ELECTRIC DISTRIBUTOR CONTROL

INSTALLATION & OPERATION MANUAL

AG GROWTH INTERNATIONAL

Read this manual before using product. Failure to follow instructions and safety precautions can result in serious injury, death, or property damage. Keep manual for future reference.

Part Number: EDCM0314-R1

Revised: Jun/17

This product has been designed and constructed according to general engineering standards[a]. Other local regulations may apply and must be followed by the operator. We strongly recommend that all personnel associated with this equipment be trained in the correct operational and safety procedures required for this product. Periodic reviews of this manual with all employees should be standard practice. For your convenience, we include this sign-off sheet so you can record your periodic reviews.

Date	Employee Signature	Employer Signature

a. Standards include organizations such as the American Society of Agricultural and Biological Engineers, American National Standards Institute, Canadian Standards Association, International Organization for Standardization, EN Standards, and/or others.

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1. Safety

1.1. GENERAL SAFETY INFORMATION

The Safety Alert symbol identifies important safety messages on the product and in the manual. When you see this symbol, be alert to the possibility of personal injury or death. Follow the instructions in the safety messages.

Why is SAFETY important?

- Accidents disable and kill.
- Accidents cost.
- Accidents can be avoided.

SIGNAL WORDS: Note the use of the signal words **DANGER**, **WARNING**, **CAUTION**, and **NOTICE** with the safety messages. The appropriate signal word for each message has been selected using the definitions below as a guideline.

DANGER	
	Indicates an imminently hazardous situation that, if not avoided, will result in serious injury or death.

WARNING	
	Indicates a hazardous situation that, if not avoided, could result in serious injury or death.

CAUTION	
	Indicates a hazardous situation that, if not avoided, may result in minor or moderate injury.

NOTICE
Indicates a potentially hazardous situation that, if not avoided, may result in property damage.

YOU are responsible for the **SAFE** use and maintenance of your equipment. **YOU** must ensure that you and anyone else who is going to work around the equipment understands all procedures and related **SAFETY** information contained in this manual.

Remember, **YOU** are the key to safety. Good safety practices not only protect you, but also the people around you. Make these practices a working part of your safety program.

Important: *Below are general instructions that apply to all safety practices. Any instructions specific to a certain safety practice (e.g., Operational Safety), can be found in the appropriate section. Always read the complete instructional sections and not just these safety summaries before doing anything with the equipment.*

- It is the equipment owner, operator, and maintenance personnel's responsibility to read and understand **ALL** safety instructions, safety decals, and manuals and follow them when assembling, operating, or maintaining the equipment. All accidents can be avoided.
- Equipment owners must give instructions and review the information initially and annually with all personnel before allowing them to operate this product. Untrained users/operators expose themselves and bystanders to possible serious injury or death.
- Use this equipment for its intended purposes only.
- Do not modify the equipment in any way without written permission from the manufacturer. Unauthorized modification may impair the function and/or safety, and could affect the life of the equipment. Any unauthorized modification of the equipment voids the warranty.
- Do not allow any unauthorized person in the work area.

1.2. INSTALLATION SAFETY

- Check all equipment for damage immediately upon arrival. Do not attempt to install a damaged item.
- Have 2 people handle the heavy, bulky components.

1.3. OPERATIONAL & MAINTENANCE SAFETY

Electrical controls, machinery guards, railings, walkways, arrangement of installation, training of personnel, etc., are necessary for a safe working environment. It is the responsibility of the contractor, installer, owner, and user to supplement the materials and services furnished with the necessary items to make the equipment installation comply with the law and accepted standards.

- Guards, access doors, and covers must be securely fastened before operating this equipment.
- Do not place hands or feet in any of the openings while equipment is running.
- Do not push or force material into the distributor.
- Do not overload distributor or use it for anything other than its intended use.
- Inspect all parts. Ensure parts are in good condition and installed properly.

1.4. LOCKOUT AND TAGOUT PROCEDURES

To minimize possibility of serious injury or death to workers from hazardous energy release (for example, when restarting the equipment) and prevent worker deaths from all forms of hazardous energy release, follow all lockout and tagout procedures when installing and servicing equipment. Ensure that lockout and tagout procedures are adhered to. For example:

- De-energize, block, and dissipate all sources of hazardous energy.
- Lock out and/or tag out all forms of hazardous energy.
- Ensure that only 1 key exists for each assigned lock, and that you are the only one that holds that key.
- After verifying all energy sources are de-energized, service or installation may be performed.
- Ensure that all personnel are clear before turning on power to equipment.

For more information on occupational safety practices, contact your local health and safety organization.

1.5. SAFETY DECALS

Please refer to the appropriate Safety subsections of the HSI Electric Distributor (Model DR) Assembly & Operation Manual for information and details regarding safety decals, including installation and locations.

2. Installation

Each unit has been factory calibrated and tested before shipping.

Contact factory for assistance if lead length between control panel and motor exceeds 100' (30.5 m).

2.1. WIRING

- Keep all control and analog leads at least 12" (305 mm) from power and motor leads.
- Keep power and motor leads in separate conduit.
- Keep all control and analog leads in their own conduit. Metal conduit is preferred.
- If necessary, cross control and analog leads with power or motor leads at 90°.
- Ground shield from analog leads at control panel only.

CABLES:

- Use **shielded** cable 18/4.
- If a double distributor is installed, 2 cables will be needed (one for lower and one for upper).

NOTICE

Adequate surge suppression is required on the incoming AC supply line to protect the processor and is usually not supplied by the factory. Please consult with your electrician for your specific requirements.

3. Operation

WARNING *Before continuing, ensure you have read and understand the relevant information in the safety section. Safety information is provided to help prevent serious injury, death, or property damage.*

Each unit has been factory calibrated and tested before shipping.

3.1. SELECT A NEW POSITION

1. The green indicator next to the drop number represents the current position.
2. To select a new position, press the circle with “Press to Select Position” on the center of the screen (Figure 3.1).

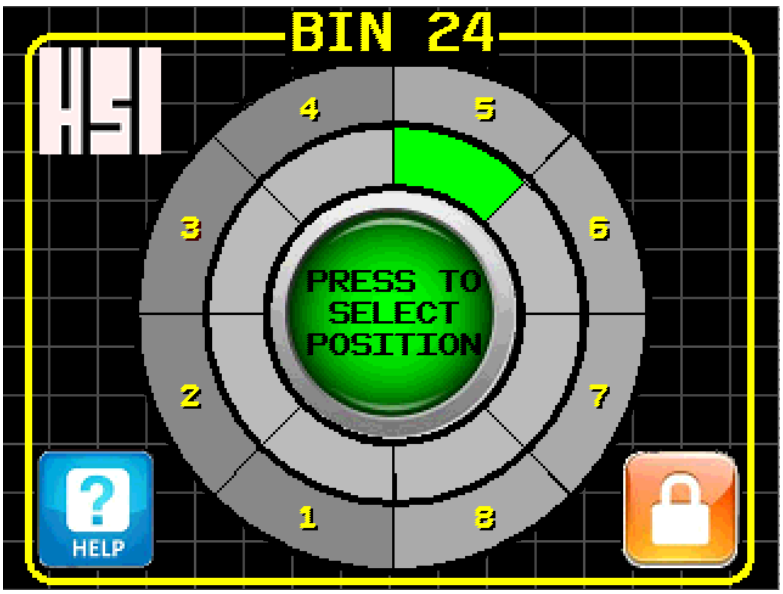


Figure 3.1

3. Re-calibration can be completed at any time by pressing the HSI Logo at the top left side of the screen.
4. Once pressed, the selection screen will appear (Figure 3.2).
   - The current position will have its box checked.
   - Any box in red is locked and cannot be selected.
   - Use the arrow keys to return or switch between selection pages.
   - Select a new position by pressing the desired drop number. Once pressed, the HMI will return to the normal operation screen.

Figure 3.2

5. Once a new position is selected, the commanded position will now show up in yellow (Figure 3.3) and moving animation will be displayed in the center of the screen. Once in position, the discharge will turn green and the discharge name will be displayed at the top of the screen.

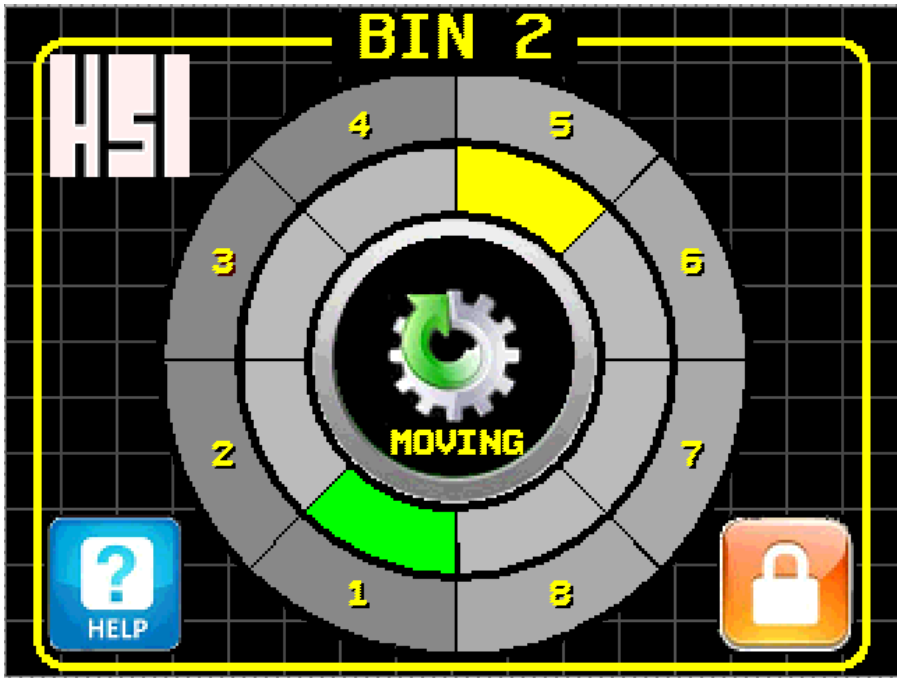


Figure 3.3

3.2. LOCKING POSITIONS

1. Locking positions will not allow selection of that position through the HMI, PLC, or Communications.
2. Locking positions can be completed through the HMI or Communications.
3. Any position with a red indicator represents it has been locked.

4. To unlock or lock a position, press the lock graphic on the lower right-hand side of the normal operation screen (Figure 3.4).

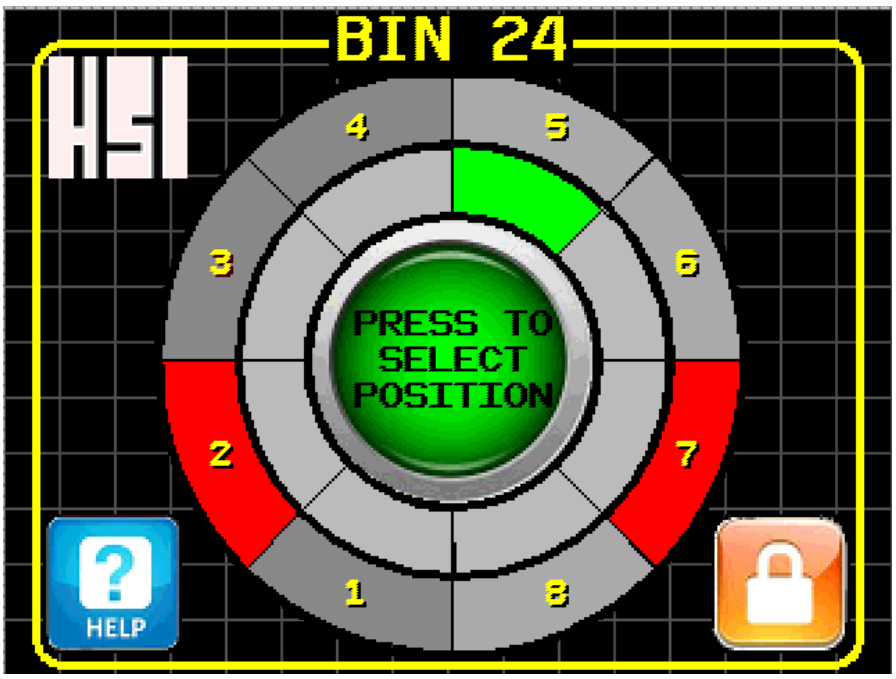


Figure 3.4

5. View the unlock screen (Figure 3.5).

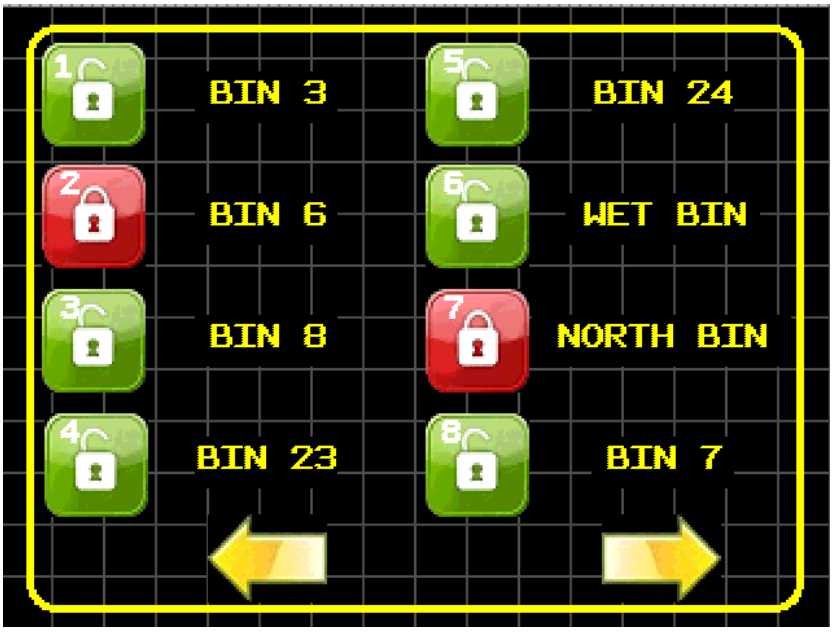


Figure 3.5

6. To lock, press any of the buttons next to the desired bin. The graphic will then change to the red locked indicator.
7. To unlock, press the desired button, which will then bring up a warning pop-up (Figure 3.6).

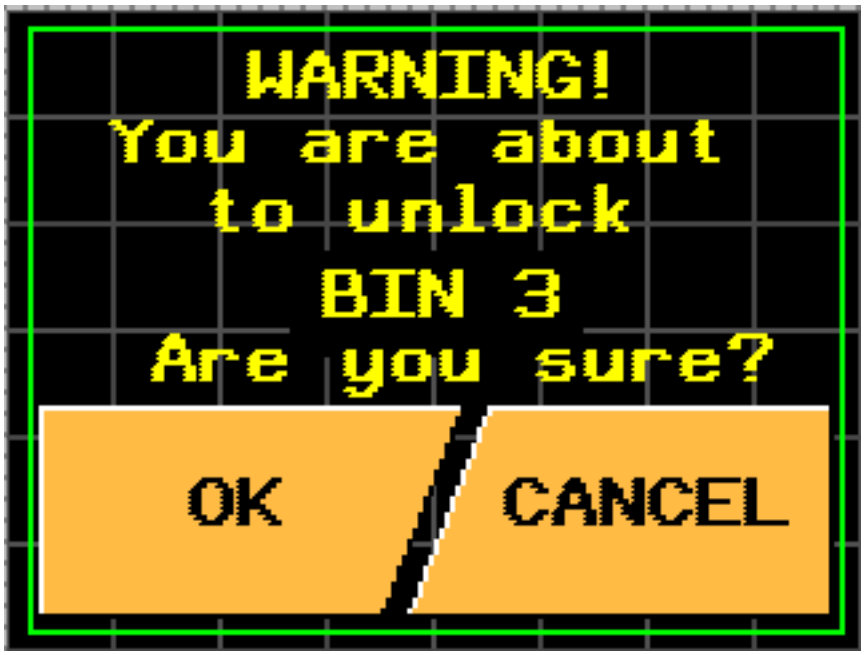


Figure 3.6

8. Press OK to unlock or Cancel to return.

3.3. FAULTS

- See fault descriptions below.
- To clear faults, select the Back button.

VFD FAULT

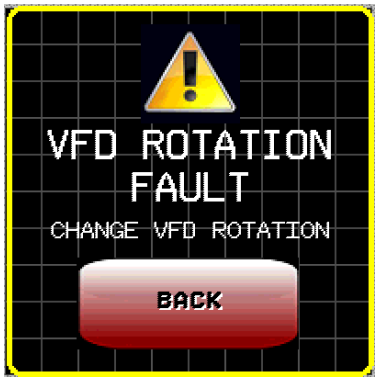
- If fault does not clear, cycle power to control panel.
- To diagnose, view display on front of VFD and consult manufacturers manual.

TRAVEL LIMIT SWITCH

- Upper distributor only.
- Upon occurrence, movement will only be allowed in the opposite direction for a short time period from the calibration page jog button. It may be necessary to press a few times for the distributor to release from the limit switch.

ENCODER FAULT

- Distributor has been commanded to run with encoder not seeing a change in position.
- Check encoder wiring and status from the advance setup screen.



VFD ROTATION FAULT

- Occurs when encoders see incorrect rotation of the distributor.
- Change VFD Rotation.

3.4. VFD PROGRAMMING

All necessary VFD programming is completed automatically by the HMI. No extra configuration is needed.

3.5. INITIAL START-UP & CALIBRATION

1. If distributor has not been calibrated, the HMI will show the screen in Figure 3.7. Touch CALIBRATE to continue.

Figure 3.7

2. Select the correct voltage, Max VFD Frequency, and Upper or Lower Distributor Style (Figure 3.8).

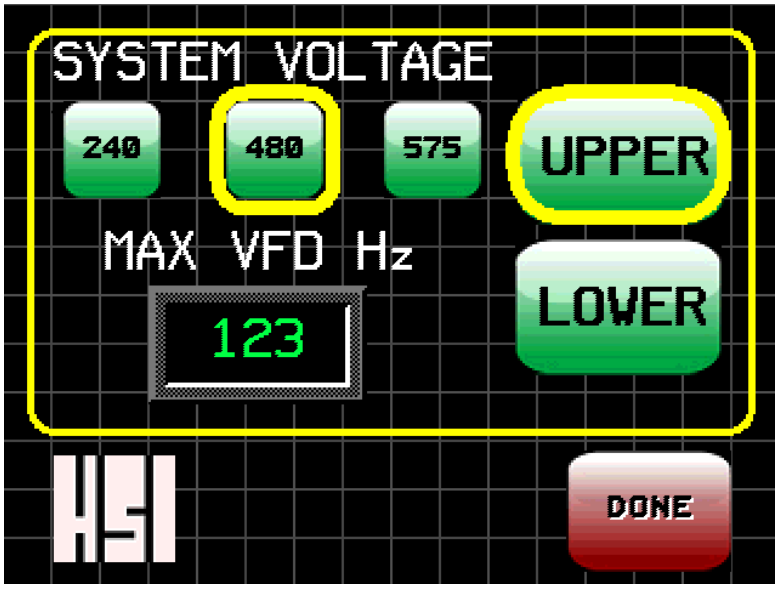


Figure 3.8

3. Select number of discharge (Figure 3.9).

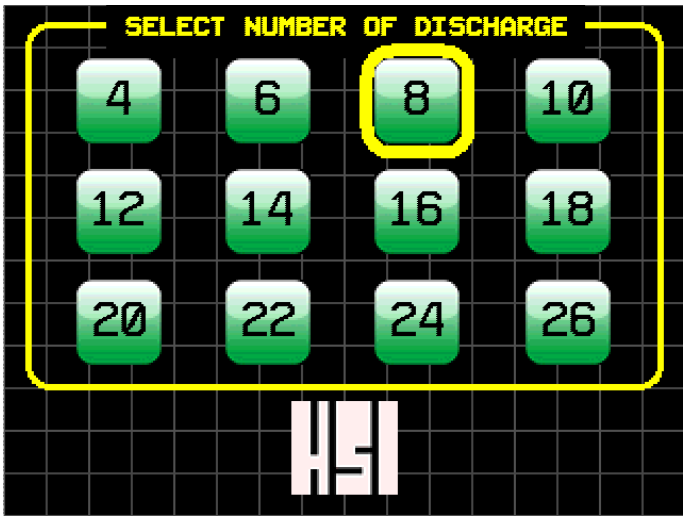


Figure 3.9

4. Calibrate drops (Figure 3.10).

Figure 3.10

a. Start by selecting the desired drop using the up and down arrows on top left and top right of HMI screen.

b. Use the Jog buttons to move the distributor forward or reverse into desired position.

c. When jogging, the single arrow is a low jog speed and the double arrow is high jog speed.

d. When in desired position and drop number is correct, press “Mark Posn” to save current location.

- When position is saved, the current position in degrees will be displayed next to the drop number (Figure 3.11).

Figure 3.11

e. Touch the yellow text in center of screen to rename the current drop.

f. Any drop can be taught at any time and in any order.

g. When completed, select DONE.

3.6. PLC CONNECTIONS

1. Command position and actual position can be determined using PLC inputs and outputs.
2. The move to a new position will be initiated on the rising edge of the PLC_MOVE input. (Input I0)
3. Output Q0 will be activated when distributor is moving.
4. Output Q1 will be activated when distributor is in position.
5. See Input Table (Figure 3.12) and Output Table (Figure 3.13) for bit status conversion to discharge numbers.

Selected Position	Bit 0 I1	Bit 1 I2	Bit 2 I3	Bit 3 I4	Bit 4 I5
1	■				
2		■			
3	■	■			
4			■		
5	■		■		
6		■	■		
7	■	■	■		
8				■	
9	■			■	
10		■		■	
11	■	■		■	
12			■	■	
13	■		■	■	
14		■	■	■	
15	■	■	■	■	
16					■
17	■				■
18		■			■
19	■	■			■
20			■		■
21	■		■		■
22		■	■		■
23	■	■	■		■
24				■	■
25	■	■		■	■
26		■		■	■

Figure 3.12 Input Table

Discharge Position	Bit 0 Q2	Bit 1 Q3	Bit 2 Q4	Bit 3 Q5	Bit 4 Q6
1	■				
2		■			
3	■	■			
4			■		
5	■		■		
6		■	■		
7	■	■	■		
8				■	
9	■			■	
10		■		■	
11	■	■		■	
12			■	■	
13	■		■	■	
14		■	■	■	
15	■	■	■	■	
16					■
17	■				■
18		■			■
19	■	■			■
20			■		■
21	■		■		■
22		■	■		■
23	■	■	■		■
24				■	■
25	■	■		■	■
26		■		■	■

Figure 3.13 Output Table

3.7. MODBUS/TCP COMMUNICATIONS

Modbus/TCP connections allow for moving of the distributor, actual position, lock/unlock positions, and view distributor status.

- IP Addressing can be changed through the advanced screen.

DEFAULT IP	
IP ADDRESS	192.192.112.53
SUBNET	255.255.255.0

3.7.1. MODBUS/TCP REGISTERS:

Description	Address	Data Type	Notes
STATUS	40020	INT	
Distributor In Position	40020 bit 00	BOOL	
Distributor Moving	40020 bit 01	BOOL	
VFD Fault	40020 bit 02	BOOL	
Upper Distributor Limit Switch	40020 bit 03	BOOL	
FEEDBACK			
Actual Drop Position	40010	INT	· Current Distributor Discharge Position
Command Position Feedback	40012	INT	· Position Verification (Verifies HMI has received commanded position from address 40011)
Command Position Degrees	40013	INT	· Actual position in degrees of the commanded position. · 0-3600 = 0-360 Degrees · Changes up Move Command
Actual Position Degrees	40014	INT	· Actual Position, in degrees of the distributor · 0-3600 = 0-360 Degrees

Description	Address	Data Type	Notes
COMMAND	40021	INT	
Distributor_GO	40021 bit 00	BOOL	· Move initiates on rising edge of signal
Unlocks All Locked Position	40021 bit 01	BOOL	·
SET POSITION			·
Command Drop Position	40011	INT	· Set to Desired Discharge Position

Description	Address	Data Type	Notes
Lock Group 1	40022	INT	Read/Write to this area to lock/unlock positions
Discharge 1	40022 bit 00	BOOL	
Discharge 2	40022 bit 01	BOOL	
Discharge 3	40022 bit 02	BOOL	
Discharge 4	40022 bit 03	BOOL	
Discharge 5	40022 bit 04	BOOL	
Discharge 6	40022 bit 05	BOOL	
Discharge 7	40022 bit 06	BOOL	
Discharge 8	40022 bit 07	BOOL	
Discharge 9	40022 bit 08	BOOL	
Discharge 10	40022 bit 09	BOOL	
Discharge 11	40022 bit 10	BOOL	
Discharge 12	40022 bit 11	BOOL	
Discharge 13	40022 bit 12	BOOL	
Discharge 14	40022 bit 13	BOOL	
Discharge 15	40022 bit 14	BOOL	
Discharge 16	40022 bit 15	BOOL	
Discharge 17	40023 bit 00	BOOL	
Discharge 18	40023 bit 01	BOOL	
Discharge 19	40023 bit 02	BOOL	
Discharge 20	40022 bit 03	BOOL	
Discharge 21	40023 bit 04	BOOL	
Discharge 22	40023 bit 05	BOOL	
Discharge 23	40023 bit 06	BOOL	
Discharge 24	40023 bit 07	BOOL	
Discharge 25	40023 bit 08	BOOL	
Discharge 26	40023 bit 09	BOOL	

Description	Address	Data Type	Notes
Lock Group 2	40023	INT	Read/Write to this area to lock/unlock positions
Discharge 17	40023 bit 00	BOOL	
Discharge 18	40023 bit 01	BOOL	
Discharge 19	40023 bit 02	BOOL	
Discharge 20	40022 bit 03	BOOL	
Discharge 21	40023 bit 04	BOOL	
Discharge 22	40023 bit 05	BOOL	
Discharge 23	40023 bit 06	BOOL	
Discharge 24	40023 bit 07	BOOL	
Discharge 25	40023 bit 08	BOOL	
Discharge 26	40023 bit 09	BOOL	

3.8. ADVANCED SETUP

1. Contact technical support before entering advanced setup.
2. Enter password to enter (Figure 3.14).

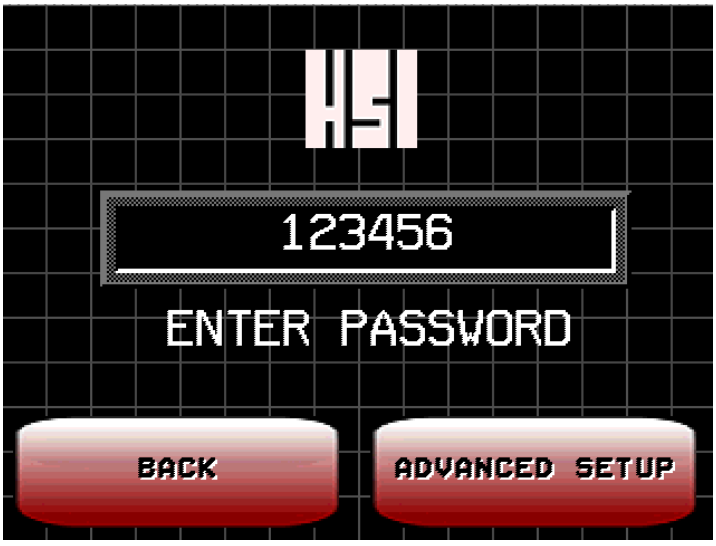


Figure 3.14

3. Advanced setup home screen shows up (Figure 3.15). Allows viewing of actual position as well as ability to change it.

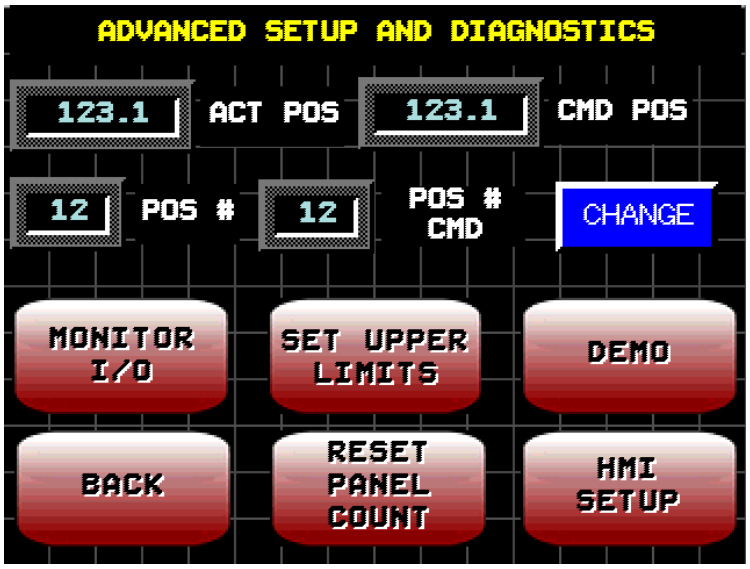


Figure 3.15

4. Monitor I/O (Figure 3.16).
    - View status of HMI inputs and outputs as well as analog input.

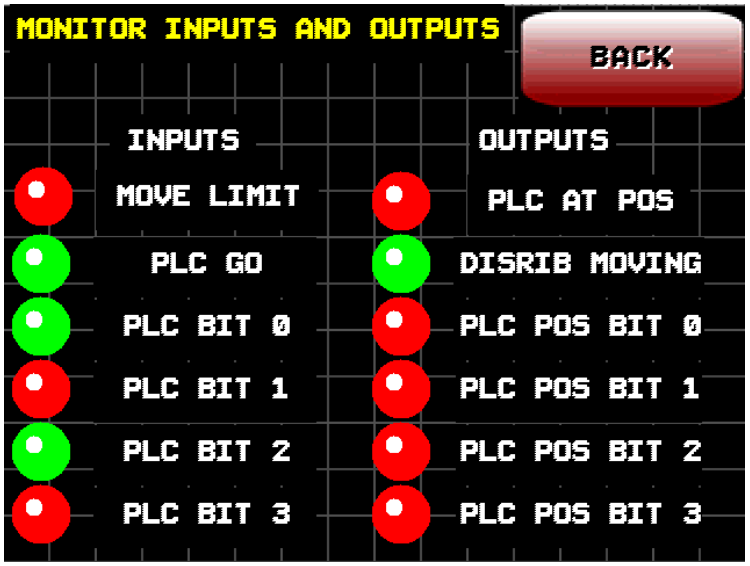


Figure 3.16

5. Set upper limits (Figure 3.17) (available only when in upper mode).

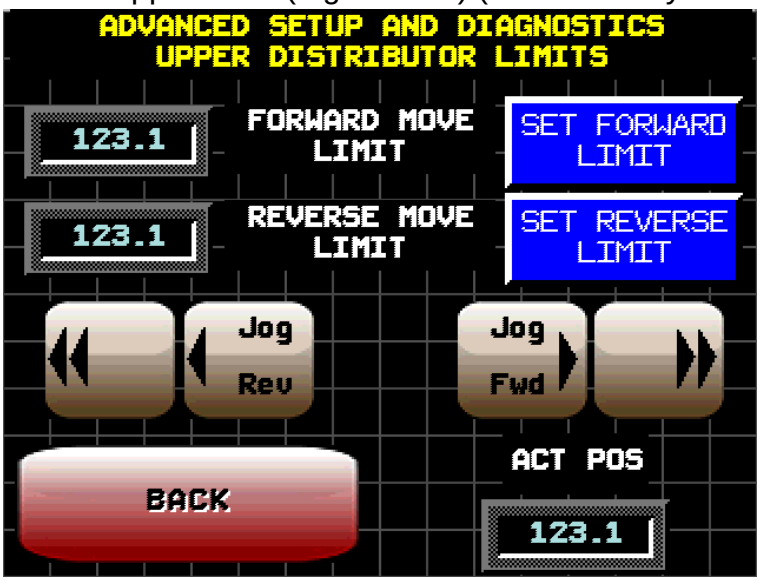


Figure 3.17

a. Sets a pre-determined stop point where the distributor will stop BEFORE hitting the limit switch. This adds another stop point before the limit switch.

NOTICE

The additional stop point will help prevent over-rotation of the upper distributor and encoder damage.

b. Use Jog Forward and place distributor a few degrees after last discharge drop and before limit switch. Press “SET FORWARD LIMIT” to set.

c. Use Jog Reverse and place distributor a few degrees after last discharge drop and before limit switch. Press “SET REVERSE LIMIT” to set.

6. Demo Mode (Figure 3.18).
   - Allow for random discharge selection points with move commands for testing and display purposes.

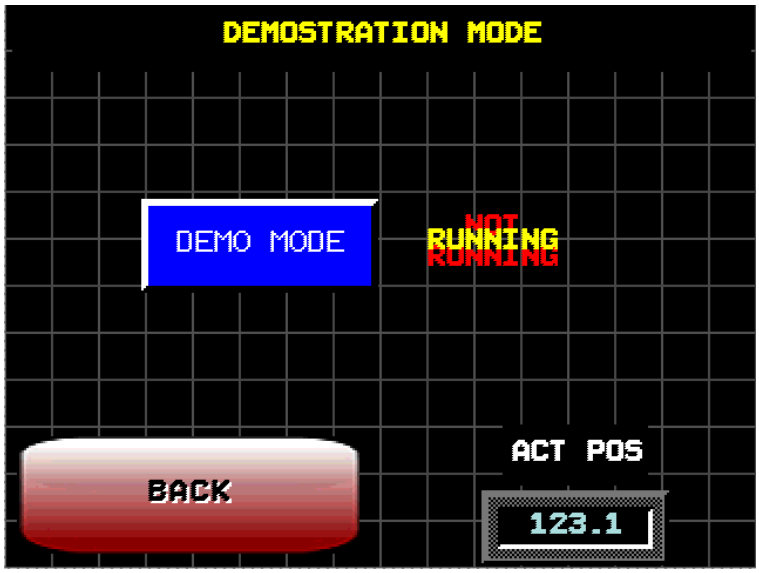


Figure 3.18

7. HMI setup:
   - Enters into HMI device setup.
   - Go to networking to change IP address settings.

4. Troubleshooting

Problem	Corrective Actions
Distributor will not turn.	• Check VFD wiring. • Verify connection between VFD and HMI. • Verify limit switch is not activated or wired incorrectly (upper distributor only). • Verify VFD is not faulted (cycle power if necessary). • Verify jumper between +24 and LI3 is present on VFD connections.
Encoder is not giving any position.	• Check encoder wiring. • Verify HMI expansion card is secured to back of HMI.
Encoder signal is fluctuating.	• Verify shielded wire is being used. • Verify signal wire is placed at least 12" (305 mm) from power conductors and crosses at 90 degrees only when necessary.

HSI is a brand of Union Iron, part of the Ag Growth International Inc. Group 1102

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