm x 50mm/sec = 10.0µL/sec

CHAPTER REVISIONS

- 6/267/2023 Initial release

IVEK CORPORATION

DRAFT DOCUMENT CARRIER SHEET

Document Number: P130006-

Description: Controller Module, Digistriper, Style B

Date Submitted: 26 June,, 2023

Reviewed By	Date Delivered	Date Returned	Signature
Director of Engineering			
Director of Sales			
Director of Operations			
Director of Quality			