



JAMESWAY INCUBATOR COMPANY INC.

GUARDIAN HVAC CONTROL PANEL MANUAL

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Guardian Control Panel Specifications

<u>PLC:</u>	<p>DirectLOGIC 205 Micro Modular PLC with Koyo/Modbus RTU communication protocol.</p> <p>D2-250-1 CPU with 1 x RS232 port for Touch Panel communication and 1 x RS232/RS422 port for HMI software communication.</p> <p>D2-09B-1 9 slot base with internal 120/240 VAC – 50/60 Hz power supply</p>
<u>Communications:</u>	<p>D2-DSCBL-2 communication cable from Port 2 of the D2-250-1 PLC CPU to FA_ISOCON signal converter.</p> <p>DB9 to RJ12 6P6C connector (for 9-Pin PC serial ports) from FA-ISOCON to PC connection. Optional USB to serial converter available.</p>
<u>Display:</u>	<p>EA7-T6CL-R (EA7-S6C-R) Color Touch Panel with 256 colors, screen resolution up to 1024 x 768 and 10MB User memory. All C-More Panels are NEMA 4/4X, IP-65 when mounted correctly (Indoor use only)</p>
<u>Power Supply:</u>	<p>120/240 VAC – 50/60Hz (Always confirm voltage before applying power to the Guardian Control Panel)</p> <p>Hammond PT series transformer Primary 120/240 VAC – 50/60Hz Secondary 24 VAC rated at 200VA</p> <p>Siemens 24 VDC Power supply Input 120/240 VAC – 50/60Hz</p>
<u>Outputs:</u>	<p>4 x D2-08TR 8 Channel Relay output module with common supply voltage of 5-30 VDC or 5-240 VAC.</p> <p>1 x F2-08DA-2 8 Channel analog output voltage module (0-10 VDC)</p>
<u>Inputs:</u>	<p>2 x F2-08AD-1 8 Channel analog input current module (4-20mA)</p>

General Description

The Guardian Controller can be used in all locations around the world. The Guardian Controller was specifically developed for controlling ventilation equipment within all hatchery environment conditions. What makes the Guardian Panel different than all others; four rooms and four exhaust plenums can be connected to a single Guardian Panel. The Guardian Panel is normally mounted in a convenient location for hatchery personnel.

This custom designed controller allows the hatchery to control, monitor, and archive information for use in the future. The DirectSoft PLC program controls the ventilation equipment by comparing the current room conditions user defined set points, and makes necessary adjustments as needed.

The Jamesway “Guardian Control Panel” is comprised of four major components:

1. PLC (Programmable Logic Controller)
2. 24 VAC transformer
3. 24 VDC power supply
4. Terminal block assembly

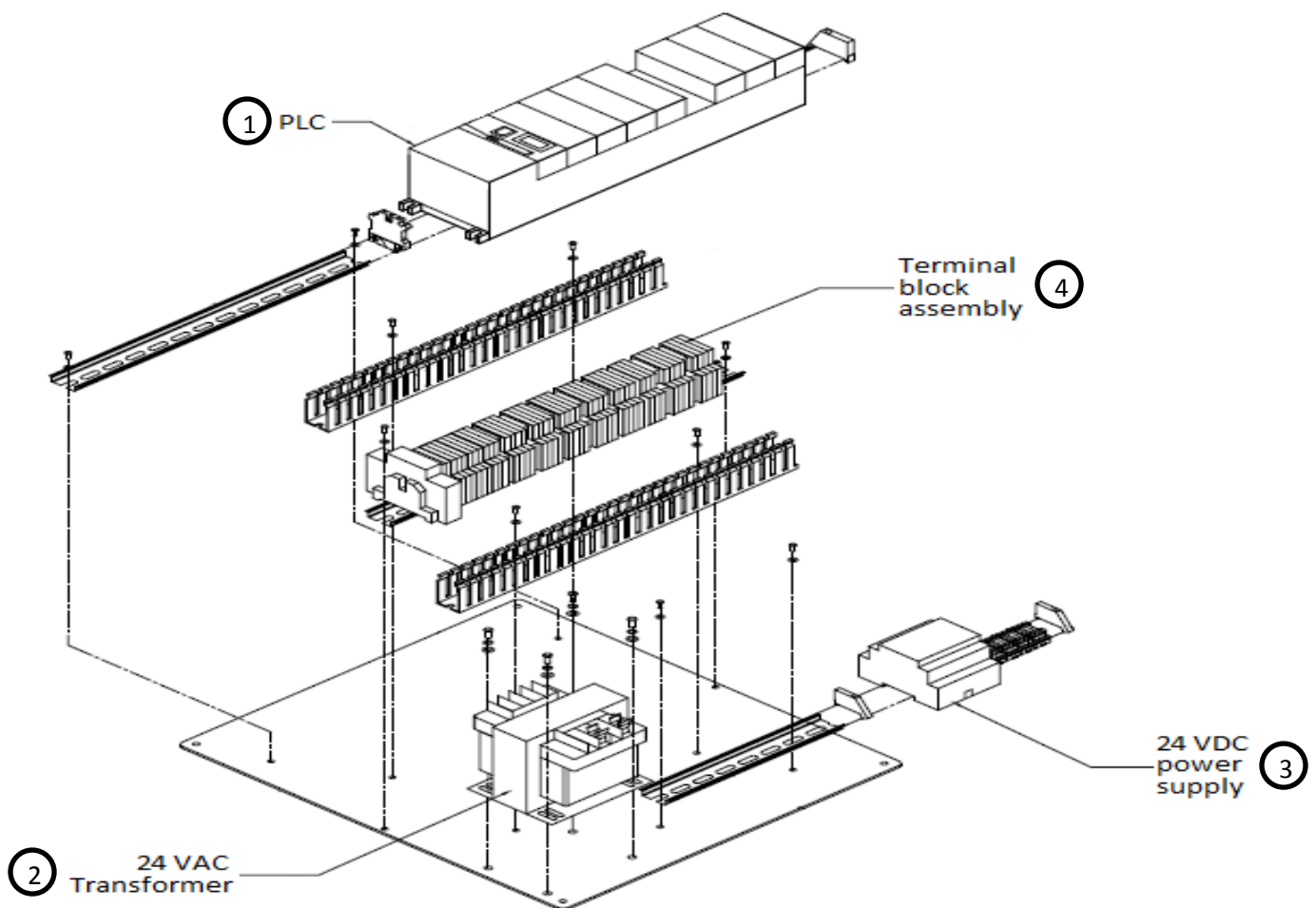


Figure 1: Guardian Control Panel

Guardian PLC Explanation

The inputs to the PLC are the readings taken by the room and plenum sensor packs. The programming performs calculations based off the user defined set points for each individual space and turns ON\OFF or adjusts the outputs. These outputs are connected to the ventilation equipment. The PLC will make adjustments for temperature by triggering relays installed in the HVAC machinery, humidity by triggering relays/contactors for independent humidification equipment and pressure by either modulating an economizer actuator or adjusting the speed of a plenum exhaust fan.



Figure 2: Guardian Control Panel CPU.

PLC CPU: Located in SLOT 0 (refer to appendix)

There are four lights on the PLC CPU that indicate normal operation or if a fault condition is present. The 'PWR' light indicates that the power supply to the PLC is working. The 'RUN' light indicates that the PLC programming is currently running. The 'BATT' light will indicate if the PLC battery needs to be replaced. Finally, the 'CPU' light indicates if there is any fault with the PLC CPU. When the Guardian PLC is in normal operation the PWR and RUN light will be illuminated and the BATT and CPU light will not. There is also a 'RUN/TERM/STOP' switch which is generally left in the 'TERM' position to allow the Guardian Control Panel to communicate with a computer.

Troubleshooting the PLC CPU

Indicator Status	Potential Problems
PWR (off)	1. System voltage incorrect 2. Power supply/CPU is faulty 3. Other component such as I/O module has power supply shorted 4. Power budget exceeded for the base being used
RUN (will not come on)	1. CPU programming error 2. Switch in TERM position 3. Switch in STOP position (DL250-1, DL260 only)
RUN (flashing)	Firmware upgrade mode
CPU (on)	1. Electrical noise interference 2. CPU defective
BATT (on)	1. CPU battery low 2. CPU battery missing, or disconnected

Figure 3: List of CPU indicator errors.

PWR Indicator

There are generally three possible reasons why the PWR indicator light is OFF:

1. There is no power being supplied to the base or the power is incorrect
2. The power supply in the PLC base is faulty
3. Another module inserted into the base is causing the power supply to remain OFF

No Base Power/Incorrect Base Power

In order for the Guardian Control Panel to operate properly, the PLC base must have the correct power supply. If the voltage is incorrect the CPU and/or base may not operate correctly or they may not operate at all.



WARNING: Before inspecting wiring connections, remember to switch OFF any system power in order to minimize the risk of electrical shock.

1. Turn OFF the circuit breaker (located on the far left of the terminal block assembly). Check for loose wire connections at the circuit breaker, terminal blocks L1 and N, and the power connections to the PLC base.
2. If all of the above connections are tight, reconnect the system power and measure the voltages listed below:

between the top of the circuit breaker and terminal block N, the bottom of the circuit breaker and terminal block N, and the two top screw terminals on the PLC base. If all the voltages are correct, the power supply in the PLC base is faulty. If the voltage is correct at the top of the circuit breaker but not the bottom, the circuit breaker is faulty. Part numbers are listed at the end of the manual. If the measurement at the top of the circuit breaker is incorrect, turn OFF the system power and correct any problems with the power being supplied to the Guardian Control Panel.

The incoming power is connected to the two top screw terminals.



Figure 4: Guardian Control Panel PLC base.

Faulty PLC Base/CPU

If your hatchery has experienced major power surges it is possible that either the PLC CPU or the power supply in the PLC base may have been damaged. Generally, the best way to check if the PLC CPU/base is faulty is to substitute the suspected faulty device with a known good one to see if the problem is corrected.

Another device/module is causing the PLC base power supply to turn OFF

Each PLC base has a 5 VDC bus that runs from the power supply to each module. A faulty PLC module or device connected to the communication ports on the PLC CPU. To test for this problem use the following steps

1. Turn OFF the circuit breaker in the Guardian Control Panel.
2. Disconnect both of the cables that are connected directly to the CPU.
3. Turn the circuit breaker ON

If the Guardian Control Panel returns to normal operation, you either have a faulty FA-ISOCAN module or there is a short in the communication wiring. If the Guardian Control Panel does not return to normal operation you can continue testing to see if a module is causing the problem. To isolate which module might be causing the problem:

- Turn OFF the circuit breaker in the Guardian Control Panel
- Remove one module at a time from the PLC base
- Turn On the circuit breaker with the one module removed.
- Turn OFF the power and replace the module. Repeat until a faulty module is found.
-



The base connector pins on the module can cause this problem. When a module is removed inspect

RUN Indicator

The 'RUN' indicator will be ON, when the Guardian Control Panel is operating normally. If the 'RUN' light is OFF, there are only two possible causes. The 'RUN/TERM/STOP' switch is not in the 'TERM' position. To reset the PLC program follow these steps:

1. Move the 'RUN/TERM/STOP' switch to 'STOP'.
2. Move the switch to 'RUN'
3. Move the switch to 'TERM'. This is the default position of the switch.

The other problem that can occur is there is a fatal error in the PLC CPU. The 'CPU' indicator light will also be ON if this is the case.

CPU Indicator

When this light is ON, there has been a fatal error within the PLC CPU. Generally this error is related to a hardware failure. Try cycling the power to the Guardian Control Panel by using the circuit breaker. If the CPU indicator light is OFF, the Guardian Control Panel should be closely monitored to determine what caused the error. Electrical noise can sometimes cause this problem by introducing interference to the PLC CPU. A thorough check of the Guardian Control Panel grounding system and electrical noise filters can be installed if grounding is an issue. If cycling the power to the Guardian Control Panel does not reset the error, the PLC CPU will need to be replaced.



Figure 5: Guardian Relay Output Module.

PLC Relay Output Modules: Located in SLOTS 1 to 4 (refer to appendix)

Each Guardian Control Panel contains four Relay Output Modules that are used to control HVAC equipment. One module is used per room. There are eight lights on each module that indicate which outputs are turned ON, and will assist in troubleshooting this module should a problem occur. Below is a table that shows a couple of the most common configurations of the relay output modules. A target table can be supplied by your Jamesway Technician to clarify how your Guardian Control Panel was terminated. This target table will also show where measurements are made.

Relay Output Module Configuration	
Module LED #	Connected control
0	First stage cooling
1	Second stage cooling
2	First stage heating
3	Second stage heating
4	Humidifier(s)
5	First stage dehumidification
6	Second stage dehumidification
7	Not used

Table 2: Sample Relay output configuration for an Incubator room.

Relay Output Module Configuration	
Module LED #	Connected control
0	First stage cooling
1	Second stage cooling
2	First stage heating
3	Second stage heating
4	Humidifier(s)
5	Not used
6	Not used
7	Not used

Table 1: Sample Relay output configuration for a Holding room.

Any of the Module outputs that are shown in the above tables as 'Not used' are generally used for specialized applications or for a spare in case a fault occurs with another relay output. On the following page is a flow chart that will help troubleshoot problems related to the Relay Output Modules. The target table should be used with the flow chart to help identify where measurements should be done. Jamesway Technical support is always available if you should have any questions.

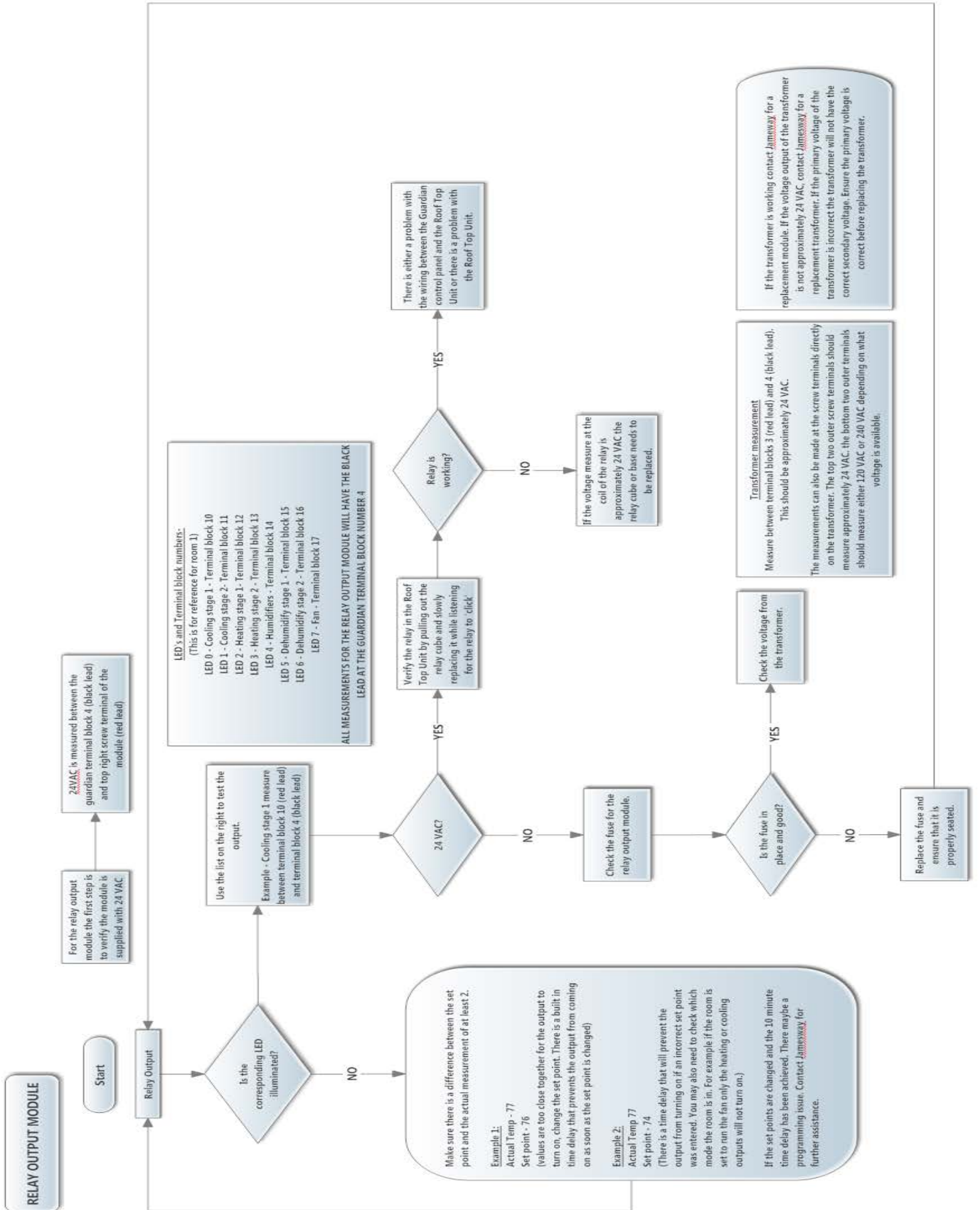


Figure 6: Relay output module troubleshooting flow chart.

PLC Analog Input Modules: Located in SLOTS 6 to 7 (refer to appendix)

Each Guardian Control Panel contains two Analog Input Modules that are used take temperature, humidity and pressure readings. One module is used for room humidity and pressure, the second module is used for room temperature and plenum pressure. A target table can be supplied by your Jamesway Technician to clarify how your Guardian Control Panel was terminated. This target table will also show where measurements are made. The Analog Input modules are a current measurements, this means that any measurements that are made to verify the accuracy of a sensor must be made with an ammeter in series.



Figure 7: Guardian Analog Input Module.

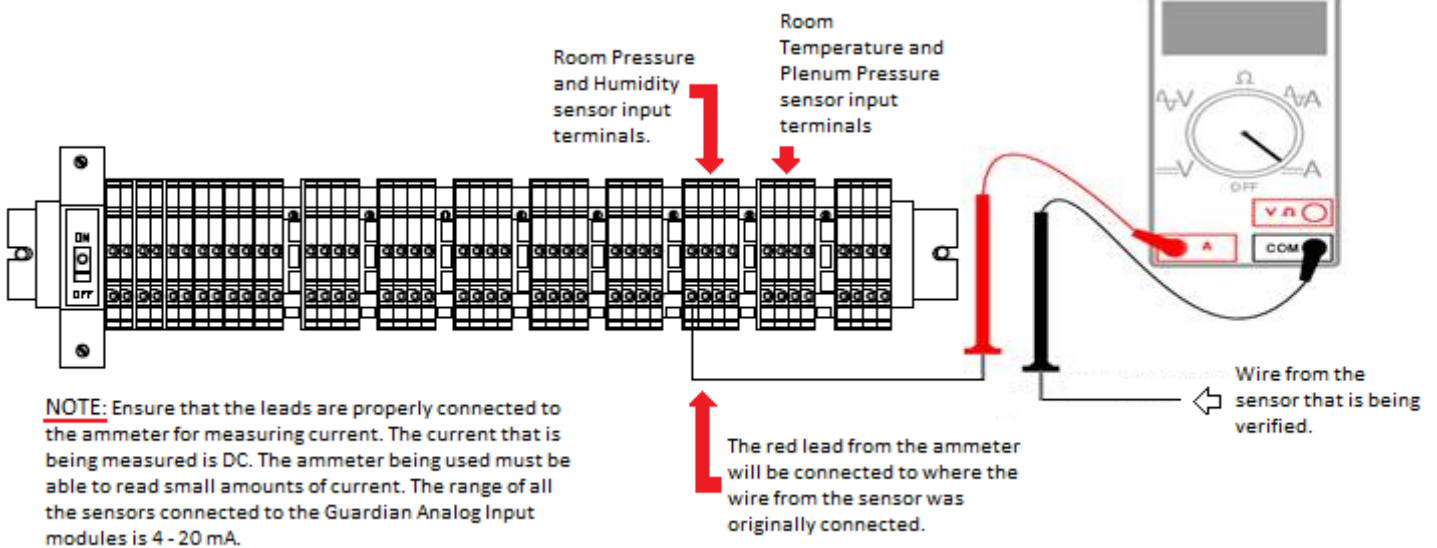


Figure 8: Placing an ammeter in series with a sensor that is being tested.

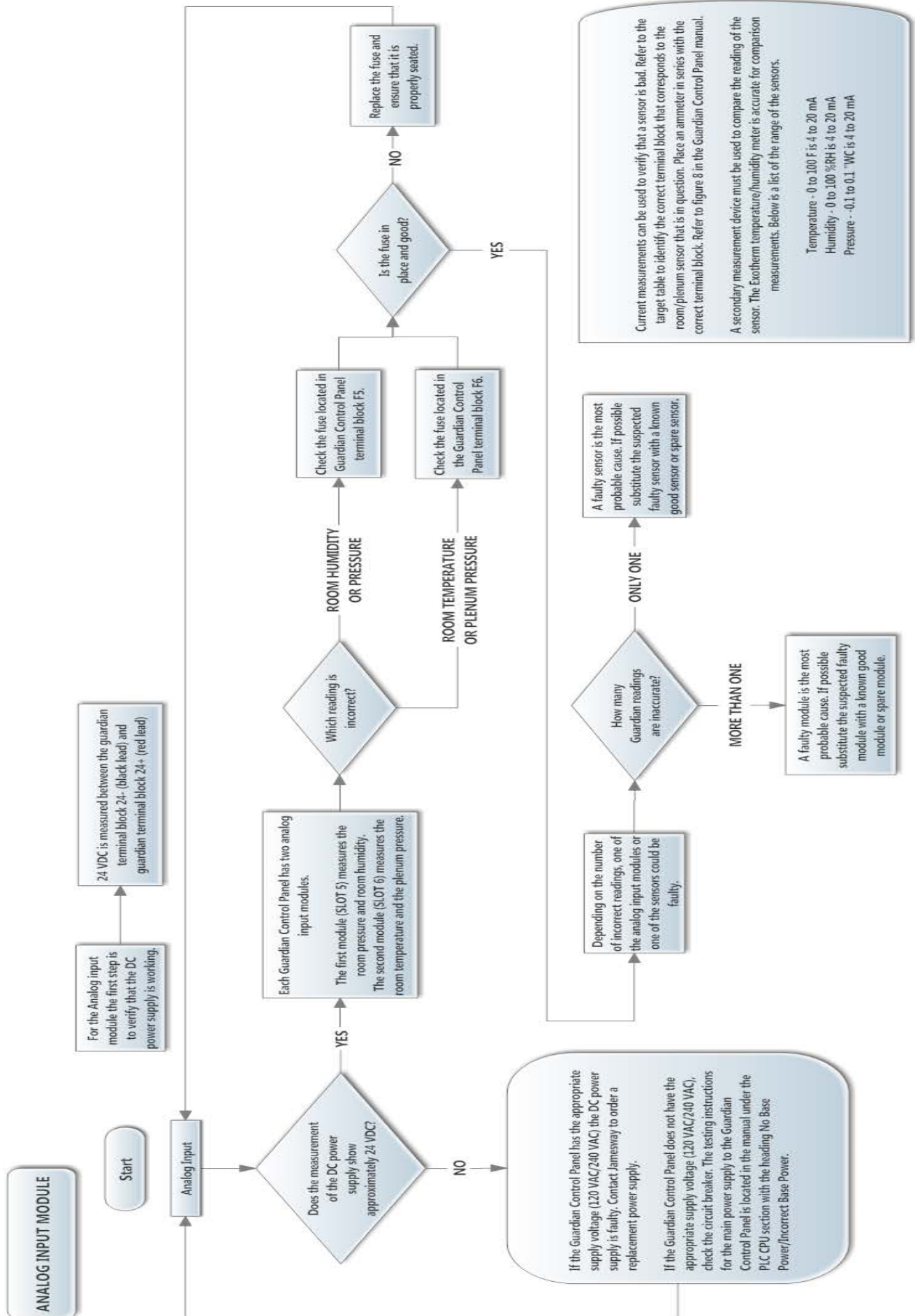


Figure 9: Analog input module troubleshooting flow chart.

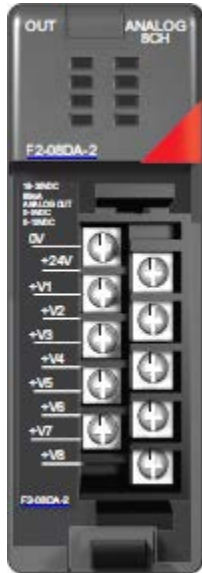


Figure 10: Guardian Analog output module.

PLC Analog Output Modules: Located in SLOT 8 (refer to appendix)

Each Guardian Control Panel contains one Analog Output Module that is used to control HVAC equipment damper motors and plenum exhaust fans. The Guardian Control Panel calculates the fan speed/damper opening based off of variations of pressure. A target table can be supplied by your Jamesway Technician to clarify how your Guardian Control Panel was terminated. This target table will also show where measurements are made. The Analog Output module is a voltage measurement. The first four outputs control the plenum exhaust fans and the last four outputs control the damper motors.



CAUTION: When replacing an analog output module, inspect the module for the jumper across the 0 -5V pins. **REMOVE AND DISCARD** the jumper.

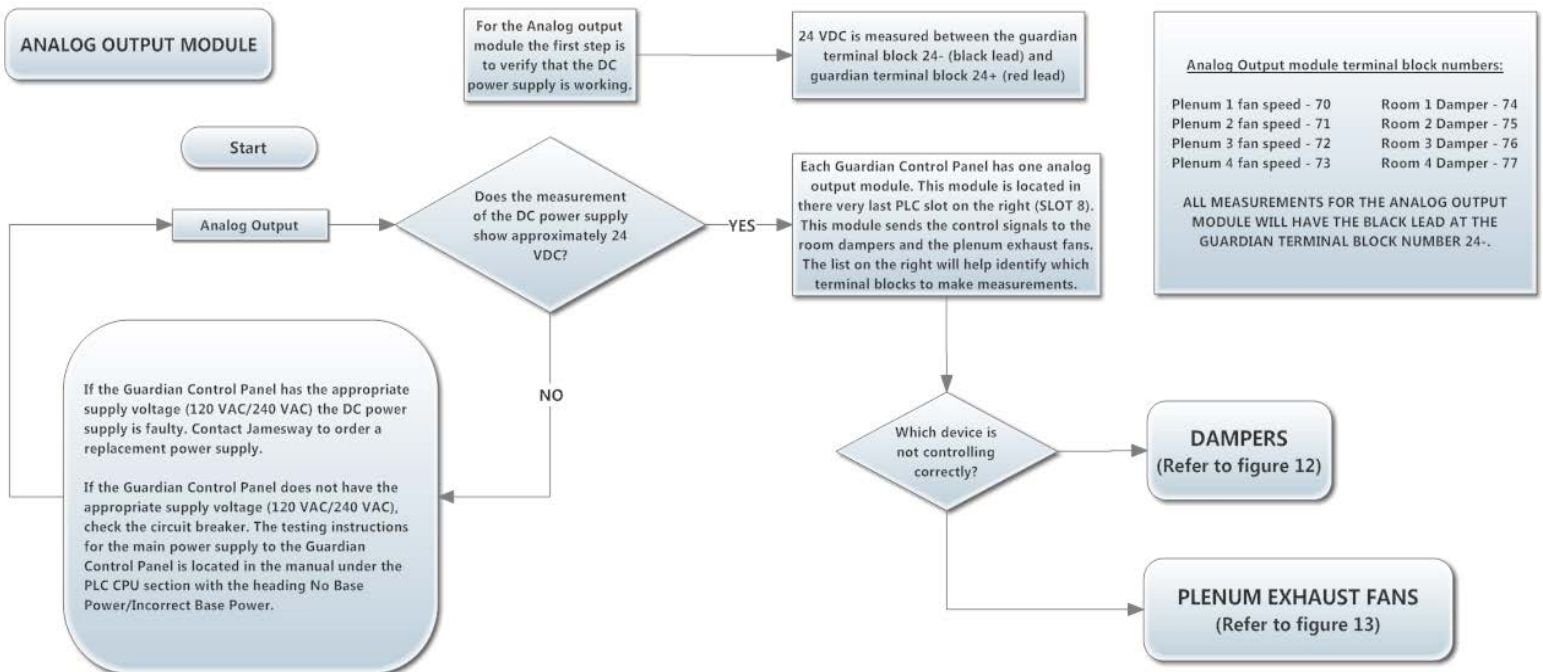


Figure 11: Analog output module troubleshooting flow chart.

DAMPERS

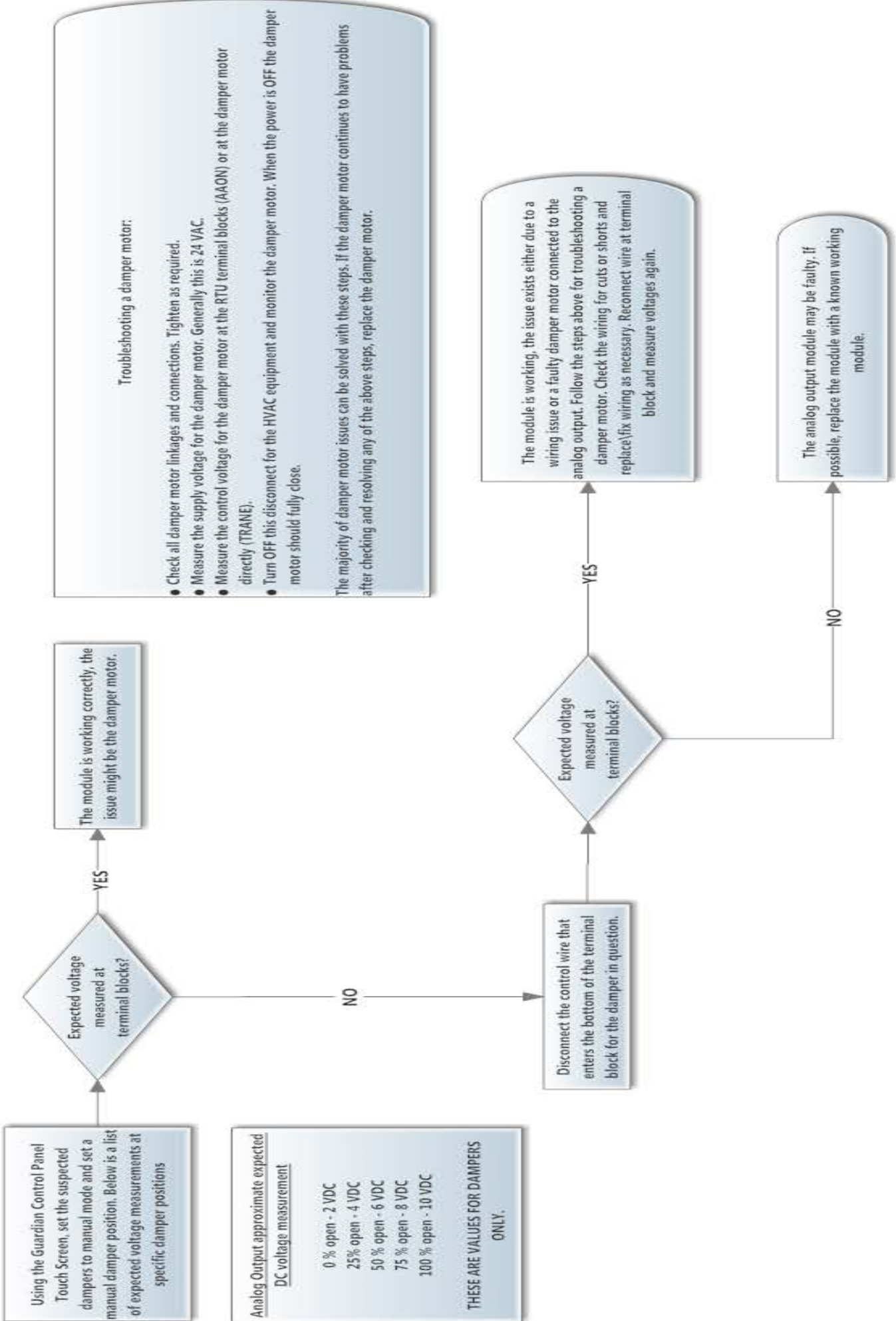


Figure 12: Damper motor troubleshooting flow chart.

PLENUM EXHAUST FANS

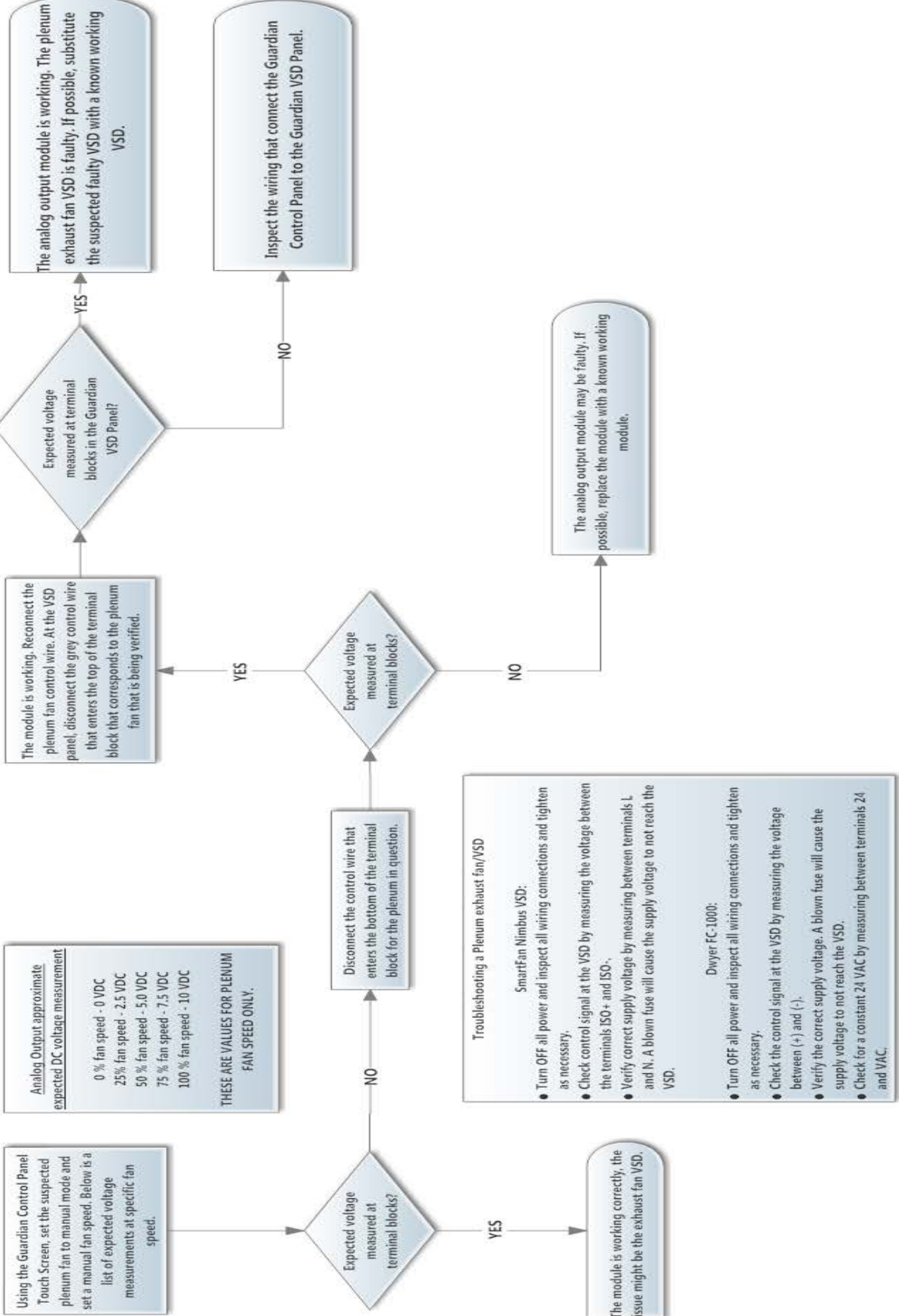


Figure 13: Exhaust plenum fan VSD troubleshooting flow chart.

Transformer and DC power supply

The 24 VAC transformer provides the power for the relay modules in slots 1 – 4, humidifier contactors and any other external devices that require 24 VAC (relays, valves, damper motors). The 24 VAC transformer provides power as well as a sinusoidal wave reference pattern to the VSD's (Variable Speed Drives). To check the transformer is working, use a multi-meter to measure the supply voltage between H1 and H4. The correct voltage for the primary (supply) side of the transformer is 120 or 240 VAC. The secondary side of the transformer supplies the Guardian Control Panel with 24 VAC, measure the voltage between terminals X1 and X2 with a multi-meter.



Note: Older Guardian VSD Panels used a Dwyer FC-1000 VSD which require a constant 24 VAC power supply to operate. Newer Guardian VSD Panels use a Nimbus SmartFan 240B7T00 VSD which does not require a constant 24 VAC power supply to operate.

The 24 VDC power supply provides power to the analog input and analog output modules in slots 6 – 8, the Guardian Control Panel touch screen, and the humidity, pressure and temperature sensors. To check if the DC power supply is working, use a multi-meter to measure the supply voltage on the DC power supply at terminals L1 and N. The correct supply voltage for the DC power supply is 120 or 240 VAC. The output side of the DC power supply supplies the Guardian Control Panel with 24 VDC, measure the voltage between the + and – terminals on the DC power supply.

Guardian Control Panel Part Numbers

Description	Jamesway Part #	Notes
PLC Base	PT2239	
PLC CPU	PT2240	
Relay output module	PT2241	Located in SLOTS 1 to 4 (D2-08TR)
RTD input module	PT2242	Located in SLOT 5 (Older Guardian Control Panels only)(F2-04RTD)
Analog input module	PT2243	Located in SLOTS 6 and 7 (F2-08AD-1)
Blank module cover	PT5052	
Analog output module	PT2245	Located in SLOT 8 (F2-08DA-2)
Humidity Sensor	PT2298	
RTD temp probe	PT1781	
Dwyer FC-1000 VSD	PB5206	
SmartFan Nimbus VSD	PB5935	
Sensor cable	PT2254	24 AWG – 3 twisted pair – shielded
Touch screen	PT2287	C-More EA7-T6CL-R
Pressure sensor	PT2332	
Relay bases	PT2249	
IDEC relays	PT2250	
Temp transmitter (puck)	PT2343	Converts the RTD temperature reading to 4 -20mA current
PLC battery	PT2247	
24 VDC power supply	PT2256	
24 VAC transformer	PB5213	
PLC to touch screen cable	PT2288	
PLC network cable	PT2252	

Table 3: General Guardian Control Panel replacement part numbers.

Guardian Control Panel Operation

C-More Touch screen: The C-More touch screen is used to view real-time HVAC equipment operation and to adjust individual room/plenum set points. There are two versions of the C-More touch screen program that are widely used in most hatcheries.

HATCH ROOM #1	T 76.8 F ● H 52.2 % MISTING P+ .012" 44% OPEN	HATCH ROOMS 1 & 2 SHARED PLENUM PRESSURE: - .022" 65 % FULL SPEED
HATCH ROOM #2	T 77.9 F H 55.7 % MIST IS OFF P+ .018" 65% OPEN	HATCH ROOMS 3 & 4 SHARED PLENUM PRESSURE: - .019" 6 % FULL SPEED
HATCH ROOM #3	T 79.3 F ●● H 54.6 % MIST IS OFF P+ .018" 18% OPEN	
HATCH ROOM #4	T 77.4 F H 51.5 % MISTING P+ .006" 25% OPEN	

Figure 14: Old C-More touch screen home page.

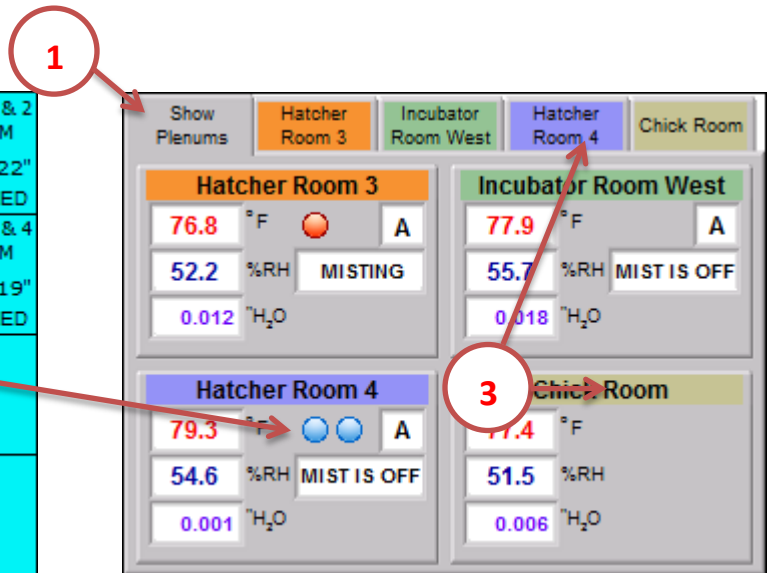
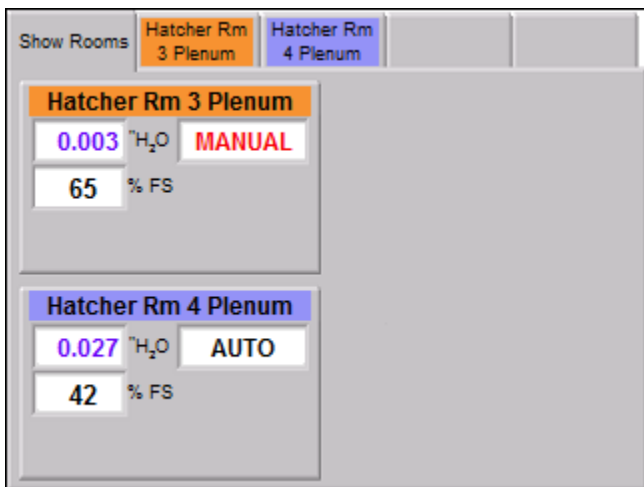


Figure 15: New C-More touch screen home page.

Home screen and navigation

Both versions of the touch screen programming will show the current room conditions. The new version has the current plenum conditions on a separate screen. Basic navigation and features of the touch screen are shown in the above figures. Current room conditions for temperature, humidity, pressure are shown on the home screen for both versions of the touch screen program.

1. Plenum conditions are shown on the home screen on the old version of the program. Pressing the show plenums button will show the current plenum conditions on the new touch screen program.
2. The current operation of the HVAC equipment (heating/cooling) is shown to the right of the temperature reading. A blue circle indicates a call for cooling; a red circle indicates a call for heating. The number of circles shows the number of stages of each mode
3. Touching the name of the room will change to the mode screen which will allow for adjustments to room set points and HVAC equipment operation.



The plenum home page shows the current conditions of any plenum areas that are connect to the Guardian Control Panel. Pressing the show rooms button will return to the room home page. Pressing on the name of a plenum are will allow for adjustments to fan operation and the plenum pressure set point.

Figure 16: Guardian touch screen plenum home page.

Room set point and mode of operation (old program)

After selecting a room to adjust a set point or mode of operation, this screen will appear. Pressing on one of the buttons to the right of SETPOINTS, will adjust the corresponding set point. The set points for temperature, humidity and pressure are all limited to prevent from accidentally entering an inappropriate value.

If your hatchery is equipped with dehumidification, the switch for enabling will be on this screen. Pressing the MODES button will allow you to adjust the method of operation for the desired room. Pressing on CALIBRATION will bring you to the room calibration screen.

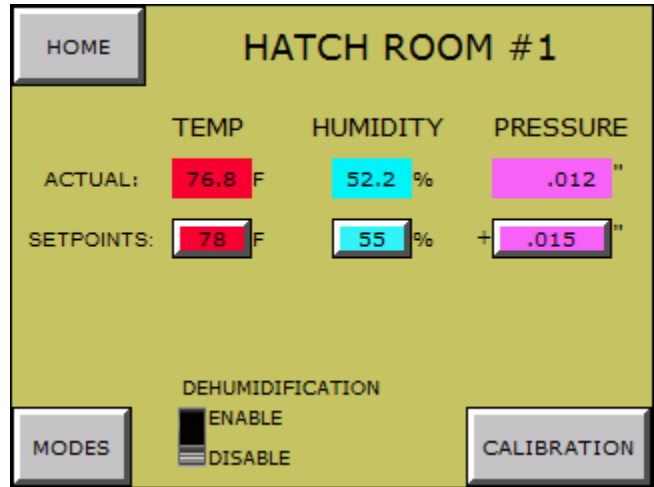


Figure 17: Room set point page. (Old program)

After selecting MODE, the screen on the left will be displayed. This screen will allow you to change how the HVAC equipment will operate. The COOLING/HEATING mode will tell the PLC program which mode you desire. There are eight modes in total. The display depends on the equipment that is installed.

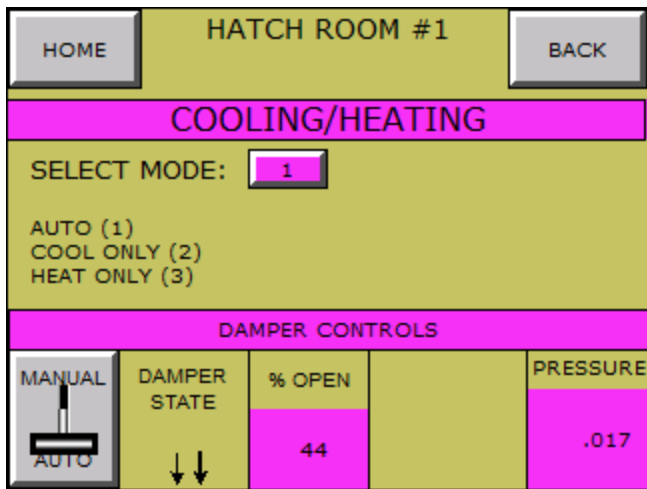


Figure 18: Room mode of operation page. (Old program)

1. RTU OFF – no control signals will be sent to equipment.
2. AUTO – cooling/heating will operate normal.
3. COOL ONLY – only control signals for cooling are sent.
4. HEAT ONLY – only control signals for heating are sent.

Economy modes are available when the Guardian Control Panel will turn ON/OFF the supply fan in the HVAC equipment. This means the Fan will cycle as needed.

5. ECON.AUTO – fan will turn ON when cooling/heating.
6. ECON.COOL – fan will turn ON when cooling.
7. ECON.HEAT – fan will turn ON when heating.
8. FAN ONLY – only the fan will run, no heating/cooling control

The damper mode can also be set on this screen. When in manual mode, the control for setting a manual damper position will appear in the space between the current damper position and the current pressure reading.

Plenum set point and mode of operation (old program)

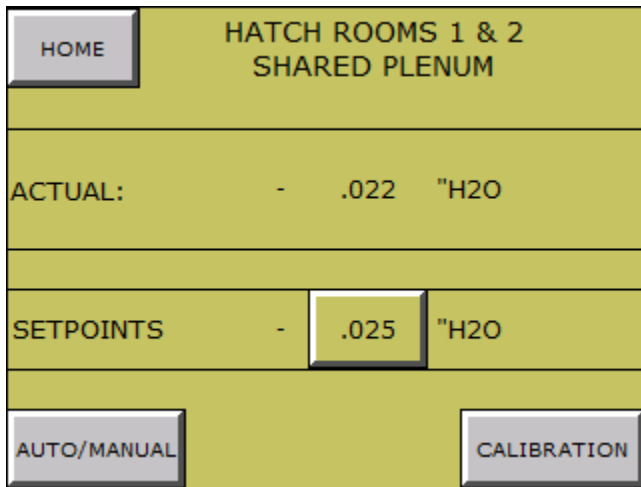


Figure 19: Plenum set point page.

After selecting a plenum to adjust, the plenum set point page will be displayed. Pressing AUTO/MANUAL will allow you to adjust the operation of the exhaust fan. Pressing CALIBRATION will allow for adjustments to the pressure measurement. Calibration will be discussed in the following section.

This screen shows the current mode of operation for the selected plenum exhaust fan. The fan can be switched from AUTOMATIC to MANUAL using the button in the lower left corner. When in AUTO, the fan state, current fan speed and plenum pressure are all displayed at the bottom of the screen. When in MANUAL, a box for entering in the desired manual fan speed will appear.

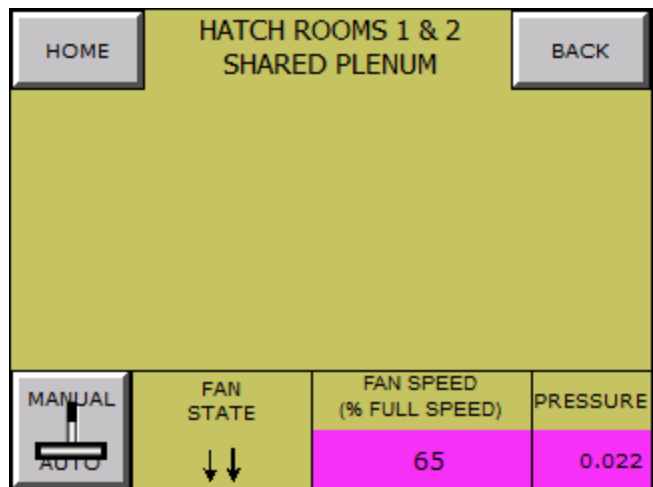


Figure 20: Plenum mode of operation page.

Room set point and mode of operation (new program)

After selecting a room to adjust a set point or mode of operation, this screen will appear. The set point is changed by pressing on the current set point value. The set points for temperature, humidity and pressure are all limited to prevent from accidentally entering an inappropriate value.

If your hatchery is equipped with dehumidification, the switch for enabling will be on this screen. Pressing the MODES button will allow you to adjust the method of operation for the desired room. Pressing on CALIBRATION will bring you to the room calibration screen.

Humidifiers can also be enabled or disabled from this page.

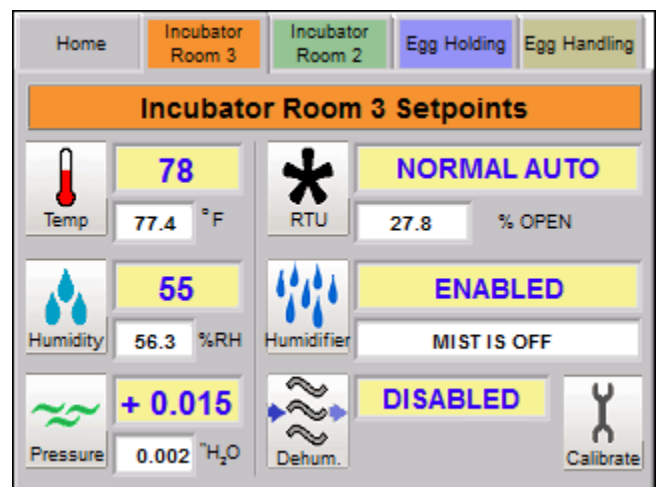


Figure 21: Room set point page (new program).



Navigation is now simple. Just touch the name of a different room to switch to the currently displayed page for the new room. For example, the screen above shows the set point page for incubator room 3. If you wanted to change any set point for incubator room 2, press the button at the top of the screen. There is no need to go back to the home page and re-enter any passwords. Password values are kept until the user returns to the home page.

After pressing the RTU button, the screen below will be displayed. This screen will allow you to change how the HVAC equipment will operate. The COOLING/HEATING mode will tell the PLC program which mode you desire. There are eight modes in total. The display depends on the equipment that is installed.

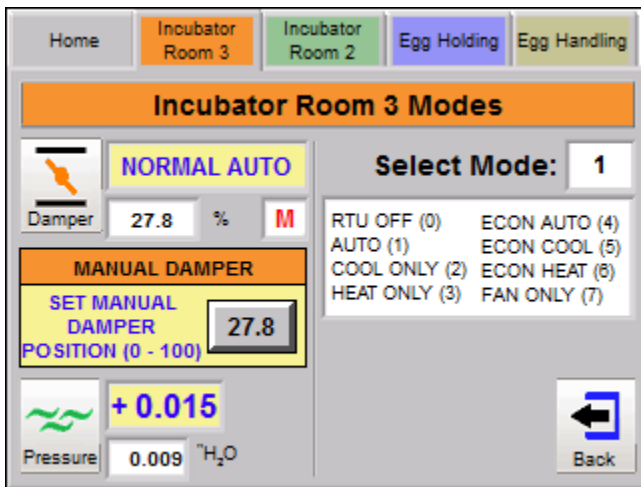


Figure 22: Room mode of operation page (new program).

1. RTU OFF – no control signals will be sent to equipment.
2. AUTO – cooling/heating will operate normal.
3. COOL ONLY – only control signals for cooling are sent.
4. HEAT ONLY – only control signals for heating are sent.

Economy modes are available when the Guardian Control Panel will turn ON/OFF the supply fan in the HVAC equipment. This means the Fan will cycle as needed.

5. ECON.AUTO – fan will turn ON when cooling/heating.
6. ECON.COOL – fan will turn ON when cooling.
7. ECON.HEAT – fan will turn ON when heating.
8. FAN ONLY – only the fan will run, no heating/cooling control

The damper mode can also be set on this screen. When in manual mode, the control for setting a manual damper position will appear in the space between the current damper position and the current pressure reading.

Plenum set point and mode of operation (new program)

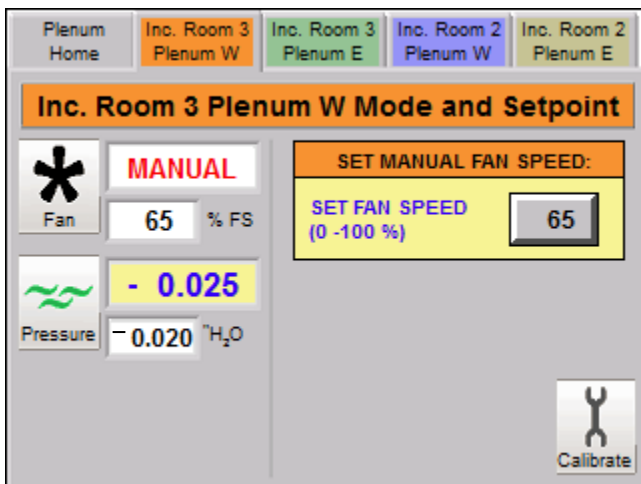


Figure 23: Room mode of operation page (new program).

After selecting a plenum to adjust, the plenum set point page will be displayed. Pressing AUTO/MANUAL will allow you to adjust the operation of the exhaust fan. Pressing CALIBRATION will allow for adjustments to the pressure measurement. Calibration will be discussed in the following section.

This screen shows the current mode of operation for the selected plenum exhaust fan. The fan can be switched from AUTOMATIC to MANUAL using FAN button. When in AUTO, the fan state, current fan speed and plenum pressure are all displayed at the bottom of the screen. When in MANUAL, a box for entering in the desired manual fan speed will appear.



Navigation is now simple. Just touch the name of a different plenum to switch to the currently displayed page for the new room. For example, the screen above shows the set point page for incubator room 3 plenum. If you wanted to change any set point for incubator room 2 plenum, press the button at the top of the screen. There is no need to go back to the home page and re-enter any passwords. Password values are kept until the user returns to the plenum home page.

Calibration of Plenum/Room sensors

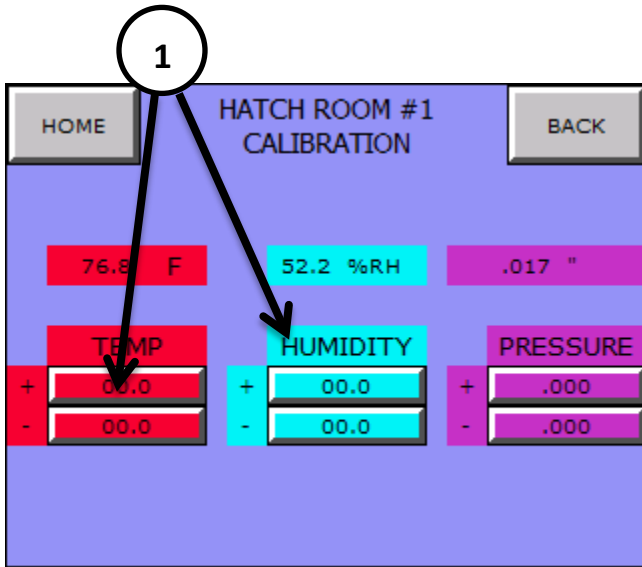


Figure 24: Room sensor calibration page (older program).

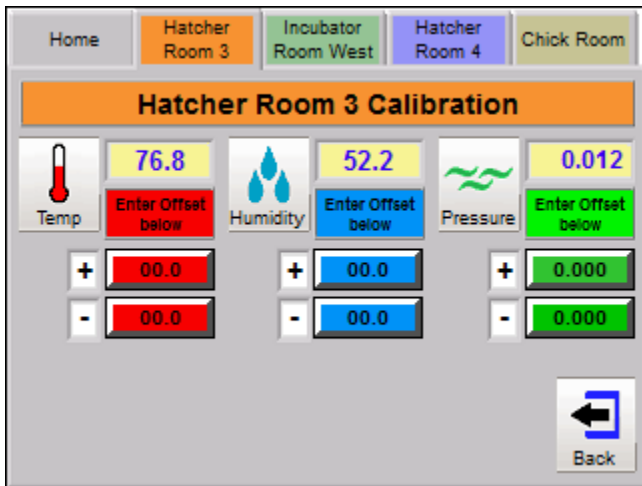


Figure 25: Room sensor calibration (new program).

Temperature/Humidity Sensor calibration

When calibrating the temperature and humidity room sensors, there is no need to open the sensor pack.

At the touch screen, access the CALIBRATION page for the sensors you are checking (From the home page, select the room then CALIBRATION). Before starting the calibration of the sensor, enter zeroes in the offset boxes for the sensor that is being checked.

Take temperature/humidity readings using an accurate measuring instrument as close as physically possible to the sensor pack.

Compare the reading on the measuring instrument to those displayed on the Guardian Control Panel CALIBRATION page. Using the offset boxes, enter values as + or – so that the two readings are the same.

Example 1: Touch screen displays 78.9 F but the thermometer reading is 77.8 F, an offset of 1.1 should be entered into the – box.

Example 2: Touch screen displays humidity as 49.8 %RH, but the psychrometer reading is 52.1%, an offset of 2.3 should be entered into the + box.



Note: When entering values into the offset boxes on the CALIBRATION page, try not to have values in both the + and – boxes. They will just cancel each other out.

Pressure sensor calibration (Room)

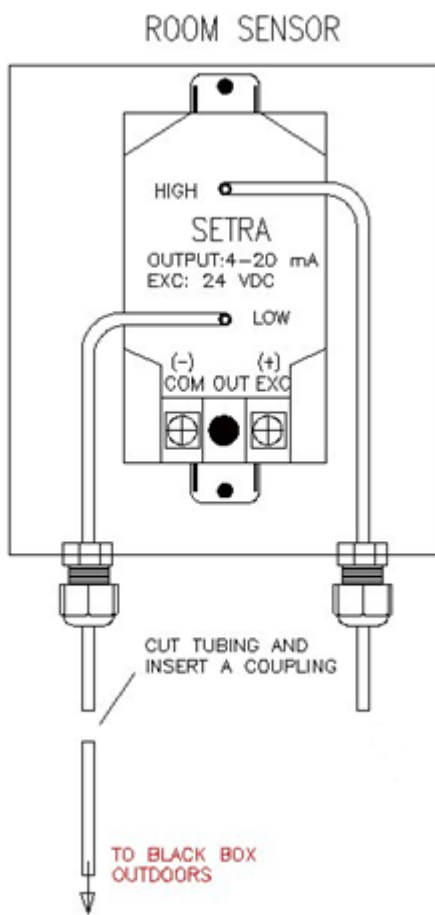
When calibrating the room pressure sensor, there is no need to open the sensor pack.

There are two plastic tubes extending from the room sensor pack. The short tube (about four inches long), is room pressure measurement. The long tube is connected to the outdoor air reference. On the long tube there is a coupler (example shown in figure 26), 'un-couple' the reference tube at this point (see figure 27)



Figure 26: 1/4" tubing coupler.

At the touch screen, access the CALIBRATION page for the sensors you are checking (From the home page, select the room then CALIBRATION). Before starting the calibration of the sensor, enter zeroes in the offset boxes for the sensor that is being checked (see figure 21). When the outdoor air reference is 'un-coupled', the touch screen should show the room pressure is 0.000. Enter a value into the + or - offset that will make the room pressure equal 0.000



Example 1: Touch screen displays +0.007, when the outdoor air reference is 'un-coupled'. Since the displayed value should be 0.000, an offset value of -0.007 is used.



Note: When entering values into the offset boxes on the CALIBRATION page, try not to have values in both the + and - boxes. They will just cancel each other out.

If the calibration offsets seem excessive, try substituting the sensor you are trying to calibrate with a known calibrated sensor to compare readings. If readings are more correct, the original sensor is faulty. If the readings are still out, refer to the section on troubleshooting an analog input module. Repeat the calibration after you have completed the steps for checking the analog input module.

Figure 27: Tubing connections for room pressure sensor.

Pressure sensor calibration (Plenum)

When calibrating the plenum pressure sensor, there is no need to open the sensor pack.

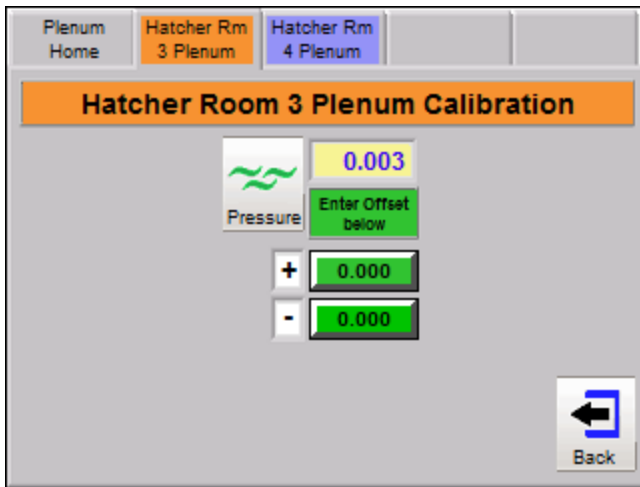
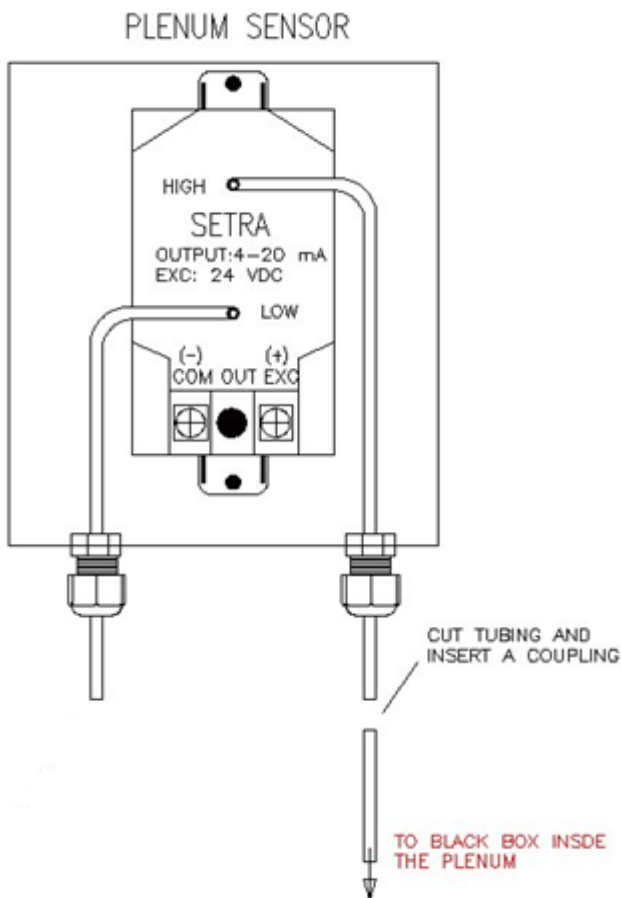


Figure 28: Plenum pressure calibration page (new program on left, old program on right).



There are two plastic tubes extending from the plenum sensor pack. The short tube (about four inches long), is room pressure measurement. The long tube is connected to the plenum black box. On the long tube there is a coupler (example shown in figure 26), 'un-couple' the reference tube at this point (see figure 29)

At the touch screen, access the CALIBRATION page for the sensors you are checking (From the home page, select the plenum then CALIBRATION). Before starting the calibration of the sensor, enter zeroes in the offset boxes for the sensor that is being checked (see figure 21). When the outdoor air reference is 'un-coupled', the touch screen should show the room pressure is 0.000. Enter a value into the + or - offset that will make the room pressure equal 0.000.

Example 1: Touch screen displays +0.007, when the tube to the plenum black box is 'un-coupled'. Since the displayed value should be 0.000, an offset value of -0.007 is used.

Figure 29: Tube connections for plenum pressure sensor.



Note: When entering values into the offset boxes on the CALIBRATION page, try not to have values in both the + and - boxes. They will just cancel each other out.

Adjusting Plenum Fan Minimum Speed (Dwyer FC-1000 only)

1. At the Guardian Control Panel touch screen, put fan in manual mode and set a minimum fan speed of 25%.
2. Verify the DC voltage across the FC-1000 drive's input terminals is 2.5V. Refer to Exhaust plenum fan VSD troubleshooting flow chart for terminal identification.
3. Measure the AC voltage across the fan motor.
4. Adjust the "IDLE SPEED" potentiometer inside the FC-1000 until the voltage across the motor is approx 25% of the motor's rated voltage (30 VAC if the fan has a 120 VAC motor).

National Instruments Lookout