DELTA-T SYSTEMS

PTAC
INSTALLATION AND OPERATION MANUAL

AUTOMATED VENTILATION CONTROL SYSTEM

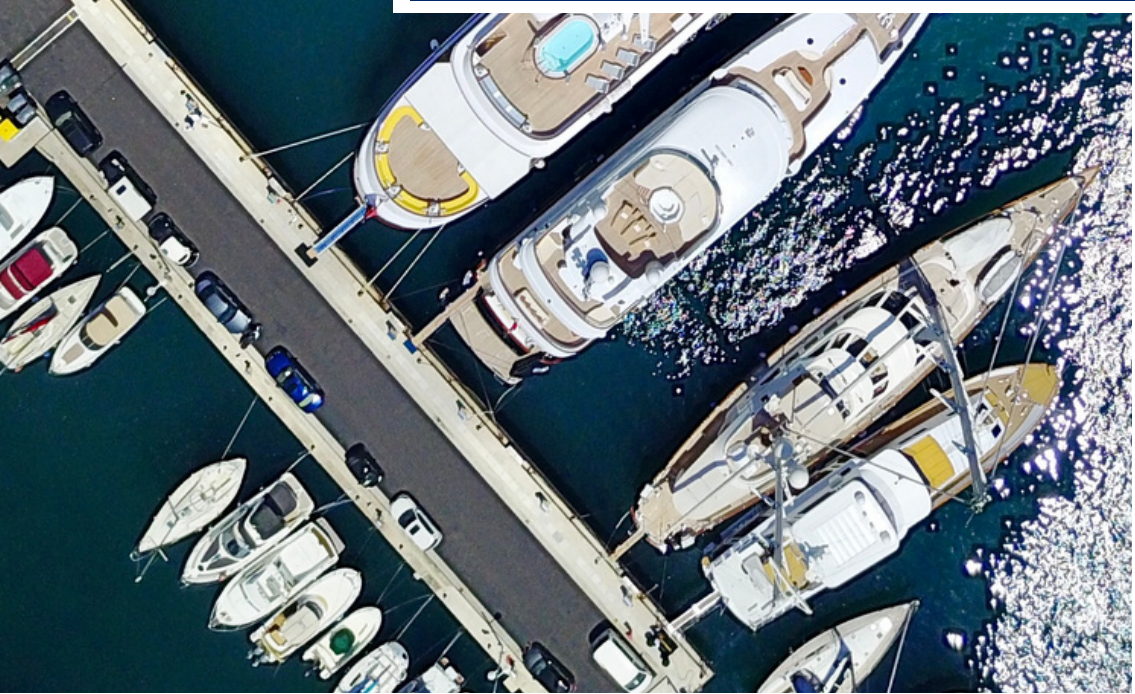

TABLE OF CONTENTS

You're in Control with the New PTAC

The PTAC comes with a state-of-the-art remote-mounted screen, providing you with unmatched convenience. Say goodbye to cumbersome control units! Mount the screen anywhere in your boat and take full control of the climate settings from anywhere on board.

Set your desired temperature, adjust the fan speed, and customize the air distribution effortlessly with just a few taps on the intuitive interface. The PTAC ensures access to control from your desired location on the vessel.

PTAC-IS - Integrated Cooling Perfection
For seamless installation and easy access, look no further than the PTAC-IS! This version comes with a prewired screen integrated right into the box. Mount the unit in your engine room and control your climate settings directly from the source.

With PTAC-IS, you'll experience hassle-free installation and space-saving benefits, making it ideal for boats with limited room for additional components. Take control of your marine climate with unmatched ease!

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SYSTEM OPERATION & MONITORING SYSTEM INTERFACE

READ BEFORE OPERATION

DELTA T SYSTEMS

The PTAC Automated Ventilation Control System is designed to require minimal input from the operator, especially when used in conjunction with the main engine run signal input. Once electrical power is supplied to the system components, it automatically starts the fans when the engines are started and manages, adjusts, and controls the airflow needed for combustion and cooling air.

When the engines are shut down, the Ventilation Control System switches modes and initiates cooling of the engine room space. It will shut down all fans once the user-defined temperature has been reached. .

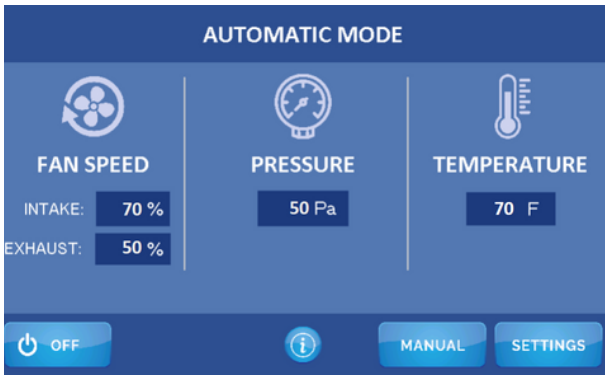
Safety is of utmost importance, and it is the responsibility of the vessel operator to ensure proper safety guards are always in place. Additionally, necessary safety precautions must be taken when personnel are working within the engine room or on the ventilation equipment and fans. Prior to operating the ventilation control system, it is crucial to check that all fans are freely turning and that no obstructions or jams are present in the blades. Furthermore, ensure that any fire/smoke dampers are open and clear.

In Auto Mode, which should always be selected when the main engines are running, it is imperative to keep all engine room hatches, doors, and portholes closed and sealed. This allows the pressure sensing intake fan(s) to function as designed, ensuring the correct flow and volume of combustion air to the main engines, as well as the additional air required for the exhaust fan(s). Failure to use Auto Mode during engine operation may result in insufficient combustion and cooling air volumes. Before performing any maintenance on system components, it is essential to turn off and lock out the circuit breakers supplying power to the Main Control Enclosure and Variable Speed Drives

Please prioritize safety measures and adhere to the guidelines provided to ensure the proper functioning of the ventilation control system and to maintain a safe working environment within the engine room.

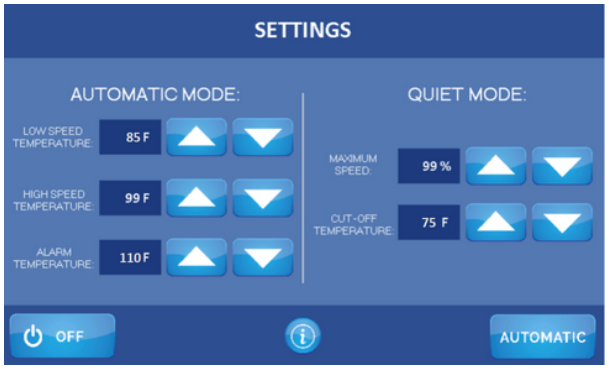
Safety and Functional Features: The system provides for shut down of all fans, but not fire dampers, in the event of a fire extinguishing system discharge (a switch supplied by others is required) adding an extra margin of safety to the ventilation system. In the event of an VSD fault trip, the system will provide the operator with notification on the touch screen. There are many additional features and adjustable parameters to allow the system to be user configured for almost any application and environment.

MODES



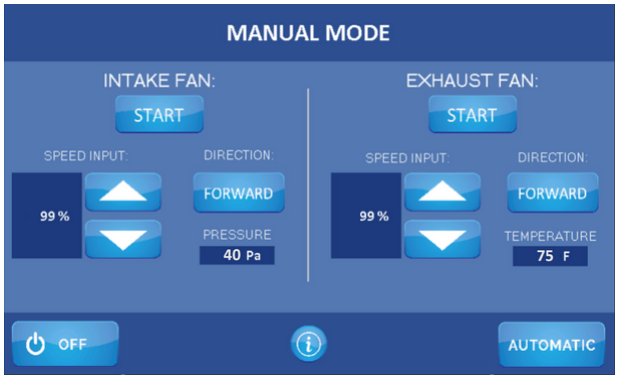
Auto Mode

The exhaust fan(s) speed is adjusted automatically as the temperature increases, measured by a sensor located within the engine room. The intake fan(s) speed is controlled by an engine room pressure sensor. This sensor requires a sensing tube to the outside atmosphere as well as to the engine room space to measure the differential pressure.



Quiet Mode

Upon main engine shut down, the ventilation system switches to the Quiet Run Mode that cools the engine room with the exhaust and intake fan(s) running at a user specified fixed speed. Once the temperature is below the user specified temperature has been reached, the fan(s) will stop thermostatically, lowering noise and electrical load levels.



Manual Mode

Manual Mode: Take control in manual mode, you have complete authority over the system. Adjust the fan speed for each fan individually, ranging from 20% to 100%, according to your requirements. You can also select the direction of rotation (forward/reverse) for each fan and start or stop them as needed. The speed settings remain in effect until you choose to modify them.

AUTO MODE

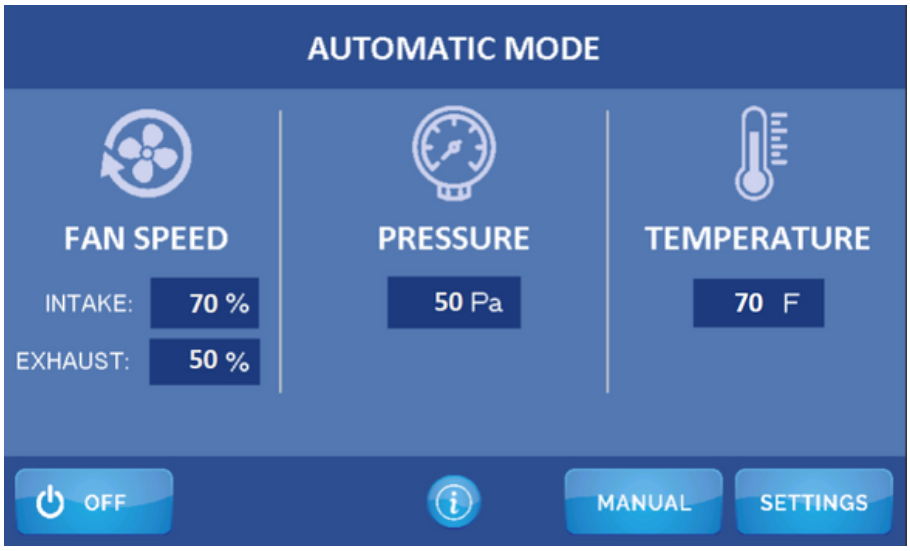
Automatic Operation - Power Up Screen
It is recommended that the system remains powered up even while at the dock. This allows Auto mode to remain functioning.

Auto Startup-
When the main engines start the ventilation control system switches to Auto Run Mode. Auto Run Mode ensures that the correct flow and volume of air is supplied for both combustion and cooling.

When the engine(s) ramp up, a negative pressure occurs in the space, which brings the intake fan(s) up to compensate for the pressure differential. When the engine(s) slow down, the temperature in the space increases and the exhaust fan(s) respond by increasing automatically to compensate for the temperature rise.

The system will always create the proper airflow if the space is sealed (doors and hatches closed.)

Viewing Auto Run Mode System Status-
The Auto Run Mode screen, the screen will allow the operator to view the System Status, including temperature, pressure, and fan speed.



QUIET MODE & AUTO MODE SETTINGS

Quiet Run Mode-

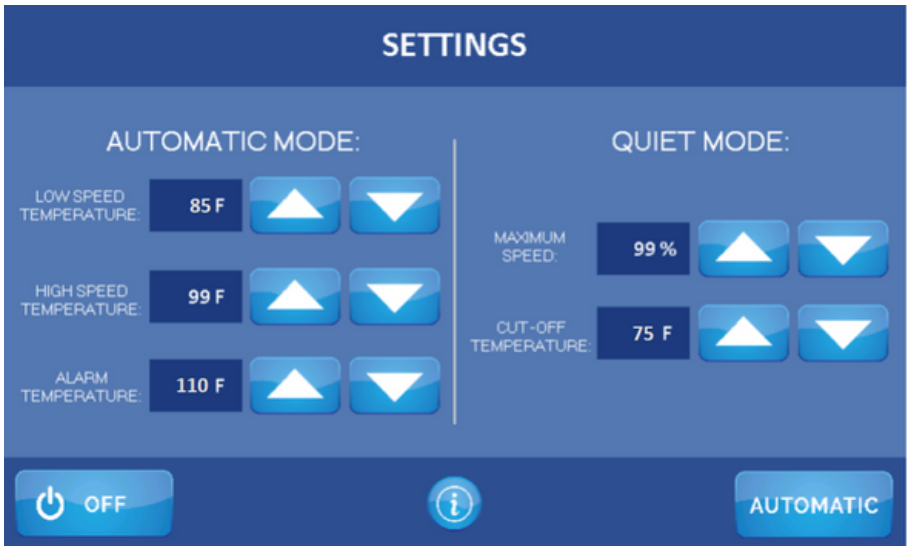
When the engines are turned off, the system automatically transitions to Quiet Run Mode. In this mode, the objective is to cool the space with reduced noise levels by limiting the fan speed. Once the engine room reaches the temperature value set by the user, all engine room fans will cease operation.
However, if the temperature in the engine room increases by 5°F (3°C) above the set point, the Ventilation Control System will reactivate the fans to cool the engine room once more. If the engines are restarted, the system will switch back to Auto Run Mode, resuming its regular operation.

In most cases the factory settings do an adequate job of managing the airflow in the engine room. The Quiet Run Speed Limit can be lowered for quieter operation dockside, and the Quiet Run Shutdown settings may have to be adjusted based on seasonal changes in ambient temperature or location of vessel.

User Tip: Set the Quiet Mode Cut off Temperature value at least 3 to 5°F Higher than the ambient exterior air temperature to be sure that the fans shut down in the Quiet Run mode. If air conditioning is provided within the engine room space, the fans will shut down at a point just above the ambient exterior air temperature and the air conditioning can then take over and further reduce the engine room temperature.

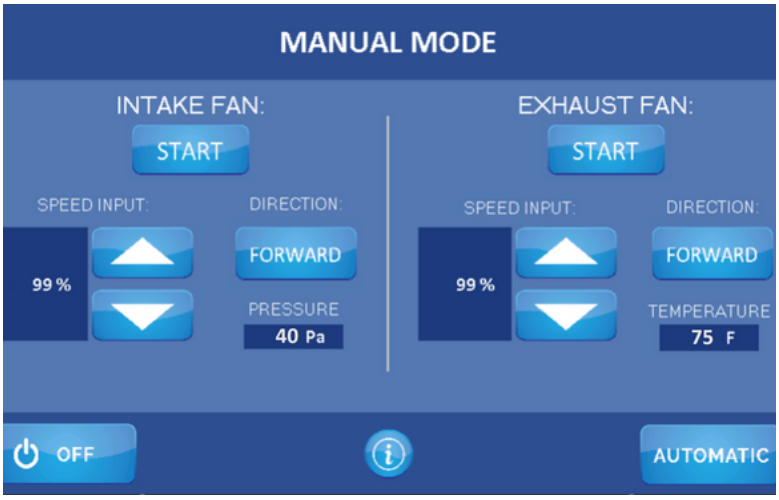
Auto Run Mode Settings-
Starting from the Main Screen press the Settings button. This allows the operator to change the settings that control Auto Run Mode and Quiet Run Mode operation. To change the values, use the arrows to the right of the value. The values in white are adjustable and the values in red are internal values that change because of the user settings.

- Low Speed Temperature- controls the lower set point at which the exhaust fans begin to ramp up.
- High Speed Temperature- controls the upper set point at which the exhaust fans reach full speed.
- Alarm Temperature - changes the notification set point.
- Quiet Run Speed Limit- sets maximum fan speed with engines off during quiet run mode.
- Quiet Run cut-off Temperature- sets the temperature that the dans will shut down with the engines off.



DELTA T
SYSTEMS

MANUAL MODE



Manual Mode

To activate the Manual Mode, press the Manual button on the main screen in the bottom right corner. Upon selection, the fans will begin to run at user defined speed. In this mode, you have independent control over the fan speed and direction. Use the up or down arrows to adjust the fan speed in increments of 5%. To change the fan direction, simply press the Forward or Reverse buttons. There's no need to stop the fans before changing direction. The Variable Speed Drives (VSDs) will gradually slow down and reverse the fans without causing significant load changes on the electrical system.

DELTA-T
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SYSTEM COMPONENT INSTALLATION

DELTA T
SYSTEMS

GENERAL INSTRUCTIONS

Read entire instruction document before starting installation.

Reading all the instructions will allow you to become familiar with the arrangement and components of the system before the actual installation. An educated installer will install the system in less time and, hopefully, without mistakes.

The Control Cables specified for connecting the VSDs and other external inputs **(such as the 610-RTS-T3 temperature sensor) to the 610-MCE-PTAC** can be seen on page 16. All conductors of the recommended cables are colored black or red. In the multi-pair cables the pair number is stamped on each conductor at one-inch intervals. All wiring diagrams supplied with this system refer to this color code. If other cables are used, you must establish your own color code. Most of the wiring and termination points associated with this equipment are quite small, as are the pair numbers stamped on each conductor of the multi-pair cables.

Be careful to get the correct conductors connected to the correct terminals. A wiring error could lead to permanent, irreparable damage to components of this system. Such damage is not covered under warranty.

IMPORTANT: You must refer to the System Block Diagram drawing located on page 17 when proceeding with this section. This drawing is your road map to the location and relationship of the components. Failure to closely follow this drawing may result in incorrect component locations which may result in costly rework and additional installation time.

DELTA T
SYSTEMS

TEMPERATURE SENSOR 610-RTS-T3

The Remote Temperature Sensor 610-RTS-T3 is designed to be mounted on the engine room overhead area to provide an accurate representation of the general temperature in the space. It is recommended to mount the RTS near the exhaust fan for the most precise temperature reading and optimal location.
When mounting the RTS, start by attaching the base plate using suitable screws and then snap the body of the temperature sensor into the base plate.

RTS Mounting

Important instructions to ensure proper functioning of the control system:

1. Do not mount the sensor where it will be exposed to direct airflow from the intake fan or external cool air, as this can affect temperature readings.
2. Avoid mounting the sensor directly over main engines, generators, exhaust systems, or other sources of significant heat, as this can lead to artificially high temperature readings and false alarm conditions.
3. Refrain from painting the stainless-steel sensor probe.
4. Ensure that the sensor probe does not come into contact with any material, particularly metallic objects. The probe must be positioned in free air.

FIRE SYSTEM DISCHARGE & REOMOTE STOP SWITCH

The Fire System Discharge Switch is customer supplied. The switch must have at least one normally closed contact set and this contact must open upon discharge of the fire extinguishing system. It is recommended that the switch be compatible with the existing fire extinguishing equipment and that it be installed by a certified fire system technician to maintain the system integrity and appropriate agency system approvals.

WARNING - This system does not automatically shut any fire dampers!

- **NEVER** defeat the purpose of the fire extinguisher discharge switch.
- **NEVER** operate the ventilation system, under any circumstances, if the fire extinguishing system protecting the ventilated space is in an inoperative or discharged condition.

Failure to observe the above precautions, in the event of a fire in the ventilated space, may result in serious property damage, personal injury, loss of the vessel or loss of life.

The Main Engine Run Input is utilized to signal the ventilation control system when the engines are running. This input requires an isolated, **normally open contact** that closes when the main engine(s) start. You can easily achieve this by using an oil or fuel pressure switch with an isolated (non-grounding) contact. It is necessary to install a switch for each main engine to enable proper system functionality. Connect the switches in parallel so that either engine starting will activate the ventilation system.

E-STOP is optional, and customer supplied. It may be desirable or required by some classification societies to have a remote, emergency manual disconnect for the fan operation. One type of switch suitable for this purpose is a snap acting, maintained operator with a push-pull mushroom type head. The switch must have at least one **normally open contact** set and must latch closed when the switch is pushed. This switch must latch. It cannot be momentary. It must be distinctive, suitable for its purpose and clearly marked as to its function and operation.

DELTA-T
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SYSTEM WIRING INSTRUCTIONS

CABLES

DELTA T
SYSTEMS

The following cables need to be pulled to the PTAC before any connections are made:

PTAC Power	3 Conductors - Line, Neutral, GND - Customer Supplied
E-Stop (Optional)	2 Conductors - Customer Supplied
Fire Extinguisher Input	2 Conductors - Customer Supplied
Main Engine Run Input	2 Conductors - Customer Supplied
Remote Temp. Sensor Cable	3 Conductors Shielded 610-CW9318 - 100' Included
Intake/ Exhaust Fan Control Bus	Multiconductor Cable 293-201530 - Customer Supplied

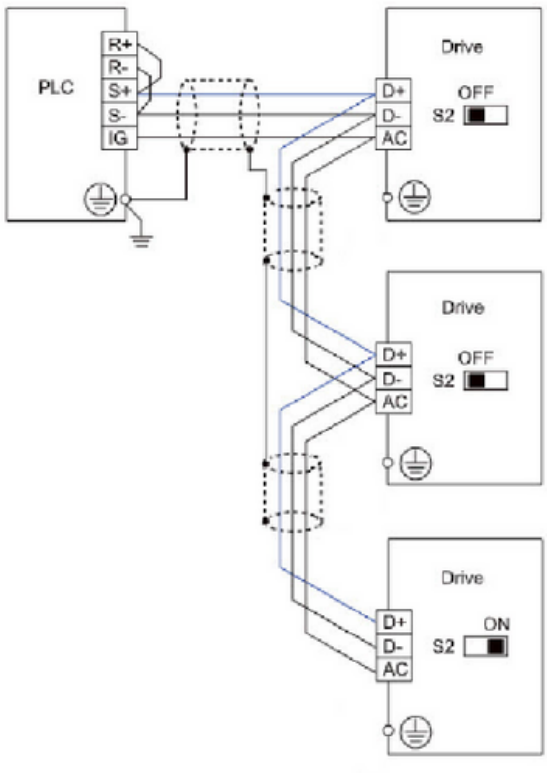
PTAC ONLY

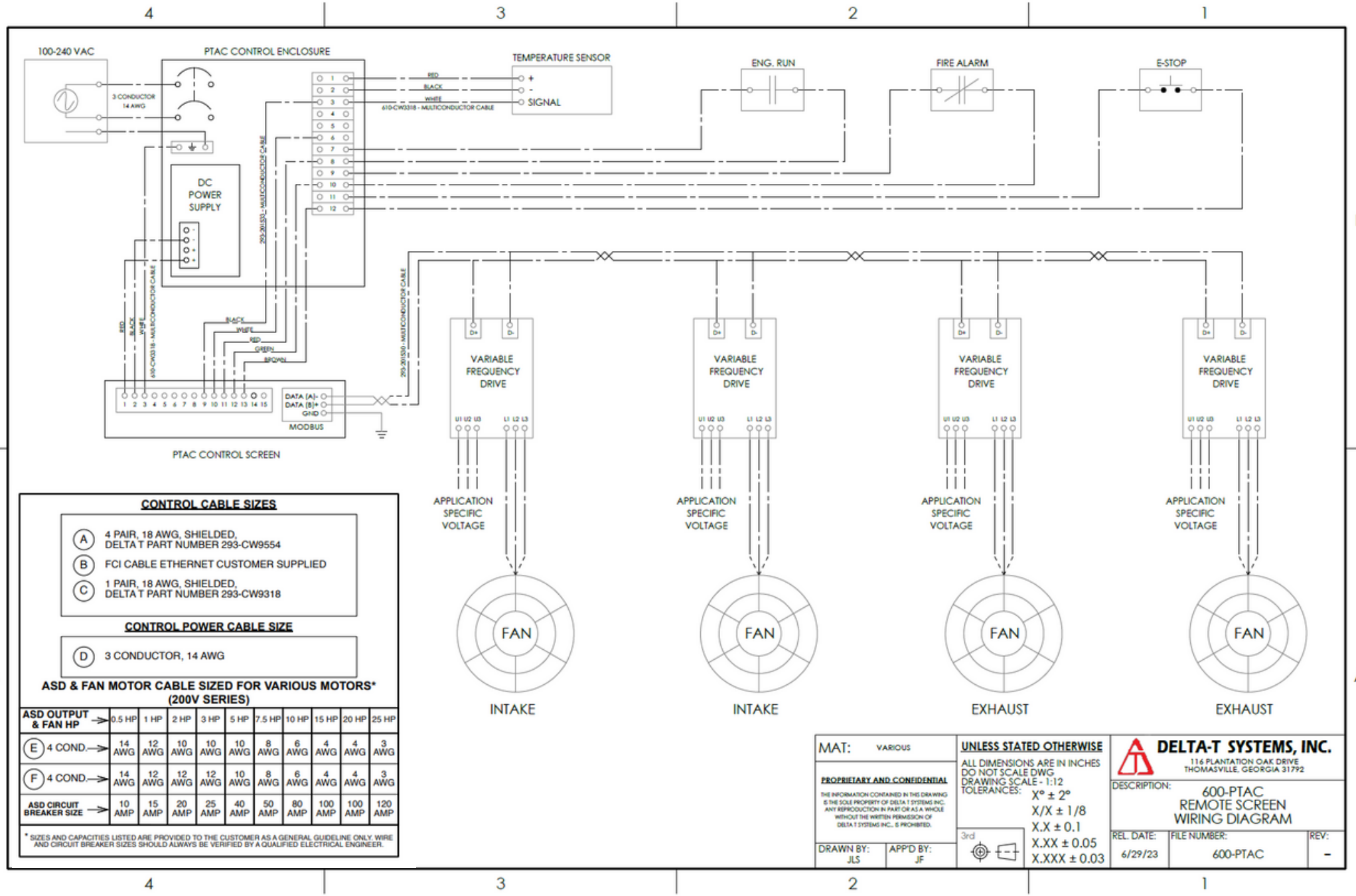
Display Power	3 Conductors- Included
Display Signals	5 Conductors- Included

The control bus is wired in a daisy chain configuration to each Variable Speed Drive (VSD). In this setup, the S2 dip switch(terminating resistor) is integrated and intended for use specifically on the final VSD in the daisy chain. Refer to diagram to the right for clairty.

For VSD power cable and breaker sizes, please refer to the System Block Diagram. The intake and exhaust VSDs are connected in the same way. Use caution not to confuse the intake and exhaust VSD connections. The drives are clearly marked on the side of the heatsink. The cables that need to be pulled to the VSDs are:

· Main supply power from circuit breaker
· Power feed from the VSD to the fan motor
· Control cable from PTAC





CONTROL CABLE SIZES

- (A) 4 PAIR, 18 AWG, SHIELDED, DELTA T PART NUMBER 293-CW9554
- (B) FCI CABLE ETHERNET CUSTOMER SUPPLIED
- (C) 1 PAIR, 18 AWG, SHIELDED, DELTA T PART NUMBER 293-CW9318

CONTROL POWER CABLE SIZE

- (D) 3 CONDUCTOR, 14 AWG

ASD & FAN MOTOR CABLE SIZED FOR VARIOUS MOTORS* (200V SERIES)

ASD OUTPUT & FAN HP →	0.5 HP	1 HP	2 HP	3 HP	5 HP	7.5 HP	10 HP	15 HP	20 HP	25 HP
(E) 4 COND. →	14 AWG	12 AWG	10 AWG	10 AWG	10 AWG	8 AWG	6 AWG	4 AWG	4 AWG	3 AWG
(F) 4 COND. →	14 AWG	12 AWG	12 AWG	12 AWG	10 AWG	8 AWG	6 AWG	4 AWG	4 AWG	3 AWG
ASD CIRCUIT BREAKER SIZE →	10 AMP	15 AMP	20 AMP	25 AMP	40 AMP	50 AMP	80 AMP	100 AMP	100 AMP	120 AMP

* SIZES AND CAPACITIES LISTED ARE PROVIDED TO THE CUSTOMER AS A GENERAL GUIDELINE ONLY. WIRE AND CIRCUIT BREAKER SIZES SHOULD ALWAYS BE VERIFIED BY A QUALIFIED ELECTRICAL ENGINEER.

MAT: VARIOUS

PROPRIETARY AND CONFIDENTIAL

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DRAWN BY: JLS | APP'D BY: JF

UNLESS STATED OTHERWISE
ALL DIMENSIONS ARE IN INCHES
DO NOT SCALE DWG
DRAWING SCALE - 1:12
TOLERANCES: X° ± 2° | X/X ± 1/8 | X.X ± 0.1 | X.XX ± 0.05 | X.XXX ± 0.03

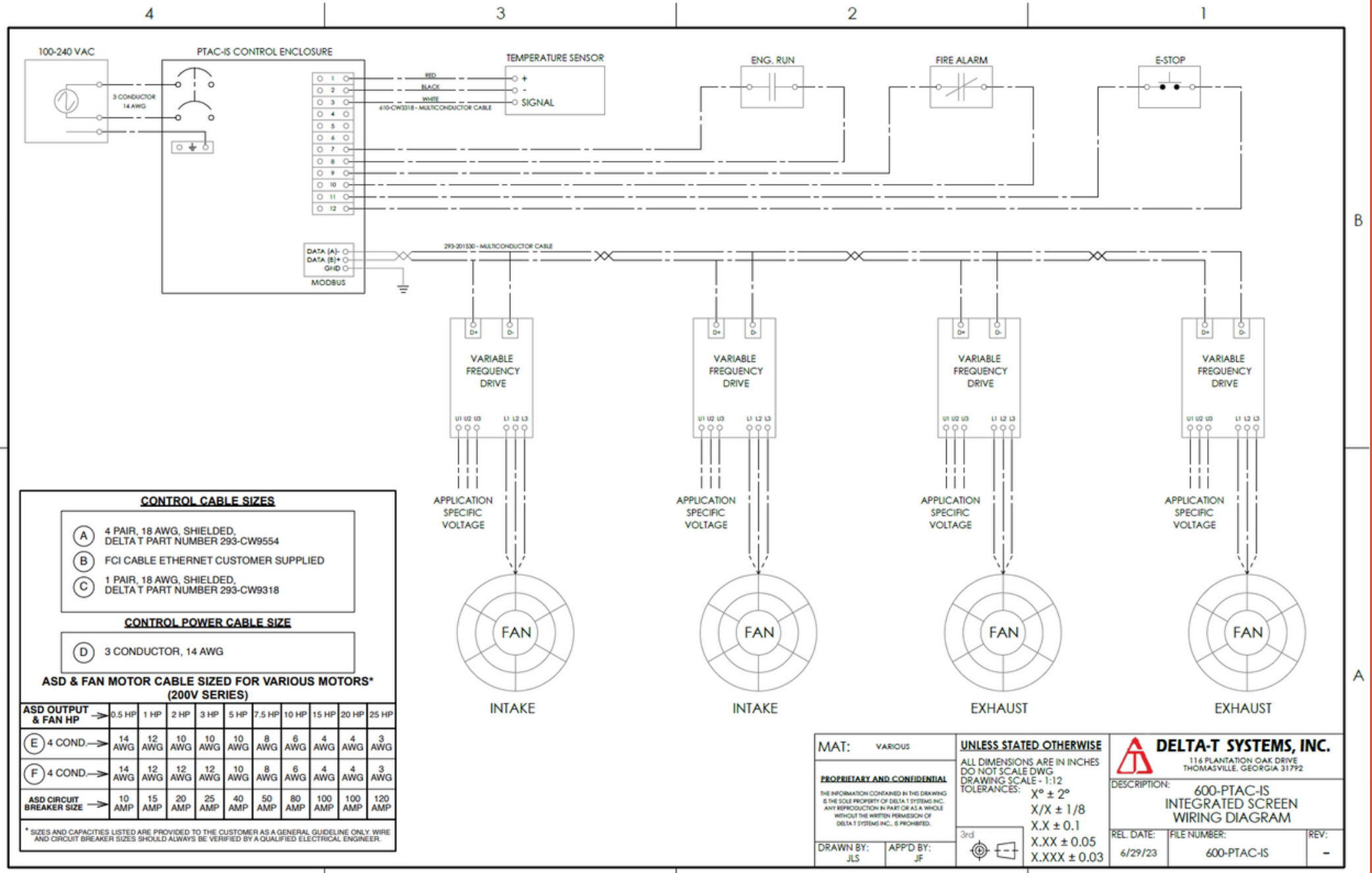
3rd

DELTA-T SYSTEMS, INC.
116 PLANTATION OAK DRIVE
THOMASVILLE, GEORGIA 31792

DESCRIPTION: 600-PTAC REMOTE SCREEN WIRING DIAGRAM

REL. DATE: 6/29/23 | FILE NUMBER: 600-PTAC | REV: -

PTAC REMOTE SCREEN WIRING DIAGRAM



CONTROL CABLE SIZES

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X.X ± 0.1
X.XX ± 0.05
X.XXX ± 0.03

3rd

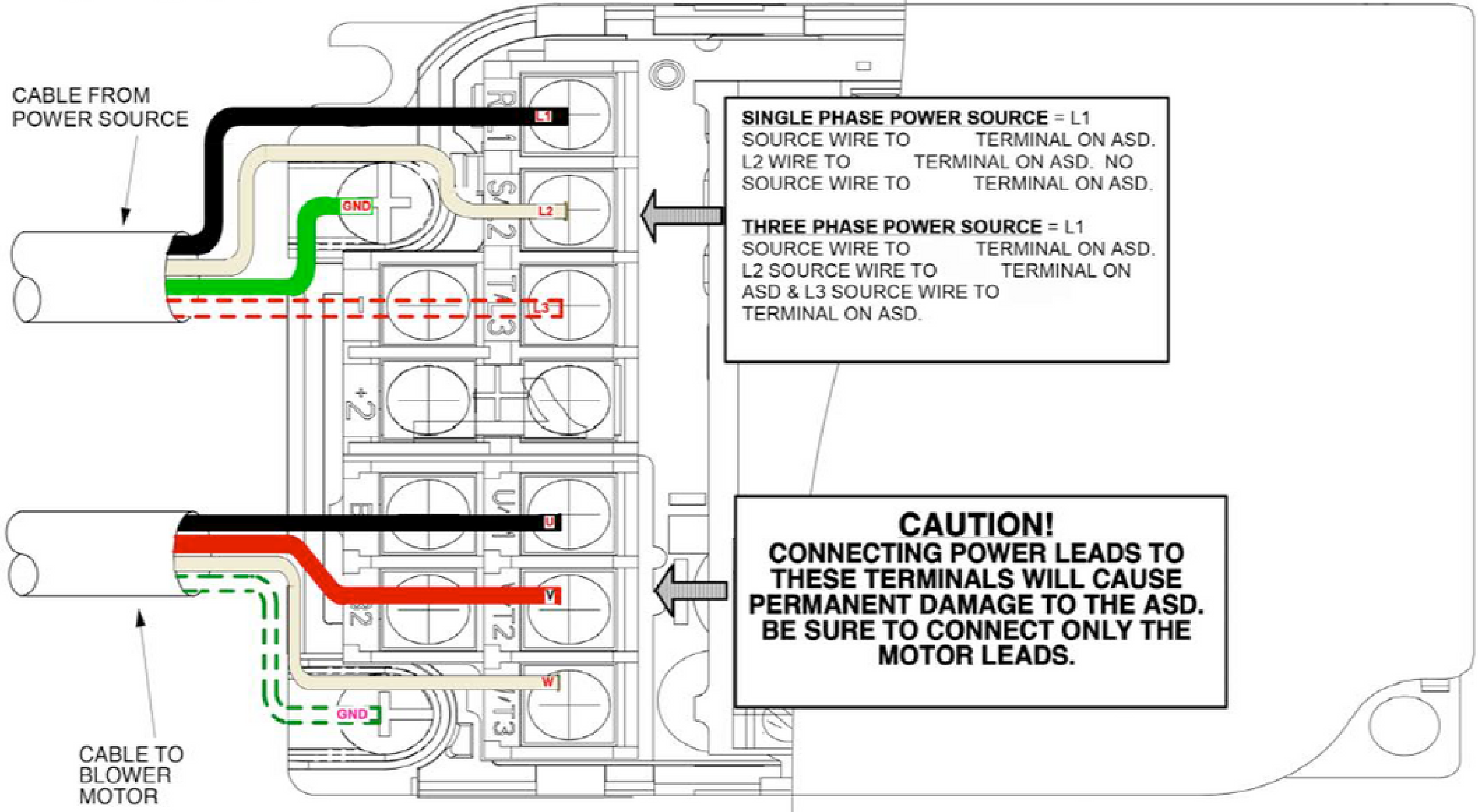
DELTA-T SYSTEMS, INC.
116 PLANTATION OAK DRIVE
THOMASVILLE, GEORGIA 31792

DESCRIPTION: 600-PTAC-IS INTEGRATED SCREEN WIRING DIAGRAM

REL. DATE:	FILE NUMBER:	REV:
6/29/23	600-PTAC-IS	-

PTAC INTEGRATED SCREEN WIRING DIAGRAM

FIGURE 12
ASD POWER AND MOTOR CONNECTIONS

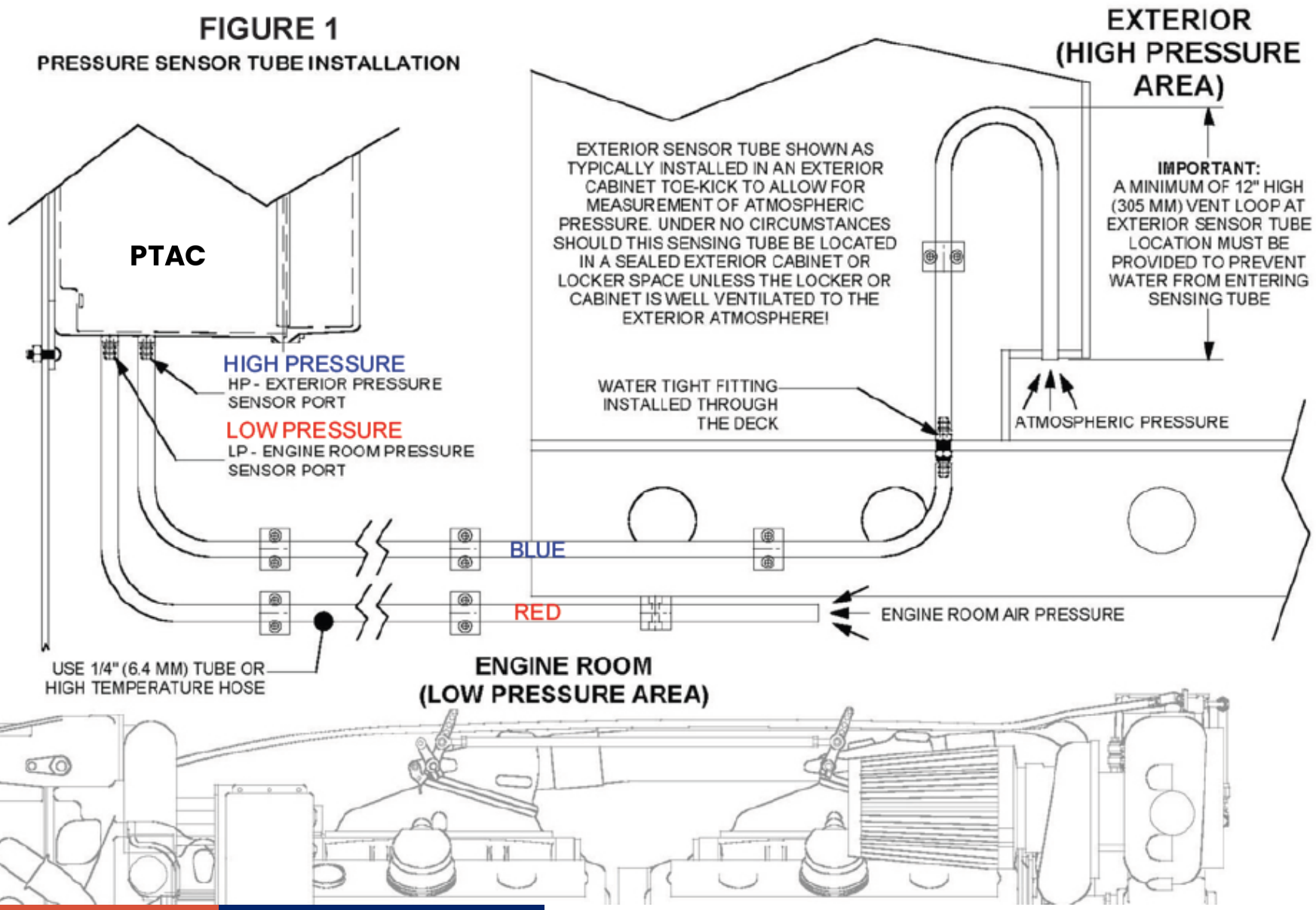


SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

NO SCALE

FIGURE 1

PRESSURE SENSOR TUBE INSTALLATION



GENERAL INSTRUCTIONS

RUNNING THE PRESSURE SENSING TUBES

Refer to Figure 1, for Pressure Sensor Piping Installation. The PTAC is fitted with two small pressure-sensing ports located on the enclosure at the lower left side of the enclosure. Note **HP (High Pressure)** and **LP (Low Pressure)** designation on Figure 1. Use 1/4" (±6.4mm) tubing that is heat resistant and is reinforced to prevent possible kinks or collapse when proceeding with this section.

- Run the **LP (Low Pressure)** sensing tube to the center of the engine room area, normally between the main engines. Be sure that the hose is unobstructed and is not kinked. Be sure the open end of the hose is not subject to the direct airflow from the intake fan that may affect the pressure sensor! Place an "LP" label on this hose at the PTAC connection so that it is clearly identified as the low-pressure interior sensing tube.

- Run the HP **(High Pressure)** sensing tube to the exterior of the vessel. Care must be taken in selecting the location of the pressure sensor tube at the exterior, if there are any questions, please contact Delta "T" Systems, Inc. before installing this tube. The location of this tube must be in a sheltered area not subject to wind normally blowing over the vessel when underway. It also must not be located within any air plenum for intake or exhaust fan ducting that may be positively or negatively pressurized. We recommend the exterior installation in a well-ventilated cabinet or locker aft of the superstructure or in the cabin side or over-head. The tube must be protected to prevent water from entering when at sea or when washing the vessel down. A minimum 12" high vent loop must be provided to avoid water entry into the sensor and sensor tube. Be sure that the hose is unobstructed and is not kinked. Place a "HP" label on this hose at the PTAC connection so that it is clearly identified as the high-pressure exterior sensing tube.

NOTE: The pressure sensor used in the PTAC or PTAC-IS is a precision measuring device and is extremely sensitive. In the automatic mode, the Control System is measuring an average pressure differential of just a 1/2" of water (0.018 psi or 124 Pa). After running the pressure sensing tubes, we recommend taping or plugging each end of each tube until the system is ready to be tested and trialed after painting and heavy construction aboard the vessel has been completed. This will prevent dust and contamination from entering the sensing tubes as well as potential damage due to over-pressure. Sensor damage due to over-pressure is not covered under warranty.

DELTA-T
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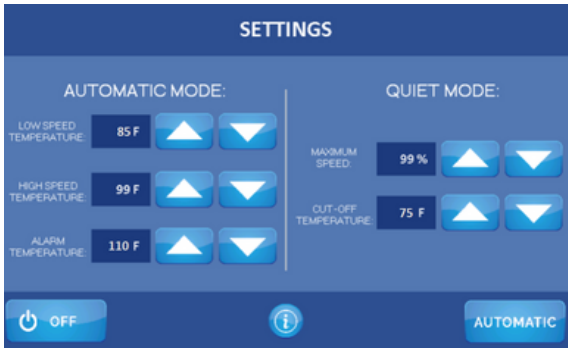
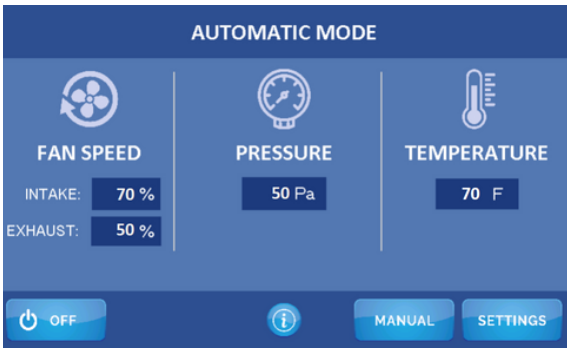
INITIAL SYSTEM STARTUP

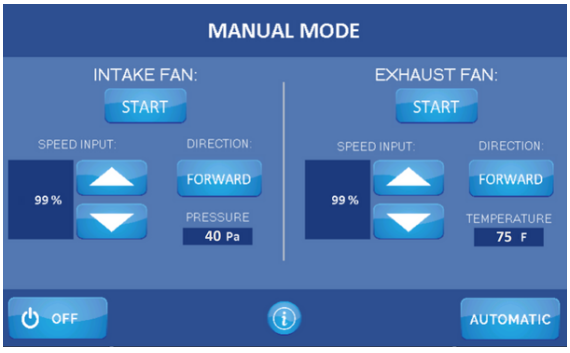
SETTING UP THE MONITORING SYSTEM INTERFACE



Exhaust fans will run at 20% (12 hz) when the room is at the low speed temperature, and 100% (60 hz) at the high speed temperature. Tap the buttons to move in increments or press and hold to quickly adjust to the desired setting.



Touch the automatic mode button, to go back to the main screen.



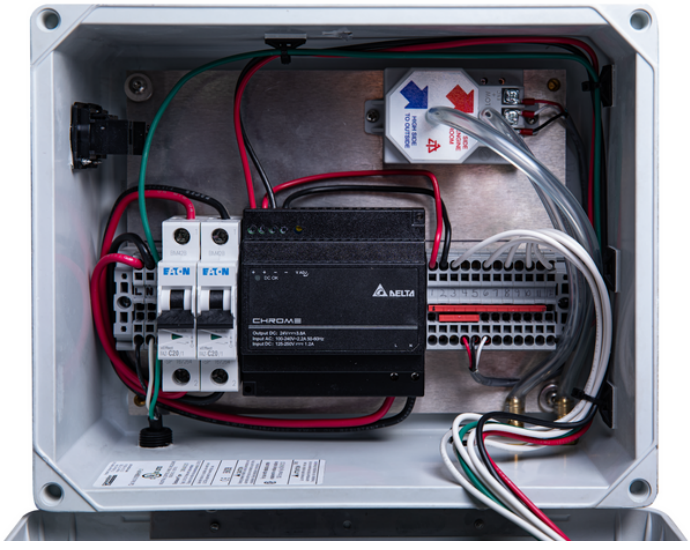
If you would like to operate the vessel in manual mode, click the manual mode button in the bottom right corner, and input the desired settings.

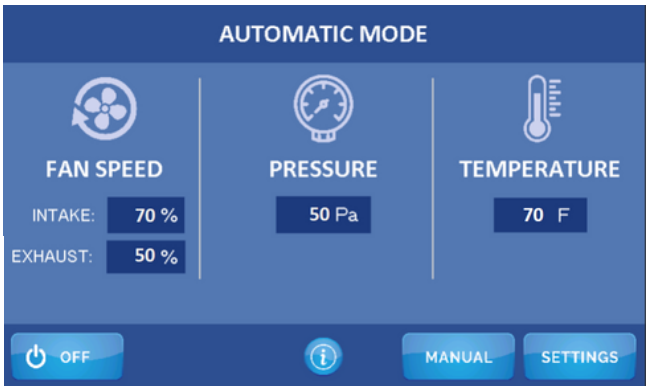
INITIAL SET UP CHECK

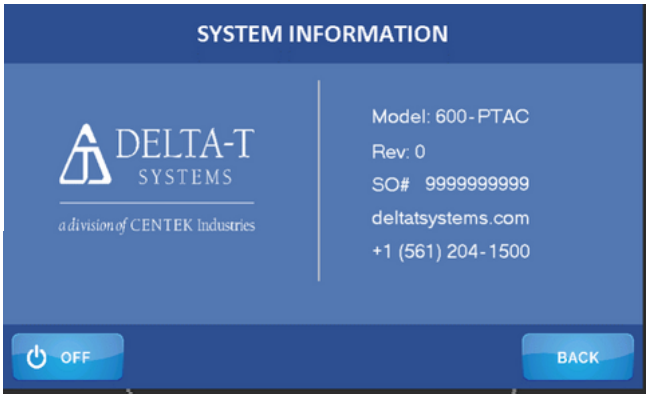
During the initial startup of a ventilation control system, it is crucial to perform certain checks to ensure correct wiring before putting the vessel into service. **These checks, known as dock trials, need to be completed before any sea trials.** The procedure for the initial system startup:

- **First Power Up:**
  - All components of the ventilation control system and related equipment have been fully wired, bench tested, and run in the assembly and testing facility before being shipped to the customer.
  - Prior to powering any components of the ventilation system, carefully inspect and verify all wiring connections according to the instructions provided in the Installation Section and accompanying wiring drawings.
  - **Many problems encountered in the initial startup of this type of ventilation control system are related to simple errors in wiring from one component to another.**

- **Step 1 - Powering the PTAC and display:**
  a. The wiring in the PTAC must be complete including the comm cable and the power cable that run to the display touch screen display.
  b. Turn on the control power circuit breaker to the PTAC and turn on the power to the VSDs. Observe the screen display as it performs its initialization.
  c. Hit the information button in the center of the screen to see system information such as model number, sales order number, and the revision number of the product.







STEP 2 – CHECKING MANUAL OPERATION AND FAN ROTATION

IMPORTANT: Before proceeding, check that all fans are free turning and that nothing has become lodged or jammed in the blades during vessel construction. Be sure any fire/smoke dampers are open and clear. Ensure that proper safety guards are in place at all times and that necessary safety precautions are taken if personnel are working within the engine room or on the ventilation equipment and fans!

- Go back to the Main screen by touching the Back button. From the Main Screen touch the Manual button to put the system into Manual Mode.
- Open a hatch or door to the exterior to allow air to escape from the space.
- Using the Down Arrow, set the exhaust fan(s) to 0%.
- Check fan flow direction for both intake and exhaust fans. Raise the intake fan(s) speed to 100% in the Forward direction. Check to make sure the air is coming into (pressurizing) the space, and there is no excessive vibration or noise from the fan(s). The intake VSD display(s) will read 50.00 or 60.00 Hz depending on the fan(s) installed. Slow the intake fan speed to 50% on the display by repeatedly pressing the Down arrow and the intake VSDs should read half of the maximum value previously observed. If a fan is found to be operating in the wrong direction it is important to determine whether the fan is physically installed backwards, or simply rotating in the wrong direction. If the fan is installed backwards, changing the rotation will not correct the problem, as an axial flow fan is only capable of about 65% of its rated airflow when running in reverse. If this happens the fan will not be able to keep up with exhaust and combustion demands and a low-pressure situation will occur with the engines at high RPM. If the fan is physically installed correctly but rotating backwards, the direction can be changed by switching any two of the wires going from the VSD output to the fan motor.
- Turn off the Intake fan with the Down arrow and do the same check for the exhaust fan(s). In Forward the exhaust fan should be exhausting (extracting) air from the space.

STEP 3 – CHECKING AUTO OPERATION

- Go back to Main Screen by touching Back button.
- With the fans off, close all hatches, port holes, and doors to seal the space.

- Press the Auto button on the Main screen to put the system into the Auto Run Mode.

- Use a heat source to gently apply heat to the RTS Temperature Sensor probe and watch the temperature display on the screen. The exhaust fan(s) should ramp up to 100% and the intake fan(s) should speed up to maintain constant pressure. The increase in the intake fan(s) speed may be relatively small with the main engines off. The reading on the display should be used to ensure there actually is an increase. If too much heat is applied the high temp alarm will appear.

- With the exhaust fan(s) still running at 100% in the Auto Run Mode open a hatch to allow additional air into the space to equalize the atmospheric and engine room pressures and the intake fan(s) speed should decrease to the minimum value of 20% fan speed.

- Test the pressure sensor by inserting the tube (provided) on to the high-pressure side (Blue) hose barb on the outside bottom of the PTAC. The intake fan % graph on the display screen should gradually rise and go to 100%.

- At this point the system is safe to operate and should be observed during sea trials. If you have any questions prior to sea trials please contact Delta "T" Systems directly at (229) 228-7653, or sales@deltatsystems.com.

DELTA-T
SYSTEMS

TROUBLESHOOTING

OPERATIONAL TEST

To troubleshoot system performance issues, conduct an operational test in manual mode. Ensure all components are properly installed and functioning. If possible, shut down the main engines and open the space to release excess air to check the intake fan(s) for correct operation. If a fan is running in the wrong direction, determine if it's physically installed backwards or simply rotating incorrectly. Correcting the rotation won't fix a fan that's physically installed backwards. An axial flow fan is only capable of about 65% of its rated airflow when running in reverse. If this is the case, the fan will not be able to keep up with exhaust and combustion demands and a low-pressure situation will occur with the engines at high RPM. If the fan is installed correctly but rotating backwards, change the direction by switching two wires from the VSD output to the fan motor.

1. Put the system in the Manual Mode. Set exhaust fan(s) speed to zero percent (20%) by repeatedly pressing the Down arrow.

2. Raise the intake fan(s) speed to 100% in the Forward direction by repeatedly pressing the Up arrow. Check to make sure the air is blowing into (pressurizing) the space, and that the intake fan(s) VSD displays reads 50.00 or 60.00 Hz (The maximum output depending on your application). Lower the fan speed to 50% on the display Touch Screen Display and the red VSD displays should now read half of that maximum value previously observed.

3. Turn off the intake fan(s) by lowering the speed by repeatedly pressing the down arrow to zero percent (20%) and repeat step 2 with the exhaust fan(s). In the Forward direction, the fan should be removing air (exhausting) from the space.

4. Set the fan speeds for all fans (Intake and Exhaust) to 50% and press each reverse button. All fans should slow to a stop and then ramp back up rotating the opposite direction.

5. Press Stop button and switch the system back to the home page. Close all hatches and openings to seal the space. Press the Auto button to start the system in the automatic mode. Important Note: The space must be completely sealed for this test!

6. Press the Status button to display the Temperature Sensor value. Use a heat gun or other heat source to apply heat to the Temperature Sensor probe and watch the temperature display on the display screen. The exhaust fan(s) should ramp up to 100% and the intake fan(s) should speed up slightly to maintain constant pressure. The increase in intake fan(s) speed may be relatively small with the main engines off. The intake fan(s) speed reading on the display screen should be used to ensure there is an increase. Note: If too much heat is applied the High Temp Alarm warning screen will appear.

7. All the installed input switches should also be checked by looking at the display screen and operating the switch. Verify that all switches are operational.

8. With the exhaust fan(s) still running at 100% in the Auto Mode, open a hatch to allow additional air into the space to equalize the pressure and the intake fan(s) speed should decrease to 20% on the display screen.

NOT TURNING ON?

If the system will not power up, use the following guide to help determine the cause:

1. Touch the display screen to make sure it is functioning.

2. Check all main power breakers supplying power to the system and ensure they are on.

3. Use a voltmeter to ensure there is voltage present at the terminals on the back of the display. If proper voltage is present and there is no DC ON indicator, it is likely the 24VDC. power supply is defective.

4. Check to see if the power is on by looking if the screen is lit up.

5. If everything in the PTAC is functioning properly, but the display is not working, it will be necessary to check the incoming power on the back of the display. On the left-hand side of the display there are terminals marked + and -. There should be 24VDC across these terminals. If no voltage is present, check your power source for the display. If there is power but no display, it is likely the display has failed. Contact Delta "T" Systems to troubleshoot further. 120 V or 240 V Required at the breakers for functionality.

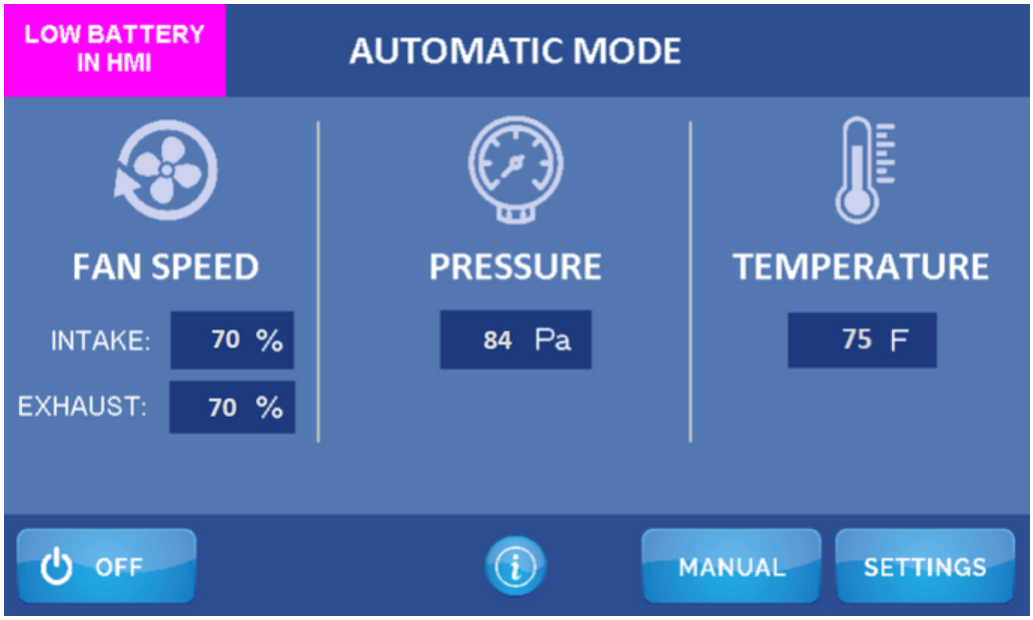
LOW BATTERY IN HMI

DELTA T SYSTEMS

The Low Battery in HMI (Human Machine Interface) alarm is an important notification that alerts users when the battery level of the HMI device falls below a critical threshold. The HMI device is a user interface that allows operators to interact with a system or machine, providing real-time data, control functions, and visualization capabilities. When the battery level is low, it is essential to take appropriate action to prevent data loss, system downtime, or potential malfunctions.

This section of the manual will guide users on how to address a Low Battery in HMI alarm:

1. **Alarm Indication:** The Low Battery in HMI alarm is displayed in the top left corner of the screen with a pink box. When this alarm is triggered, it is crucial to address it promptly to avoid potential disruptions.
2. **Battery Status Check:** Begin by checking the current battery status on the HMI device.



3. **Battery Replacement:** Replace the battery with power connected and controller on. The battery type used is a CR 2450N, please use a direct replacement battery to ensure function.

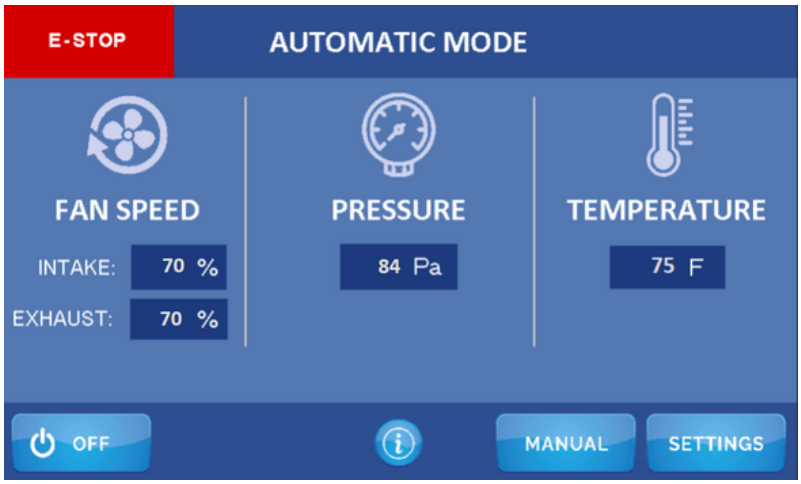
4. **Contact Technical Support:** If the Low Battery in HMI alarm persists despite following the above steps, or if you require additional assistance, it is recommended to contact the Delta T's technical support.

E-STOP ALARM & FIRE ALARM

DELTA T SYSTEMS

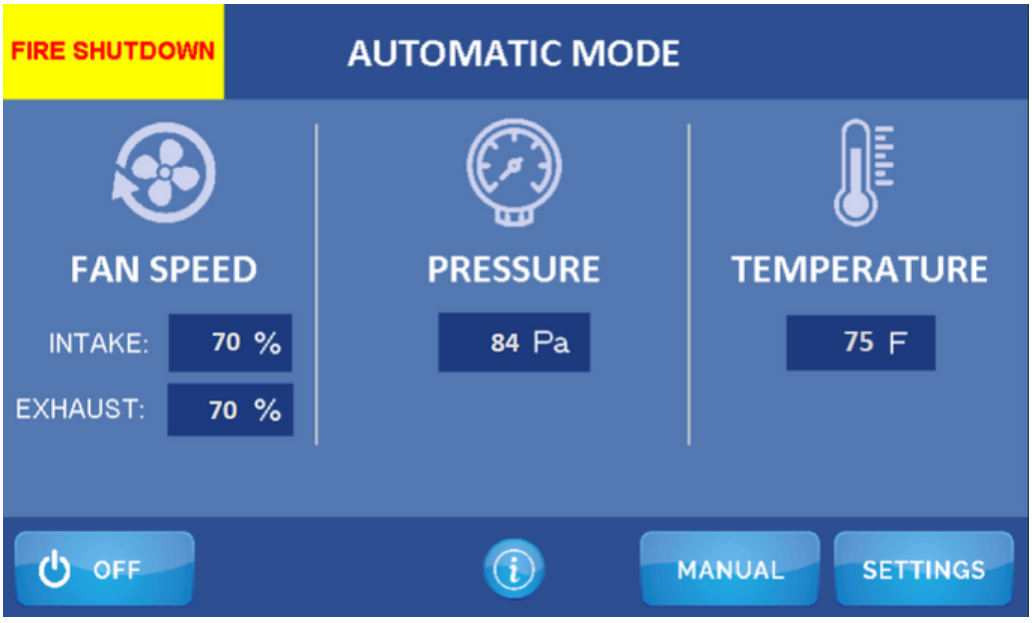
The E-Stop (Emergency Stop) alarm is a critical notification that indicates the activation of an emergency stop button or switch. The E-Stop is a safety mechanism designed to quickly halt the operation of fans in emergency situations, ensuring the protection of personnel and preventing potential hazards. The E-Stop is manually activated as per a switch described earlier in this manual.

If the E-Stop is indicated, the fans have been shut down. Investigate the cause and ensure no safety hazards exist before restoring operation of the fans.



The Fire Shutdown Alarm is generated when the switch on the fire suppression system opens. In this condition, the fans will stop. The only way to clear this alarm is to reset the fire system discharge switch located on the fire extinguishing system.

MPORTANT:
THE SCREEN IN THE PHOTO BELOW INDICATES THAT A FIRE SHUTDOWN HAS OCCURRED WITHIN THE ENGINE ROOM SPACE AND THAT A POTENTIALLY LIFE-THREATENING SITUATION MAY EXIST! USE CAUTION AND APPROPRIATE SAFETY MEASURES WHEN ENTERING THE ENGINE ROOM!

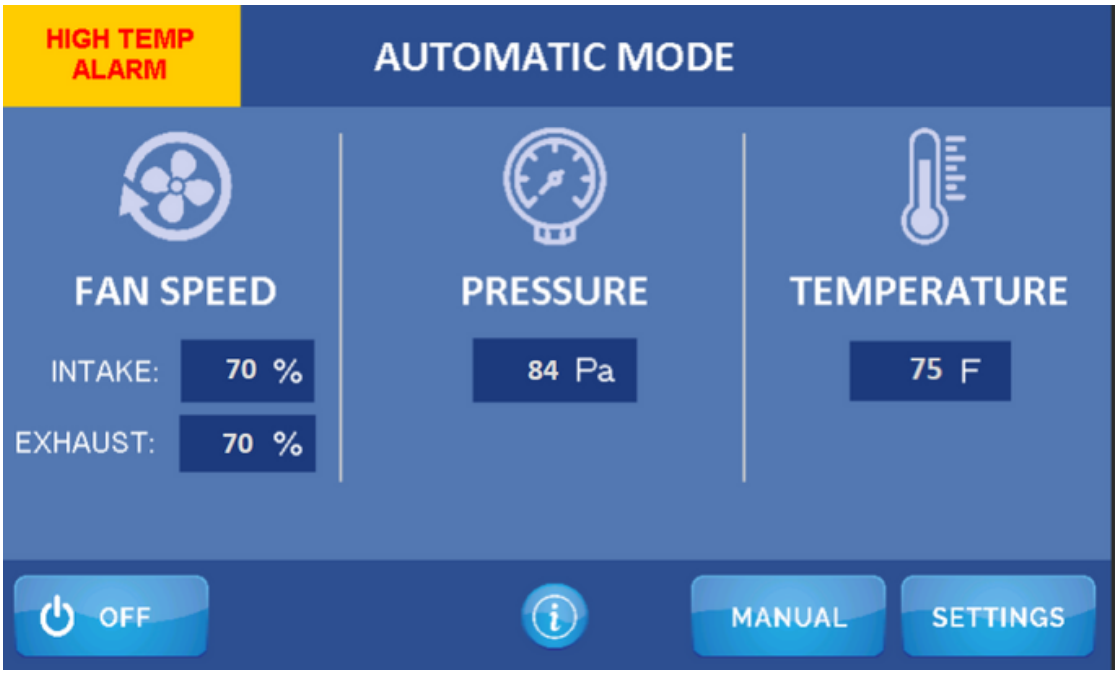


HIGH TEMP ALARM

DELTA T SYSTEMS

High Temperature Notification

If a High Temperature Notification appears, it is first necessary to determine the actual engine room temperature using another reference. Compare the actual temperature with the display on the status screen. If the two are not reasonably close, check the wiring from the temperature probe to the PTAC (Keep in mind that the mounting location of the probe can drastically affect the temperature reading). If the Alarm Set Point on the parameters screen has been set too low this alarm will appear. If the Alarm Set Point reads 0, the Parameters have been lost. This can occur if the control is not powered for long periods of time. Refer to the Setting Default Parameters section below.



Temperature Reads 0°F

An engine room temperature reading of 0°F on the display is an indication of incorrect wiring, or an issue with the temperature sensor.

- In most cases with newly installed systems this is a result of reversed polarity on the Remote Temperature Sensor wiring. RED (+) should be Connected to (+) on the RTS, BLACK (-) should be connected to (-) on the RTS.
- If reversing the polarity does not correct the problem, check continuity of the wiring from the RTS to the PTAC.
- If no problem can be found, contact Delta "T" Systems for assistance. (229) 228-7653

COMM LOSS

DELTA T
SYSTEMS

The Comm Loss (Communication Loss) alarm is an important notification that indicates a loss of communication between different components or devices in a system. This alarm is triggered when the system fails to establish or maintain communication links, which can have various causes such as network disruptions, cable failures, or configuration issues.
Identifying the specific cause of a Comm Loss alarm requires a systematic approach to troubleshooting. Here's a section that explains the steps to follow when encountering a Comm Loss alarm:
1. **Alarm Indication:** The Comm Loss alarm is displayed through an error message on a screen. When this alarm is triggered, it is important to take immediate action to resolve the communication issue and restore normal operation.
2. **Initial Checks:** Start by conducting some initial checks to ensure that the issue is not a temporary glitch or a simple fix. Perform the following steps:

- Verify all connections: Check the physical connections between devices involved in the communication. Ensure that cables are securely plugged in and not damaged or disconnected.
- Power cycle the devices: Power cycle the devices experiencing the communication loss. This involves turning them off, waiting for a few seconds, and then turning them back on. Sometimes, a power reset can resolve minor communication issues.

3. **Check Network Infrastructure:** If the initial checks don't resolve the problem, the next step is to examine the network infrastructure that facilitates the communication. Perform the following tasks:

- Review network configuration: Verify that the network settings, including IP addresses, subnet masks, and gateway settings, are correctly configured on all relevant devices.
- Check network cables: Inspect network cables for any physical damage, such as cuts or bends. Replace damaged cables if necessary.
- Test network connectivity: Use network diagnostic tools or commands to test the connectivity between the devices. Ping commands or network analyzers can help identify any network interruptions or blockages.

4. **Review Device Settings:** If the network infrastructure appears to be functioning correctly, review the settings and configurations of the devices involved in the communication. Perform the following actions:

- Check communication protocols: Verify that the devices are using compatible communication protocols and that the settings match on both ends.
- Validate device configurations: Review the configuration parameters, such as baud rates, parity settings, or network addresses, to ensure they are set correctly and match the required specifications.

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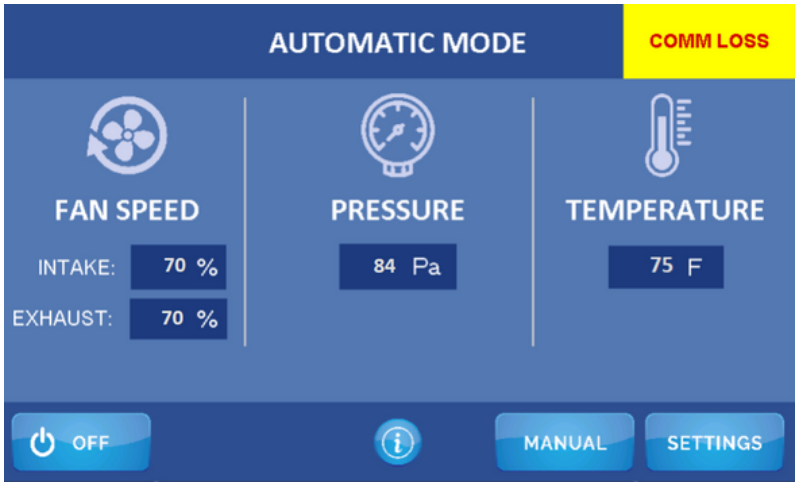


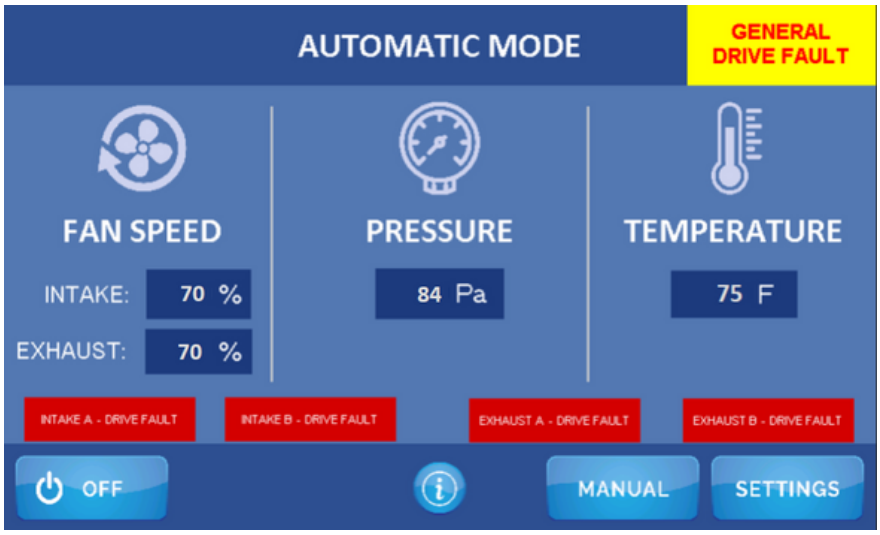
GENERAL DRIVE FAULT

DELTA T SYSTEMS

A General Drive Fault alarm is a notification that indicates a problem with one or more drives in a system. When this alarm is triggered, it typically means that there is a fault or failure in one of the drives, and it requires attention to resolve the issue.

To fix the specific drive that is faulting, you will need to follow a manual process that involves several steps. Here's a general procedure to determine the faulty drive:

1. **Locate the alarm:** The General Drive Fault is displayed through an error message on a screen. When this alarm is triggered, it is important to take immediate action to resolve the issue and restore normal operation.
2. **Initial Checks:** Start by conducting some initial checks to ensure that the issue is not a temporary glitch or a simple fix. Perform the following steps:
   a. Verify all connections: Check the physical connections between devices involved. Ensure that cables are securely plugged in and not damaged or disconnected.
   b. Power cycle the devices: Power cycle the devices experiencing the communication loss. This involves turning them off, waiting for a few seconds, and then turning them back on. Sometimes, a power reset can resolve minor communication issues.
3. **Identify the faulty drive:** Examine the drive information to identify the specific drive that corresponds to the General Drive Fault alarm. This information is displayed with a unique identifier, a red box on the bottom of the screen with a label.
4. **Cross-reference the information:** Compare the details of the faulty drive obtained from the drive information with the physical drives in the system. This may involve visually inspecting the drives, checking their labels or serial numbers, or referring to documentation or diagrams that indicate the drive's location and wiring procedure.
5. **Verify the fault:** Once you have identified the potential faulty drive, it's important to verify the fault by conducting further tests or diagnostics. The most common drive fault is due to wiring issues, please ensure the wiring has been completed correctly. This step ensures that you don't mistakenly replace a functional drive.
6. **Replace or repair the faulty drive:** If the fault is confirmed, you will need to take appropriate action to resolve the issue by contacting Delta T systems. Depending on the system and the nature of the fault, this might involve replacing the faulty drive with a new one or performing repairs on the existing drive.



VARIABLE SPEED DRIVE TROUBLESHOOTING

VSD Overview

The Variable Speed Drives are used to supply AC power with a variable frequency to the fan motors to change the speed. The VSD works by taking the AC input from the electrical system, converting it to DC voltage, then converting it back into a variable AC output, which is then supplied to the fan motors. The DC section in the drive contains large power storage capacitors operating at high, potentially deadly DC voltages to smooth out power fluctuations and changes in motor load. These capacitors can store energy for a period of time after power has been removed from the drive. To avoid shock, you should wait several minutes after turning off the breaker to the VSDs before removing the cover. There is a red LED charge indicator inside the VSD. Work should never be performed on the VSD while this is lit! The input to the VSD can be single or three phase. Regardless of electrical system on the boat, the output of the VSD to the fan motor is three phase. They are very reliable and require very little if any maintenance; it is advisable however, to occasionally clean dust off the heat sinks and fans on the back of the VSD by blowing compressed air through them. In the event of an VSD fault, the display will display an VSD Fault message that specifies which VSD has faulted. To diagnose the fault, it will be necessary to read the alarm code from the VSD display. It is helpful to take note of the fault before pressing the Reset button on the display. The following section covers the alarms that are generated by the VSDs and how to monitor operating conditions.

VSD Alarm Code Quick Check List

- GF Ground Fault, Current shorted to ground exceeded 50% of rated current on output side of the drive.
- LF Output Phase Loss, Phase loss on the output side of drive.
- LF2 Output Current Imbalance, one or more of the phases in the output current is lost.
- oC Over Current, Sensors have detected an output current greater then the specified over current level.
- oH Heat sink Overheat, the temperature of the heat sink exceeded the value set.
- oL Motor Overload, make sure the VSD is properly sized for the fan.
- Uu Low voltage at Drive Input from ships supply.
- PF Power Fault. One of the phases is missing from the ship's supply.
- oU High voltage at drive input from ship's supply.
- CE Comm Error.

VSD ALARMS

Retrieving VSD Alarm Fault Information
If an VSD alarm occurs, it may be necessary to call Delta "T" Systems for assistance. Before calling technical support, it is helpful to note the conditions when the fault occurred and write it down. IMPORTANT: Write down these values before calling Delta "T" Systems for technical support on drive problems if possible!

VSD Over Current Alarm
The Over Current alarms are generated when the drive output current exceeds settings placed in the drive by Delta "T" Systems to protect the drives and motors. If this alarm occurs the possible causes are:
• Faulty VSD output to motor wiring creating an intermittent short. If the alarm is occurring below maximum output frequency this is very likely the cause. The wires should be disconnected from the drive and a Mega Ohmmeter should be used to test the wiring from the VSD to the motor windings. DO NOT use the Mega Ohmmeter with the wires connected to the VSD! Doing so can cause permanent damage to the VSD.
• VSD connected to the incorrect fan (Reverse installation of the Intake and Exhaust VSDs is a common problem on new systems). Verify that the rated drive HP on the Delta "T" Systems label matches the fan HP!
• Possible defective fan motor. The fan should be checked for free rotation and unusual noise while operating. The Mega Ohmmeter can be used to check the windings for short circuits.
• Improper wire size used in installation. The VSDs are very sensitive to wire size due to the harmonics generated when changing the DC voltage back to AC. Using wire smaller than specified in the System Block Diagram can cause an increase in apparent current. This is the case with any variable frequency drive, and is most apparent on vessels with a non-conductive hull because of the grounding arrangement.

VSD Over/Under Voltage Alarm
The VSD has circuitry that constantly monitors the condition of the DC section in the drive. If an abnormal voltage is sensed the VSD will shut down and generate an alarm. The abnormal condition is usually caused by incoming power that is not at the correct voltage. Possible causes are:
• Defective voltage regulator or incorrect output voltage at generator(s)
• Loose connections or circuit breakers
• Improper power supply from shore power input
The Over Voltage alarm can also be caused when the system is in Manual Mode and the exhaust fan is overdriven by the intake fan. Running the intake fan at high speeds, with the space sealed effectively, turns the exhaust fan into a generator. The power generated has no place to go and causes the DC bus on the VSD to go over voltage. If this happens, reset the alarm and open a hatch or door to the exterior to allow air to escape the engine room while in the Manual Mode.

DELTA T SYSTEMS

LET'S WORK TOGETHER

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Revision: Alpaca