



**GREASEBOTS**



# **MODEL GP 600 Gen3**

## Operation Manual

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## **1.0 Important user information**

Read this document and the appropriate robot user manual about connection, configuration, and operation of this equipment before you connect, configure, operate, or maintain this product. Users are required to familiarize themselves with operation and connection instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including connection, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice. If this equipment is used in a manner not specified by the manufacturer and the robot manufacturer, the protection provided by the equipment may be impaired.

In no event will GreaseBots, LLC. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The recipes provided with the unit are included solely for illustration purposes. Because of the many variables and requirements associated with any particular application, GreaseBots, LLC. cannot assume responsibility or liability for actual use based on the examples.

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## **WARNING – READ ENTIRE MANUAL BEFORE OPERATION**

### **2.0 Safety Instructions**

#### **2.1 Electrical Warning**

- 2.1.1 Follow proper safety procedures when connecting to electrical outlets.
- 2.1.2 ALWAYS wear proper Personal Protective Equipment when powering unit.
- 2.1.3 DO NOT attempt to modify, repair or replace any electrical components or connection.
- 2.1.4 Use only GFI electrical outlet connections
- 2.1.5 DO NOT use outside or in unprotected areas.
- 2.1.6 DO NOT make electrical connections when water or unsafe conditions are present.
- 2.1.7 DO NOT use if any electrical wires or connections experience abrasions or chaffing.
- 2.1.8 Remove from service if any conditions exist that could cause electrical shock.

#### **2.2 Operational Warnings**

- 2.2.1 ALWAYS wear proper Personal Protective Equipment when operating pump system.
  - 2.2.1.1 This can include, but not limited to, safety glasses w/ side shields, hard-hat, steel boots, hand protection, high-visibility clothing and proper attire.
- 2.2.2 DO NOT attempt to operate pump system if you are unfamiliar with any components of system.
- 2.2.3 Lock casters and foot brake to prevent rolling while in use.
- 2.2.4 NEVER leave machine unattended while is use.
- 2.2.5 DO NOT allow grease to be present on any area of cart surface, push-handle or surrounding floor area. AVOID SLIPPERY CONDITIONS.
- 2.2.6 ALWAYS keep hoses clean and free of grease.
- 2.2.7 ALWAYS roll up hoses and avoid tripping hazards.

#### **2.3 Maintenance Warnings**

- 2.3.1 ALWAYS wear proper Personal Protective Equipment when operating and maintaining system.
- 2.3.2 ALWAYS lift pump system by supplied EYE HOOK located on top of system lid.
- 2.3.3 ALWAYS follow proper rigging techniques to lift pump system.
- 2.3.4 CAUTION: Avoid making contact with components while lifting pump system.
- 2.3.5 DO NOT service or maintain if you are not familiar with any components of the system.
- 2.3.6 DO NOT proceed with any work on or around pump system if slippery conditions exist.

**FAILURE TO COMPLY WITH SAFETY WARNINGS CAN RESULT IN  
SERIOUS INJURY OR DEATH**

## 3.0 Operating Instructions

# MODEL GP 600

## 6 AXIS AUTO GREASE SYSTEM

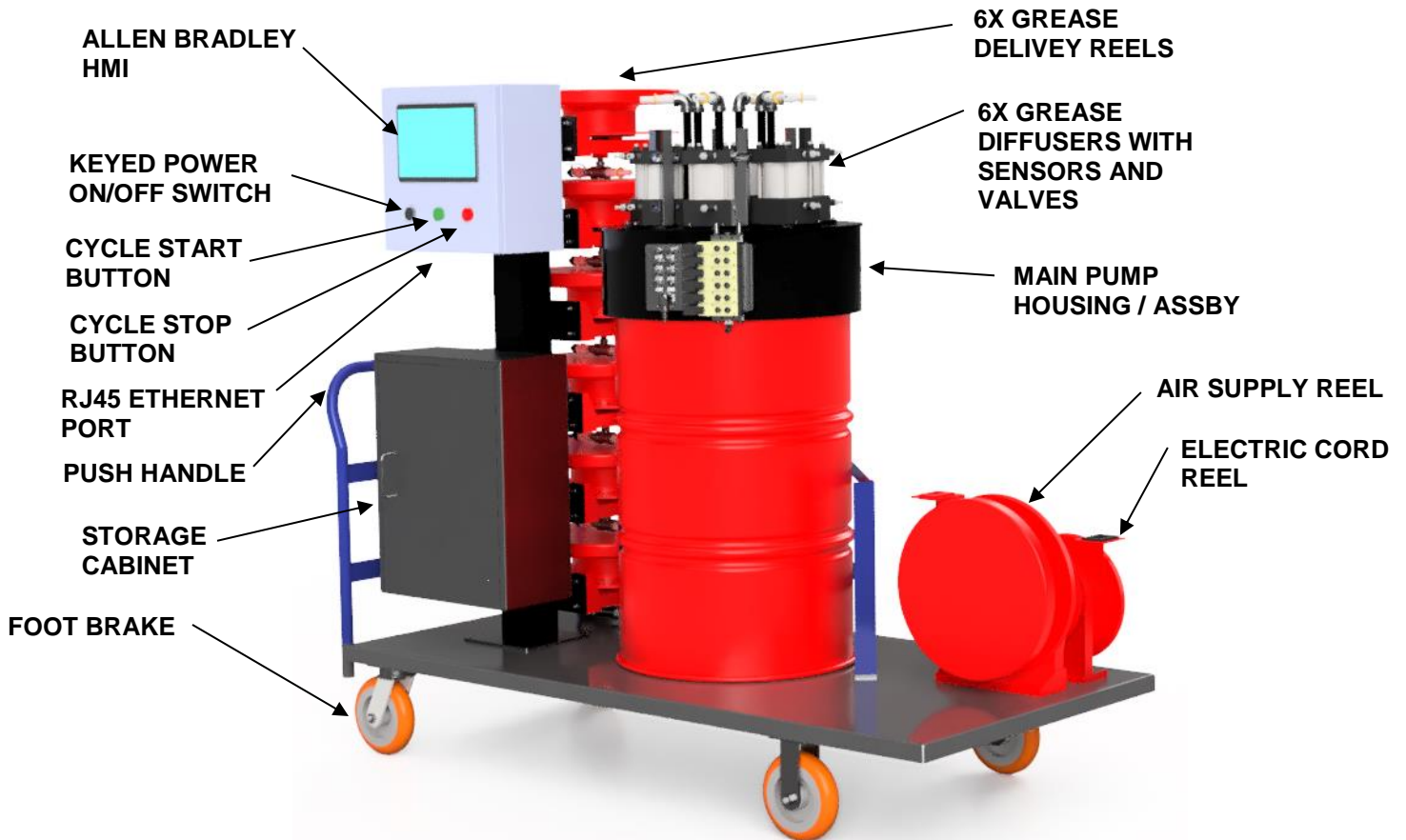


FIGURE 1

### 3.1 System Overview

- 3.1.1 The Model GP 600 Grease Pump System is designed to deliver grease to up to 6 Axis independently with programmed tables for timing and grease volumes according to the robot manufacturer specifications.
- 3.1.2 **IMPORTANT:** Each operator must become familiar with each component of the system and understand all aspects of operation and programming. See Figure 1.

### 3.2 Replacing Drum

- 3.2.1 **IMPORTANT: LOCK CASTERS TO PREVENT MOVEMENT.**
- 3.2.2 **WARNING: CART MUST REMAIN STATIONARY AT ALL TIMES**

### **3.2.3 WARNING: DISCONNECT AIR AND ELECTRICAL REEL LINE CONNECTIONS**

- 3.2.4 Unlatch Safety Chains around drum
- 3.2.5 Attach Lifting Strap(s) to Lifting Ring Location. Strap(s) must have a combined capacity rated for 500 lbs. minimum
- 3.2.6 Lift Pump Assembly out of drum entirely.
- 3.2.7 Safely remove drum from cart.
- 3.2.8 Replace drum using approved machine or device.

### 3.3 Pump connection

- 3.3.1 Connect 120V electrical connection from reel on cart to appropriate outlet.
- 3.3.2 Connect clean, dry shop air to the system. Regulator pressure should not exceed **120 PSI**. Recommended pressure is **80 PSI**.
- 3.3.3 Turn power key selection switch to the “On” position
- 3.3.4 The HMI MAIN SCREEN DISPLAY is shown in Figure 2 below.
- 3.3.5 Make sure all pumps remain in OFF position until ready for use, and do not place the system in “Auto” mode until ready to use.
- 3.3.6 Connect grease lines from pump system to robot using provided quick connect fittings.
- 3.3.7 Open the correct drain port at each axis and attach the supplied drain expansion fittings. Connect the fittings such that the outlet is facing downward. **DO NOT OVERTIGHTEN THESE FITTINGS** – snug by hand only. *Over tightening will cause damage to the fitting.*

**NOTE: DO NOT OPERATE PUMP WITHOUT OPENING THE CORRECT DRAIN PORT. EQUIPMENT DAMAGE CAN RESULT.**

*Failure to open the correct drain port for the ejected used grease can result in abnormal pressure within the grease cavity.*

## HMI MAIN SCREEN DISPLAY

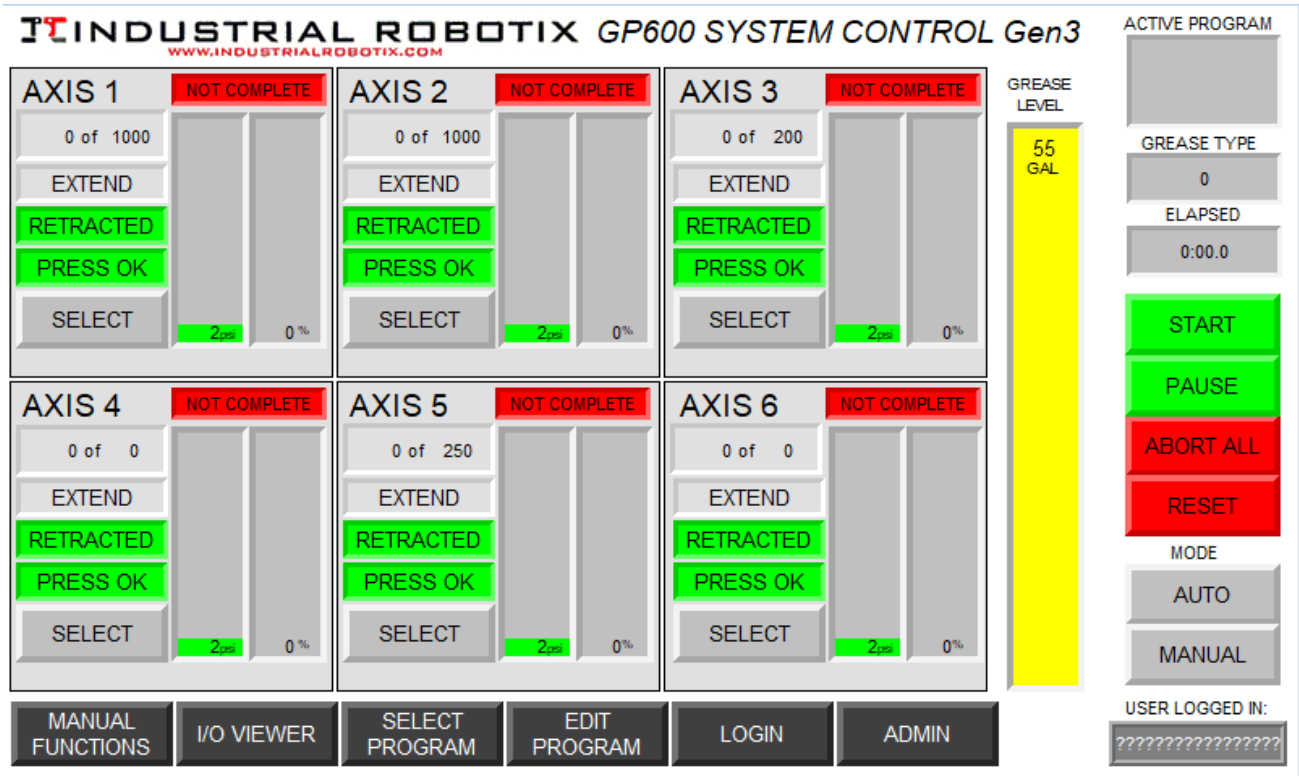


FIGURE 2

### 3.4 HMI Main Screen Display

Refer to Figure 2 above. This is the main operation screen of the system and is not security enabled.

- 3.4.1 Auto / Manual buttons – select system mode
- 3.4.2 Start button – will initiate the pumping sequence
- 3.4.3 Pause button – will pause all pumps, elapsed time, but remain in sequence. Un-pause by pressing it again and the system will continue.
- 3.4.4 Abort button – will stop the pumping system, retract all cylinders, drop the sequence(s), and the values of volume dispensed.
- 3.4.5 Reset button – will reset the system
- 3.4.6 Elapsed indicator – shows elapsed time of pumping sequence.
- 3.4.7 Grease type indicator – shows the type of grease being pumped. Preset values are Molywhite 0.0, Vigo grease, and “Custom”
- 3.4.8 Active program indicator shows the current program loaded in memory by robot type
- 3.4.9 Grease level indicator – shows current grease level in gallons
- 3.4.10 Pump complete / not complete indicator shows when pump sequence is complete
- 3.4.11 Percent complete indicator – shows what percent complete the pumping sequence is
- 3.4.12 PSI indicator – shows pump pressure in PSI calibrated at the robot gearbox

- 3.4.13 Volume dispensed indicator – shows the volume of grease dispensed in the cycle in units of ml.
- 3.4.14 Extended / Retracted indicators – show position of the pumping ram
- 3.4.15 Pump OK / Overpressure indicator – notifies of over-pressure on that particular pump.
- 3.4.16 Select button – selects or un-selects that particular pump to be run in the cycle
- 3.4.17 Manual Functions navigation button – **security enabled** -navigates to the Manual Functions Screen
- 3.4.18 I/O Viewer navigation button – navigates to the I/O viewer screen
- 3.4.19 Select Program navigation button – **security enabled** -navigates to the Select Program screen
- 3.4.20 Edit Program navigation button – **security enabled** -navigates to the Edit Program screen
- 3.4.21 Login navigation button – user system login
- 3.4.22 Admin navigation button – **security enabled** Administration screen

Security enabled buttons require a login with administrator rights. The as-shipped admin login information is as follows and should be changed:

**Username:** *Admin*

**Password:** *1234*

Refer to the Admin page instructions for further information on creating, modifying, and deleting users with various security rights.



## MANUAL FUNCTIONS SCREEN DISPLAY

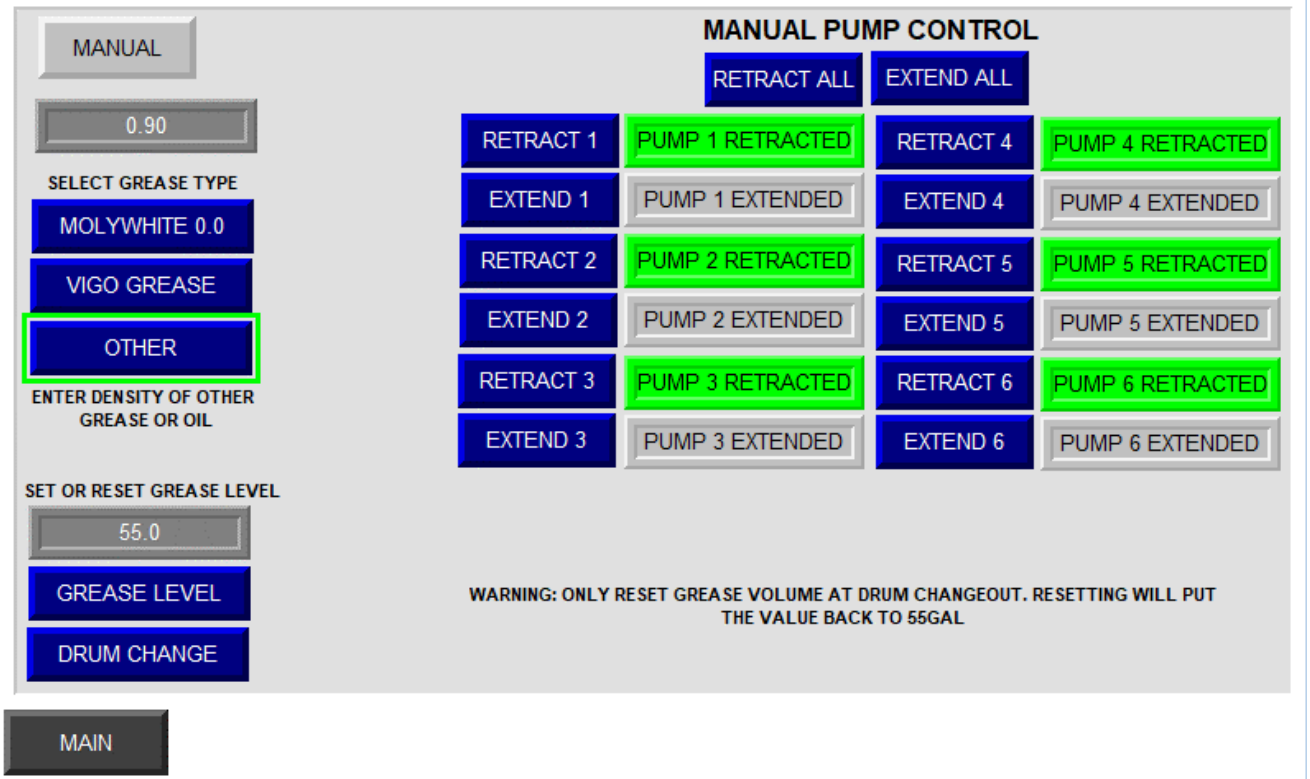


FIGURE 3

### 3.5 Manual Functions HMI Display

Refer to Figure 3 above. Security enabled screen is available to users with administrator rights

- 3.5.1 Manual Mode – manual mode must be selected to use the functions on this page. No buttons will function if the system is not in Manual Mode.
- 3.5.2 Grease type indicator – displays the grease type currently selected
- 3.5.3 Molywhite 0.0 will select Molywhite as the grease type
- 3.5.4 Vigo Grease will select Vigo as the grease type
- 3.5.5 Custom – will enable the user to enter the specific gravity / density of the grease or oil that is being pumped. This must be accurate in order to achieve the correct volume displacement numbers.
- 3.5.6 Grease level indicator – displays grease level in gallons
- 3.5.7 Grease level button – allows user to enter a custom grease level in gallons
- 3.5.8 Reset grease level button – will reset the grease level to 55 gallons. This should only be done at grease drum changeover
- 3.5.9 Retract All button- will move all pumps to the retracted position
- 3.5.10 Extend all button – will move all pumps to the extended position
- 3.5.11 Extend / Retract buttons for Axis 1 thru Axis 6 will extend and retract each pump individually

### I/O VIEWER SCREEN DISPLAY

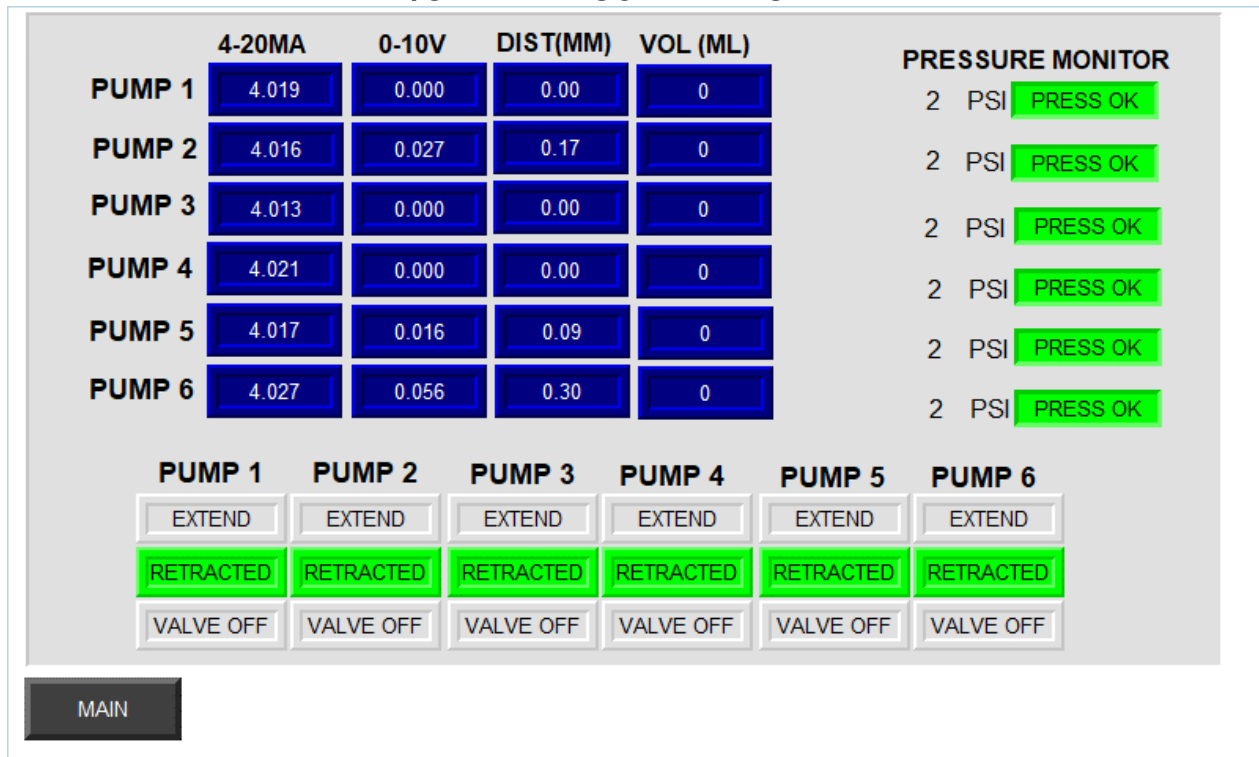


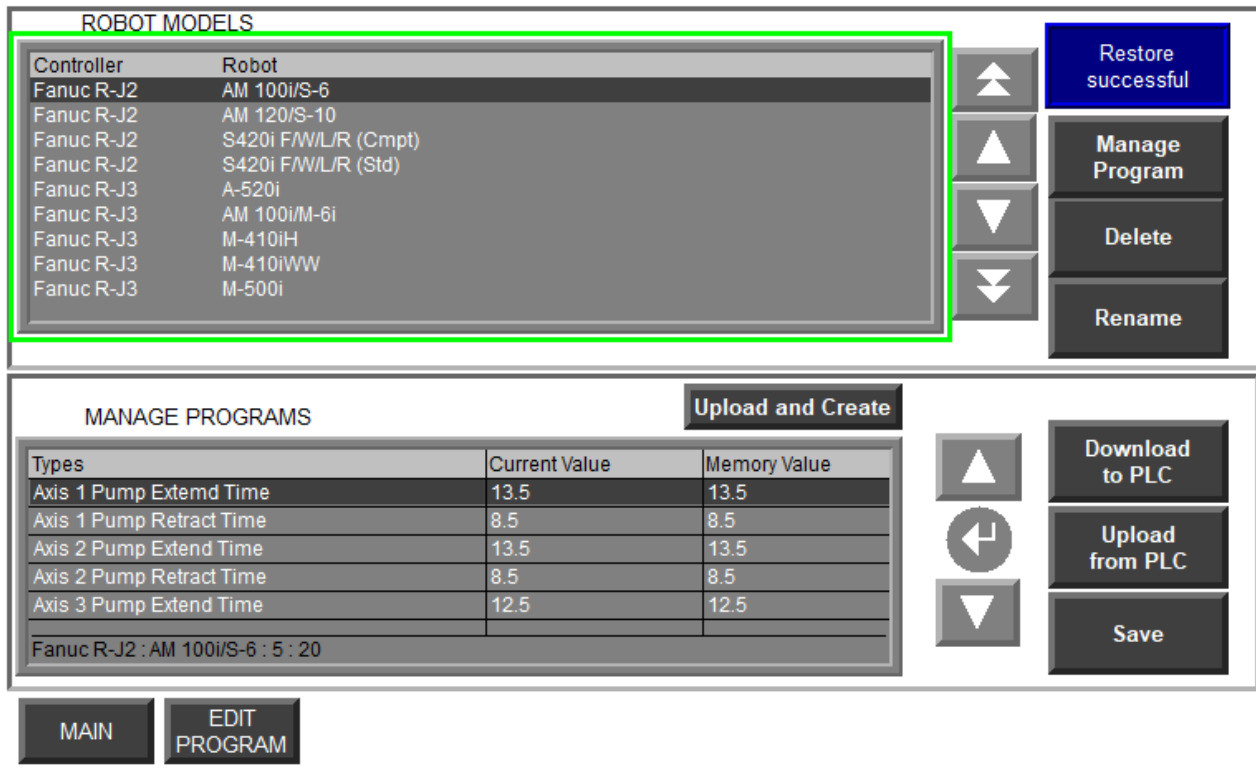
FIGURE 4

#### 3.6 I/O Viewer screen display

Refer to Figure 4 above. Non-security enabled screen allows operators to view I/O status of critical components

- 3.6.1 4-20mA indicators for Pumps 1 through 6 display the current value in mA. 4-20mA is the valid range for pressure transducers.
- 3.6.2 0-10V indicators display the voltage from the analog inputs on Pumps 1 through 6 based on the distance traveled.
- 3.6.3 Dist indicators show the distance the ram has travelled from the Retracted Position shown in mm. This allows an accurate volume dispensed to be calculated based on the percentage of the pump volume dispensed each stroke.
- 3.6.4 Vol indicators show the amount of grease that has been dispensed in ml based on the specific gravity of the grease being dispensed, along with the calculated distance the ram has travelled utilizing the volume of a cylinder calculation.
- 3.6.5 Pumps Extended or Retracted indicators for Pumps 1 through 6 show pump in extended or retracted position
- 3.6.6 Pressure Monitors for Pumps 1 through 6 will show calculated pressure at the robot gearbox in PSI, and will show "Pumps OK" if the operating pressure is below 22.5PSI. If over 22.5PSI the indicator will show "Over Press" for each corresponding pump
- 3.6.7 Valve on/off indicators for pumps 1 through 6 show valve status for that pump.

## SELECT PROGRAM SCREEN DISPLAY



**FIGURE 5**

### 3.7 Select Program screen display

Refer to Figure 5 above. Security enabled screen is available to users with administrative rights. This screen allows the selection of a robot program, then the download of the selected program to the PLC. It also allows new programs to be created, and program edits that are to be saved into memory.

- 3.7.1 Manage Program button – press this button after selecting desired program with arrow keys
- 3.7.2 Delete – this button will delete the selected program
- 3.7.3 Rename – this button will rename the selected program
- 3.7.4 Download to PLC – this button will download the selected / managed program from above to the PLC and make it active
- 3.7.5 Upload from PLC – this button will upload the current program from the PLC to the HMI buffer, and saved.
- 3.7.6 Upload and Create – this button allows the creation of a new program that must be named, and tables defined – see section 3.3 for more detailed instruction
- 3.7.7 Save button will save data in the current buffer

To select a program, press “Manage Program” and the program, name, and tables will be displayed in the lower “Manage programs” box. If no changes are to be made to the program, press “Download to PLC” and that program will be active, and displayed as the active program on the Main page.

To make changes to the tables, press the arrow keys, then the enter button on the table to be changed, and key in the number. Be careful when altering tables as this can vastly change pump operation. Pump extend and retract timers are pre-set to allow pressure dissipation. However these can be tweaked to fit your exact robot and saved into the system memory as needed. Volume can also be altered in these tables, and saved into memory. Once altered be sure to click the “save” button and verify the program has been saved into memory. To verify the changes in the tables, select “Upload from PLC” after saving and the new values will be in the “Memory Value” table.

- 3.7.8 New programs can be created by pressing the “Upload and Create” button. Name the program accordingly and fill the tables in as required. Refer to the manufacturer recommended grease volume per axis and use these numbers to start with. They can be adjusted to suit at a later time after pumping a few units to verify. Once the program is named, and the tables are populated, be sure to save the program. It will now be in the program memory for selection later on. Typically, the program names are the robot model. Keep in mind that many times that many robot models may be covered by one program. Be sure to carefully note this when creating the program and referring to the mfg. manual.

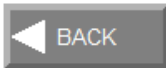
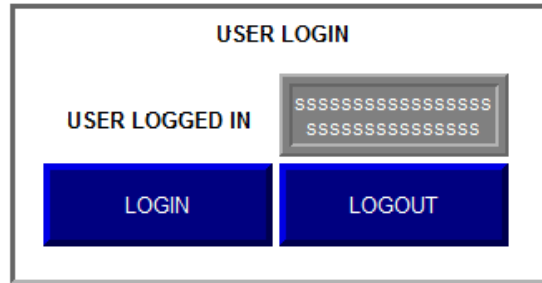
AXIS 1		AXIS 2		AXIS 3		ACTIVE PROGRAM
Axis 1 Extend	14	Axis 2 Extend	14	Axis 3 Extend	13	
Axis 1 Retract	9	Axis 2 Retract	9	Axis 3 Retract	9	
Volume (ml)	1000	Volume (ml)	1000	Volume (ml)	200	
AXIS 4		AXIS 5		AXIS 6		
Axis 4 Extend	10	Axis 5 Extend	10	Axis 6 Extend	10	
Axis 4 Retract	7	Axis 5 Retract	7	Axis 6 Retract	7	
Volume (ml)	0	Volume (ml)	250	Volume (ml)	0	
MAIN	PROGRAM SELECT			Max Pressure (PSI)	20	

**FIGURE 6**

### 3.8 Edit Program screen display

Security enabled screen is available for administrators to tweak program settings to suit. Note that these edits are not saved into the program, they are for testing purposes only. Any tweaks made to the system that are to be saved must be done in the Select Program screen.

- 3.8.1 Note – small changes to the extend and retract timers will make drastic changes in how the pressures are dissipated or not within the system. Table values that are factory set will be provided in case that data needs to be re-entered. It is not recommended these timers be changed without an extensive knowledge of the system operation.
- 3.8.2 Volume quantities can be tweaked in either direction to suit. Manufacturers recommended volumes are pre-programmed into the tables of the included robot models. If more or less grease needs to be dispensed, these tables can be altered as required. Visual confirmation of the purging grease at the vent ports will dictate whether a complete grease purge has been accomplished.

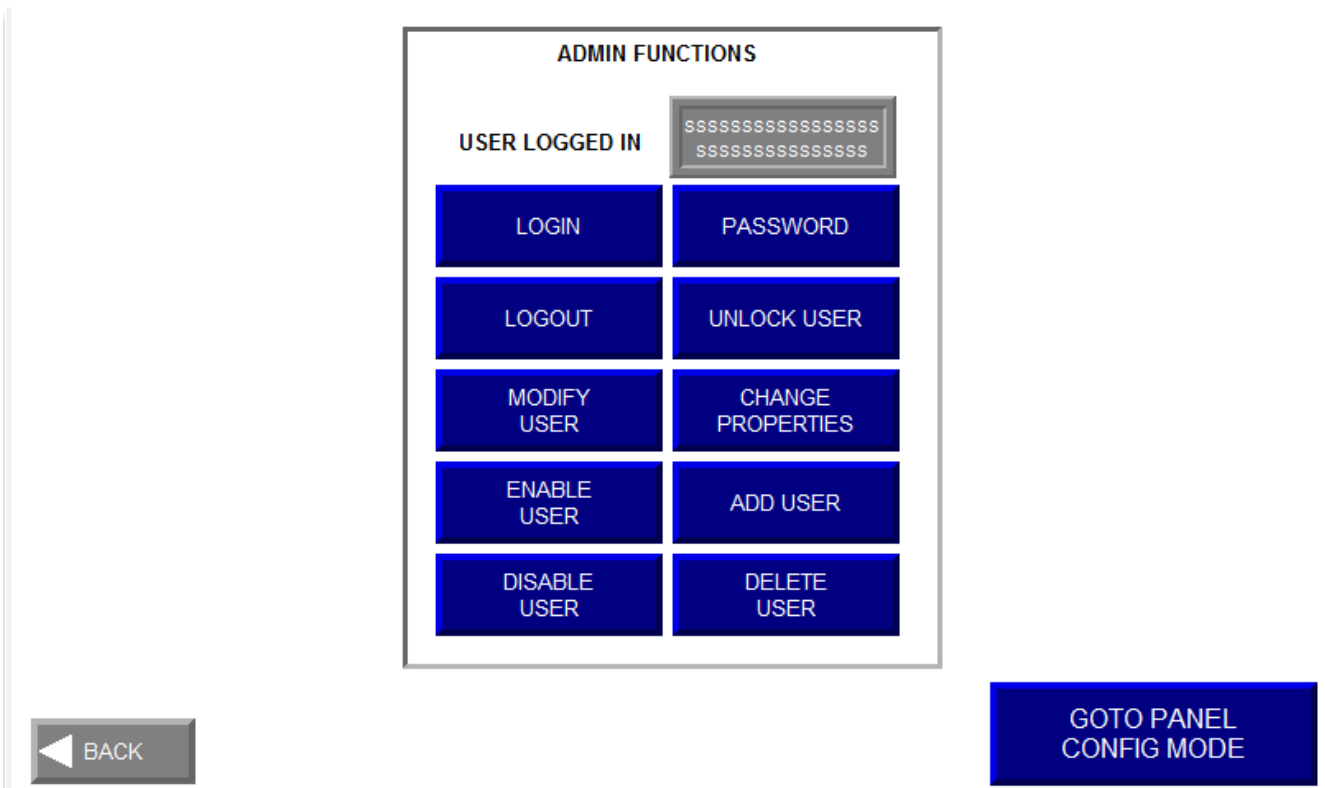


**FIGURE 7**

### 3.9 Login screen display

Allows users to log into the system

3.9.1 – Press the Login button, type username and password. Any users to be added, deleted, or managed must be done by an administrator on the Admin Screen. Refer to section 3.0



**FIGURE 8**

3.10 Admin screen display

This security enabled screen allows administrators to add/delete/and manage users as required.

2.10.1 Adding a user

You must first be logged in as administrator

Press the “Add User” button

Give the new user a user name and password

Select the appropriate group for the user to belong in.

Administrators and Programmers have full control while Operators have no access to security enabled screens.

Save the data and click “cancel/exit” to exit

Users can also be managed, deleted, enabled, or disabled by administrators.

*It is to be noted that if a new .mer file is downloaded to the HMI, all user data will be erased.*

## 4.0 Running the system

- 4.1.1 Once the system has been powered up, a user must be logged in. “Default” user will be logged in at power up but this user has no privileges. This user can run the system but cannot make any changes in any security enabled pages.
- 4.1.2 Click on the “Login” page and login as “Admin” with the password “1234”
- 4.1.3 Be sure to change the “Admin” user’s password to something that can be remembered
- 4.1.4 Once logged in, click on the “Admin” page, and add users as required, and add them to the groups they belong – Administrators and Programmers have full privileges, and Operators only have the ability to run the system in its current state or after an administrator has made program selections or edits.
- 4.1.5 On the Main screen, select “Auto” mode
- 4.1.6 Select each pump that is to be run in Auto mode by pressing the “select” button on each one. Verify that the correct robot being serviced is displayed in the Active Program window
- 4.1.7 Verify that the correct grease being dispensed is displayed in the Grease window
- 4.1.8 Verify all connections to be pumped are connected to the robot, and drains are installed.
- 4.1.9 Press “Cycle Start” and the unit will begin pumping.
- 4.1.10 Pressing “Pause” will pause the system until the pause button is pressed again to un-pause it.
- 4.1.11 Pressing the “Reset” button will reset the pump and all of the local counters, volume dispensed, and percent complete.
- 4.1.12 Pressing the Abort Program button will reset as described in 4.1.9 and also drop mode.
- 4.1.13 The system will pump each axis simultaneously until the volume required has been dispensed. Upon completion, the pump will stop and the “Completed” indicator will be lit. When each axis is complete, the operator can start to disconnect the pump hoses and drains for that axis.



## 5.0 Troubleshooting Guide:

Symptom	Cause	Solution
System does not power on	- No incoming electrical power	- Check power cord is plugged into a 120Vac, 15A supply and supply is energized.
	- Internal circuit breaker is tripped	- Disconnect electrical supply. Open electrical panel and reset circuit breaker. Re-energize pump. If circuit breaker trips again, check for electrical shorts. Consult schematics.
	- Internal fuse is blown	- Disconnect electrical supply. Open electrical panel and replace fuse. Re-energize pump. If fuse blows again, check for electrical shorts. Consult schematics.
	- Electronics/Controller/HMI damaged	- Replace faulty device. Consult schematics.
	- Pressure sensor not properly working	- Check sensor connections
	- Shipping caps are in place	- Remove shipping caps on lower check valves

Symptom	Cause	Solution
No air pressure	- No incoming air pressure	- Check air line is connected to 80PSI shop air.
	- Incoming air pressure not correct	- Adjust incoming air pressure to specifications. - Adjust Air regulator to specifications
	- Position sensor not properly working	- Check sensor connections - Replace Sensor
	- No air supply	- Apply 80PSI shop air to pump system.
	- Incoming air pressure not correct	- Adjust incoming air pressure to specifications.
		- Adjust Air regulator to specifications

Symptom	Cause	Solution
Single axis does not move	- Wrong axis selected on HMI	- Select correct axis on HMI and restart
	- Recipe Incorrect	- Select proper recipe and download again.
	- Air flow controls on cylinder not properly set	- For GEN 2 controls, the pump must be calibrated. Consult the factory.
		- For GEN 3 controls, adjust the flow controls until the desired grease flow occurs. Do not exceed maximum pressure.
	- Position sensor not properly working	- Check sensor connections
		- Replace Sensor
	- No air supply	- Apply 80PSI shop air to pump system.
- Incoming air pressure not correct	- Adjust incoming air pressure to specifications.	
	- Adjust Air regulator to specifications	

Symptom	Cause	Solution
Multiple axes do not move	- Recipe Incorrect	- Select proper recipe and download again.
	- No air supply	- Apply 80PSI shop air to pump system.
	- Incoming air pressure not correct	- Adjust incoming air pressure to specifications.
		- Adjust Air regulator to specifications
	- Position sensor not properly working	- Check sensor connections
	- Air flow controls on cylinder not properly set	- For GEN 2 controls, the pump must be calibrated. Consult the factory.
- For GEN 3 controls, adjust the flow controls until the desired grease flow occurs. Do not exceed maximum pressure.		

Symptom	Cause	Solution
Single Axis does not build pressure	- Wrong axis selected on HMI	- Select correct axis on HMI and restart
	- Recipe Incorrect	- Select proper recipe and download again.
		- Correct recipe
	- Air in grease lines/pump needs primed	- Select axis that needs primed and run until constant cycle of grease is pumped out. Each axis of the pump system consumes approximately 2.5L (2/3 gal) of grease.
	- Air flow controls on cylinder not properly set	- For GEN 2 controls, the pump must be calibrated. Consult the factory.
		- For GEN 3 controls, adjust the flow controls until the desired grease flow occurs. Do not exceed maximum pressure.
	- Pressure sensor not properly working	- Check sensor connections
		- Replace Sensor
	- Incoming air pressure not correct	- Adjust incoming air pressure to specifications.
		- Adjust Air regulator to specifications
- Shipping cap is in place	- Remove shipping cap on lower check valve	

Symptom	Cause	Solution
Multiple axes do not build pressure	- Recipe Incorrect	- Select proper recipe and download again. - Correct recipe
	- Incoming air pressure not correct	- Adjust incoming air pressure to specifications.
		- Adjust Air regulator to specifications
	- Air in grease lines/pump needs primed	- Select axis that needs primed and run until constant cycle of grease is pumped out. Each axis of the pump system consumes approximately 2.5L (2/3 gal) of grease.
	- Air flow controls on cylinder not properly set	- For GEN 2 controls, the pump must be calibrated. Consult the factory.
		- For GEN 3 controls, adjust the flow controls until the desired grease flow occurs. Do not exceed maximum pressure.
	- Pressure sensor not properly working	- Check sensor connections
- Shipping caps are in place	- Remove shipping caps on lower check valves	

**NOTES:** \_\_\_\_\_  
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