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Section Description Page

3. MULTISPENSE 900 W/TOUCHSCREEN STYLE B CONTROLLER MODULE

3.1 DESCRIPTION

The Multispense 900 W/Touchscreen Style B Controller Module, hereafter referred to as the Controller Module, contains all the control, monitoring, and interface components for the dispensing operations. The operator controls and interface connections are located on the front and rear panels.

3.1.1 Front Panel Controls & Indicators (Figure 3.1)

The front panel of the Controller Module is made up of the Touchscreen, and individual front panels of the Multispense Master Plug-In PCB (Printed Circuit Board), hereafter referred to as the Master Plug-In and Multispense 900 Channel Plug-In PCB(s), hereafter referred to as the Channel Plug-In(s).

3.1.1.1 Touchscreen (Figure 3.1 Item 1)

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.

3.1.1.2 Master Plug-In Front Panel (Figure 3.1 Item 3)

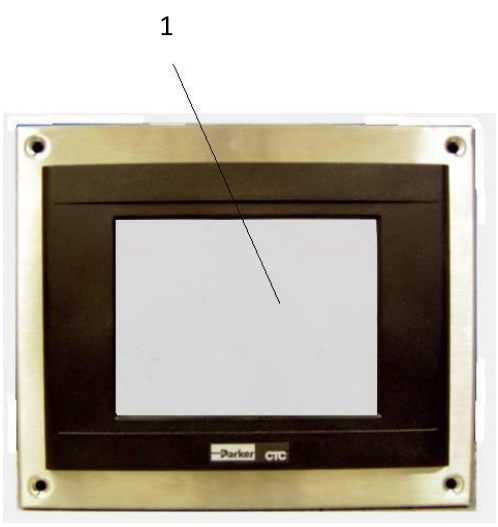
Serial Interface data Indicators (2) - A green LED (Light Emitting Diode) indicates touchscreen data being received in by the Master Card, a green LED indicates touchscreen data being transmitted out by the Master Card.

3.1.1.3 Channel Plug-In Front Panel (Figure 3.1 Item 4)

Enabled Indicator (5) - (green) illuminates while this channel is enabled for operation.

Disabled Indicator (6) - (red) illuminates while this channel is NOT enabled for operation.

Enable Switch (7) - This switch allows this channel to be enabled or disabled. Move the switch on the top (SELECT momentary) position and release to alternate between ENABLE and DISABLE. If the channel is disabled in this manner, it will be enabled the next time the power is turned "on". The bottom (LOCKOUT maintained) position will disable the channel, including when power is turned "on", as long as the switch remains at the LOCKOUT position.



Refer to Figure 3.17 for Touchscreen dimensions

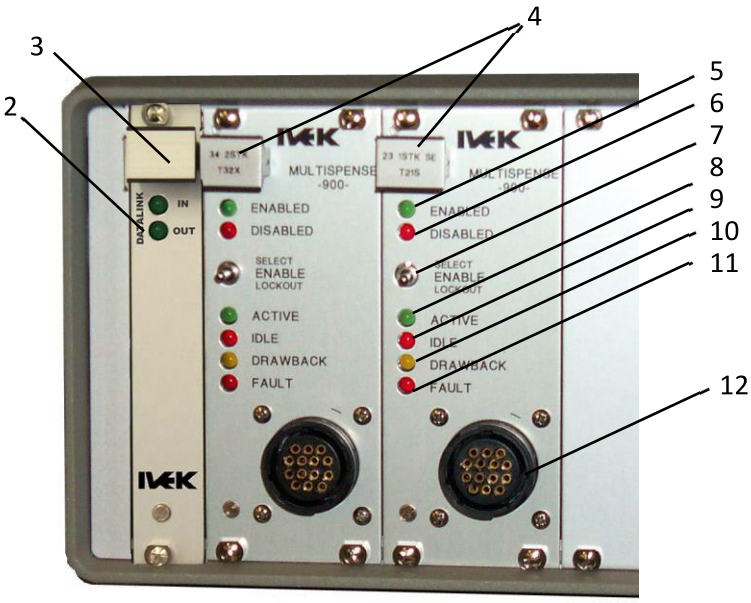


Figure 3.1 Multispense 900 Controller Module Front Panel

Use LOCKOUT to insure a particular Motor/Base Module will not be operated. There is No warning on the touchscreen that a channel is disabled.

When a serial interface is used in place of the touchscreen, the channel cannot be enabled using the serial interface while this switch is in the LOCKOUT position.

Active Indicator (8) - (green) illuminates while pump is operating.

Idle Indicator (9) - (red) illuminates while pump is not operating.

Drawback Indicator (10) - (yellow) illuminates when the pump is in the drawback portion of a cycle.

Fault Indicator (11) - (red) illuminates when there is any system or pump fault. The indicator illuminates orange when a motor voltage fuse is blown.

Motor/Base Module Connector (12) - A Channel Plug-In for a standard Motor/Base Module will have a 14 pin female connector.

3.1.2 Rear Panel Detail (Figure 3.2)

The rear panel of your Controller Module will look similar to either Figure 3.2A or Figure 3.2B. If your system is 4 or fewer channels it will look similar to Figure 3.2A. If your system is 5 or more channels it will look similar to Figure 3.2B.

3.1.2.1 Power Entry Module (Figure 3.2A Item 1)

The power entry module contains a receptacle for a standard IEC power cord, a voltage selector switch and main fuse holder.

CAUTION

Before plugging in the system, insure the line voltage setting appearing in the window agrees with the available line voltage. Damage to the equipment could result if the two voltages do not match.

Refer to the Title Page section of this manual to determine the power connection and fuse specifications for this Controller Module.

The design of the power entry module requires the line cord be disconnected before either the voltage select switch is changed or a line fuse is removed. Perform the following steps if it is necessary to change the setting of the line voltage select switch.

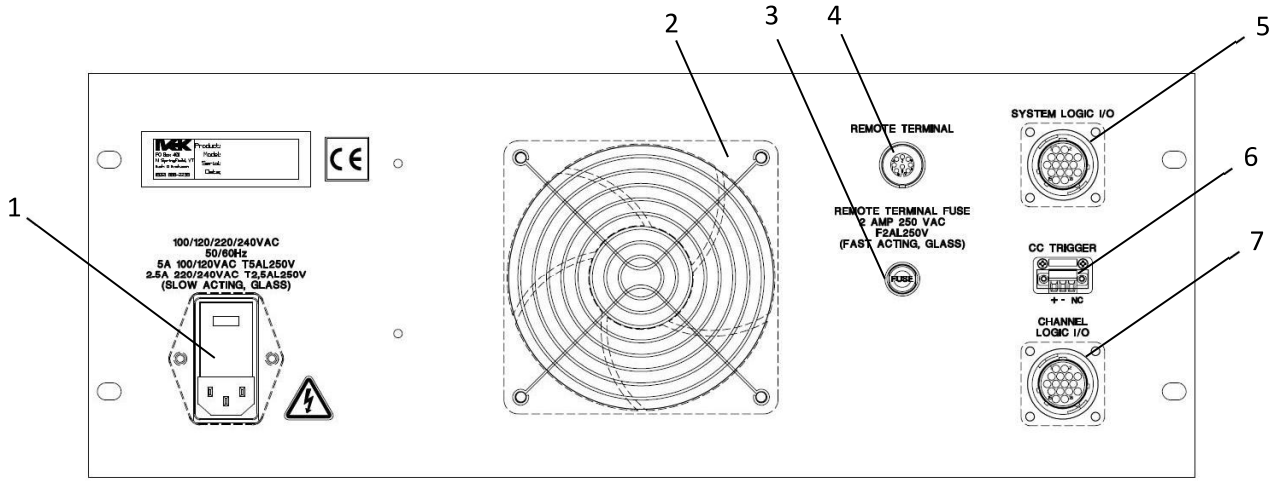


Figure 3.2A Multispense 900 Style B 1 - 4 Channel Controller Module Rear Panel

- Disconnect the line cord at the power entry module and open its cover.
- Remove the selection cam from the unit and replace it oriented so the desired voltage will appear in the window when the cover is closed.

CAUTION

Rotating the voltage select cam while it is in the module may damage the module.

- With the voltage select cam in the proper position, close the cover and replace the line cord. If the cover does not completely close, open the cover and slightly reposition the voltage select cam.

3.1.2.2 Fan (Figure 3.2A Item 2 and Figure 3.2B Item 3)

The fan cools the inside of the Controller Module when power is applied. Check the air filter on a regular basis to ensure it is not restricting the air flow.

3.1.2.3 Remote Terminal Fuse Holder and Fuse (Figure 3.2A Item 3 and Figure 3.2B Item 7)

The Remote Terminal Fuse Holder houses the fuse for protecting the Touchscreen from an over current condition. To remove the fuse, push in slightly with a screwdriver and turn in a counter-clockwise direction. Refer to the Title Page section of the manual for the fuse requirements.

3.1.2.4 Remote Terminal Connector (Figure 3.2A Item 4 and Figure 3.2B Item 5)

The Remote Terminal Connector is used to connect the touchscreen to the Controller Module.

3.1.2.5 System Logic I/O Connector (Figure 3.2A Item 5 and Figure 3.2B Item 6)

The System Logic I/O connector is used for making the electrical connection to the PLC Interface Device. Refer to section 3.2.2 for additional information.

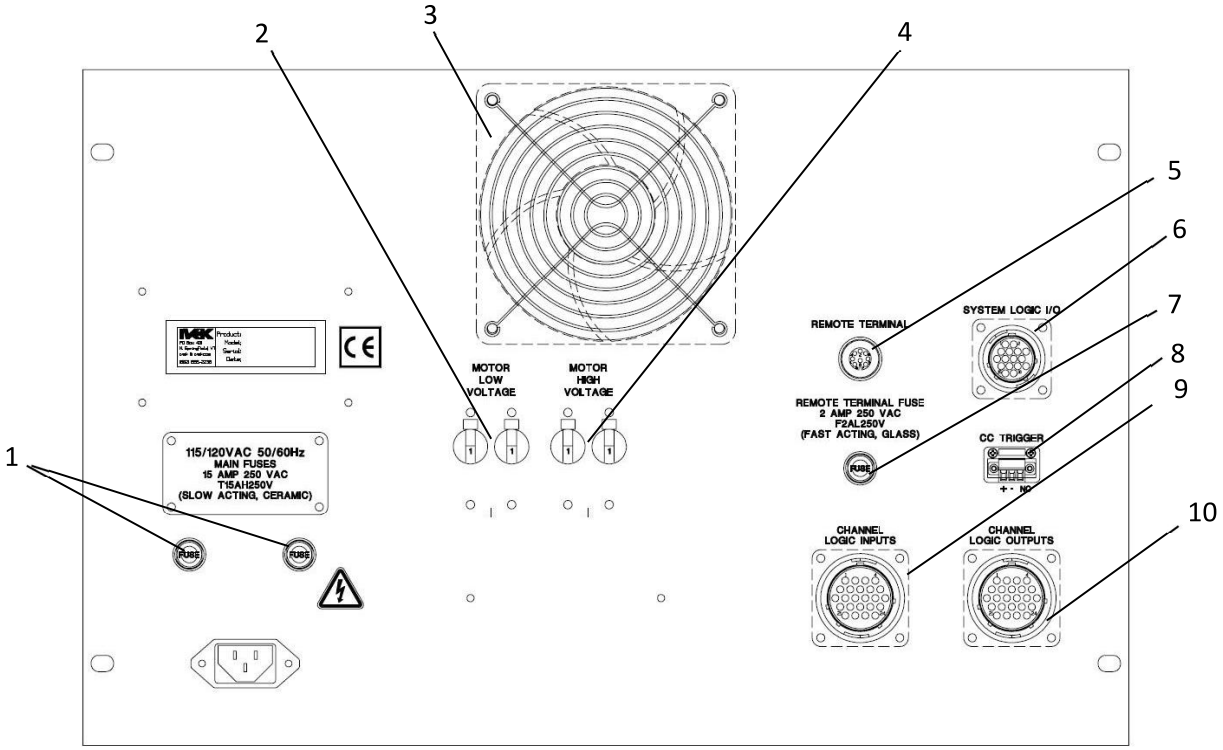


Figure 3.2B Multispense 900 Style B 5 - 8 Channel Controller Module Rear Panel

3.1.2.6 CC Trigger Connector (Figure 3.2A Item 6 and Figure 3.2B Item 8)

The CC Trigger (Contact Closure) connector provides two inputs (labeled 1 and 2) and a common for triggering a variety of functions. Refer to section 3.2.7 for additional information.

3.1.2.7 Channel Logic I/O (Figure 3.2A Item 7) and Channel Logic Inputs and Outputs Connectors (Figure 3.2B Items 9 and 10)

The Channel Logic I/O connector contains the Independent Channel Trigger In signals and the Channel Ready Out signals. Refer to Section 3.2.4 for additional information.

3.1.2.8 Power Cord, Main Fuse Holder and Fuse (Figure 3.2B Item 1)

The power cord is provided with large multiple channel systems. Separate system fuse holders and fuses are located near the power cord. The system is factory configure for the proper line voltage. To remove the fuse, push in slightly and turn in a counter-clockwise direction. Refer to the Title Page section of this manual to determine the power connection and fuse specifications for this Controller Module.

3.1.2.9 Motor Low Voltage Circuit Breaker (Figure 3.2B Item 2)

The Motor Low Voltage Circuit breaker protects the low voltage side of the motor from an over current condition. The circuit breaker should be in the up (ON) position during normal operation. If the breaker is not in the up (ON) position there may be a problem with the system. Push the breaker up, if it switches to the down (OFF) position call IVEK Technical Support.

3.1.2.10 Motor High Voltage Circuit Breaker(s) (Figure 3.2B Item 4)

The Motor High Voltage Circuit Breaker protects the high voltage side of the motor from an over current condition. Systems with more than 8 channels will have two Motor High Voltage Circuit Breakers. The circuit breaker(s) should be in the up (ON) position during normal operation. If the breaker(s) is not in the up (ON) position there may be a problem with the system. Push the breaker up, if it switches to the down (OFF) position call IVEK Technical Support.

3.2 OPERATION

The Controller Module provides the controls for producing liquid flow via a positive displacement pumping mechanism. The systems utilize solid-state electronics, stepping motor drives, and precision machined ceramic pump heads. These components combine to provide exceptional accuracy and precision, high reliability, and low maintenance.

IVEK units have custom designed stepping motors and pumps sized to the specific dispensing application to provide the proper torque and speed.

Volume commands for the Controller Module use number of full revolutions. Rate commands are in revolutions per minute. The typical resolution of the pumps used is 200 steps per revolution, or 1.8° per step.

3.2.1 Drive System

All operational parameters on the Controller Module are programmed through the touchscreen. Total electronic control allows for full accountability of cumulative volumes dispensed.

3.2.2 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 touchscreen contains nine different operator interface screens with each providing information to the operator. Start and Stop buttons appear on two screens for starting and stopping the system.

3.2.2.1 Introduction

Configurations - A configuration is a collection of the operating parameters required to operate the system. The operating parameters include volume, rate, direction and drawback. For each configuration, the parameters are stored in the configuration database. All channels use the same value for a given parameter.

Buttons - A button initiates a command being sent to the IVEK Multispense 900 Controller Module. The "Start" and "Stop" area in the Main screen (Figure 3.8) are examples of buttons.

Boxes - A box looks identical to a button, but provides information only. Pressing a box will have no effect on the system. The "CHANNEL" and "DESCRIPTION" area in the Fault Screen (Figure 3.13) are examples of boxes.

Screens - There are nine screens used to setup, operate and exit the system as shown in Figure 3.3. Each screen contains information relating to operating the system. The screens and a brief description are as follows:

Main Screen	Volume, Rate and Drawback settings are viewed here. The system can be operated from this screen.
Volume & Rate Screen	Volume and Rate settings are viewed and changed here. The system can be operated from this screen.
Configuration Screen	Configurations are changed and stored with this screen. Any parameters changed outside the configuration will not be saved as a configuration.
Params A Screen	Displays Totalizer, Permission, Prime Duration and Ready Out information.
Params B Screen	Displays software versions and Controller serial number. Acceleration setting is viewed and changed (Microspense only).
Drawback Screen	Drawback and Stall Retries settings are viewed and changed here.
Fault Screen	Faults are displayed and cleared.
Clear Totalizer Screen	Clears all totalizer values.
Exit Screen	Exit the software.

Figure 3.3 shows the screens and provides an overview of the function of each screen. Lines and arrows show accessibility for each screen.

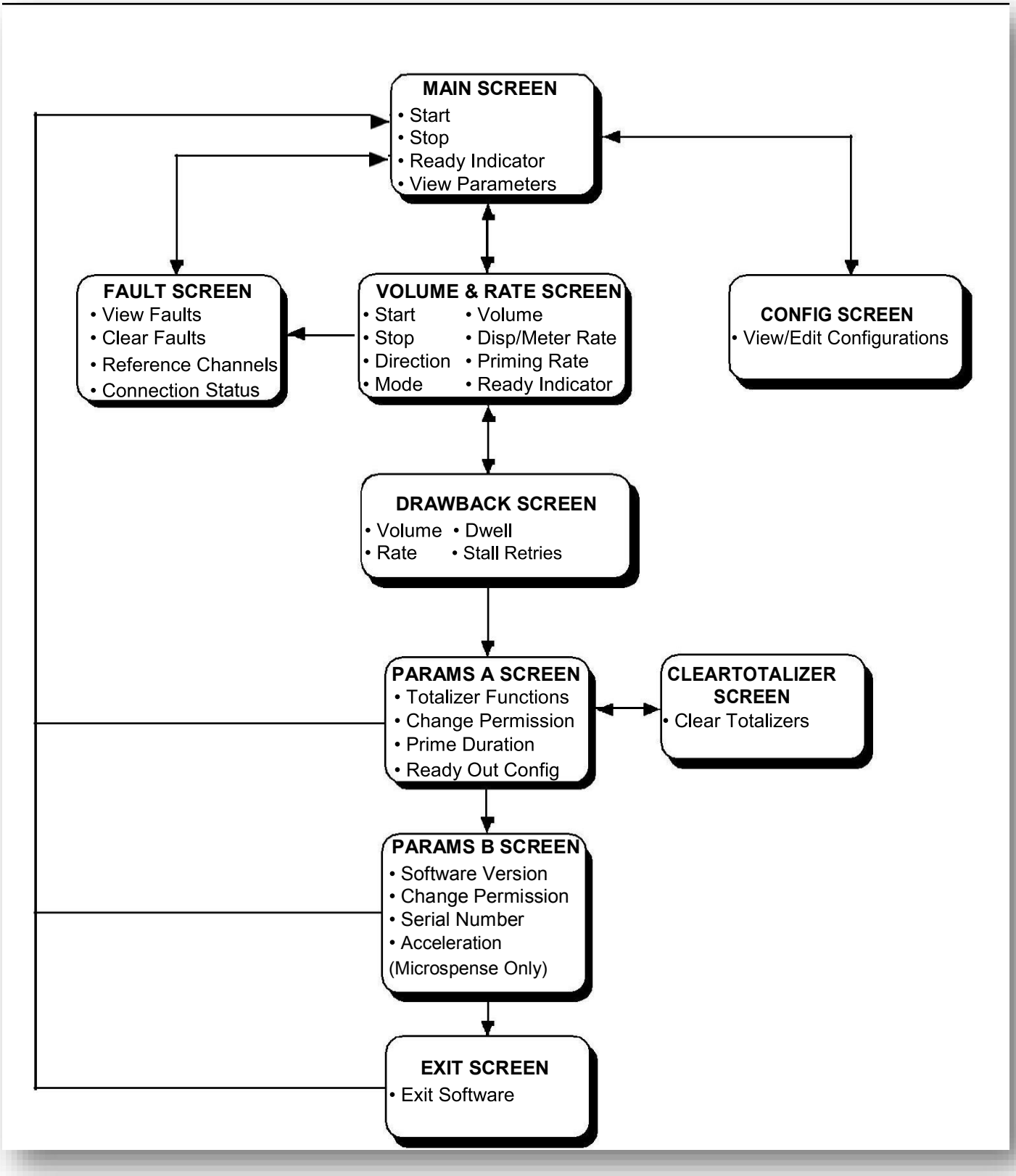


Figure 3.3 Screen Information

Another display, called the Keypad, only appears on the top of screens. The Keypad is used for changing the selected parameter and is shown in Figure 3.4.

—— Displays the value being entered.

—— Displays minimum and maximum settings.

—— Numerical Keypad.

—— "Enter" loads the value into the selected parameter. "BS" deletes the last digit entered.

—— Moves the keypad left and right on the screen.

—— Deletes any entered value in the display and removes the keypad screen.

Figure 3.4 Keypad Display

3.2.2.2 Permission Levels

There are three levels of permission; Operator, Manual and Supervisor. Each level allows access to selected items on the touchscreen.

The permission level can be changed by using the "Change Permission" button in the Params A or Params B screen. Click on the button to display the Keypad then type in the password for the required permission and press the "ENTER" key.

The highest level is **Supervisor**. This level allows access to all items on all screens.

The **Manual** level allows access to all items on all screens except changing values in the Configurations and access to the "EXIT" button on the Params A screen.

The **Operator** level does not allow changing system parameters. Configurations can be selected and loaded, but not changed.

If a button is not available because of the permission level, a security flag will be present over the button. Figure 3.5 shows the permission flag.

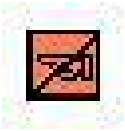


Figure 3.5 Permission Flag

3.2.2.3 Getting Started

The touchscreen will "Boot" when the power to the Controller Module is turned on. If the program is accidently exited, the Controller Module must be turned off and then back on. The "Boot" sequence will be visible on the Touchscreen and takes approximately one minute.

The last values entered into the touchscreen before it was turned off will appear after the system has booted.
The first screen displayed will be the Main screen containing the last parameter settings. Usually, the last parameter setting is either Dispense or Meter mode so it is a good idea to first go to the Configuration screen or enter the setting manually in the Volume & Rate and Drawback screens.

If the touchscreen cannot communicate with the Multispense 900 Controller Module, a fault will occur. The fault can be cleared in the Fault screen. (Section 3.2.2.10) The communications flag shown in Figure 3.6 may also be displayed on the Touchscreen.

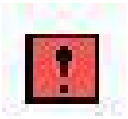


Figure 3.6 Communications Flag

3.2.2.4 Configuration Screen (Figure 3.7)

The Configuration screen displays the parameter settings for each of the twenty five configurations. The system arrives with a few configurations preset and the remaining configurations set with default parameters. The current permission level determines which buttons are currently available as shown in Figure 3.7.

The configurations are the recommended method of changing operating parameters. Once a configuration has been created or changed it is available to use each time the system is used. Parameters not saved in configurations will be lost once the system is turned off.

The twenty five configurations are named **Configuration 1** through **Configuration 25**. The current configuration number is displayed in the Main screen. Each configuration can be programmed to perform a specific job function. All configuration parameters are numerical values and must be entered in the keypad as numbers. To use a preset configuration:

1. Use the "CONFIG ->" and "<- CONFIG" buttons to move to the desired configuration.
2. Press the "USE CONFIG" button to load the parameters into the Controller Module.

To change a configuration;

1. Use the "CONFIG ->" and "<- CONFIG" buttons to move to the desired configuration.
2. Use the "PREV ITEM" and "NEXT ITEM" buttons to select the parameter.
3. Press the "EDIT ITEM" button.
4. The keypad appears with the minimum and maximum settings displayed.
5. Type the new parameter number.

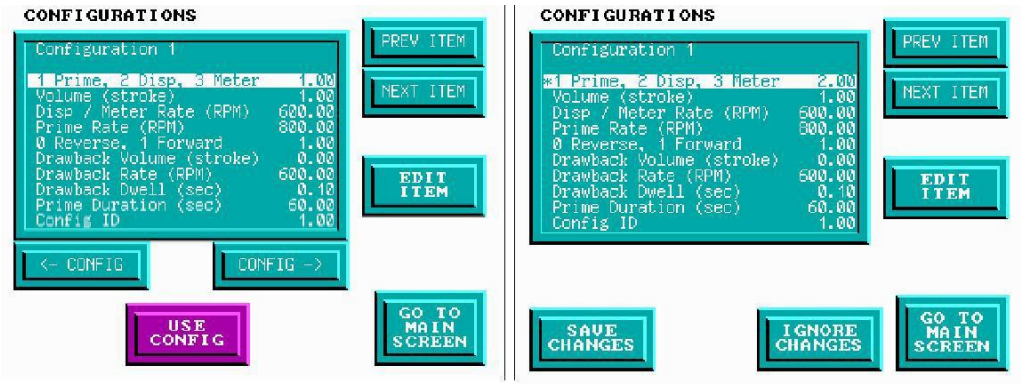
NOTE

If a number smaller than the minimum is entered, a message will appear stating the minimum number which can be entered.

If a number larger than the maximum is entered, a message will appear stating the maximum number which can be entered.

6. When all parameters are entered, press "SAVE CHANGES" or "IGNORE CHANGES".
7. To start using the new configuration press the "USE CONFIG" button. This will load the parameters into the Controller Module.

An * appears in front of edited items until the changes are saved or ignored.



The Configuration screens allow generating, changing and using preset parameters
(See below for a description of each section)

	Operator	Manual	Supervisor
PREV ITEM — Moves the cursor to the parameter above.	√	√	√
NEXT ITEM — Moves the cursor to the parameter below.	√	√	√
EDIT ITEM — Displays the keypad screen for making changes to the highlighted parameter.			√
GO TO MAIN SCREEN — Switches to the Main screen.	√	√	√
Lists the parameter settings for each configuration. (1 - 25) A * in left column indicates edited parameter.			
<- CONFIG — Switches to the next configuration.	√	√	√
CONFIG -> — Switches to the previous configuration.	√	√	√
USE CONFIG — Loads the selected configuration for use.	√	√	√
SAVE CHANGES — Saves any changes made to the current configuration.			√
IGNORE CHANGES — Cancels any changes made to the current configuration.			√

Figure 3.7 Configuration Screen

3.2.2.5 Main Screen (Figure 3.8)

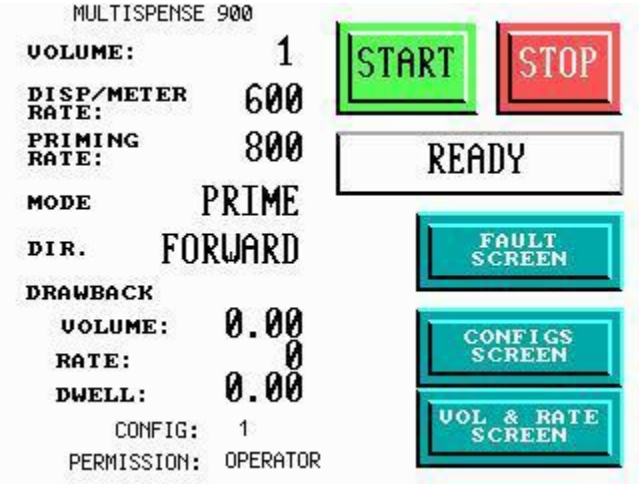
The Main screen displays the parameter settings currently in use. The Main screen is normally used to operate the system. The Fault, Configuration and Vol & Rate screens are accessible from this screen. All the buttons on this screen are accessible by all permission levels.

NOTE

If a configuration has been selected and the parameters changed in the Volume & Rate or Drawback screens the Main screen will display the changed parameters.

The "START" button will start the system using the current parameters. The system will operate until the cycle is completed or the "STOP" button is pressed. The "Ready" box indicates the state of the READY output in the PLC Interface. If the system is not Ready, the icon will change color and display "Busy".

The current configuration and Permission access level are displayed. The Configuration number will normally be a number from 1 to 25 indicating the current configuration. "MODIFIED" will be displayed when the access level was Manual or Supervisor and was then changed to Operator without a configuration being selected. This indicates the parameters displayed may not be the same as one of the 25 configurations.



The Main screen controls the system and displays the operating parameters (See below for a description of each section)

—— Displays the current Volume setting in strokes.

—— Displays the current Dispense/Meter Rate setting in RPM.

—— Displays the current Priming Rate setting in RPM.

—— Displays the current mode (Prime / Dispense / Meter)

—— Displays the current direction (Forward / Reverse)

—— Displays the current Drawback Volume setting in strokes.

—— Displays the current Drawback Rate setting in RPM.

—— Displays the current Drawback Dwell setting in seconds.

—— Displays the current configuration (1 - 25 or MODIFIED).

—— Displays the current permission level.

Starts the current mode of operation.

—— Stops the current mode of operation.

—— Indicates the state of the READY output in the PLC Interface.

—— Switches to the Fault screen. Button changes to when a channel is faulted.

—— Switches to the Configuration screen.

—— Switches to the Volume & Rate screen.

Figure 3.8 Main Screen

3.2.2.6 Volume & Rate Screen (Figure 3.9)

The Volume & Rate screen displays the primary operating parameters for the configuration selected in the Configuration screen. This screen is used to change parameters for custom dispenses. The current permission level determines which buttons are currently available as shown in Figure 3.9.

NOTE

Parameters changed in this screen will not be saved if a different configuration is selected.

The system can be operated from this screen. The Fault, Drawback and Main screens are accessible from this screen.

Volume Strokes

Volume Strokes is number of revolutions the motor turns for one dispense operation. To change the Volume Strokes value;

1. Press the "SET" button.
2. The keypad appears with the minimum and maximum settings displayed.
3. Enter the value using the number keypad.
4. Press the "ENTER" button.

Disp/Meter Rate

The Disp/Meter rate is the speed of the motor in revolutions per minute during the dispense and meter operations. To change the Disp/Meter Rate value;

1. Press the "SET" button.
2. The keypad appears with the minimum and maximum settings displayed.
3. Enter the value using the number keypad.
4. Press the "ENTER" button.

Priming Rate

The Priming rate is the speed of the motor in revolutions per minute during the priming operations. To change the Priming Rate value;

1. Press the "SET" button.
2. The keypad appears with the minimum and maximum settings displayed.
3. Enter the value using the number keypad.
4. Press the "ENTER" button.

Operating Mode

The "PRIME / DISPENSE / METER" button indicates the current mode of operation. The button will display only the current mode.

Prime mode produces a continuous cycle to pump fluid in one direction. Prime is used to fill the system with fluid in preparation for actual operation, empty the system of fluid, and flush the system for cleaning.

Dispense mode is used to deliver a specific volume of fluid at a specific rate. The current settings for the fluid direction determine the direction of fluid flow.

Meter mode is used to deliver fluid at a specific rate for the period of time the system is active.

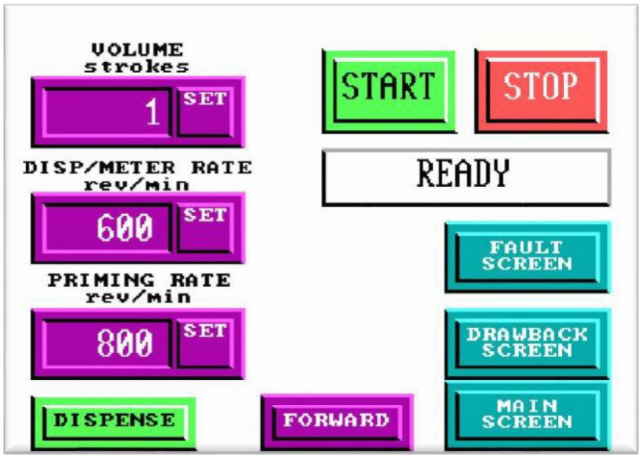
To change the Operating Mode;

1. Press the button displaying the current mode.
2. The button will cycle through PRIME / DISPENSE / METER.
3. Stop at the desired mode.

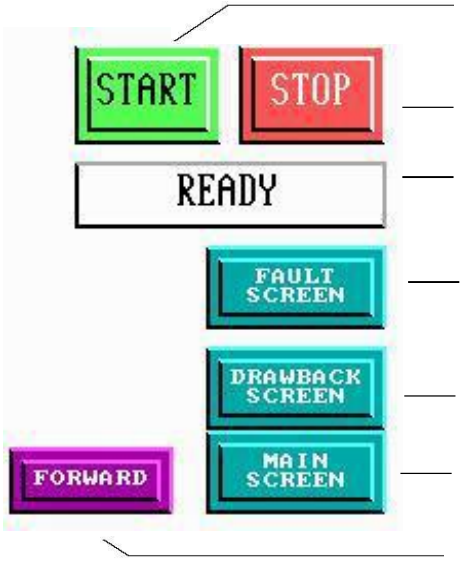
Liquid Direction

The "FORWARD / REVERSE" button indicates the current liquid direction. The button only displays the current direction. To change the Liquid Direction;

1. Press the button displaying the current direction.
2. The direction button will change to display the new direction.



The Volume and Rate screen is used to set volume and rate parameters
(See below for a description of each section)



	Operator	Manual	Supervisor
Displays the current Volume Strokes setting. Pressing SET enables the entry keypad for changing the setting.		√	√
Displays the current Dispense and Meter Rate setting in rev/min. Pressing SET enables the entry keypad for changing the setting.		√	√
Displays the current Priming Rate setting in rev/min. Pressing SET enables the entry keypad for changing the setting.		√	√
Displays the current operating mode. When pressed toggles between Prime, Dispense and Meter.		√	√
Starts the current mode of operation.	√	√	√
Stops the current mode of operation.	√	√	√
Indicates the state of the READY output in the PLC Interface.			
Indicates a current fault condition and when pressed switches to the Fault Screen.	√	√	√
Switches to the Drawback screen.	√	√	√
Switches to the Main screen.	√	√	√
Displays the current direction. When pressed toggles between Forward and Reverse		√	√

Figure 3.9 Volume And Rate Screen

3.2.2.7 Drawback Screen (Figure 3.10)

The Drawback screen displays parameters which control Drawback operation settings for the configuration selected in the Configuration screen. This screen is used to change drawback parameters for custom dispenses. Drawback is a controlled reverse flow at the end of a dispense to improve volume repeatability when 'stringy' liquids are being dispensed. At the end of the dispense cycle, the motor will reverse pulling the liquid back into the liquid line. The Controller Module will automatically compensate for the drawback volume, the dispense volume value must **not** be adjusted. The current permission level determines which buttons are currently available as shown in Figure 3.10.

NOTE

Parameters changed in this screen will not be saved if a different configuration is selected.

The Params A and Vol & Rate screens are accessible from this screen.

Drawback Volume Strokes

Volume Strokes is a fractional number, to a resolution of one hundredth of a stroke, of reverse revolutions the motor turns for one drawback operation. To change the Volume Strokes value;

1. Press the "SET" button.
2. The keypad appears with the minimum and maximum settings displayed.
3. Enter the value using the number keypad.
4. Press the "ENTER" button.

Drawback Rate

The Drawback rate is the number of revolutions per minute the motor turns during the drawback operations. To change the Rate value;

1. Press the "SET" button.
2. The keypad appears with the minimum and maximum settings displayed.
3. Enter the value using the number keypad.
4. Press the "ENTER" button.

Drawback Dwell

The Drawback Dwell is the amount of time between the end of the Dispense or Meter operation and the start of the Drawback operation.

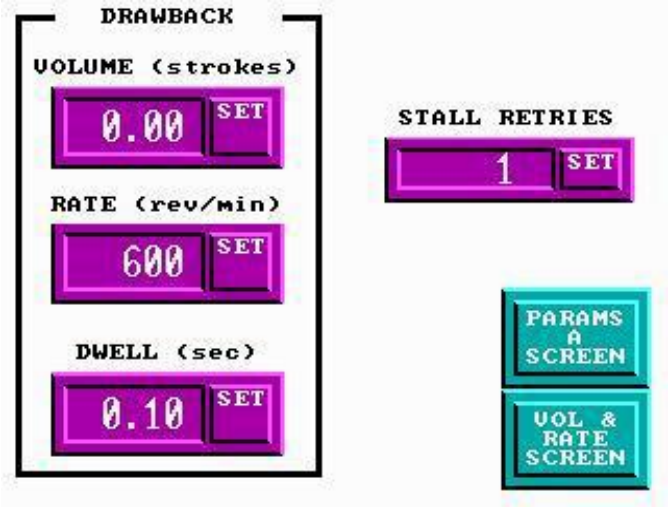
To change the Dwell value;

1. Press the "SET" button.
2. The keypad appears with the minimum and maximum settings displayed.
3. Enter the value using the number keypad.
4. Press the "ENTER" button.

Stall Retries

Stall Retries is the number of times the motor will try turning before a fault is generated and is generally set at 4. A stall is detected when the Controller Module has commanded the motor to turn one revolution without receiving a signal from a sensor on the Motor/Base Module. If 'Stall Retries' is"1", the channel will fault. Otherwise, after a short idle delay, the Controller Module will again command the motor to turn. Select the number of "Stall Retries" for the Controller Module to attempt before a Fault is generated. To change the Stall Retries;

1. Press the "SET" button.
2. The keypad appears with the minimum and maximum settings displayed.
3. Enter the value using the number keypad.
4. Press the "ENTER" button.



The Drawback screen is used to set drawback and configuration parameters
(See below for a description of each section)

	Operator	Manual	Supervisor
Displays the current Drawback Volume Strokes setting. Pressing SET enables the entry keypad for changing the setting.		√	√
Displays the current Drawback Rate setting in rev/min. Pressing SET enables the entry keypad for changing the setting.		√	√
Displays the current Drawback Dwell setting in sec. Pressing SET enables the entry keypad for changing the setting.		√	√
Displays the current Stall Retries setting. Pressing SET enables the entry keypad for changing the setting.		√	√
Switches to the Params A screen.	√	√	√
Switches to the Volume and Rate screen.	√	√	√

Figure 3.10 Drawback Screen

3.2.2.8 Params A Screen (Figure 3.11)

The Params A screen displays certain system parameters and Permission information. This screen is used to clear the totalizer and change the permission level. The current permission level determines which buttons are currently available as shown in Figure 3.11.

The Clear Totalizer, Params B, Main and Exit screens are accessible from this screen.

Totalizer

The "TOTALIZER" box displays the volume dispensed in motor rotations for the channel indicated below. This will normally be the same number for all enabled channels.

To clear the Totalizer for the selected channel;

1. Press the "CLEAR SELECTED TOTALIZER" button.

To clear the Totalizer for all channels;

1. Press the "CLEAR ALL TOTALIZERS" button.
2. The Clear Totalizer screen is displayed.
3. Press the "CLEAR TOTALIZERS FOR ALL CHANNELS" button to clear the totalizer or press the "PARAMS A SCREEN" button to cancel.

Change Permission

The "Change Permission" button displays the keypad for changing the permission level to the software. There are three levels; Supervisor, Manual, and Operator (Refer to section 3.2.2.2). To change the Permission level;

1. Press the "CHANGE PERMISSION" button.
2. The keypad will appear.
3. Enter the password code for the desired permission level.
4. Confirm the display shows the desired level.

Prime Duration

The Prime Duration is the maximum amount of seconds the system will operate during one Prime operation. This should be adjusted for operational requirements to reduce "floods". To change the Prime Duration;

1. Press the "SET" button.
2. The keypad appears with the minimum and maximum settings displayed.
3. Enter the value using the number keypad.
4. Press the "ENTER" button.

Ready Out Config

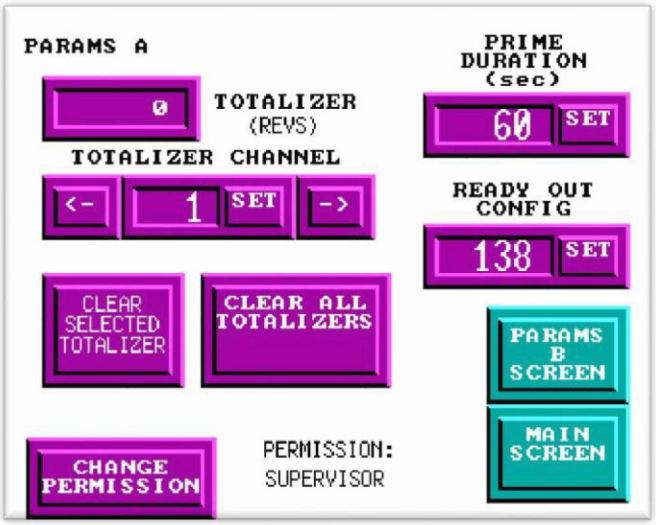
The ready Out Configuration determines when the Ready Out signal will be false. The signal is always false during dispense and meter operations.

Both the "SYSTEM READY" and optional "Independent Channel Ready" signals are configured with this value. The following optional settings are available:

System	2	Priming (System Ready also false)
System	8	Any fault true, reference required (System Ready also false)
Channel	32	Priming (Channel Ready also false)
Channel	128	Any fault true, reference required (Channel Ready also false)
Default	138	System not ready if in Prime, fault or reference required. Channel not ready if fault or reference required.

Add the desired values listed above to determine the correct value for the "Ready Out Config" parameter. To change the Ready Out Config;

1. Press the "SET" button.
2. The keypad appears with the minimum and maximum settings displayed.
3. Enter the value using the number keypad.
4. Press the "ENTER" button.



The Params A screen displays system parameters and user information
(See below for a description of each section)

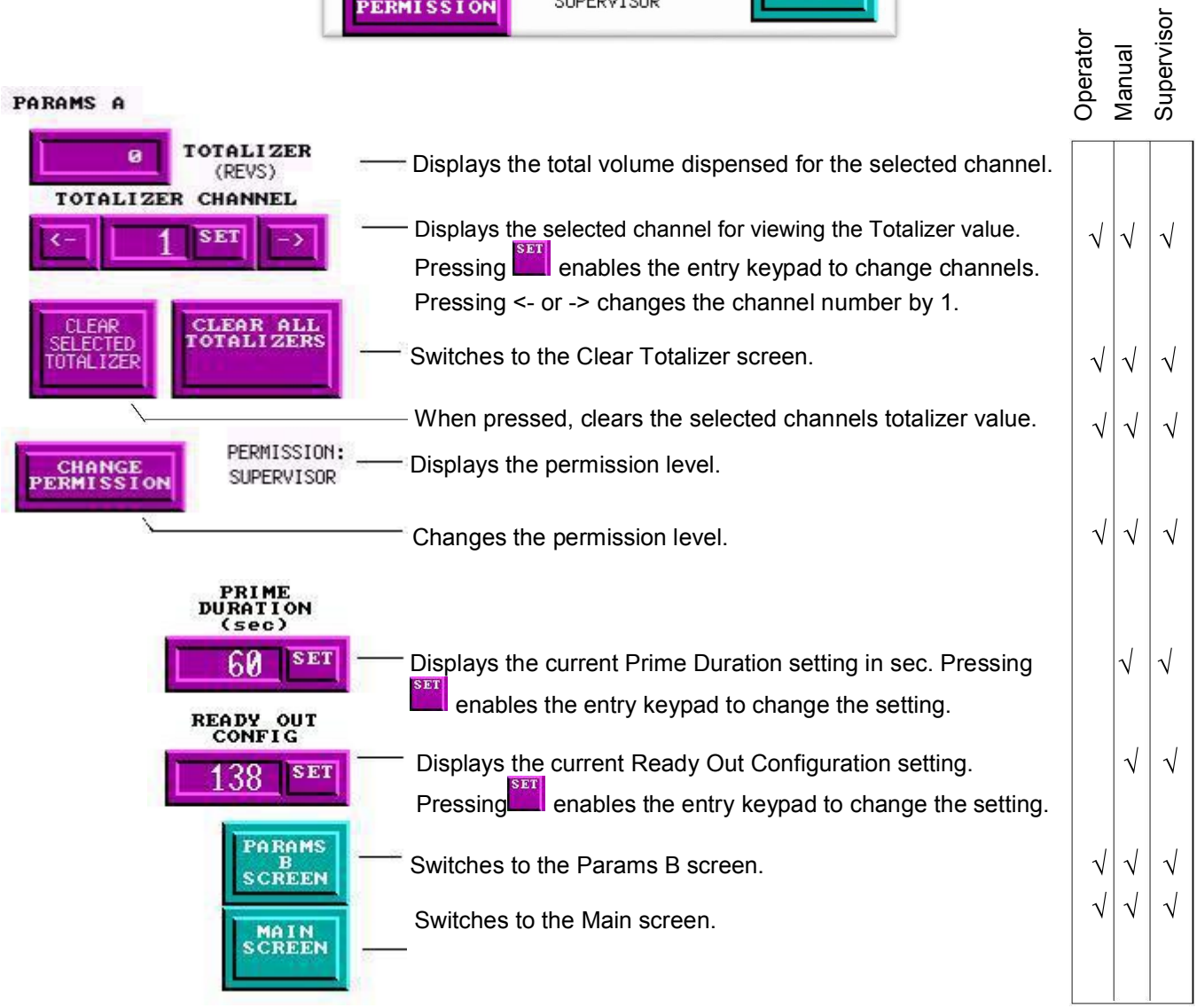


Figure 3.11 Params A Screen

3.2.2.9 Params B Screen (Figure 3.12)

The Params B screen displays additional parameters not displayed in the Params A screen. This screen is used to change the permission access and exit the software. The current permission level determines which buttons are currently available as shown in Figure 3.12.

If the system uses Microspense motor/bases, view and change the current Acceleration value here. If the system uses standard or Heavy-Duty motor/bases, this area of the screen is blank. Most applications will use Standard acceleration. Applications using single-stroke dispense and have a small volume being ejected from the dispense tip may benefit from Fire-Off acceleration. High-viscosity fluids will not benefit from Fire-Off acceleration, and may stall as a result of the reduced torque.

Information is displayed which may be requested by IVEK's Technical Service Department when locating the source of problems. The software version of the Master Plug-In and Channel 1 Plug-In(s) and Touchscreen are displayed. The serial number of the Controller Module is stored in the Touchscreen (entered during manufacture at IVEK Corporation).

Insure the motor/base type (Microspense versus Standard and Heavy Duty) displayed on the touchscreen matches the Controller Module Channel Plug-Ins and Motor/Base Modules being used. This insures the maximum and minimum limits on values in the touchscreen matches those in the Controller Module.

The Main screen is accessible from this screen.

NOTE

There is no need to exit the Touchscreen program before powering down the Controller Module. IVEK Technical Service may have you exit the program for calibration or troubleshooting.

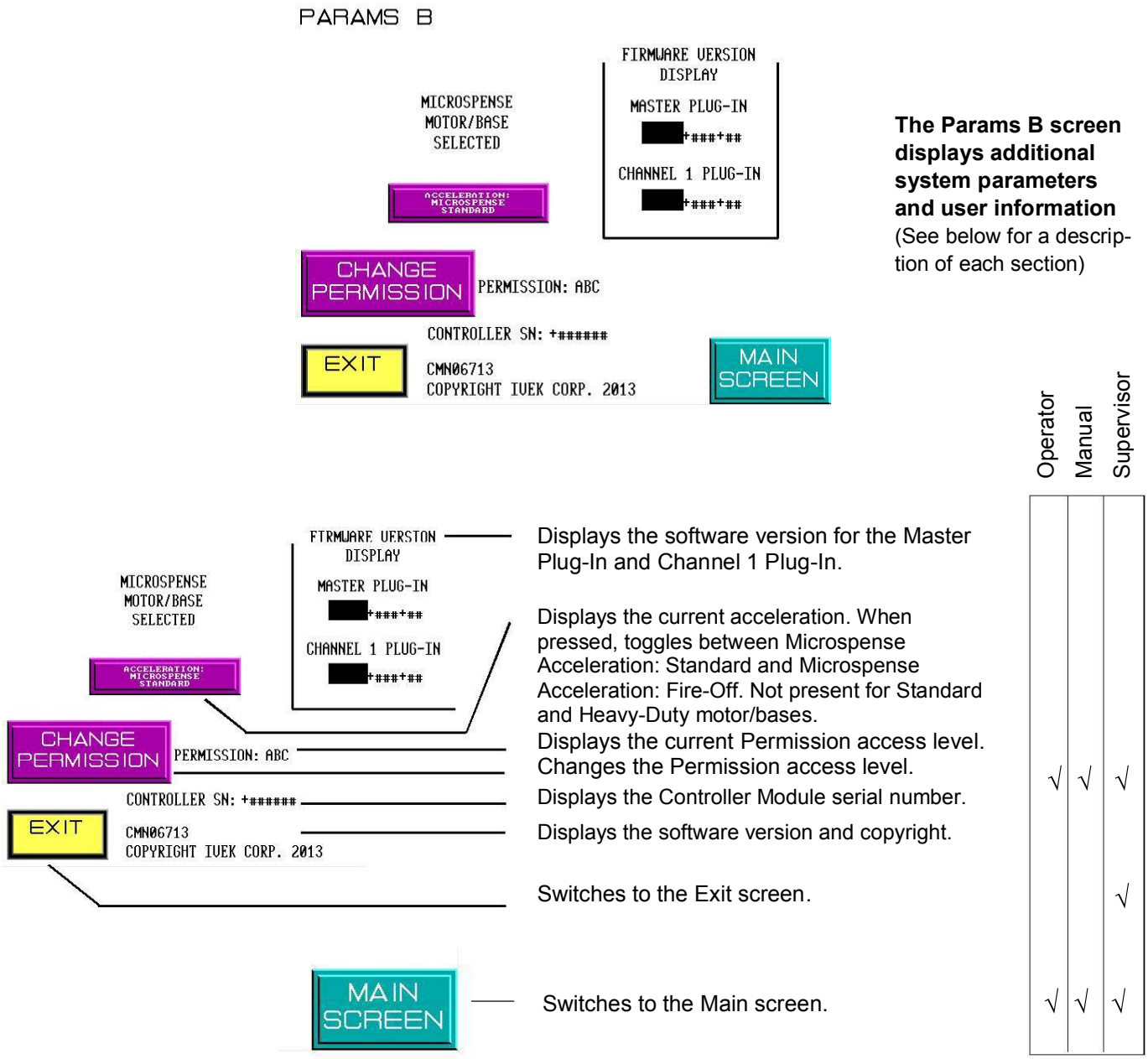
The "EXIT" button is the only way to exit the software. To exit the software;

1. Press the "EXIT" button.
2. The Exit screen will appear.
3. Press "EXIT" to exit the software or "DON'T EXIT GO TO MAIN SCREEN" to cancel.

Change Permission

The "Change Permission" button displays the keypad for changing the permission level to the software. There are three levels; Supervisor, Manual, and Operator (Refer to section 3.2.2.2). To change the Permission level;

1. Press the "CHANGE PERMISSION" button.
2. The keypad will appear.
3. Enter the password code for the desired permission level.
4. Confirm the display shows the desired level.



The Params B screen displays additional system parameters and user information (See below for a description of each section)

Figure 3.12 Params B Screen

3.2.2.10 Faults Screen (Figure 3.13)

The Faults screen displays fault information and is used to reference the system. All the buttons on this screen are accessible by all access levels.

Faults

When the Fault screen is displayed the fault on one channel will be displayed. The "CHANNEL" box displays the faulted channel and the "DESCRIPTION" box displays the fault message. If no faults exist, the "CHANNEL" box will be "0" and the "DESCRIPTION" box will be empty.

Press "CLEAR AND REFERENCE" to clear the fault and reference the pump. The next fault (if one exists) and associated channel will then be displayed in the "CHANNEL" and "DESCRIPTION" boxes.

To clear all the faults and reference all channels press the "CLEAR FAULTS AND REFERENCE ALL CHANNELS" button.

Communication Box

The communication box displays the status of the electrical connection between the Touchscreen and the Master Circuit Card.

When the Touchscreen is communicating with the Master Plug-In the message "GOOD COMMUNICATION TO MASTER PLUG-IN" is displayed. When there is no communication the message "CONNECTION TO MASTER PLUG-IN IS INTERRUPTED" is displayed.

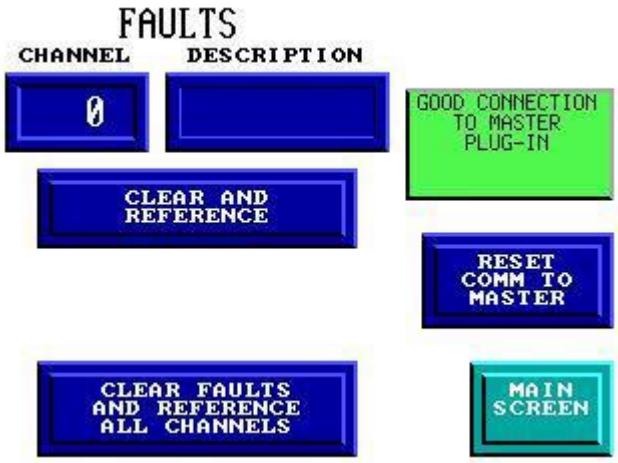
If communications are interrupted, press the "RESET COMM TO MASTER" button to reestablish communications.

3.2.2.11 Clear Totalizer Screen (Figure 3.14)

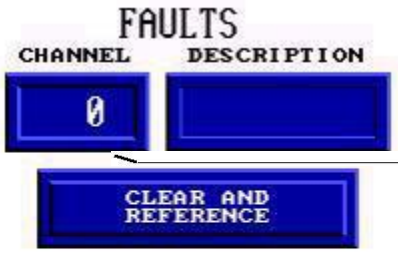
The Clear Totalizer screen is a backup screen in case the "CLEAR ALL TOTALIZERS" button on the Params A screen was accidently pressed. All the buttons on this screen are accessible by all permission levels.

To clear the totalizers press the "CLEAR TOTALIZERS FOR ALL CHANNELS" button.

Press the "PARAMS A SCREEN" button to return without clearing the totalizers or after all totalizers have been cleared.



The Fault screen Displays and clears faults
(See below for a description of each section)



—— Displays the fault description for the indicated channel. Blank if no faults are present.

Displays the channel with the fault. Will be "0" if none are faulted.

—— Clear and References indicated channel.

—— Clear and References all channels.

—— Displays Master Plug-In communications status.

—— Resets communications to the Master Plug-In.

—— Switches to the Main screen.

Figure 3.13 Fault Screen

The Clear Totalizer screen clears all channels values
(See below for a description of each section)

Clears all totalizer values

Returns to the main screen

Figure 3.14 Clear Totalizer Screen

3.2.2.12 Exit Screen (Figure 3.15)

NOTE

There is no need to exit the Touchscreen program before powering down the Controller Module. IVEK Technical Service may have you exit the program for calibration or troubleshooting.

The Exit screen is a backup screen in case the "EXIT" button on the Params A screen was accidently pressed. The current permission level determines which buttons are currently available as shown in Figure 3.15.

The Motor/Base selection button selects either the 23 Frame or the 34 Frame Motor/Base. When changing Motor/Base types, the Channel Plug-In(s) must also be changed. Contact Technical Service prior to making a change, provide the Controller Module serial number located on the rear of the Controller Module.

To exit the software press the "EXIT" button.

Press the "DON'T EXIT GO TO THE MAIN SCREEN" button to escape without exiting.

The Exit screen allows returning to the Main screen or exiting the software (See below for a description of each section)

	Operator	Manual	Supervisor
Exits the Touchscreen software.			√
Returns to the main screen.			√
Changes Motor/Base types.			√

NOTE

There is no need to exit the Touchscreen program before powering down the Controller Module. IVEK Technical Service may have you exit the program for calibration or troubleshooting.

Figure 3.15 Exit Screen

3.2.3 System Logic I/O Interface

The System Logic I/O interface provides connections between the Controller Module and the customer's PLC. Trigger Input, Ready Out, and Fault Out signals are communicated to and from the PLC.

3.2.3.1 Signal Functions

System Trigger In - The 'System Trigger In' signal initiates a cycle. The trigger signal has no effect in Prime mode.

Dispense Mode - When the Controller Module is properly configured for Dispense mode, all channels are triggered at the transition when a signal is applied to the system trigger. If a channel is disabled, faulted, requires a reference, that channel is not triggered. (see section 3.2.3.2)

Meter Mode - When the Controller Module is properly configured for Meter mode, all channels are triggered as long as a signal is applied to the system trigger. If a channel is disabled, faulted, requires a reference, that channel is not triggered. (see section 3.2.3.3)

System Ready Out - The 'System Ready Out' signal indicates the active/idle state of the Controller Module. All channels must be ‘ready’ for this output to be "true". This output is false if any channel is not 'ready'. The Params A screen "READY OUT CONFIG" button (refer to section 3.2.2.9) is used to define ‘ready’ for both the ‘system ready’ and optional ‘independent channel ready’ outputs.

System Fault Out - The 'System Fault Out' signal indicates that a fault has been detected in the operation of a Motor/Base Module. This output is complemented, i.e., the output is true when no fault exists on any channel, and is false when one or more channels are faulted.

3.2.3.2 Signal Levels

All signals are optically isolated. The power for all signals is provided by the customer’s equipment.

All inputs accept a 24 VDC signal and require 20 mA.

All outputs conduct when the signal is ‘true’ and do not conduct when the signal is ‘false’ (see FAULT OUT). Outputs can switch a signal of up to 24 VDC and 50 mA. The output consists of the emitter and collector connections to an IC opto-isolator.

3.2.3.3 Connections

All connections are through a 16-pin circular plastic connector, with the mating connector and pins supplied with the unit. The connector has the pin layout as shown in Table 3.1.

Table 3.1 System I/O Interface

PIN	SIGNAL	PIN	SIGNAL
1	Key Hole	9	Future Use
2	Key Hole	10	Future Use
3	TRIG IN +	11	Future Use
4	TRIG IN -	12	Future Use
5	READY OUT +	13	Future Use
6	READY OUT -	14	Future Use
7	FAULT OUT +	15	Future Use
8	FAULT OUT -	16	Future Use

3.2.4 CHANNEL LOGIC INPUTS

Channel Logic Input signals for each channel are added to the PLC interface. The trigger input signals for each channel permit independent triggering of an individual channel using a logic signal rather than a command through the serial interface.

3.2.4.1 Signal Functions

Channel <n> Trigger In - The 'Channel <n> Trigger In' signal initiates a cycle for each channel. A signal applied to this input will trigger the selected channel if the channel has Dispense or Meter mode selected. A channel will not be triggered if it is in Prime, is faulted, or requires a reference.

3.2.5 CHANNEL LOGIC OUTPUTS

The Channel Logic Output signals for each of the channels are added to the PLC interface. The ready output signals for each channel permit independent monitoring of the ‘ready’ versus ‘busy’ status of an individual channel using a logic signal rather than a command through the serial interface. This section describes the differences between the standard PLC Interface and this option.

3.2.5.1 Signal Functions

Channel <n> Ready Out - The 'Channel <n> Ready Out' signal indicates the active/idle state of each channel. The "READY OUT CONFIG" button in the Params A screen (Figure 3.13) is used to define ‘ready’ for both the ‘system ready’ and ‘channel ready’ outputs.

3.2.6 Connections

The following sections show the pin configurations for the different size Controller Modules.

3.2.6.1 Channel Logic Input/Output Connections (1-4 Channels)

All connections are through a 16 pin circular plastic connector, with the mating connector and pins supplied with the unit. Table 3.2 contains a list of each pin in the connector and its associated signal. If your Controller Module is less than 4 channels, the extra signals are not used.

Table 3.2 CHANNEL LOGIC INPUTS/OUTPUTS Pin Configuration

Pin Number	Signal	Pin Number	Signal
1	Channel 1 Trigger In +	9	Channel 1 Ready Out +
2	Channel 1 Trigger In -	10	Channel 1 Ready Out -
3	Channel 2 Trigger In +	11	Channel 2 Ready Out +
4	Channel 2 Trigger In -	12	Channel 2 Ready Out -
5	Channel 3 Trigger In +	13	Channel 3 Ready Out +
6	Channel 3 Trigger In -	14	Channel 3 Ready Out -
7	Channel 4 Trigger In +	15	Channel 4 Ready Out +
8	Channel 4 Trigger In -	16	Channel 4 Ready Out -

The mating components for the connectors are supplied with the system. The IVEK part #'s are as follows.

Part	IVEK Part #
Pins	630023/F04
Plug	630029/F16
Shell	630025/S17

3.2.6.2 Channel Logic Input Connections (5-8 Channels)

All connections are through a 24 pin circular plastic connector, with the mating connector and pins supplied with the unit. Table 3.3 contains a list of each pin in the connector and its associated signal. If your Controller Module is less than 8 channels, the extra signals are not used.

Install the keying plug in pin 17 on the Controller Module end of the customer supplied Channel Logic Input cable.

Table 3.3 CHANNEL LOGIC INPUTS Pin Configuration

Pin Number	Signal	Pin Number	Signal
1	Channel 1 Trigger In +	13	Channel 7 Trigger In +
2	Channel 1 Trigger In -	14	Channel 7 Trigger In -
3	Channel 2 Trigger In +	15	Channel 8 Trigger In +
4	Channel 2 Trigger In -	16	Channel 8 Trigger In -
5	Channel 3 Trigger In +	17	Key
6	Channel 3 Trigger In -	18	not used
7	Channel 4 Trigger In +	19	not used
8	Channel 4 Trigger In -	20	not used
9	Channel 5 Trigger In +	21	not used
10	Channel 5 Trigger In -	22	not used
11	Channel 6 Trigger In +	23	not used
12	Channel 6 Trigger In -	24	not used

3.2.6.3 Channel Logic Outputs Connections (5-8 Channels)

All connections are through a 24 pin circular plastic connector, with the mating connector and pins supplied with the unit. Table 3.4 contains a list of each pin in the connector and its associated signal. If your Controller Module is less than 8 channels, the extra signals are not used.

Install the keying plug in Pin 5 on the Controller Module end of the Channel Ready Output Cable.

Table 3.4 CHANNEL LOGIC OUTPUTS Pin Configuration

Pin Number	Signal	Pin Number	Signal
1	not used	13	Channel 3 Ready Out –
2	not used	14	Channel 4 Ready Out +
3	not used	15	Channel 4 Ready Out –
4	not used	16	Channel 5 Ready Out +
5	not used	17	Channel 5 Ready Out –
6	not used	18	Channel 5 Ready Out +
7	Key	19	Channel 6 Ready Out –
8	Channel 1 Ready Out +	20	Channel 5 Ready Out +
9	Channel 1 Ready Out –	21	Channel 7 Ready Out –
10	Channel 2 Ready Out +	22	Channel 5 Ready Out +
11	Channel 2 Ready Out –	23	Channel 8 Ready Out –
12	Channel 3 Ready Out +	24	not used

The mating components for the two connectors are supplied with the system. The IVEK Spec # are as follows:

Part	IVEK Spec #
Pins	N630023/F04
Plug	N630029/F24
Shell	N630025/S23
Keying Plug	N630033

3.2.6.4 Channel Logic Inputs Connector Pinout (9-16 Channels)

All connections are through a 37 pin circular plastic connector, with the mating connector and pins supplied with the unit. Table 3.5 contains a list of each pin in the connector and its associated signal. If your Controller Module is less than 16 channels, the extra signals are not used.

Install the keying plug in Pin 34 on the Controller Module end of the Channel Trigger In Cable.

Table 3.5 Channel Logic Inputs Pin Configuration

Pin Number	Signal	Pin Number	Signal
1	Channel 1 Trigger In +	20	Channel 10 Trigger In -
2	Channel 1 Trigger In -	21	Channel 11 Trigger In +
3	Channel 2 Trigger In +	22	Channel 11 Trigger In -
4	Channel 2 Trigger In -	23	Channel 12 Trigger In +
5	Channel 3 Trigger In +	24	Channel 12 Trigger In -
6	Channel 3 Trigger In -	25	Channel 13 Trigger In +
7	Channel 4 Trigger In +	26	Channel 13 Trigger In -
8	Channel 4 Trigger In -	27	Channel 14 Trigger In +
9	Channel 5 Trigger In +	28	Channel 14 Trigger In -
10	Channel 5 Trigger In -	29	Channel 15 Trigger In +
11	Channel 6 Trigger In +	30	Channel 15 Trigger In -
12	Channel 6 Trigger In -	31	Channel 16 Trigger In +
13	Channel 7 Trigger In +	32	Channel 16 Trigger In -
14	Channel 7 Trigger In -	33	Keying Plug
15	Channel 8 Trigger In +	34	Keying Plug Hole
16	Channel 8 Trigger In -	35	not used
17	Channel 9 Trigger In +	36	not used
18	Channel 9 Trigger In -	37	not used
19	Channel 10 Trigger In +		

3.2.6.5 Channel Logic Outputs Connector Pinout (9-16 Channels)

All connections are through a 37 pin circular plastic connector, with the mating connector and pins supplied with the unit. Table 3.6 contains a list of each pin in the connector and its associated signal. If your Controller Module is less than 16 channels, the extra signals are not used.

Install the keying plug in Pin 4 on the Controller Module end of the Channel Ready Output Cable.

Table 3.6 Channel Logic Outputs Pin Configuration

Pin Number	Signal	Pin Number	Signal
1	not used	20	Channel 8 Ready Out +
2	not used	21	Channel 8 Ready Out -
3	not used	22	Channel 9 Ready Out +
4	Keying Plug Hole	23	Channel 9 Ready Out -
5	Keying Plug	24	Channel 10 Ready Out +
6	Channel 1 Ready Out +	25	Channel 10 Ready Out -
7	Channel 1 Ready Out –	26	Channel 11 Ready Out +
8	Channel 2 Ready Out +	27	Channel 11 Ready Out -
9	Channel 2 Ready Out –	28	Channel 12 Ready Out +
10	Channel 3 Ready Out +	29	Channel 12 Ready Out -
11	Channel 3 Ready Out –	30	Channel 13 Ready Out +
12	Channel 4 Ready Out +	31	Channel 13 Ready Out -
13	Channel 4 Ready Out –	32	Channel 14 Ready Out +
14	Channel 5 Ready Out +	33	Channel 14 Ready Out -
15	Channel 5 Ready Out –	34	Channel 15 Ready Out +

Pin Number	Signal	Pin Number	Signal
16	Channel 6 Ready Out +	35	Channel 15 Ready Out -
17	Channel 6 Ready Out –	36	Channel 16 Ready Out +
18	Channel 7 Ready Out +	37	Channel 16 Ready Out -
19	Channel 7 Ready Out -		

The mating components for the two connectors are supplied with the system. The IVEK Part #'s are as follows:

Part	IVEK Spec #
Pins	630023-F04
Plug	630029-F37
Shell	630025-S23
Keying Plug	630033

3.2.6.6 Channel Logic Input Connector Pinout (17-24 Channels)

All connections are through a 37 pin circular plastic connector, with the mating connector and pins supplied with the unit. Table 3.7 contains a list of each pin in the connector and its associated signal. If your Controller Module is less than 24 channels, the extra signals are not used.

Install the keying plug in pin 2 and pin 37 on the Controller Module end of the customer supplied Channel Logic Input cable.

Table 3.7 Channel Logic Inputs Pin Configuration

Pin Number	Signal	Pin Number	Signal
1	Keying Plug	20	Channel 18 Trigger In +
2	Keying Plug Hole	21	Channel 19 Trigger In +
3	Channel 1 Trigger In +	22	Channel 20 Trigger In +
4	Channel 2 Trigger In +	23	Channel 21 Trigger In +
5	Channel 3 Trigger In +	24	Channel 22 Trigger In +
6	Channel 4 Trigger In +	25	Channel 23 Trigger In +
7	Channel 5 Trigger In +	26	Channel 24 Trigger In +
8	Channel 6 Trigger In +	27	not used
9	Channel 7 Trigger In +	28	not used
10	Channel 8 Trigger In +	29	not used
11	Channel 9 Trigger In +	30	not used
12	Channel 10 Trigger In +	31	not used
13	Channel 11 Trigger In +	32	not used
14	Channel 12 Trigger In +	33	not used
15	Channel 13 Trigger In +	34	not used
16	Channel 14 Trigger In +	35	not used
17	Channel 15 Trigger In +	36	Channel Trigger In -
18	Channel 16 Trigger In +	37	Keying Plug Hole
19	Channel 17 Trigger In +		

The mating components for the two connectors are supplied with the system. The IVEK Part #'s are as follows:

Part	IVEK Part #
Pins	630023-F04
Plug	630029-F37
Shell	630025-S23
Keying Plug	630033

3.2.6.7 Channel Logic Output Connector Pinout (17-24 Channels)

All connections are through a 37 pin circular plastic connector, with the mating connector and pins supplied with the unit. Table 3.8 contains a list of each pin in the connector and its associated signal. If your Controller Module is less than 24 channels, the extra signals are not used.

Install the keying plug in pin 1 and pin 36 on the Controller Module end of the customer supplied Channel Logic Output cable.

Table 3.8 Channel Logic Output Pin Configuration

Pin Number	Signal	Pin Number	Signal
1	Keying Plug Hole	20	Channel 18 Ready Out -
2	Channel Ready Out +	21	Channel 19 Ready Out -
3	Channel 1 Ready Out -	22	Channel 20 Ready Out -
4	Channel 2 Ready Out -	23	Channel 21 Ready Out -
5	Channel 3 Ready Out -	24	Channel 22 Ready Out -
6	Channel 4 Ready Out -	25	Channel 23 Ready Out -
7	Channel 5 Ready Out -	26	Channel 24 Ready Out -
8	Channel 6 Ready Out -	27	not used
9	Channel 7 Ready Out -	28	not used
10	Channel 8 Ready Out -	29	not used
11	Channel 9 Ready Out -	30	not used
12	Channel 10 Ready Out -	31	not used
13	Channel 11 Ready Out -	32	not used
14	Channel 12 Ready Out -	33	not used
15	Channel 13 Ready Out -	34	not used
16	Channel 14 Ready Out -	35	not used
17	Channel 15 Ready Out -	36	Keying Plug Hole
18	Channel 16 Ready Out -	37	Keying Plug
19	Channel 17 Ready Out -		

The mating components for the two connectors are supplied with the system. The IVEK Part #'s are as follows:

Part	IVEK Part #
Pins	630023-F04
Plug	630029-F37
Shell	630025-S23
Keying Plug	630033

3.2.7 CC TRIGGER Connector

The CC TRIGGER connector provides an optically isolated input to allow a contact closure source (such as a footswitch or relay) to initiate the system trigger signal. This signal is OR'd together with the Trigger In signal of the System Logic I/O connector. While both signals could be used simultaneously, it is recommended that only one of these signal be used in a system.

3.2.7.1 Signal Levels

All output signals are optically isolated. The power for output signals is provided by the customer's equipment. All inputs are configured for contact closure (dry contact or solid state) 5 VDC signal at 20 mA. The power for input signals is provided by the IVEK controller.

The contact closure input provides power to the contact closure (dry contact or solid state). When the contact closure is open, the output voltage of the signal is near 5VDC. The maximum current that can be delivered when the contact closure closed is less than 20mA. DO NOT apply power to this input; doing so may damage the contact closure circuitry.

The input signal is true when the external contact is closed.

3.2.8 Operating Modes

There are several different modes of operation which provide the Controller Module with its vast functional flexibility. Volume commands for the Multispense 900 use number of full revolutions. Rate commands are in revolutions per minute.

3.2.8.1 Prime

Prime mode produces a continuous cycle to pump fluid in one direction. The current setting for the liquid direction determines the direction of the fluid flow. The operating mode and liquid direction setting can be viewed in the Main screen (Figure 3.8). Pumping is started using the "START" button in the Main or Volume & Rate screens (Figures 3.8 or 3.9). The pumping will continue until the "STOP" Button is pressed or until the maximum time set with the "PRIME DURATION" button in the Params A screen (Figure 3.11) is reached. The time-out insures a communications problem won't result in the pumps operating forever.

Prime is used to fill the system with fluid in preparation for actual operation, empty the system of fluid, and flush the system for cleaning.

The flow rate for priming is set in the Volume & Rate screen (Figure 3.9) and is separate from the Dispense and Meter rate.

Volume pumped during prime operation does not accumulate on the totalizer viewed in the Params A screen (Figure 3.11).

3.2.8.2 Dispense

Dispense mode is used to deliver a specific volume of fluid at a specific rate. The current setting for the liquid direction determines the direction of the fluid flow. The operating mode and liquid direction setting can be viewed in the Main screen (Figure 3.8). Pumping can be started "START" button in the Main or Volume & Rate screens (Figures 3.8 or 3.9). The dispense cycle will continue until the volume set using the "VOLUME Strokes button in the Volume & Rate screen (Figure 3.9) has been delivered, unless the "STOP" button is pressed.

The flow rate and volume for dispensing are set in the Volume & Rate screen (Figure 3.9) and is separate from the Prime rate.

Volume pumped during dispense operation accumulates on the totalizer which is viewed Params A screen (Figure 3.11).

3.2.8.3 Meter

Meter mode is used to deliver fluid at a specific rate for a period of time determined by hardwired input signals or through the Touchscreen by manually pressing the START or STOP buttons. The operating mode and liquid direction setting can be viewed in the Main screen (Figure 3.8). The most accurate and repeatable method to control metering operation uses the hardwired inputs. Pumping will start when the hardwired signal is present and will stop when the hardwired signal stops. Pumping can also be operated with the "START" and "STOP" buttons in the Main or Volume & Rate screens (Figures 3.8 or 3.9).

In meter mode, the pump will stop as soon as possible without regard to the reference position of the pump. If switching from Meter to Dispense mode, the first dispense must be wasted. This will align the pump to the reference position.

The flow rate and metering is set in the Volume & Rate screen (Figure 3.9) and is separate from the Prime rate.

Volume pumped during dispense operation accumulates on the totalizer which is viewed Params A screen (Figure 3.11).

3.2.8.4 Other Operating Sequences

Reference - Under certain conditions the controller may require a reference cycle when a fault occurs because it does not sense the rotary position of the piston. When the "CLEAR AND REFERENCE" or "REF ALL" buttons (Figure 3.13) are pressed, the piston will find the rotary home and stop at this position.

A reference cycle may be required after any fault before a command resulting in motion of the pump is accepted.

Drawback - Drawback is a controlled reverse flow at the end of a dispense to improve volume repeatability when 'stringy' fluids are being dispensed. If no drawback is required, the drawback volume is simply set to 0.

The Drawback settings are done in the Drawback screen (Figure 3.10). When drawback is used, the "VOLUME Strokes" button specifies the net fluid displaced, the actual forward motion is the sum of the specified dispense volume and the drawback volume. The flow rate during drawback as well as the dwell (time between the forward and reverse portions of the cycle) are specified with the "RATE" and "DWELL" buttons respectively.

3.2.9 Operating Parameters

Parameters are divided into a number of categories. This section provides a description of each command in the parameter that best fits its description.

3.2.9.1 Pump Control

The following parameters control the specific operation of the Motor/Base Module(s). The parameters are set for all channels of the Motor/Base Module.

Rate For Dispense And Meter Operation - This parameter is used to control the fluid flow rate for both Dispense and Meter mode.

Dispense Volume - This parameter is used to specify the volume of fluid dispensed during dispense operation. The dispense volume indicates full revolutions of the pump.

Rate For Prime - One parameter is used to control the fluid flow rate for prime mode.

Direction - The direction of the fluid flow is normally forward, but can be reversed to empty fluid back into the supply.

Drawback - Three parameters are specified to describe drawback operation. These are the drawback volume, the fluid flow rate during drawback, and the dwell (time delay) between the dispense and drawback portions of the cycle.

Time Limit For Prime - In order to prevent a mess if the communications are interrupted during a prime operation, priming is limited to a duration specified by a parameter.

3.2.10 Status Information

3.2.10.1 Faults

A fault is the result of improper operation of the Motor/Base Module being detected.

Clear Faults - The clear faults command must be issued prior to any commands which would cause motion in the Motor/ Base Module.

NOTE

After a fault is cleared, a reference MUST BE issued to insure proper operation of the channel that was faulted.

The channel that was faulted WILL NOT respond to any motion command until the reference command has successfully completed.

3.3 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.

If different types of Motor/Base Modules are used on a single Controller Module, insure the Motor/Base Module is connected to the correct Channel Plug-In. Refer to Figure 3.18 for the Channel Plug-In and Chapter 5 for the Motor/Base Module (Chapter 6 for custom) for identification information.

3.4 MAINTENANCE

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

For Touchscreen maintenance, refer to Chapter 4 in the Computer Technology Corporation "PowerStation PA Series User Guide".

3.4.1 Assembly/Disassembly Procedures

The Controller Module contains the following replaceable parts.

- Master Plug-In
- Channel Plug-In
- Main Power Fuse
- Touchscreen Backlight (Refer to procedure in Parker CTC Manual)

3.4.1.1 Master Plug-In (Figure 3.18 Item 1)

CAUTION

This is an electrostatic sensitive device. Electrostatic discharge can damage the Plug-In if not handled properly.

Disassembly

1. Turn power OFF.
2. Loosen two captive screws securing the Master Plug-In to the chassis.
3. Grab the handle and slide the Master Plug-In straight out.

Assembly

1. Slide the Master Plug-In into the chassis making sure it goes into the rear connector and secure with the two captive screws.

3.4.1.2 Channel Plug-In (Figure 3.18 Item 2)

If both Microspense AP and Heavy Duty Motor/Base Modules are used on a single Controller Module, insure the Motor/Base Module is connected to the correct Channel Plug-In. Refer to the specification section following the Table of Contents for the Channel Plug-In Motor/Base Module identification chart.

CAUTION

This is an electrostatic sensitive device. Electrostatic discharge can damage the Plug-In if not handled properly.

Disassembly

1. Turn power OFF.
2. Remove the cable from the connector.
3. Loosen four captive screws securing the Channel Plug-In to the chassis.
4. Grab the handle and slide the Channel Plug-In straight out.

Assembly

1. Slide the Channel Plug-In into the chassis making sure it goes into the rear connector. Secure with the four captive screws.
2. Connect the cable to the connector.

3.4.1.3 Touchscreen (Figure 3.17)

The Touchscreen is available in two configurations; either mounted in an IVEK Touchscreen enclosure or shipped without an enclosure for customer mounting. The following disassembly/assembly procedure is for the IVEK mounted configuration. This procedure may need to be altered for customer mounted configurations.

Disassembly

1. Turn power OFF.
2. Gain access to the rear of the touchscreen by removing the front panel of the enclosure which contains the touchscreen. After loosening the four captive screws that secure the front of the enclosure, be sure to support the front panel to avoid stress on the wiring.
3. Disconnect power cable connector (1) from Touchscreen (2) by pulling downward on cable connector (1).

NOTE

Do not remove the wires going into the connector.

4. Disconnect communications cable connector (5) from the COM1 port on Touchscreen (2). **Do not pull on the wires to remove the connector.**
5. Remove Touchscreen (2) from the enclosure by turning four screws (4) counter-clockwise about four turns, pushing bracket (3) forward (towards the front of the enclosure) pulling bracket (3) and screw (4) away from touchscreen (2).
6. Slide Touchscreen (2) out the front of the enclosure.

NOTE

Make sure you hold the front of Touchscreen (2) to prevent it from falling out of the enclosure when the last bracket (3) is removed.

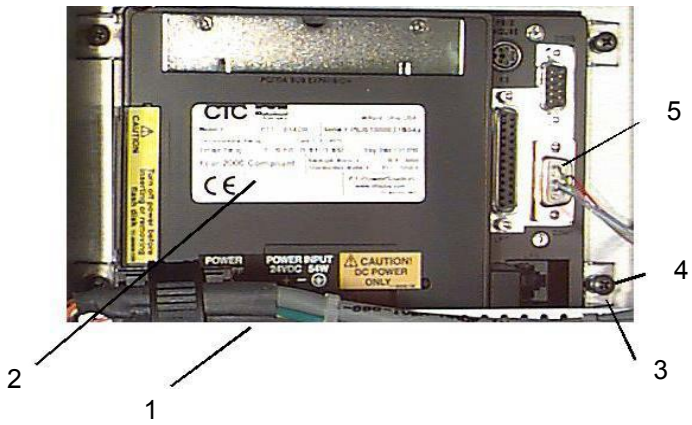


Figure 3.17 Touchscreen Rear View

NOTE

Refer to Computer Technology Corporation "POWERSTATION Model PA Series User Guide" for a list of replaceable parts and assembly / disassembly procedures for those parts. Computer Technology Corporation provides contact and Model # information on the back of the Touchscreen.

Assembly

1. Slide Touchscreen (2) in through the front of the enclosure.
2. Secure Touchscreen (2) to the enclosure using four clips (3) and four screws (4). Position clips (3) on Touchscreen (2) and tighten screws (4).
3. Connect communications cable connector (5) to Touchscreen (2) COM1 connector.
4. Connect power cable connector (1) to Touchscreen (2).
5. Position the enclosure cover(s) on the enclosure and secure with the screws.

3.5 PROBLEM GUIDE

Table 3.9 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.

3.5.1 Optically Isolated Serial Interface

CAUTION

Do not issue a motion command while the actuator is busy (while the actuator is in motion). Use the 'q' Ready/Busy command to determine the actuator's Ready/Busy status.

It is suggested the actuator NOT be run in the reverse direction for extended periods. Loss of the linear home position may result. If reverse direction is required, a periodic reference or load command should be issued to allow the actuator to reaquire the linear home sensor.

The optically isolated serial interface provides control of all functions available with electrical isolation between the RS-232 input signals and the internal control electronics. The hardware is configured as RS-232 Data Communications Equipment (DCE) standard with the pin configuration shown in Table 3.10.

Table 3.10 Connections (DCE, 9 pin D-sub female)

Pin Number	Signal	Direction
2	RD	From Controller Module
3	TD	To Controller Module
5	COM	
6	DSR	From Controller Module
7	DTR	To Controller Module

No hardware signals are currently used for handshaking.

The parameters of the communications interface must be set as follows.

- 9600 BAUD
- 8 BIT
- NO PARITY
- ONE STOP BIT

Table 3.9 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. Fuse is blown.	Ensure AC power cord is plugged into a properly grounded three-prong outlet capable of supplying the voltage listed in the Title Page section of this manual. Unplug main power cord from outlet. Remove fuse from rear panel fuse holder. Test fuse conductivity. Install good fuse in rear panel fuse holder.
Power is on, Controller Module accepts trigger, piston fails to move and Motor/Base Module makes a sound. * This condition does not harm the system.	A Pump Module or motor malfunction can cause this problem.	Turn off Controller Module power. Remove Pump Module from Motor/Base Module. Turn on Controller Module and try again. If the motor operates correctly, the pump may need to be cleaned or serviced.
Power is on, Controller Module accepts a trigger, (ACTIVE indicator illuminates), piston fails to move, and Motor/Base Module is silent.	Channel fuse is blown. A motor malfunction can cause this problem.	Unplug main power cord from outlet. Remove Channel PCB Plug-In. Remove fuses F5 and F6 from fuse holders. Test fuse conductivity. Replace if necessary. Turn off Controller Module power. Check to ensure 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 controller, Motor/Base Module and Pump Modules to IVEK Corporation for repair.
Controller Module power on and operational, but will not activate Motor/Base.	I/O Cable	Check connection of cable between Controller Module and Motor/Base Module. Inspect and repair faulty cable.
Controller Module has power, touchscreen does not.	Faulty Touchscreen.	Turn Controller Module power off then back on.
A communication error occurs on one or more channels.	Faulty Touchscreen.	Turn Controller Module power off then back on.
After pressing a button, expected results don't occur.	Slow response time.	Wait longer before pressing another button.
The Ready/Busy display is not as expected.	Slow response time.	Wait longer before pressing another button.
Fault LED illuminates orange (all Channel PCB Plug-Ins)		If included, check motor High Voltage breaker(s) and Low Voltage breaker(s).
Fault LED illuminates orange (single Channel PCB Plug-Ins)		Unplug main power cord from outlet. Remove Channel PCB Plug-In. Remove fuses F5 and F6 from fuse holders. Test for conductivity. Replace if necessary.
		If none of the above solves the problem, contact IVEK technical support for assistance.

NOTE

Refer to the Title Page section of this manual to determine the fuse specifications for fuses F5 and F6.

The USB is an alternate for the RS-232 interface. The USB connector is a type B connector. The USB connection is a device connection. The connection between the USB and the PC is a virtual serial port. The driver for the USB is included with the most recent versions of Windows.

3.5.1.1 Command Structure

The command is a string of ASCII characters. The use of the ASCII backspace or rub out characters as a means of entry correction is not supported.

Commands are not directly echoed as they are received. The terminal being utilized to send commands should be setup for half duplex mode.

<name> Represents an argument

[ ] Represents an optional argument
, Field delimiter character for numerical arguments.
<CR> End of command represented by ASCII carriagereturn character (no line feed).

The complete command form is: [<chan>]<cmd>[<value1>[,<value2>[,<value3>]]]<CR>

<chan> Channel number

All numerical characters beginning a command are evaluated as the channel number.

<cmd> Command

First non-numerical character seen in the command string will be evaluated as the command character.

<value1> First numerical parameter

The first numerical character received after the command character begins evaluation of the first numerical parameter.

<value2> Second numerical parameter

All non-numerical values with the exception of the field delimiter character will be ignored.

<value3> Third numerical parameter

All non-numerical values with the exception of the field delimiter character will be ignored.

Note: Do not rely on default values for any parameter if the value is required for proper operation in your application. Initialize all parameters required for proper operation, even if the value is the same as the default.

All values in the command string that are not required by the command specified will be ignored. Following are some examples of command strings.
3v89<CR> Channel 3, command v, one value of 89

0r400<CR> All channels, command r, one value of 400
e<CR> Same channel as previous command, command e
Transmission should stop when an ASCII carriage return character is sent and can resume when the ASCII carriage return of the response is received.

3.5.1.2 Response String

The response from the Controller Module has a format which is very similar to the command with the addition of an additional ‘flag’ and value if a fault or warning is active.

<name>	Represents an argument
[ ]	Represents an optional argument
,	Field delimiter character for numerical arguments.
*	Field delimiter character which precedes fault or warning value
<CR>	End of command represented by ASCII carriage return character (no line feed).

The complete command form is: <chan><cmd>[<value1>[,<value2>[,<value3>]]]<CR>. The description for the response string above follows the structure of the command string previously described.

If a fault or warning exists, the normal value(s) are returned for the command, followed by the fault delimiter (in place of the normal field delimiter) and the fault number to indicate the problem. The fault delimiter and fault number will appear in all responses from that channel until the command to clear faults is sent to the faulted channel. If a command normally returns three values, the fault number will replace the third value. Following are some examples of command strings.

3c89<CR>	**Command:** Channel 3, command c, one value of 89
3c<CR>	**Response:** Channel 3, command c, no values other than warnings are returned by command c.
4m1<CR>	**Command:** Channel 4, command m, one value of 1
4m1<CR>	**Response:** Channel 4, command m, one value of 1
u<CR>	**Command:** Same channel as previous command (4), command u, no new value
4u2000<CR>	**Response:** Channel 4, command u, one value of 2000
u3500<CR>	**Command:** Same channel as previous command (4), command u, 1 value of 3500
4u3500<CR>	**Response:** Channel 4, command u, one value of 3500
r0<CR>	**Command:** Same channel as previous command (4), command r, 1 value of 0
4r1000*2<CR>	**Response:** Channel 4, command r, current value is 1000 (no change), warning 2 =value no good

3.5.1.3 Broadcasting

A command with a channel address of 0 will send that command to both channels if installed. A subsequent command which does not indicate a new channel number will also be broadcast to both channels (previous channel number is retained as in single channel commands). The response from each channel will be sent by the Controller Module, with a semicolon separating the responses of the channels. An ASCII carriage return is sent by the Controller Module at the end of the response from the last channel.

1<cmd><value>;2<cmd><value>3<cmd><value>; ;n<cmd><value><CR>

EXAMPLES

0m2<CR>	**Command:** sets all channels to Dispense mode
1m2;2m2<CR>	**Response:** for a 2 channel system
0v54<CR>	**Command:** sets all channels to a volume of 54
1v54;2v54<CR>	**Response:** for a 2 channel system
0f<CR>	**Command:** references all channels
1f;2f<CR>	**Response:** for a 2 channel system

3.5.1.4 Verbose/Terse Response

Responses from the Controller Module can be selected as ‘verbose’, with information from the command sent, or as ‘terse’, with only warning and fault information sent. Verbose or terse mode is selected using the ‘h’ command to the Master Plug-In (channel 99). This feature is included to improve communication throughput if many channels and parameters are being changed. For this application, we recommend using Verbose mode.

3.5.1.5 Commands

There are two command sets; master and channel. The master commands are sent to the Master Plug-In and control the overall settings of the system. The channel commands are sent to the Channel Plug-In(s) and can either control one Plug-In or all Plug-Ins depending on the code sent. If a 0 is sent as the channel number, all boards will be affected. If the Channel Plug-In number is sent, (i.e. 1 for channel 1, 2 for channel 2 etc...) then only that channel will be affected. Tables 3.11 and 3.12 list the commands for the Master Plug-In and Channel Plug-In(s).

NOTE

Refer to previous description for complete command syntax ("COMMAND STRUCTURE").

TABLE 3.11 MASTER PLUG-IN COMMANDS

(Precede command with 99)

Command	Response	Description
<ESC> => RESET		
<ESC>		Resets processor on master card only. Any time an escape character is received, the master card processor will be restarted without changing any setup parameters for the master card. Neither a preceding channel number, nor a following carriage return is required for this command to be recognized and executed. As this is a software controlled reset, it is not guaranteed to work in all cases.
h => HARDWARE CONFIGURATION		
99h	h<value1>	Returns the current configuration for the hardware.
99h<value1>	h<value1>	Sets the hardware configuration. <value1>: 0 = Terse 1 = Verbose (default) Any nonzero number results in Verbose.
m => MODE		
99m	(Reserved for Digifeeder 2002)	
z => SOFTWARE VERSION		
99z	z<value1>,<value2>,<value3>	Returns the software version.

To properly decode this information, the first two values should be converted to 16 bit hexadecimal. The final 'readable' format is three uppercase letters followed by five decimal digits.

value 1 high byte:	first letter in ASCII
value 1 low byte:	second letter in ASCII
value 2 high byte:	third letter in ASCII
value 2 low byte:	fourth and fifth decimal digits as a hexadecimal value
value 3:	first, second, and third decimal digits as a hexadecimal value

As an aid to determining relative age of different versions, the last two digits are the year and the previous three digits are the day in the year for that version.

TABLE 3.12 CHANNEL PLUG-IN COMMANDS

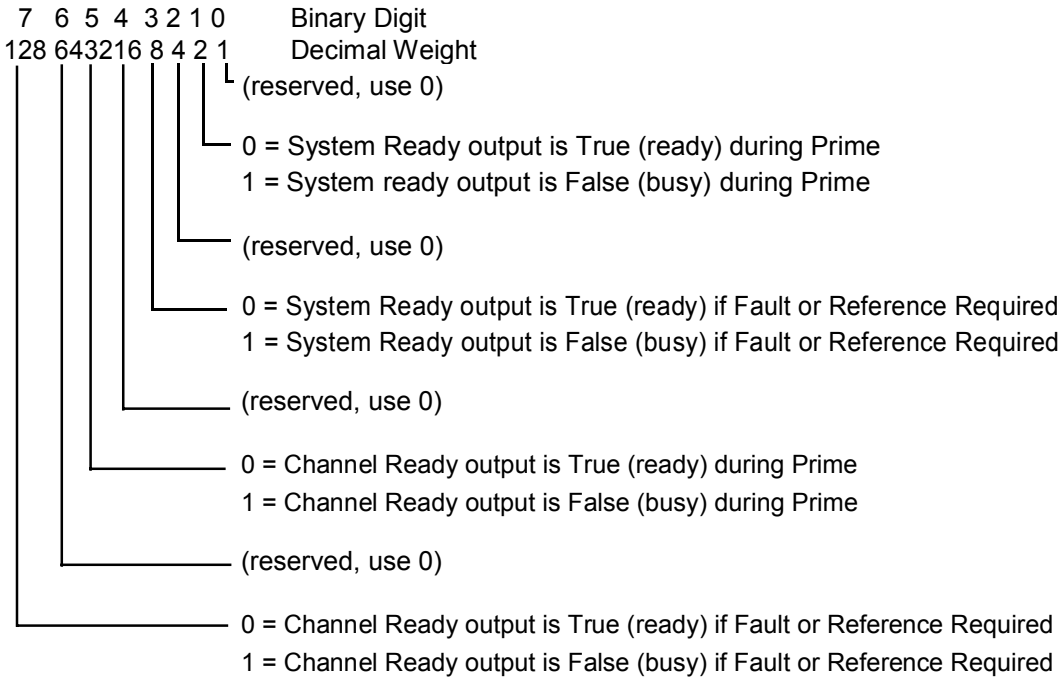
(Precede command with 0 for all channels or the individual channel number)

Command	Response	Description
b => BEGIN		
b	b	Initiates a prime, dispense, or meter cycle according to the current 'mode' setting.
c => CLEAR FAULTS		
c	c<value1>	Clears all faults. Error number returned as value1. Extended error information may be returned as value 2 and value 3 if applicable to that error number.
d => DIRECTION		
d	d<value1>	Returns current fluid direction setting.
d<value1>	d<value1>	Sets the liquid flow direction. <value1>: 0 = Reverse 1 = Forward (default) Any nonzero number results in Forward.
e => END		
e	e	Ends the current pumping cycle. In Prime mode, will continue until piston has reached the rotary sensor.
f => REFERENCE		
f	f	References the piston in the rotary home position.
g => TOTALIZER		
g	g<value1> Volume.	Returns current value, in pump rotations, of the totalizer for dispensing and metering <value1> represents a 5 digit decimal value.
g0	g0	Resets the value of the totalizer to zero. This parameter can only be reset to zero.

MAX VALUE: The totalizer will increment to a maximum value of 65,535 and stop. The totalizer will not 'wrap around'. The pump will continue to operate without incrementing the totalizer.

h => HARDWIRED READY SIGNAL OPERATION		
h	h<value1>	Returns the current configuration for the hardwired ready signals.
h<value1>	h<value1>	Sets configuration for the hardwired ready signals <value1> represents a 3 digit decimal value.

The hardwired ready signals (SYSTEM READY and optional CHANNEL READY) are always false while the pump is active in dispense or metering operation. In addition, the ready signals can be configured to be false during other times by setting appropriate bits in this configuration value. In all other cases, the ready output will be true. The command requires the decimal equivalent of the binary value as calculated below. Individual configuration information can be determined using binary decoding as follows:



Default:

138 (1000 1010) System Ready Out and Channel Ready Out (option) are false (busy) during dispense, during meter, during prime, if faulted, or if reference is required; are true (ready) when idle.

k => KEYLOCK

k	k<value1>	Returns the current setting which inhibits or allows operation of the channel.
k<value1>	k<value1>	Enables or disables a channel. <value1>: 0 = Disabled 1 = Enabled (default)

m => MODE

m	m<value1>	Returns the current mode.
m<value1>	m<value1>	Sets the operating mode. <value1>: 1 = Prime (default) 2 = Dispense 3 = Meter

q => READY/BUSY

q q<value1> Indicates READY/BUSY status.
<value1> is 0 for READY and greater than 0 for BUSY. Individual operational information can be determined using binary decoding as follows:

bit	value	active if bit set
0	1	Any Motion
1	2	Dispense or Meter
2	4	Prime
3	8	(reserved)
4	16	(reserved)
5	32	Referencing
6	64	Drawback

r => DISPENSE RATE

r	r<value1>	Returns the current dispense and metering flow rate in steps/sec.
r<value1>	r<value1>	Sets the Dispense or Metering flow rate in steps/sec. <value1>: represents a 4 digit decimal number Maximum: 4000 (23 Frame Motor) Maximum: 3500 (34 Frame Motor) Minimum: 14 Default: 500
r<value1>,1	r<value1>	Updates the present flow rate to a new flow rate during the present cycle.

s => STATUS

s or s2	s2<value2>	Returns number of rotary sensor faults (stalls) as <value2>.
s1,<value2>	s1,<value2>	Number of stalls before a rotary sensor fault occurs. <value2> represents a 3 digit decimal value. Maximum: 255 Minimum: 1 Default: 4
s2,0	s2,0	Resets the number of rotary sensor faults to zero. This parameter can only be reset to Zero.
s3,<value2>	s3,<value2>	Set the acceleration <value2>: 0= 23-Frame Standard (default) 1= 23-Frame Fire Off 2= 34-Frame Standard 3= 34-Frame (future)

t => TIME LIMIT FOR PRIME

t	t<value1>	Returns current limit on prime cycle in seconds.
t<value1>	t<value1>	Sets the limit on prime cycles in seconds. Value of zero will allow priming for less than one Second. <value1>: represents a 3 digit decimal number Maximum: 255 Minimum: 0 Default: 120

u => PRIME RATE

u	u<value1>	Returns the current prime flow rate in steps/sec.
u<value1>	u<value1>	Sets the Prime flow rate in steps/sec. <value1>: represents a 4 digit decimal number Maximum: 4000 (23 Frame Motor) Maximum: 3500 (34 Frame Motor) Minimum: 14 Default: 2000

v => DISPENSE VOLUME

v	v<value1>	Returns the current dispense volume in revolutions.
v<value1>	v<value1>	Sets the dispense volume in revolutions. A volume of zero will not allow the unit to be triggered while in Dispense mode. <value1>: represents a 5 digit decimal number Maximum: 10,000 Minimum: 0 Default: 1

w => DRAWBACK

w	w<value1>,<value2><value3>	Returns the current Drawback parameters.
w<value1>	w<value1>,<value2>,<value3>	Sets the drawback parameters. <value1> VOLUME in steps Maximum: 1000

Minimum: 0 (Default)
<value2> RATE in steps/sec.
Maximum: 4000 (23 Frame Motor)
Maximum: 3500 (34 Frame Motor)
Minimum: 14*
Default: same as 'r' command*
<value3> DWELL hundredths of a second
Maximum: 255
Minimum: 0 (Default) (23 Frame Motor)
Minimum: 5 (34 Frame Motor)

*Firmware version JHY33608 and JHZ33608 default to minimum (14), and Drawback only operates at rate specified. All other versions allow entry of Drawback Rate to a minimum of 0, which is the default value. If the value of Drawback Rate is less than 14, then drawback is performed at the current Dispense Rate.

3.5.1.6 Warnings

Warnings indicate problems in the command received, or a state of the Controller Module which prohibits immediate operation. An asterisk (*) precedes warnings in responses. An appropriate command (other than 'clear faults') may be required to operate the pump.

1 Command Not Valid - Response to any unrecognized command.
2 Value Not Valid - Response to any out of range value
3 Load Required - (reserved)
4 Reference Required - Pump needs to locate rotary reference position. Reference cycle, using 'f' command, this must be completed before continuing.
5 Mode Not Selected - (reserved)
6 Number Format - (reserved)
7 Channel Not Installed - No response from channel with that address.
8 Channel Locked Out - Switch on front panel of channel control card is in LOCKOUT position. Channel cannot be enabled via the serial interface with the 'k' command. The switch must first be moved to the middle position.
9 Channel Not Enabled - Specific channel triggered with 'begin' commands but NOT enabled.
10 Channel Not Responding - Master Plug-In does not see response from Channel Plug-In during internal communications attempt. If condition persists, contact IVEK Technical Support for replacement.
11 Second Command Character - A second command character (alphabetic character) was seen in a single command (before <CR> character). Entire command is ignored.

3.5.1.7 Faults

Faults are a result of the system detecting improper operation of the Motor/Base Module. All fault numbers will be greater than or equal to 1000. An asterisk (*) precedes warnings in responses. The 'clear faults' command must be used before any subsequent operation of the affected channel is performed.

1000 Fault On Other Channel - An unspecified fault has been detected on another channel. This error will not appear if a warning or fault condition exists in the channel for the command (won't replace warning or fault information from command's channel to indicate fault elsewhere). This error will not appear in a broadcast response.
1001 Linear Sensor Fault - (reserved)
1002 Rotary Sensor Fault - "Home" position sensor for rotary motion was not detected. Clear faults using 'c' command and re-reference using 'f' command.
1003 Linear Stall - (reserved)
1004 Rotary Stall - (reserved)

3.5.1.8 Command Summary

The command summary section is almost identical to the Command section except it has been abbreviated into two pages. This will allow for removal, copying and locating near the controlling terminal. Tables 3.13 and 3.14 list the abbreviated commands for the master and channel cards.

Table 3.13 Master Plug-In Commands (Precede command with 99)

Command	Response	Description
s => STATUS		
<ESC>		Resets processor on master card only.
h<value1>	h<value1>	Sets the hardware configuration <value1>: 0 = Terse 1 = Verbose (default)
m		(Reserved for Digifeeder 2002)
z	z<value1>,<value2>,<value3>	Returns the coded software version.

Table 3.14 Channel Plug-In Commands (Precede command with 0 for all or the channel number)

Command	Response	Description
b	b	Initiates a pumping cycle.
c	c<value1>	Clears all faults.
d<value1>	d<value1>	Sets the liquid flow direction. <value1>: 0 = Reverse 1 = Forward (default)
e	e	Ends the current pumping cycle.
f	f	Sets the piston in the reference location.
g	g<value1>	Returns the total number of motor revolutions of the totalizer. (send 0 to reset)
h<value1>	h<value1>	Sets configuration for the hardwired ready signals
	bit	**if bit set, SYSTEM value READY also false**
	0	1 not used
	1	2 Prime
	2	4 not used
	3	8 Fault, Ref Required
	4	16 not used
	5	32 Prime
	6	64 not used
	7	128 Fault, Ref Required
		136 System or Channel not ready if Fault or Reference Required
k<value1>	k<value1>	Enables or disables a channel. <value1>: 0 = Disabled 1 = Enabled (default)
m<value1>	m<value1>	Sets the operating mode. <value1>: 1 = Prime (default) 2 = Dispense 3 = Meter
q	q<value1>	Returns the Ready/Busy status. <value1>: 0 = Ready not 0 = Busy

Command	Response	Description
r<value1>	r<value1>	Sets the Dispense or Metering flow rate in steps/sec. <value1>: represents a five digit decimal number Maximum: 4000 (23 Frame) 3500 (34 Frame) Minimum: 14 Default: 500
s or s2	s2<value2>	Returns number of rotary sensor faults (stalls) as <value2>.
s1,<value2>	s1,<value2>	Number of stalls before a rotary sensor fault occurs. <value2> represents a 3 digit decimal value. Maximum: 255 Minimum: 1 Default: 4
s2,0	s2,0	Resets the number of rotary sensor faults to zero. This parameter can only be reset to zero.
s3,<value2>	s3,<value2>	Set the acceleration <value2>: 0= 23-Frame Standard (default) 1= 23-Frame Fire Off 2= 34-Frame Standard 3= 34-Frame (future)
t<value1>	t<value1>	Sets the limit on prime cycles in seconds. <value1>: represents a 3 digit decimal number Maximum: 255 Minimum: 0 Default: 120
u<value1>	u<value1> <value1>:	Sets the Prime flow rate in steps/sec. represents a 5 digit decimal number Maximum: 4000 (23 Frame Motor) 3500 (34 Frame Motor) Minimum: 14 Default: 2000
v<value1>	v<value1>	Sets the dispense volume in revolutions. <value1>: represents a 5 digit decimal number Maximum: 10,000 Minimum: 0 Default: 1
w<value1>	w<value1>,<value2>,<value3>	Sets the drawback parameters. <value1> Drawback Volume in steps Maximum: 1000 Minimum: 0 Default: 0 <value2> Rate in steps/sec. Maximum: 4000 (23 Frame Motor) 3500 (34 Frame Motor) Minimum: 14 Default: same as 'r' command <value3> Dwell hundredths of a second Maximum: 255 (23 Frame) Minimum: 0 Default: 5 (34 Frame) 0
z	z<value1>,<value2>,<value3>	Returns the software version.

	WARNINGS				FAULTS
1	Command Not Valid	7	Channel Not Installed	1000	Fault On Other Channel
2	Value Not valid	8	Channel Locked Out	1001	(reserved)
3	(reserved)	9	Channel Not Enabled	1002	Rotary Sensor Fault
4	Reference Required	10	Channel Not Responding	1003	(reserved)
5	(reserved)	11	Second Command Character	1004	(reserved)
6	(reserved)				

3.6 SPECIFICATIONS

Input Power Requirements:

Refer to Title Page section of this manual.

3.7 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.

1 - 2 Channel Enclosure 520254 - # ## # # # #
3 - 4 Channel Enclosure 520251 - # ## # # # #
5 - 8 Channel Enclosure 520246 - # ## # # # #
9 - 16 Channel Enclosure 520240 - # ## # # # #
17 - 24 Channel Enclosure 520243 - # ## # # # #

Motor/Base

C - Microspense AP Rare Earth Motor
D - Microspense AP Custom Overdrive
E - Heavy Duty 1 Stack
F - Heavy Duty 2 Stack
G - Heavy Duty 3 Stack
H - Heavy Duty Custom Overdrive

Number of Installed Channels

00 - 24

Motor Voltage

A - 2.5V Low, 90V High
B – 5.0V Low, 90V High

Logic Interface

L - PLC W/Load Input
Independent Trigger In
Independent Ready Out
Contact Closure

Parameter Interface

H – Local Terminal
I – Remote Terminal

Line Cord & Agency Approval

C - US Cord, 115/120 VAC, CE
D - Intl Cord, 115/120 VAC, CE
G - US Cord, 230/240 VAC, CE
H - Intl Cord, 230/240 VAC, CE
I - US Cord, 100 VAC, CE
J - Intl Cord, 100 VAC, CE
K - US Cord, 200/208 VAC, CE (not available on 1-4 Channel Systems)
L - Intl Cord, 200/208 VAC, CE (not available on 1-4 Channel Systems)
M - US Cord, 220 VAC, CE
N - Intl Cord, 220 VAC, CE

NOTE

A 'Z' in the model number or a model number not listed indicates a custom option and will be described in either the Title Page or Chapter 4.

3.8 ILLUSTRATED PARTS BREAKDOWN

The illustrated parts breakdown (Figure 3.18) contains replacement parts for the Controller Module.

INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY
	5202XX-######	Multispense 900 W/TS Style B Controller Module	1

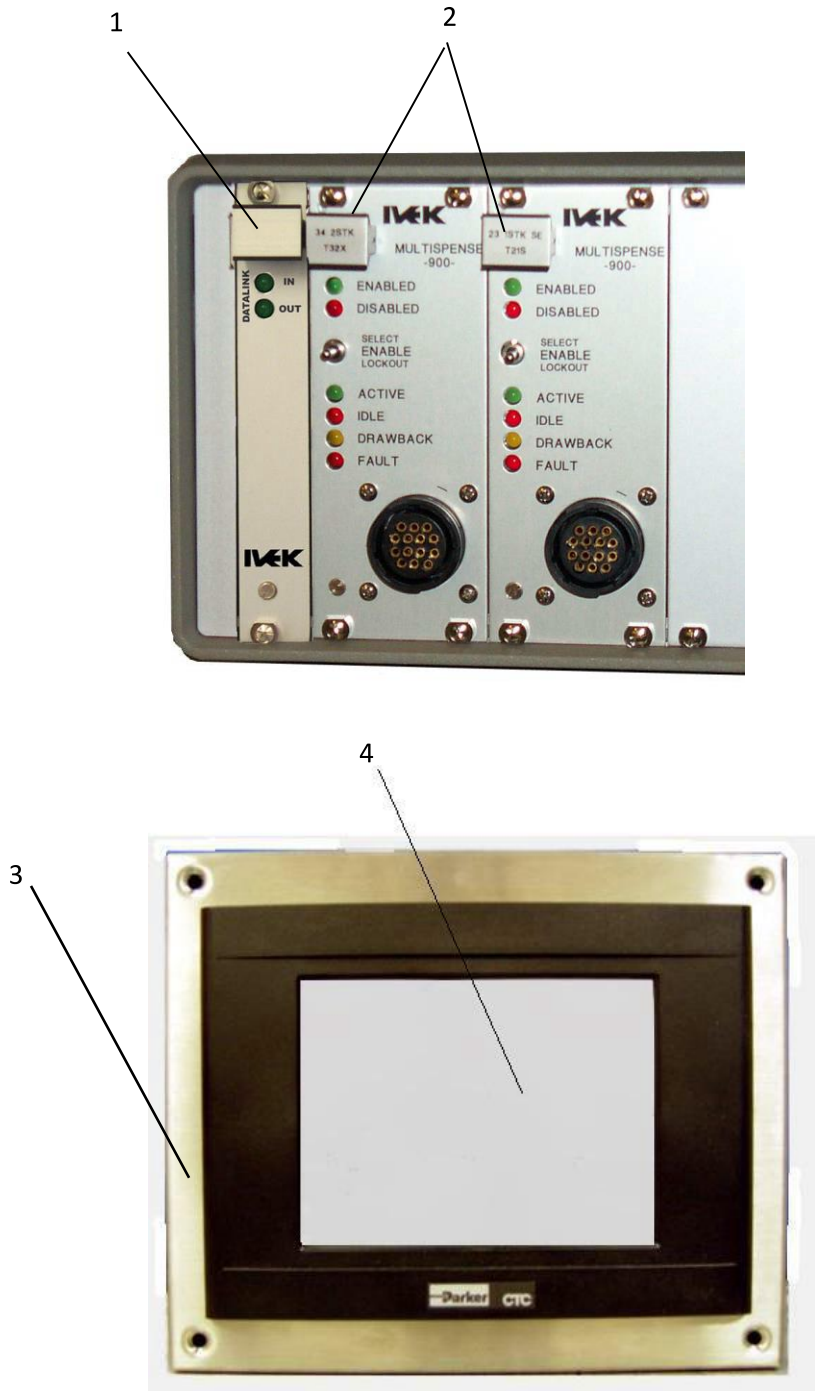
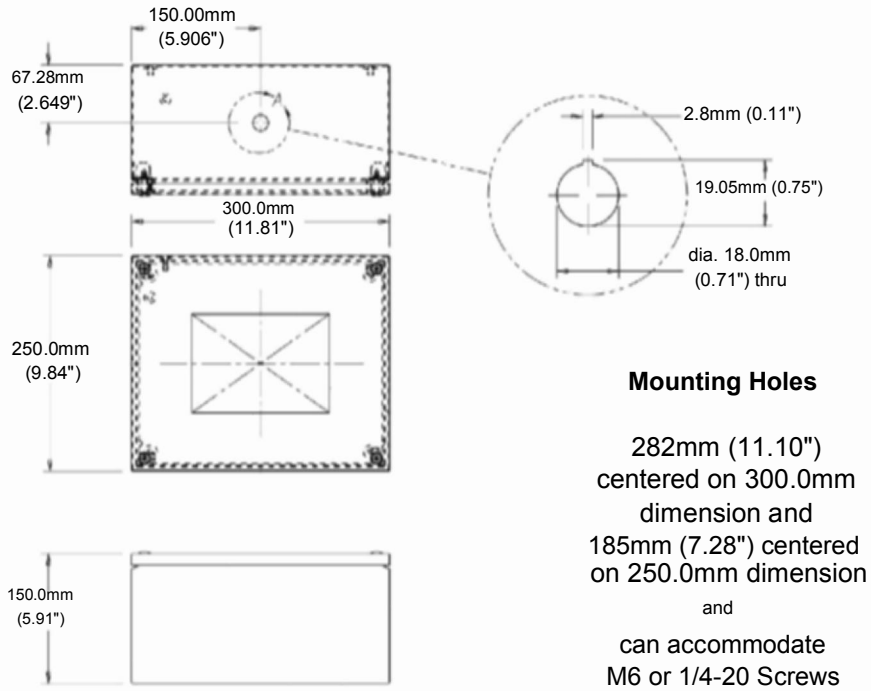


Figure 3.18 Multispense 900 W/TS Style B Controller Module (Sheet 1 of 3)

INDEX NO.	PART NUMBER	DESCRIPTION	UNITS PER ASSY
	5202XX-######	**Multispense 900 W/TS Style B Controller Module**	**1**
1	500184-02	PCB Plug-In, MS Master; Style B; Remote RS232, Standard	1
2	500185-C	PCB Plug-In, MS900 Channel; Style B, 23 Frame Rare Earth	##
2	500185-D	PCB Plug-In, MS900 Channel; Style B, 23 Frame Custom Overdrive	##
2	500185-E	PCB Plug-In, MS900 Channel; Style B, 34 Frame 1 Stack SE or DE	##
2	500185-F	PCB Plug-In, MS900 Channel; Style B, 34 Frame 2 Stack SE or DE	##
2	500185-G	PCB Plug-In, MS900 Channel; Style B, 34 Frame 3 Stack SE or DE	##
2	500185-H	PCB Plug-In, MS900 Channel; Style B, 34 Frame Custom Overdrive	##
3	062462-01	Stainless Steel Touchscreen Enclosure	1
4	662142-04	Touchscreen, 8 In. Diag. Color Char 02	1

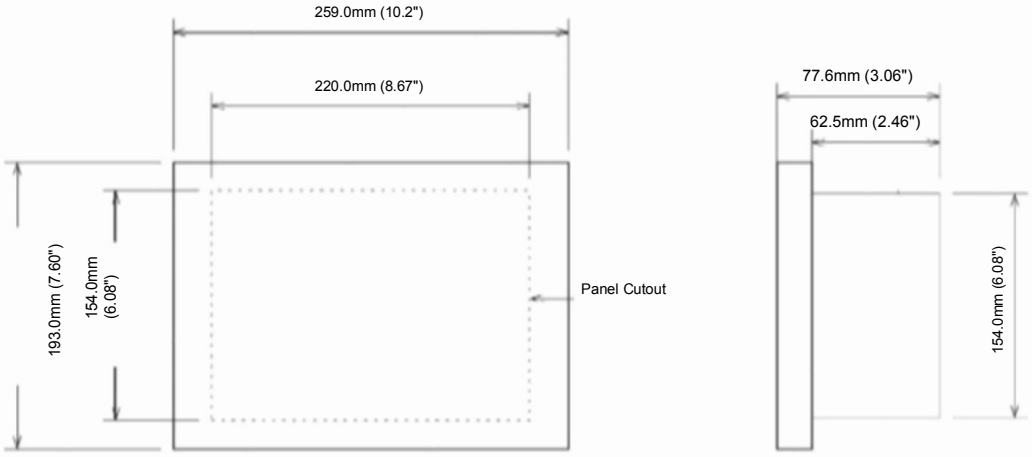
Figure 3.18 Multispense 900 W/TS Style B Controller Module (Sheet 2 of 3)



Mounting Holes

282mm (11.10")
centered on 300.0mm
dimension and
185mm (7.28") centered
on 250.0mm dimension
and
can accommodate
M6 or 1/4-20 Screws

Touchscreen Enclosure Dimensions



Touchscreen Dimensions

Figure 3.18 Multispense 900 W/TS Controller Module (Sheet 3 of 3)