YASKAWA

Integrated Dispensing
FUNCTION MANUAL

Upon receipt of the product and prior to initial operation, read these instructions thoroughly and retain for future reference.

MOTOMAN INSTRUCTIONS

MOTOMAN XXXXXX INSTRUCTIONS
DX100 INSTRUCTIONS
DX100 OPERATOR'S MANUAL
DX100 MAINTENANCE MANUAL

The DX100 operator's manual above corresponds to specific usage.
Be sure to use the appropriate manual.

Part Number: 156879-1CD
Revision: 0

YASKAWA

MANUAL NO.
156879-1CD ◈0

MANDATORY

- This system manual provides an overview of the Motoman Integrated Dispensing system. It gives general information about the system, a description of its major components, and the procedures for installation, system operation, and preventive and repair maintenance. Be sure to read and understand this manual thoroughly before installing and operating the Integrated Dispensing system.
- General items related to safety are listed in Section 2 of the *DX100 Controller Manual*. To ensure correct and safe operation, carefully read the *DX100 Controller Manual* before reading this manual.

CAUTION

- Some drawings in this manual are shown with the protective covers or shields removed for clarity. Be sure that all covers and shields are replaced before operating this product.
- The drawings and photos in this manual are representative examples, and differences may exist between them and the delivered product.
- YASKAWA may modify this model without notice when necessary due to product improvements, modifications, or changes in specifications.
- If such a modification is made, the manual number will also be revised.
- If your copy of the manual is damaged or lost, contact a YASKAWA representative to order a new copy. The representatives are listed on the back cover. Be sure to tell the representative the manual number listed on the front cover.
- YASKAWA is not responsible for incidents arising from unauthorized modification of its products. Unauthorized modification voids your product's warranty.

Notes for Safe Operation

Read this manual carefully before installation, operation, maintenance, or inspection of the Motoman Integrated Dispensing system.

In this manual, the Notes for Safe Operation are classified as “WARNING,” “CAUTION,” “MANDATORY,” or “PROHIBITED.”

 WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.
 CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury to personnel and damage to equipment. It may also be used to alert against unsafe practices.
 MANDATORY	Always be sure to follow explicitly the items listed under this heading.
 PROHIBITED	Must never be performed

Even items described as “CAUTION” may result in a serious accident in some situations. At any rate, be sure to follow these important items.

To ensure safe and efficient operation at all times, be sure to follow all instructions, even if not designated as "CAUTION" and "WARNING."

WARNING

- Before operating the manipulator, check that servo power is turned OFF by pressing the EMERGENCY STOP buttons on the operator station or Programming Pendant (refer to *Figure 1*). When servo power is turned OFF, the SERVO ON LED on the Programming Pendant is turned OFF.

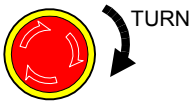
Injury or damage to machinery may result if the Emergency Stop circuit cannot stop the manipulator during an emergency. The manipulator should not be used if the EMERGENCY STOP buttons do not function.

Figure 1: EMERGENCY STOP Button

- Release the EMERGENCY STOP button (refer to *Figure 2*). Once this button is released, clear the cell of all items which could interfere with the operation of the manipulator. Then turn servo power ON.

Injury may result from unintentional or unexpected manipulator motion.

Figure 2 : Release of EMERGENCY STOP Button



- Observe the following precautions when performing teaching operations within the P-point maximum envelope of the manipulator:
  - View the manipulator from the front whenever possible.
  - Always follow the predetermined operating procedure.
  - Ensure that you have a safe place to retreat to in case of emergency.

Improper or unintended manipulator operation may result in injury.

- Confirm that no person is present in the P-point maximum envelope of the manipulator and that you are in a safe location before:
  - Turning on the power for the DX100 controller.
  - Moving the manipulator with the Programming Pendant.
  - Running the system in the check mode.
  - Performing automatic operations.

Injury may result if anyone enters the P-point maximum envelope of the manipulator during operation. Always press an EMERGENCY STOP button immediately if there is a problem. The EMERGENCY STOP buttons are located on the operator station and on the Programming Pendant.

CAUTION

- Perform the following inspection procedures prior to conducting manipulator teaching. If problems are found, repair them immediately and be sure that all other necessary processing has been performed.
  - Check for problems in manipulator movement.
  - Check for damage to insulation and sheathing of external wires.
- Always return the Programming Pendant to the hook on the cabinet of the DX100 controller after use.

The Programming Pendant can be damaged if it is left in the manipulator's work area, on the floor, or near fixtures.

- Read and understand the Explanation of Warning Labels in the *DX100 Controller Manual* before operating the Integrated Dispensing system.

Definition of Terms Used Often in This Manual

The MOTOMAN manipulator is the YASKAWA industrial robot product.

The manipulator usually consists of the controller, the Programming Pendant, and supply cables.

In this manual, the equipment is designated as follows:

Equipment	Manual Designation
DX100 controller	DX100
DX100 Programming Pendant	Programming Pendant
Cable between the manipulator and the controller	Manipulator cable

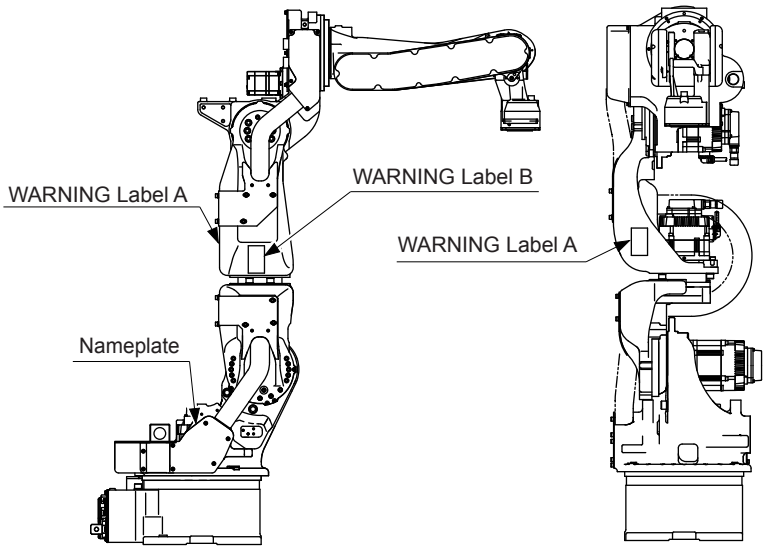
Explanation of Warning Labels

The following warning labels are attached to the manipulator (refer to *Figure 3*).

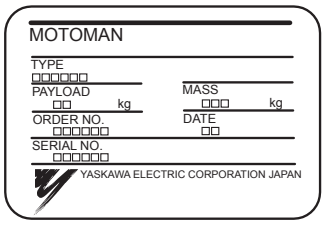
Always follow the warnings on the labels.

Also, an identification label with important information is placed on the body of the manipulator. Prior to operating the manipulator, confirm the contents.

Figure 3: Warning Labels Location

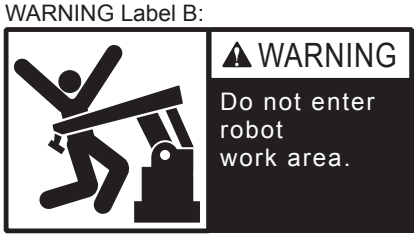


Nameplate:



WARNING Label A:

WARNING Label B:



1 Introduction

Motoman's Integrated Dispensing system is part of the Motoman family of standardized solutions. It is a fully integrated hardware/software system, supported by Motoman, Inc., and designed for precise, high-speed application of adhesives, sealants, lubricants and other single-component materials. Material flow and volume are servo controlled providing highly accurate material control. Integrating the pressure and timing variables into the robot controller significantly increases the system's programmability allowing for a variety of preset dispense profiles. The accuracy of the system allows for precise product yields and predictable throughput.

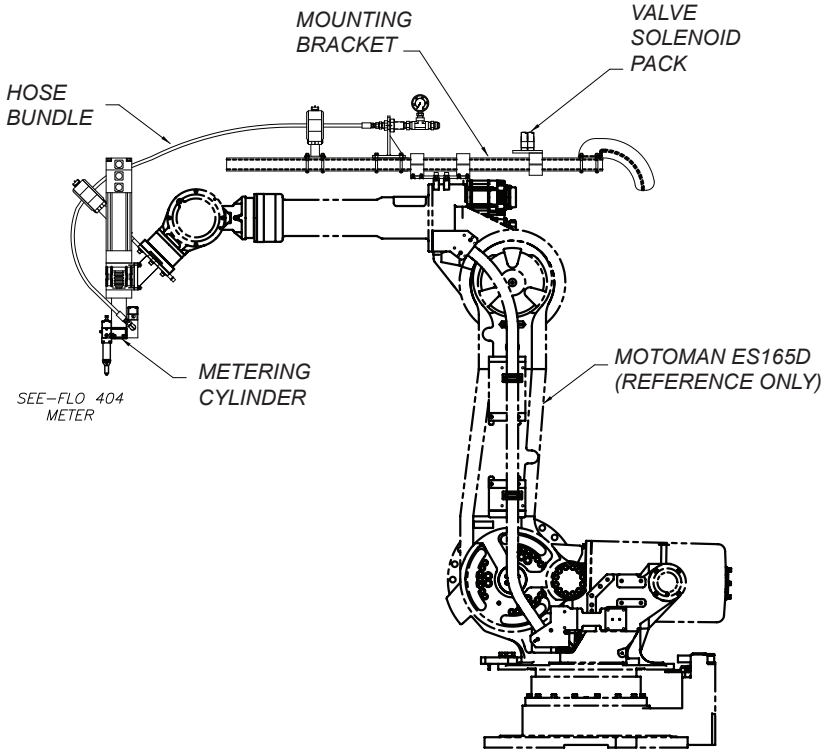
1.1 System Overview

The Integrated Dispensing system is designed around a complete fluid metering dispense system including: supply hoses, meter, control, dispense valve, air hoses, and valve tooling.

NOTE The standard package from Motoman does not include feed pumps or hoses from the pump. This equipment will be unique to each material dispensed and not covered in this manual.

The dispense system uses a servo-controlled electric roller screw actuator mounted to the robot T-axis. This actuator drives a metering rod into the metering cavity to displace the material. Communication cables and hoses are routed to a solenoid pack and junction box mounted on the robot U-axis.

Fig. 1-1: Basic Hardware Layout (SEE 404 System Shown)



The SEE 404 System is shown. However, the Motoman Integrated Dispensing package can work with a variety of different dispense vendors.

The dispensing interface runs directly on the programming pendant.

Fig. 1-2: Dispensing Pendant Interface

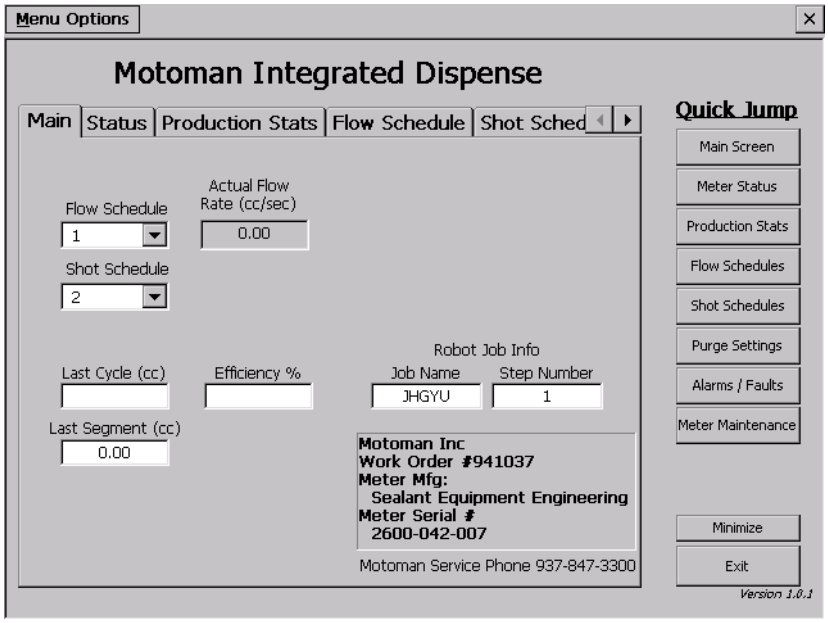


Table 1-1: Integrated Dispensing Features

Function	Details
Robots	Motoman MH50, MH50-35, ES165D robots
Robot Controller	DX100
Dispensers	• SEE Servo-Flo 404 • Nordson

The Motoman Integrated Dispensing system includes the following major components:

- Motoman MH50, MH50-35, or ES165D robots
- Shot Meter (various capacities)
- Meter Mount
- Valves & Solenoid Pack
- Material Supply Hoses (robot upper arm to meter)
- Communication Cables
- Dispensing Interface Software on Programming Pendant
- Servo Motion Control Kit
- EtherNet/IP Communication Interface

1.2 About this Document

This manual is intended as an introduction and overview for personnel who are familiar with the operation of their Motoman robot model and robot programming.

This function manual provides a description of functionality, usage instructions, as well as application examples for the Integrated Dispensing pendant application. For detailed information on specific system components listed in this document, please refer to the documentation package included with your system.

This manual contains the following sections:

Section 1 "Introduction"
This section provides an overview of the Integrated Dispensing system, lists reference documents that are included with the documentation package, and provides Motoman Customer Support contact information.

Section 2 "Setup and Configuration"
This section provides setup and configuration instructions for the Integrated Dispensing pendant application.

Section 3 "Understanding the Pendant Interface"
This section provides a basic overview of the Integrated Dispensing pendant application.

Section 4 "Operation"
This section provides instructions for operating the Integrated Dispensing system including creating and modifying dispense jobs directly from the programming pendant.

1.3 Learning to Use Integrated Dispensing

Motoman provides a variety of options to help you to learn to use the Integrated Dispensing application, including training and technical support. For more information on available training classes for Integrated Dispensing, please contact our training department at: training@motoman.com or visit our website at: www.motoman.com.

1.4 Reference to Other Documentation

For additional information refer to the following:

- Motoman *DX100 Controller Manual* (P/N 155494-1CD)
- Motoman *DX100 Maintenance Manual* (P/N 155492-1CD)
- Motoman *DX100 Operator's Manual for General Purpose* (P/N 155506-1CD)
- Motoman *DX100 Concurrent I/O Manual* (P/N 155491-1CD)
- Motoman *Sigma II Series Servo Manual* (P/N 147237-1CD)
- Motoman *INFORM User's Manual* (P/N 155493-1CD)
- Vendor manuals for system components not manufactured by Motoman

1.5 Customer Service Information

If you are in need of technical assistance, contact the Motoman service staff at (937) 847-3200. Please have the following information ready before you call:

- Robot Type (MH50, MH50-35, or ES165D, etc.)
- Application Type (dispensing)
- Manufacturer of Dispensing Equipment (SEE, Nordson, etc.)
- Robot Serial Number (located on the back side of the robot arm)
- Robot Sales Number (located on the back side of the controller)

2 Setup and Configuration

While the physical installation of the dispensing hardware and installation of the software are performed by a Motoman technician, there are other procedures that you must complete before the Integrated Dispensing package can be used with your robotic system. During installation, your Motoman technician will setup the software for your particular robot.

The system includes all valves, sensors and cables from the robot and pump to the Motoman DX100 controller. System air is supplied to a ¼" NPT inlet mounted on the upper arm.

Material is supplied to a ¾" NPT inlet mounted on the upper arm. (Feed and feed hoses are customer responsibility to robot upper arm.)

Single component (1K) materials that can be dispensed include: epoxy, silicone, urethane, acrylic, adhesives, polysulfide, PVC sealer, sound deadener, mastic, oil and grease.

Processes include: beads, shots, dots, streaming, extrusion, spray and high-speed mastic stitching applications.

Applications include: adhesive bonding, automated dispensing, battery filling, casting, coating, composite bonding, encapsulating, fiberglass fusion, gasketing, laminating, lubricating, molding, package filling, potting, pultrusion, resin infusion, resin transfer molding, sealing, structural bonding, adhesive bonding

Capacity in meter: 80 cc

Temperature range: up to 160º F

Max. dispense pressure: 1,500 psi (103 bar)

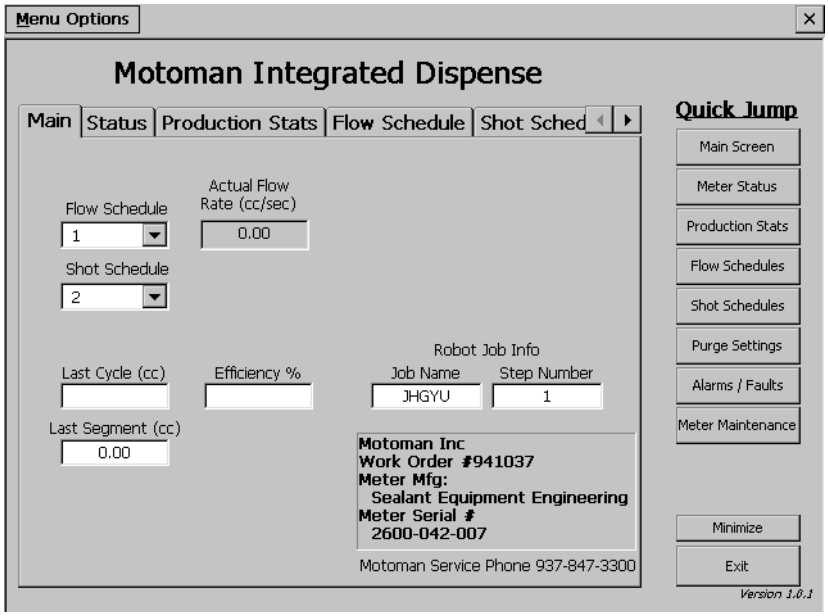
Max. flow rate: 80 cc/sec

3 Understanding the Pendant Interface

The Integrated Dispensing system includes an easy to use graphical pendant application. The pendant application's various tabs, fields and buttons are described below.

NOTE

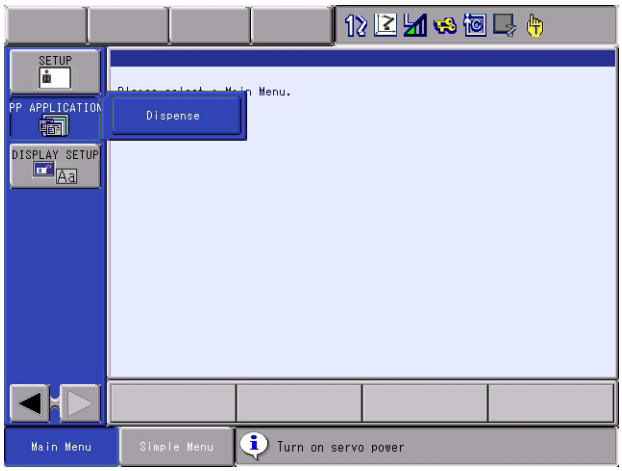
Prior to using the Integrated Dispensing application for production runs, it is recommended that you conduct a brief test-run to verify that adjustments and parameters are set for optimum performance.



3.1 Launching Integrated Dispensing

The Integrated Dispensing application is accessed from the programming pendant. To start the Integrated Dispensing pendant application, proceed as follows:

1. Turn the controller ON.
2. From the main menu, select {PP APPLICATION}.



3. Select {Dispense} from the submenu.
4. The Integrated Dispensing application starts.

Minimizing the Integrated Dispensing application allows you to access other areas of the programming pendant while leaving the Integrated Dispensing application running in the background. For example, you can press the Minimize button to enable you to access the I/O screens, Jobs, or other pendant functions. To view the Integrated Dispensing application again, simply select it from the {PP APPLICATION} submenu as described above.

NOTE The Integrated Dispensing application must be running if dispensing is to occur. Minimizing the application is acceptable.

To close and quit the Integrated Dispensing application, simply press the [Exit] button. Only close the program if additional dispensing is not required.

3.2 Using Tabs

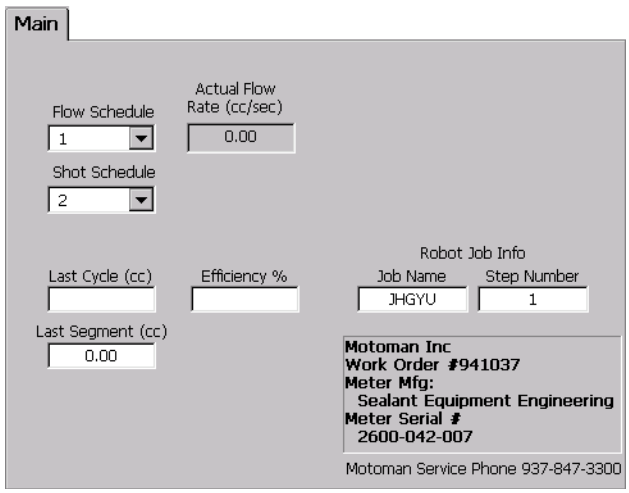
Tabs are control windows that help you edit and monitor different aspects of your Integrated Dispensing application. The tabs let you edit and monitor meter status, production statistics, dispense schedules and more. For example, you can use the Flow Schedule tab to modify dispenser On-time, Off-time, and pre-pressure (preload) values.

The Quick Jump launcher contains buttons for quickly opening any of your most frequently used tabs. The Quick Jump launcher is located to the right of the application window.

3.2.1 Main Tab

The Main tab allows you to select predefined Flow and Shot schedules, monitor flow rates and dispense amounts for the last cycle and last segment, and view robot job information. Production data from the last cycle and segment can also be viewed here. The efficiency of the process, the ratio of volume dispense compared to expected volume, can also be evaluated from this screen. The expected cycle volume is set in M75. For more information refer to *Section 3.2.3 “Production Statistics”* .

Fig. 3-1: Main Tab



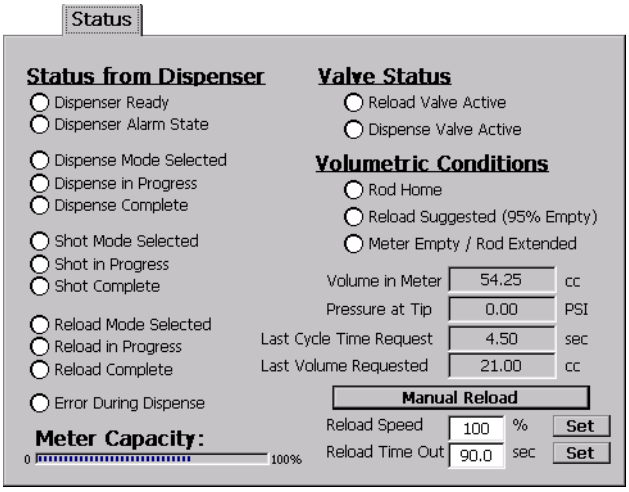
3.2.2 (Meter) Status Tab

The Meter Status screen allows you to monitor dispenser status, mode handshaking, valve status, as well as volumetric conditions. You can request the meter be reloaded using the "Manual Reload" button only when in Play or Remote mode.

The Reload Time Out value is an amount of time that can pass during the reload operation before the DX will trigger an alarm. This value will vary between materials and material feed rate from the customer supplied pumps. Adjust the Reload Speed to correspond with reload time and feed rates.

** When logged into maintenance mode, settings can modified - manual reload speed and time out can also be set from this screen.

Fig. 3-2: Meter Status Tab



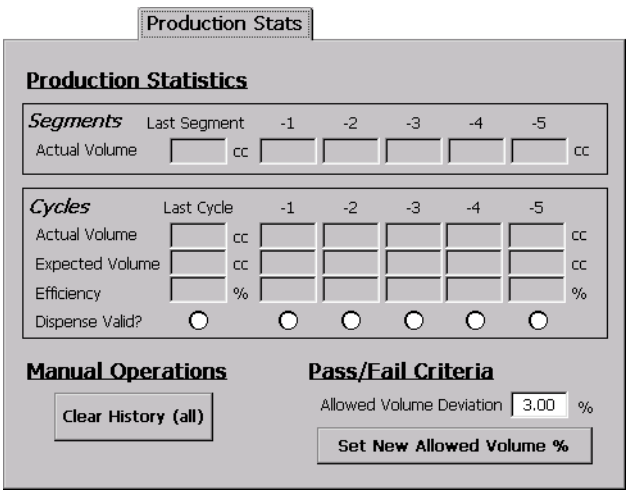
The status indicators (LEDs) provide I/O feedback from the controller and meter allowing you to monitor meter operation from the pendant.

3.2.3 Production Statistics

The Production Statistics screen provides volume and efficiency statistics for the last six dispense cycles. Pass/Fail criteria for each dispense cycle as set as a measure of volume deviation determines dispense validity.

** When logged into maintenance mode, you can modify the Allowed Volume % setting and clear all historical production data as well.

Fig. 3-3: Production Statistics Tab

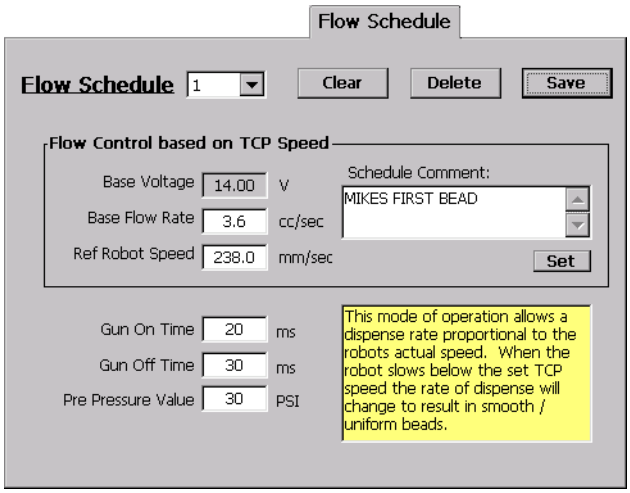


3.2.4 Flow Schedule

The Flow Schedule tab allows you to setup and modify dispense settings for each flow schedule. Flow rate is controlled as a proportion of the robot speed. As robot speed increases, dispense rate increases as well. The Reference Robot Speed sets the robot speed at which the Base Flow Rate is dispensed. For example; with the Base Flow Rate set at 3.6 cc/sec and the Ref Robot Speed set at 238 mm/sec, the meter dispenses at a rate of 3.6 cc/sec only when robot speed reaches 238 mm/sec. At half the Ref Robot Speed (119 mm/sec) the meter dispenses at a rate of 1.8 cc/sec. This provides a uniform bead as the robot speed changes.

Gun On Time, Gun Off Time, and PrePressure (preload) Values are also controlled from the Flow Schedule tab. The Gun On Time setting is similar to anticipation, in that it is used to open the dispenser prior to the programmed point. The Gun Off Time determines the time the gun closes before the programmed point.

Fig. 3-4: Flow Schedule Tab



To program or edit a new flow schedule, proceed as follows:

1. Select the Flow Schedule number using the dropdown menu.
2. Set the Base Flow Rate. This value sets the dispense rate in cc/sec at 100% of the reference robot speed.
3. Set the Reference Robot Speed.
4. Set the Gun On Time. This value determines the length of time the dispense valve needs to open before the dispensing process can begin. This delay is caused by the reaction time of the solenoids. Set this value in milliseconds.
5. Set the Gun Off Time. This value determines the delay time for the dispense valve to react after being requested to close. Set this value in milliseconds.
6. Set the pre-pressure (preload) value to the recommended setting for your fluid. This value will vary based on the type of material being dispensed. A thin fluid typically uses a small value (1-100 psi), while a thicker material may use much greater values (500-1200 psi).
   The pre-pressure setting is used to equalize the material pressure inside the metering pump with the pressure required to overcome the dispense nozzle. This value is found by monitoring the dynamic fluid pressure while dispensing material out the nozzle. This value is determined during system commissioning.

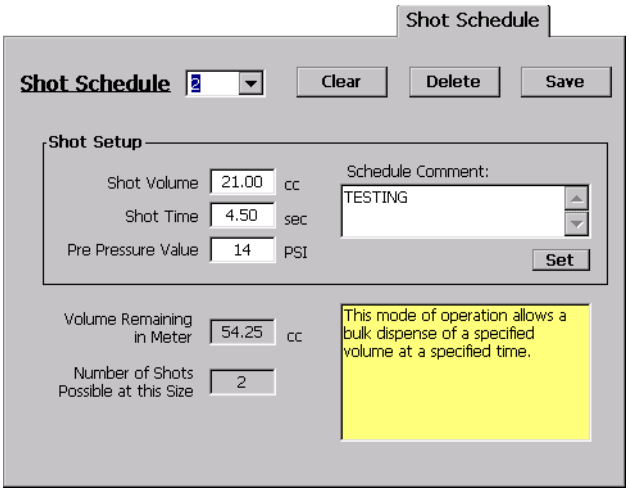
7. Click [Save] the save the flow schedule. You must select [Save] to retain any changes made to the schedule.

Optional comments/descriptions can also be added to the schedule as desired - up to 80 characters long.

3.2.5 Shot Schedule

The Shot Schedule tab allows you to setup and modify shot settings for each shot schedule, including shot volume, shot time, and pre-pressure (preload) values. You can also monitor remaining volume and the remaining number of shots available of this size.

Fig. 3-5: Shot Schedule Tab



To program or edit a new shot schedule, proceed as follows:

1. Set the Shot Schedule number using the dropdown menu.
2. Set the desired Shot Volume. This value determines how much fluid to dispense.
3. Set the Shot Time. This determines the amount of time the process takes to dispense the set amount. The servo system calculates the correct dispense rate to meet this target time.
4. Set the pre-pressure (preload) value to the recommended setting for your fluid. For a shot, this value should be low. Starting a shot with excessive pre-pressure can cause more material to be dispensed than expected. Set this value below 20 psi unless a highly viscous fluid is being used.
   The pre-pressure setting is used to equalize the material pressure inside the metering pump with the pressure required to overcome the dispense nozzle. This value is found by monitoring the dynamic fluid pressure while dispensing material out the nozzle. This value is determined during system commissioning.
5. Click [Save] the save the shot schedule.

Optional comments/descriptions can also be added to the schedule as desired - up to 80 characters long.

3.2.6 Purge Settings

The Purge Settings tab allows you to view Auto Purge settings or perform manual purging of the dispense system. Auto Purge settings must be made in the Meter Maintenance tab (see *Section 3.2.8 "Meter Maintenance"*).

The purge settings are used to set up the program to monitor the time the dispenser has been idle (not dispensing material). Some materials have a skin over or mix life. In auto-mode, when the timer times out, the dispenser automatically initiates a dispense shot, dispensing the amount of material called for in the purge volume. Once the pump has reloaded, the purge timer starts counting down again. Robot motion must be configured in the "PURGE" robot job.

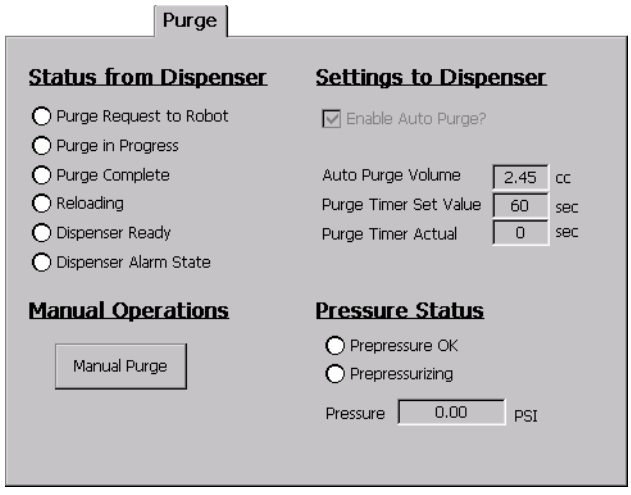
Once purge settings have been made and Auto Purge enabled, the status indicators (LEDs) provide I/O feedback from the controller and meter allowing you to monitor the purge operation directly from the pendant. Auto Purge can only be enabled or disabled when logged into Maintenance mode.

Purge timer settings vary depending on materials used. Some materials do not require a purge. Materials that cure or degrade over time should have auto purge settings established.

If you need to purge the pump, press the Manual button. This initiates the purge sequence without waiting for the Auto Purge timers to activate.

NOTE Contact your material supplier for fluid data and Protective Personal Equipment recommendations.

Fig. 3-6: Purge Settings Tab

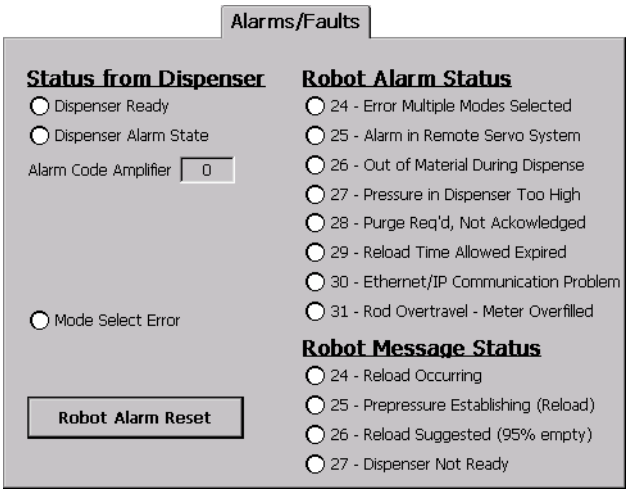


3.2.7 Alarms/Faults

The Alarms and Faults tab monitors dispenser status and robot alarm and message status. Status indicators (LEDs) provide direct I/O feedback from the controller and meter allowing you to monitor robot alarm and dispenser status directly from the pendant. Refer to *Chapter 4 "Operation"* for further explanations of errors and messages.

The Dispenser Alarm State LED indicates that an error has occured in the servo amplifier. An alarm code is displayed in the text box. Cross reference this alarm code in the Sigma II Series Servo Manual (P/N 147237-1) to determine the cause and remedy.

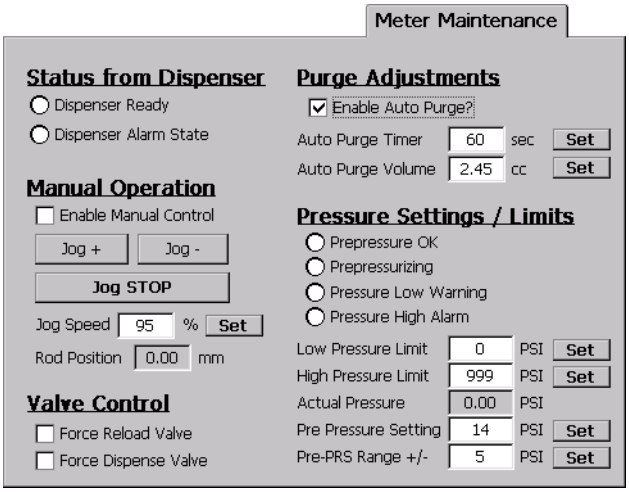
Fig. 3-7: Alarms & Faults Tab



3.2.8 Meter Maintenance

The Meter Maintenance tab provides tools for troubleshooting and maintenance of the Integrated Dispensing system. Auto Purge settings are made in the Meter Maintenance tab. Many of the features and settings on this tab can only be edited by high level users. Maintenance mode or above user access is required for the Set buttons to be made available.

Fig. 3-8: Meter Maintenance Tab



The Manual Operation area allows you to manually advance or retract the metering rod. **To manually jog the metering rod**:

1. Place the system in Play or Remote mode.
2. Check the [Enable Manual Control] radio button.
3. The jog speed for the rod is set as a percentage of the max speed. This value can only be changed in Maintenance mode.
4. Click on the [Jog +] or [Jog -] buttons to advance and retract the metering rod. Select the button again to disable movement.
5. Press the [Jog STOP] button to stop all rod motion.

The Valve Control area allows you to manually activate the reload and dispense valves using the appropriate check buttons. This is useful for debugging or commissioning a system.

The Purge Adjustments area is where you setup Auto Purge. Editing the purge timer and purge amount values is only available in maintenance mode.

The Pressure Settings / Limits area allows you to setup and monitor pressure limits for your Integrated Dispensing application. Editing these values is only available in maintenance mode.

NOTE

Change High and Low Pressure Limits for the material selected. Also, set the Pre-Pressure Range (Pre-PRS) before continuing.

4 Operation

4.1 Sample Robot Jobs

4.1.1 Job Name: RESETDIS

Description: Resets all conditions and requests for dispensing. When all these signals are OFF, the remote servo system should be reset from any dispense condition or request, which turns off the error.

Job content:

```
NOP
DOUT OT#(49) OFF
DOUT OT#(50) OFF
DOUT OT#(51) OFF
DOUT OT#(52) OFF
DOUT OT#(57) OFF
END
```

4.1.2 Job Name: RELOAD

Description: First turn off all valves. Then set the bits to request the shot meter to reload.

Job content:

```
NOP
DOUT OT#(17) OFF
DOUT OT#(18) OFF
DOUT OT#(52) OFF
DOUT OT#(51) OFF
DOUT OT#(49) OFF
DOUT OT#(50) OFF
TIMER T=0.01
DOUT OT#(51) ON
WAIT IN#(51)=ON
WAIT IN#(62)=ON
DOUT OT#(51) OFF
TIMER T=0.25
END
```

4.1.3 Job Name: SHOT

Description: Dispense a set amount of material. The job checks that there is enough material remaining in the meter for this dispense amount. If there is not enough material, the job calls RELOAD before executing the dispense. Shot schedule is selected by setting a value in M-Register 71. This can be set in the robot job or called from the "Shot Schedule" drop down boxes on the Programming Pendant.

Job content:

```
' VERIFY CAPACITY REMAINING
GETREG LI000 MREG#(50)
GETREG LI001 MREG#(56)
CALL JOB:RELOAD IF LI000>=LI001
'
DOUT OT#(49) ON
DOUT OT#(50) OFF
DOUT OT#(51) OFF
WAIT IN#(49)=ON
'
DOUT OT#(57) ON
WAIT IN#(61)=ON
DOUT OT#(57) OFF
'
'TRIG SEGMENT END
DOUT OT#(59) ON
'
DOUT OT#(49) OFF
END
```

4.1.4 Job Name: FLOW

Description: Dispense a bead of material. The flow schedule is selected by setting a value in M-Register 70. This can be set in the robot job or called from the "Flow Schedule" drop down boxes on the Programming Pendant.

Job content:

```
' APPROACH MOTION HERE
' BASE TCP SPEED SET FROM SCHEDULE
GETREG I010 MREG#(53)
SET D000 I010
DIV D000 10
ARATION AO#(1) BV=14.00 V=I010
PSTART JOB:FLOW-ON SUB1
MOVL C00003 V=D000
MOVC C00004 V=D000
MOVC C00005 V=D000
MOVC C00006 V=D000
MOVL C00007 V=D000
PSTART JOB:FLOW-OFF SUB2
MOVL C00008 V=D000
ARATIOF AO#(1)
PULSE OT#(59)
PULSE OT#(60)
END
```

4.1.5 Job Name: FLOW-ON

Description: Start the dispense sequence. This is a sub-job called by FLOW.

Job content:

```
NOP
DOUT OT#(49) OFF
DOUT OT#(50) OFF
DOUT OT#(51) OFF
TIMER T=0.01
DOUT OT#(50) ON
WAIT IN#(50)=ON
DOUT OT#(57) ON
END
```

4.1.6 Job Name: FLOW-OFF

Description: Turn off dispense sequence. This is a sub-job called by FLOW.

Job content:

```
NOP
DOUT OT#(58) ON
WAIT IN#(63)=ON
'
' OFF
DOUT OT#(50) OFF
DOUT OT#(57) OFF
DOUT OT#(58) OFF
END
```

4.2 Robot User Alarms

4.2.1 9088 - Error Multiple Modes Selected

Cause - Dispense system requested to be in more than mode: Shot, Flow, Reload, or Manual.

Resolution - Only one mode can be selected at a time. Be sure only one of the following outputs is turned on at a time: 49, 50, 51, or 52

4.2.2 9089 - Alarm in Remote Servo System

Cause - External dispense system is under error.

Resolution - Determine alarm code from LED display on SGDH-15AE amplifier insider robot cabinet or from the Pendant Application. Various things can cause this alarm (refer to Sigma II Series Servo Manual P/N 147237-1CD).

4.2.3 9090 - Out of Material During Dispense

Cause - The dispenser was commanded to dispense some material (Flow, Shot, Purge, etc) but the meter was empty before the dispense could complete. Shot mode should verify that enough material is available to dispense otherwise a reload is triggered. This may happen during commissioning of a flow mode job, after commissioning the amount of dispense should be known. At this point, the programmer finalizes the appropriate dispense segments and adds Reload calls as required.

Resolution - Turn off dispense request outputs (49, 50, 51, or 52). Then issue Reload commands and resume operation.

4.2.4 9091 - Pressure in Dispenser too High

Cause - The pressure sensor has recorded a value exceeding the limit set in M66 - this value can be manipulated through the Meter Maintenance screen on the Programming Pendant.

Resolution - Relieve pressure inside the shot meter. The actual cause of the high pressure may be caused by a few conditions. Pressure should be relieved when the dispense valve is opened. If pressure is not relieved, check the following:

- Is there air pressure coming to the valve pack?
- Verify the dispense solenoid is active by checking the pilot LED.
- Air should be flowing from the valve pack to the dispense valve, disconnect air lines to verify.
- If the above investigations are OK then the dispense nozzle is probably blocked. Reference the manuals supplied with the shot meter for directions on maintenance and nozzle cleaning.
- Alternately, the reload valve can be opened to allow pressure to go back into the feed hoses.
- De-energize all valves (OUT 17 + 18) and restart operation.

4.2.5 9092 - Purge Requested, but Not Fulfilled

Cause - A purge timer was configured in the Purge Screen (see M62). After this time passes the robot must respond by running the PURGE job.

Resolution - Put the robot into automatic mode when the purge timer is required. Or... Change the timer value. Or… turn off the Auto Purge output (OUT 64) so that this alarm will not keep occurring.

4.2.6 9093 - Reload time allowed expired

Cause - A reload was requested but the time to reload exceeded the set time allowed.

Resolution - Adjust the allowable time (M68) for reload under the Meter Maintenance screen. The shot meter will only reload when feed pressure exceeds 10 psi, this ensures some incoming material supply and should reduce air bubble occurrences.

4.2.7 9094 - Ethernet/IP Comm Failure

Cause - Communication failed between robot and MP2300 motion controller - a watchdog bit monitors that communication remains active.

Resolution - Investigate CAT5 cabling inside the robot controller and verify that the Ethernet switch is powered / functional. Only a catastrophic failure of hardware should cause this alarm.

4.2.8 9095 - Rod Overtravel / Meter Overloaded

Cause - Somehow the rod has traveled past home and is now overfilled. In one scenario an error in the remote servo system could allow the brakes to remain released by the robot, with the reload valve open, allowing material to flow into the shot meter reservoir.

Resolution - Turn off all other modes. Enable manual mode (OUT 52) and turn on the Dispense Valve (OUT 17), now using Jog Dispense (OUT 55) to move the rod back toward home to clear this alarm.

4.3 User Messages

4.3.1 0024 - Reload Occurring

Cause - Reload bit is turned ON. Message alerts operator that this operation is in progress. Otherwise the operator may assume nothing is happening since the reload process can take a good deal of time.

4.3.2 0025 - Prepressure Establishing (Reload)

Cause - After reloading the dispenser will try to hit the pre pressure setup for the shot profile or under the Meter Maintenance Screen. The prepressure value is stored in M52 and the prepressure acceptable range is stored in M61.

4.3.3 0026 - Reload Required

Cause - The reserve is 95% empty. It is suggested to reload ASAP unless small shots are the next operation. The standard shot job will check to make sure there is capacity left in the meter before attempting dispense - otherwise a reload is commanded. This is just a warning that things are getting close to empty.

4.3.4 0027 - Dispenser Not Ready

The Dispense Ready signal (Input 57) is turned Off. This may be resolved by simply applying Servo On to the robot system.

4.4 I/O Variable Usage

Table 4-1: Status Bits from DX to MP2300

DX Output Address	Output #	Function
30070	33	Servo On
30071	34	Alarm/Error Occur
30072	35	
30073	36	
30074	37	
30075	38	
30076	39	
30077	40	Reset MP2300 Alarm
30080	41	
30081	42	
30082	43	
30083	44	
30084	45	
30085	46	
30086	47	
30087	48	EtherNet/IP Heartbeat
30090	49	Shot Mode Request
30091	50	Flow Mode Request
30092	51	Reload Request
30093	52	Job/Manual Mode

Table 4-1: Status Bits from DX to MP2300

DX Output Address	Output #	Function
30094	53	OK to Purge
30095	54	
30096	55	Jog Dispense
30097	56	Job Reload
30100	57	Dispense Start
30101	58	Dispense End
30102	59	Sequence End
30103	60	Cycle End
30104	61	Last Dispense OK
30105	62	
30106	63	Manual Purge
30107	64	Auto Purge Allowed

Table 4-2: Status Bytes/Registers from DX to MP2300

Register	Output Address	Output #	Function
M54	30110-30127	65-80	Flow Rate at 100% (0.1 cc/sec)
M61	30130-30147	81-96	Pre-Pressure Range Acceptable
M300	30150-30167	97-112	Pressure at Meter Tip
M260	30170-30187	113-128	Robot TCP Speed Voltage (0-14VDC)
M53	30190-30207	129-144	Robot Base TCP Speed (0.1 mm/sec)
M50	30210-30227	145-160	Shot Size (.01 cc)
M51	30230-30247	161-176	Shot Dispense Time (.01 sec)
M52	30250-30267	177-192	PrePressure Setting (psi) (see M61)
M62	30270-30287	193-208	Purge Timer (1 sec)
M63	30290-30307	209-224	Purge Amount (0.01 cc)
M64	30310-30327	225-240	Reload Speed %
M65	30330-20247	241-256	Jog Speed % of Set
M66	30350-20267	257-272	High Pressure Value
M67	30370-30387	273-288	Low Pressure Value
M72	30390-30407	289-304	Gun On Time
M73	30410-30427	305-320	Gun Off Time
M68			Reload Time Out (sec)
M69			Allowed Volume Deviation %
M70			Flow Schedule Number
M71			Shot Schedule Number
M75			Expected Volume (0.01 cc)

Table 4-3: Status Bits from MP2300 to DX

DX Input Address	Input #	Function
20070	33	Alarm Occur
20071	34	
20072	35	
20073	36	
20074	37	
20075	38	Rod Over travel / Meter Overfilled
20076	39	Jog Mode
20077	40	Ethernet/IP Heartbeat
20080	41	Shot Occurring
20081	42	Flow Occurring
20082	43	Reload Occurring
20083	44	Purge Occurring
20084	45	Pre-Pressuring
20085	46	Rod Home (Meter Full)
20086	47	Meter Empty (Rod Fully Extended)
20087	48	Out of Material During Dispense
20090	49	Shot Mode Selected
20091	50	Flow Mode Selected
20092	51	Reload Selected
20093	52	Mode Select Error
20094	53	Purge Requested
20095	54	Purge Complete
20096	55	Dispense Valve
20097	56	Refill Valve
20100	57	Dispense System Ready
20101	58	Pre-Pressure Set
20102	59	Pressure Low
20103	60	Pressure High
20104	61	Shot Complete
20105	62	Reload Complete
20106	63	Dispense Flow Complete
20107	64	Reload Suggested

Table 4-4: Status Bytes/Registers from DX to MP2300

Register	Input Address	Input #	Function
M55	20110-20127	65-80	Current Flow Rate (0.01cc/sec)
M56	20130-20147	81-96	CC Remaining (0.01 cc)
M57	20150-20167	97-112	CC of Last Dispense (0.01 cc)
M58	20170-20187	113-128	Time of Last Dispense (0.01 sec)
M60	20190-20207	129-144	Rod Position (0.01)
	20210-20227	145-160	
	20230-20247	161-176	
M59	20250-20267	177-192	Alarm Code on Amplifier

4.5 Robot Variables

I010 - Robot TCP Speed (Scaled from register M53)

** to get M register into controller, first store to Integer then scale to Double, used by job FLOW.

D000 - Robot TCP Speed (0.1 mm/sec)

** used in MOV commands in FLOW Jobs. This is I010 divided by 10.

Integrated Dispensing
FUNCTION MANUAL

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