EasyTouch Operation Manual

2.5" Color TFT Touch Screen Controller
for FX1 & FX2 Control Boards

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1. INTRODUCTION

The EasyTouch Control is a microcontroller-based unit designed for use with direct expansion, reverse-cycle air conditioning systems or with chilled-water air handlers.

2. READ THIS MANUAL BEFORE PROCEEDING

Read this manual completely before you proceed with the installation and operation of the EasyTouch. If you have questions or require assistance with your EasyTouch control, contact Micro-Air at +1 (609) 259-2636.

The EasyTouch is covered under the Micro-Air Warranty Policy, and incorrect installation, neglect and system abuse are not covered under warranty policy. See section 19 for more details.

3. FEATURES

3.1 Standard

- Works automatically via auto-detection with FX1 or FX2 control circuit boards.
- User-friendly and intuitive 2.5" touch screen display requires no manual for basic operation.
- Five-volt logic and microcontroller located in the display.
- Automatic and three programmable manual fan speeds.
- Numerous programmable parameters for custom installations.
- Moisture Mode for controlling relative humidity.
- De-Icing cycle to prevent evaporator coil icing.
- Programmable compressor staging delays.
- Universal 115-230V, 50/60Hz AC power supply.
- Nonvolatile memory retains settings without batteries.
- Programmable display-brightness control.
- Programmable failsafe modes.
- Integrated CAN-bus network capability
- Low-Voltage Monitor.
- AC Current Monitor
- Fits Vimar® Eikon and Eikon EVO bezels.

3.2 Optional

- Outside air temperature sensor.
- Alternate air temperature sensor.
- Pump Sentry (Service) water sensor.
- Combination Temp/%RH sensor for Cabin Relative Humidity Control in CW
- Electric heating control capabilities in reverse-cycle DX and in CW.
- Air Filter Cleaning or Replacement Timer.
- Fresh Air Makeup (FAMU) DX and CW Control
- Expanded 4x DC Blower Output (daughterboard) support
- EasyStart Soft Starter (daughterboard) support
- Wi-Fi support for EasyTouch smart phone application

3.3 Control Boards and Options Supported by EasyTouch

The EasyTouch has evolved and supports all of the features available in the original FX1 and in the newest FX2 Control Boards. Please refer to the following chart below for the minimum required firmware versions for the EasyTouch to support the control features required.

Table 1 – Control Boards & Options Supported by EasyTouch

Control Family	Control Board Micro-Air P/N	Control Board Description	Control Board Hardware Versions	Supported Control Features								Required EasyTouch Firmware Version
				Standard	Cabin %RH	FAMU	AC Current Limit	CAN Bus	EasyStart	DC Blower	Wi-Fi	
FX1	ASY-370-X09	FX1 Control Board, standard	All	√								Any
FX2 1st Gen	ASY-360-XG1	FX2 Control Board, standard	G1 and older	√								Any
	ASY-360-XG11	FX2 Control Board, with 731 Temp/Humidity Sensor Daughterboard Option (depopulated)	G1	√	√							N05 or newer
	ASY-360-XG2	FX2 Control Board, with 361 CAN Bus Daughterboard Option	n/a	Not Supported								n/a
	ASY-360-XG4	FX2 Control Board, with 361 Expanded DC Blower Daughterboard Option	n/a	Not Supported								n/a
	ASY-360-XG5	FX2 Control Board, with 367 EasyStart™ Daughterboard Option	n/a	Not Supported								n/a
	ASY-360-XG8	FX2 Control Board, with 731 FAMU Daughterboard Option	n/a	Not Supported								n/a
FX2 2nd Gen	ASY-360-XL1/3	FX2 Control Board, standard w/ Integrated CAN Bus Support	J and newer	√	√	√	√	√		1[1]	√	N07 or newer N10 for Wi-Fi
	ASY-360-XL4	FX2 Control Board, with 361 Expanded DC Blower Daughterboard Option	J and newer	√	√	√	√	√		4[2]	√	N07 or newer N10 for Wi-Fi
	ASY-360-XL4/5	FX2 Control Board, with 521 EasyStart™ Daughterboard Option	J and newer	√	√	√	√	√	√	1[1]	√	N07 or newer N10 for Wi-Fi

[1] One DC Blower output is integrated into base control board, and can support up to 2 DC blowers in parallel

[2] Four separate DC blower outputs are available on the daughterboard with individual fan speed programming. The one DC blower output integrated into the base control board can still be used and its speed settings follow that of Fan A.

This manual provides all necessary information for proper installation and operation of the EasyTouch Display. Poor installation and misunderstood operating parameters will result in unsatisfactory performance and possible failure.

4. OVERVIEW

4.1 EasyTouch Home & Main Screen Displays

The EasyTouch Home screen shown in Figure 1 consists of large, easy to read graphics, with large buttons for basic control functions. The Main screen shown in Figure 2 consists of smaller graphics showing all of the controls readouts and statuses, and had more buttons for all of the control functions.
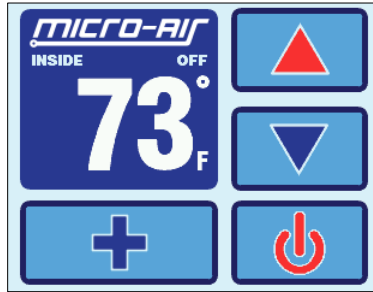
Figure 1 – Home Screen Display
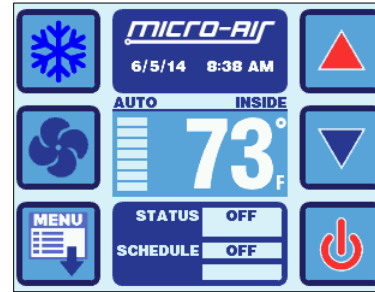
Figure 2 – Main Screen Display

4.2 EasyTouch Power-Up & Default Sleep Mode Screen Display

During power up and whenever the display enters Sleep Mode, the display shown in Figure 3 is shown. While in Sleep mode, the graphic will move around the screen. See section 15.3 for more information on the various Sleep Mode settings.

Figure 3 – Power-Up & Default Sleep Screen Display

5. INSTALLING THE DISPLAY PANEL

5.1 Choosing the Location

Before mounting the control panel, consider the location. The display panel's built-in air sensor provides excellent room-air temperature sensing when properly located and installed. The physical location of the air sensor is shown in Figure 4 and marked with "S". Be sure to mount the display panel on an inside wall, slightly higher than mid-height of the cabin, in a location with freely circulating air where it can best sense average temperature. The display's distance from the air conditioner must be within the 15' (4.5m) length of the display cable. Longer, custom cable lengths are also available.

5.2 Installing the Battery (for older EasyTouch models only)

Starting in second half of 2015, all EasyTouch display will be supplied with a rechargeable battery that requires no installation or maintenance. Previous models will be supplied with a loose type CR2032 battery that must be installed before mounting the display. The purpose of this battery is to maintain the time clock and date calendar only whenever AC power is removed from the EasyTouch. The battery has nothing to do with numerous programmable settings and features of EasyTouch, all of which are stored in non-volatile memory that does not require a battery.
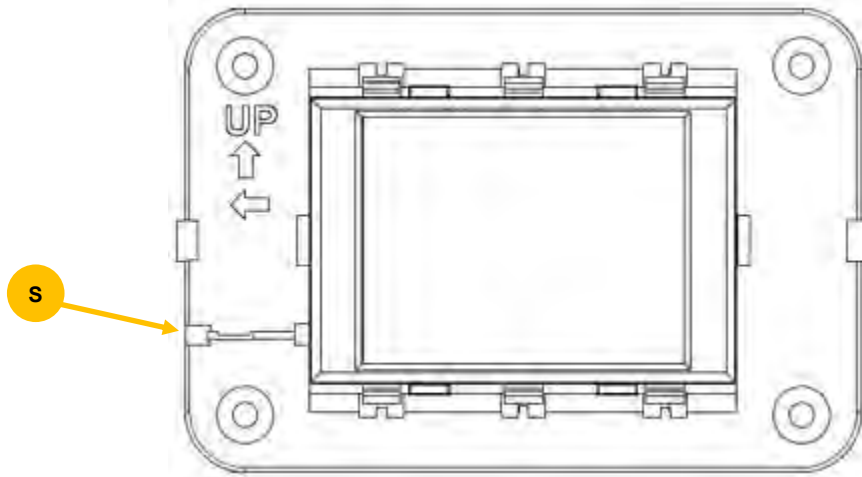
Figure 4 – EasyTouch Display Front Panel

IMPORTANT:

Do not mount the display in direct sunlight, near any heat-producing appliances or in a bulkhead where temperatures radiating from behind the panel may affect performance. **Do not mount the display in the supply-air stream.** Do not mount the display above or below a supply-air or return-air grille. Do not mount the display behind a door, in a corner, under a stairwell or any place where there is no freely circulating air. If you cannot mount the display in a suitable location for accurately sensing room temperature, install the optional remote air sensor as explained in section 6.1.

5.3 Mounting the Display

1. Choose a wall location that has adequate depth (at least 1"/25.4mm) behind the wall itself. See Figure 5 for the depth dimensions of the display.
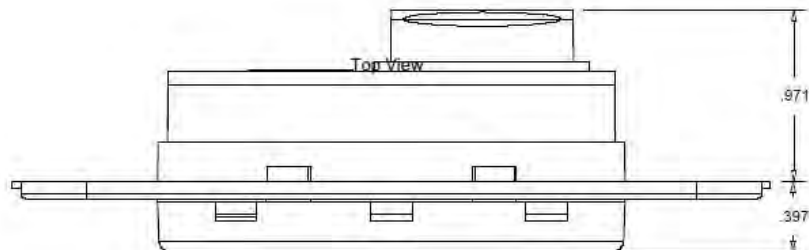
Figure 5 – EasyTouch Display Top View Mounting Dimensions

2. Make the cut-out for the display panel as shown in Figure 6. Cut-out size is 2.900" (74mm) wide by 2.165" (55mm) tall.
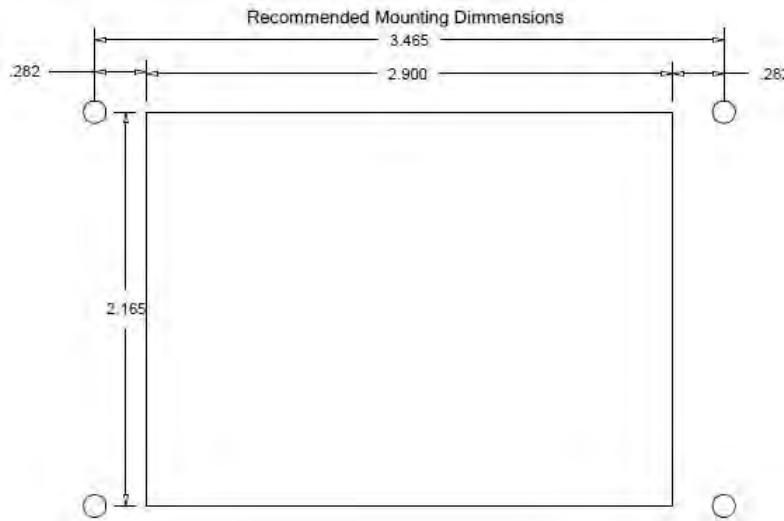
Figure 6 – EasyTouch Display Mounting Dimensions

3. Plug one end of the display cable (8-pin connector) into the display jack on the circuit board in the electric box and the other end into the back of the display panel.

4. Secure the display panel to the bulkhead using the four screws provided.
Do not use a screw gun and do not over tighten screws when mounting, because either method may damage the display.

5. When the display is securely mounted, mount the bezel over the display frame until it snaps into place.

6. INSTALLING THE OPTIONAL SENSORS

6.1 Remote (Alternate) Air Temperature Sensor
Install the optional remote air sensor if the display cannot be mounted in a proper location for accurately sensing room temperature. Installing the remote air sensor overrides the display's built-in sensor. The standard cable length for the remote air sensor is 7 feet (2.1m).

1. Mount the remote air sensor in a reliable return-air stream, preferably just behind the opening of the return-air grille. DO NOT attach the sensor to the edge of the unit's drain pan since the condensate water and cold air spilling off of the heat exchanger coil will cause an inaccurate temperature reading.
2. Plug its cable (6-pin connector) into the "ALT. AIR" or "ALT. AIR / RH" jack on the circuit board.

6.2 Outside Air Temperature Sensor
Install the optional outside air temperature sensor to monitor the temperature outside the cabin. Outside air sensor cables are available in various lengths.

1. Mount the sensor outside but not in direct sunlight.
2. Plug its cable into the "OAT" jack on the circuit board.

6.3 Service Sensor (for DX systems only)
Install the optional condenser coil temperature sensor into the "OAT/H20" jack on the FX1 circuit board or into the "SERVICE" header on the FX2 circuit board.

1. Mount the sensor in the middle of the condenser coil, strapping it securely to the piping.
2. Enabled the use of this sensor by going to DX Operational Settings, and then the Pump Sentry feature as explained in section 12.3.5.

6.4 Water Inlet Temperature Sensor (for CW systems only)
When using the EasyTouch with a chilled-water air handler, plug the water-inlet sensor cable into the "OAT/H2O" jack on FX1 or into the "OUTSIDE / RH" jack on FX2. Attach the sensor securely to the

chilled-water inlet pipe on the air handler. Ensure that the sensor makes good contact with the copper pipe and make sure it is covered with adequate insulation. DO NOT attach the sensor to rubber hose.

6.5 Combination Temp/Humidity Sensors (for CW & FAMU FX2 systems only)

As described in the table in section 3.3, the EasyTouch supports an optional temperature and relative humidity sensor for cabin %RH control and for Fresh Air Makeup (FAMU) operation on FX2 control boards only. For FX2 control boards with hardware revision is available only with the FX2 control board. For FX2 control board rev J and newer, plug the combo temperature/humidity sensor into the "ALT. AIR / RH" jack for cabin %RH control, and plug in an additional combo temperature/humidity sensor into the "OUTSIDE / RH" jack for FAMU control operation. For FX2 control board revisions G1 and older, the optional Temp/Humidity Sensor daughterboard is required to support cabin %RH control only; plug the combo temperature/humidity sensor into the "INTAKE" jack on the daughterboard and insure that the Inside Temp Sensor Selection programming parameter is set to "AUTO" (see section 12.1.16).

The cabin temperature and humidity control feature is enabled automatically once a combo temperature/humidity sensor is detected in either the "ALT. AIR / RH" or "INTAKE" jacks on the FX2 board revisions described above. See section 12.1.11 for more information on using the humidity control feature.

The FAMU control feature must be deliberately enabled in order to take effect. See section 9 for more information on setting up FAMU control operation.

7. NORMAL HEATING OR COOLING CYCLE

In **Automatic Mode**, heating and cooling are supplied as required. If cooling is required, the system will start a cooling cycle when the cabin temperature exceeds the set point by 2°F (1.0°C) and will continue to cool until the temperature equals the set point. (See the parameter setting *Set Point Temperature Differential* as described in section 12.1.3 for more information on how to change this variation to 1°F [0.5°C].) The cabin temperature must drop below the set point by at least 4°F (2.0°C) in order for the system to switch from cooling to heating. Similarly, if heating is required, the system will start a heating cycle when the cabin temperature is below the set point by 2°F (1.0°C) and will continue to heat until the temperature equals the set point. The cabin temperature must exceed the set point by at least 4°F (2.0°C) in order for the system to switch from heating to cooling. If you select **Cool Mode**, only cooling is supplied. If you select **Heat Mode**, only heating is supplied. The cabin temperature in either mode is maintained within 2°F (1.0°C) of set point by default. When the heating or cooling set point is satisfied, the compressor cycles off and the fan returns to low speed. The fan speed remains constant if Manual Fan Speed is selected. For more information on the fan speed control and its operation, see section 8.3.

7.1 Reversing Valve Operation (for DX systems only)

The position of the reversing valve determines if the system is in Cool Mode or Heat Mode. **The EasyTouch and FX1/FX2 systems are designed to energize the reversing valve output when in Heat Mode.** In addition, the reversing valve will toggle into the opposite position for 2 seconds to equalize the system pressure and reduce the compressor's starting surge whenever a cooling or heating cycle is called for and the system has been off for less than 75 seconds. Unnecessary valve toggling is limited to reduce reversing valve noise.

7.2 Water Valve Operation (for CW systems only)

When cooling or heating is required, the water valve will not open unless the water temperature is adequate. The fan remains in low speed until the adequate water temperature is available and the system status on the Main display screen will show "Cool Pending" or "Heat Pending". If the optional Electric Heater is enabled, heating will be provided if the water temperature is not adequate. See the *Water Temperature Differential* parameter setting described in section 12.4.2 for a definition of adequate cooling or heating water temperature and how to adjust its factory default setting to something other than 10°F (6°C).

8. STANDARD OPERATION

8.1 Operator Controls and Display
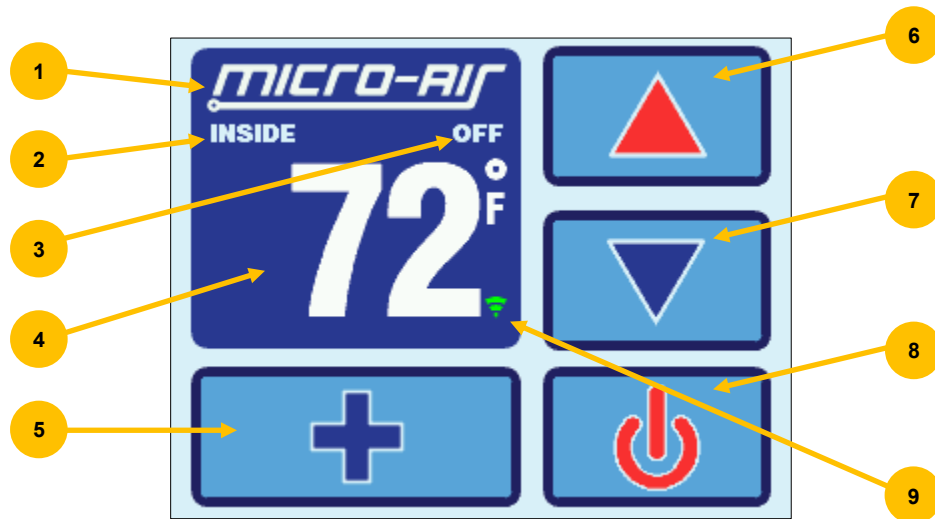
8.1.1 Home Screen Indicators & Buttons

Figure 7 – EasyTouch Home Screen Icons & Functions

1. **Force Sleep Mode Button** - Press and release to force Sleep Mode to initiate immediately, if enabled. See section 15.3 for more information on Sleep Mode.
2. **Temperature Display Selection** – Indicates the current temperature display value: SET, INSIDE, OUTSIDE, SERVICE/WATER, or %RH. If the associated temperature sensor is not installed or is faulty, "- - -" will be displayed.
3. **Status Indicator** – This display area indicates the abbreviated operational status of the control, including standby and active states, fault states, fault recovery, and fault lockout. More information on the operational status is available on the Main Screen.
4. **Temperature Display Indicator** – This value indicates the current temperature reading that corresponds to the Temperature Display Selection explained above. Press and release over the top of the numeric value to select the various temperature displays: Set point(s), Inside, Outside, Service/Water temperatures, or Relative Humidity (if equipped). By default, the temperature display will always revert back to showing the Inside Temperature after 3 seconds. If you wish to change the default Temperature Display to one of the other available choices, immediately after selecting the desired temperature, press and hold again for 5 seconds (until the button highlight disappears) and the currently displayed temperature will be retained and reverted back to.
5. **More Button** - Press and release to change display to Main Screen.
6. **Up Button** - Press and release to display the set point. Press and release or press and hold the UP button to increase the set point.
7. **Down Button** - Press and release to display the set point. Press and release or press and hold to decrease the set point.
8. **Power On/Off Button** - Press and release to toggle between the ON (green) and OFF (red) operation.
9. **Wi-Fi Network Status Indicator Icon** – If the EasyTouch display has the optional Wi-Fi support feature installed, a Wi-Fi icon will appear and indicate the status of the Wi-Fi connection. Green=connected, Yellow=connecting in progress, and Red=connection failed/disconnected.
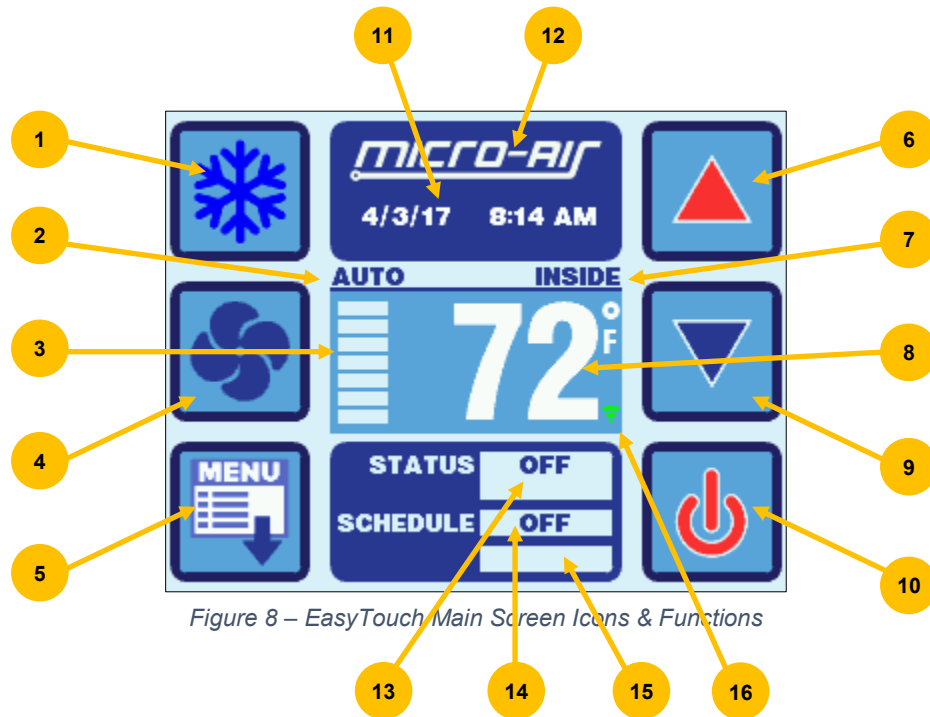
Figure 8 – EasyTouch Main Screen Icons & Functions

1. **Mode Button** - The Mode button indicates the currently active mode of operation. Press and release to step through the four available operating modes: COOL, HEAT, AUTO, and MOISTURE. See section 8.2 for more information on all the modes of operation.

2. **Fan Speed Mode Indicator** – This label indicates the current fan speed mode, AUTO or MANUAL. See section 8.3 for more information on the fan speed mode.

3. **Fan Speed Indicator** – This indicator is a bar graph that shows the speed at which the fan is currently operating. There are 3 fan speeds with EasyTouch: 1 bar lit indicates low speed, 4 bars lit indicate medium speed, and 7 bars lit indicate high speed.

4. **Fan Button** – The Fan button is used to control the fan speed. The Fan button will rotate when the fan is on, and will be stationary when the fan is off. See section 8.3 for more information on the controlling the fan speed.

5. **Menu Button** – The Menu button allows access to the EasyTouch Main Menu and all sub-menus beyond. See section 11 for more information on the menus.

6. **Up Button** - Press and release to display the set point. Press and release or press and hold the UP button to increase the set point.

7. **Temperature Display Selection** – Indicates the current temperature display value: SET, INSIDE, OUTSIDE, SERVICE/WATER, or %RH. If the associated temperature sensor is not installed or is faulty, "- - -" will be displayed.

8. **Temperature Display Indicator** – This value indicates the current temperature reading that corresponds to the Temperature Display Selection explained above. Press and release over the top of the numeric value to select the various temperature displays: Set point(s), Inside, Outside, Service/Water temperatures, or Relative Humidity (if equipped). By default, the temperature display will always revert back to showing the Inside Temperature after 3 seconds. If you wish to change the default Temperature Display to one of the other available choices, immediately after selecting the desired temperature, press and hold again for 5 seconds (until the button highlight disappears) and the currently displayed temperature will be retained and reverted back to.

9. **Down Button** - Press and release to display the set point. Press and release or press and hold to decrease the set point.

10. **Power On/Off Button** - Press and release to toggle between the ON (green) and OFF (red) operation.

11. **Date & Time Display** – The date and time are displayed here, if enabled.   See section 14 for information on how to set the date & time, change formats, and enable or disable the display.

12. **Home Button** – Hidden behind the Micro-Air logo is a button that when pressed returns the display to the Home Screen.

13. **Operational Status & Fault Help Button** – This display area indicates the current operational status of the control, including standby and active states, fault states, fault recovery, and fault lockout. If a fault is active, touching this status area will display the Fault Help screen for the active fault. See section 9.3.2 for more information on fault displays.

14. **Program Scheduler Status and Resume Button** – This display area indicates the current operational status of the Program Scheduler. If the Program Scheduler is currently in an Override state, touching this status area will cause the Program Scheduler to resume the active program for the current time & date period. See section 13 for more information on the Program Scheduler.

15. **Filter Maintenance Status** – If enabled, this display area indicates when it is time to clean or replace the air filter. See section 12.1.6 for more information on the Air Filter Reminder.

16. **Wi-Fi Network Status Indicator Icon** – If the EasyTouch display has the optional Wi-Fi support feature installed, a Wi-Fi icon will appear and indicate the status of the Wi-Fi connection. Green=connected, Yellow=connecting in progress, and Red=connection failed/disconnected.

8.2 Modes of Operation

8.2.1   OFF Mode
When the control is in OFF Mode, all control outputs are turned off. Upon entering OFF mode, if the electric heater was active within the previous 4 minutes, the fan will remain on at low speed for up to 4 additional minutes to cool down the electric heater.

8.2.2   ON Mode
When the control is in ON Mode, power is supplied to the appropriate outputs and the display indicates the current state of operation.

8.2.3   AUTO Mode
When AUTO Mode is selected as indicated by the Mode button icon, the system provides both heating and cooling as required. The Inside temperature in is maintained within 2°F (or 1.0°C) of set point by default. See section 12.1.3 for more information on the *Set Point Temperature Differential* parameter setting and how it can be adjusted. If the system was most recently cooling, the cabin temperature must drop below the set point by at least 4°F (or 2.0°C) by default in order for the system to switch from cooling to heating. Similarly, if the system was most recently heating, the cabin temperature must exceed the set point by at least 4°F (or 2.0°C) by default in order for the system to switch from heating to cooling. This behavior prevents small temperature overshoots from causing the system to switch between heating and cooling when it is not necessary.

8.2.4   COOL Mode
When COOL Mode is selected as indicated by the Mode Button icon, only the cooling system operates as required. If the ambient temperature drops below the set point, the system will not automatically switch to the HEAT Mode.

8.2.5   HEAT Mode
When HEAT Mode is selected as indicated by the Mode Button icon, only the heating system operates as required. If the ambient temperature rises above the set point, the system will not automatically switch to the COOL Mode.

8.2.6   MOISTURE Mode
MOISTURE Mode, sometimes called "Humidity" or "Dehumidification" mode, is used to help control humidity while you are away from the boat or away from a particular cabin. Once

MOISTURE Mode is enabled as indicated by the Mode Button Icon, the fan circulates the air for 30 minutes. During this time, the air temperature is sampled and entered into memory. After 30 minutes, a cooling cycle starts and continues until the temperature is lowered 2°F (or 1.0°C) or until the cooling cycle runs a maximum of one hour. Four hours after the temperature is satisfied or the cooling cycle times out, this cycle repeats. Moisture Mode will also prevent your boat or a particular cabin from dropping below a minimum temperature as a means to prevent the contents from freezing. When the temperature drops low, eliminating moisture may become less of a concern and maintaining some minimum temperature may become more important. After the 30-minute fan circulation, if the temperature is at or above the *Humidity Mode Minimum Temp* (50°F/10°C, by default), a cooling cycle is started and runs as described above. However, if the temperature is below the Humidity Mode Minimum Temp, a heating cycle will be started instead. The heating cycle will continue until the temperature reaches the Humidity Mode Minimum Temp or until the heating cycle runs a maximum of one hour. Four hours after the temperature is satisfied or the cooling/heating cycle times out, the entire cycle repeats, each time determining whether cooling or heating is required. See section 12.1.11 for more information on how to adjust the Humidity Mode Minimum Temp parameter setting to a temperature that may better suit your particular requirements.

IMPORTANT (for DX systems only):

If your air conditioning unit is Cool-Only (i.e. it does not have a reversing valve) and an Electric Heater is not installed or enabled, then COOL Mode MUST be selected. DO NOT use AUTO or HEAT modes for a Cool-Only unit. If either AUTO or HEAT modes are selected with a Cool-only unit and the thermostat calls for heating, the compressor will run and still provide cooling.

8.3 Fan Speed Modes

8.3.1   Automatic Fan Speed Mode
EasyTouch has three automatic fan speeds available: High, Medium and Low. While in the On Mode, Automatic Fan Speed Mode allows the EasyTouch to determine the required fan speed based upon the set point temperature differential. This permits a balance between the most efficient temperature control and slower, quieter fan speeds. To select Automatic Fan Speed Mode, on the Main Screen press and release the Fan Button as many times as necessary until the word "AUTO" is displayed above the fan speed bar graph.

8.3.2   Manual Fan Speed Mode
There are three manual fan speeds available: High, Medium and Low. While in the On Mode, Manual Fan Speed Mode allows you to select and maintain a desired fan speed. To select Manual Fan Speed Mode, on the Main Screen press and release the Fan Button until the desired speed is indicated on the Fan Speed bar graph and the word "MANUAL" is displayed above the fan speed bar graph. The selected fan speed will increase and decrease as the Fan Button is repeatedly pressed until the Fan Speed Mode is returned back to Automatic.

8.3.3   Fan-Only Mode
While in the Off Mode, use the Fan-Only Mode to operate the fan for air circulation when no cooling or heating is desired. On the Main Screen, press and release the Fan Button to start at low fan speed. Press and release again to select Medium fan speed. Press and release a third time to select High fan speed. Press and release a fourth time to turn off the fan. Putting the control into ON Mode will cancel the Fan-Only Mode and revert the fan speed back to the Automatic Mode or whatever the last selected manual fan setting was.

NOTE: Please refer to section 12.1.11 for more information on the Fan Operational Modes, Continuous or Cycled.

9. FRESH AIR MAKEUP (FAMU) OPERATION

A Fresh Air Makeup (FAMU) system is meant to draw in and condition outside air and drive it into the interior cabin areas. The air drawn in from the outside is considered the "intake", and the air discharged into the cabin is considered the "exhaust". The FAMU unit must condition the outside air in a <u>single pass through the system</u>. FAMU systems therefore must incorporate both cooling and electric heating. EasyTouch supports FAMU operation for both DX and CW systems using the FX2 Control Board, rev J and newer.   Please refer to the *FX2 Control Board User Manual* for further details on how to wire the FX2 control board to a FAMU system (available on the Micro-Air website at this <u>link</u>).

A FAMU system takes warm and moist intake air at temperature T1, dew point DP1, and relative humidity %RH1, and will first cool and dry the air to a lower dew point DP2 at a temperature lower than the desired exhaust set point. Then, the FAMU system will reheat the air, increasing only its dry bulb temperature, further reducing its relative humidity, to temperature T2 and relative humidity %RH2. Please refer chart shown in Figure 9 for a Psychrometric analysis and overview of how a FAMU system accomplished this function.
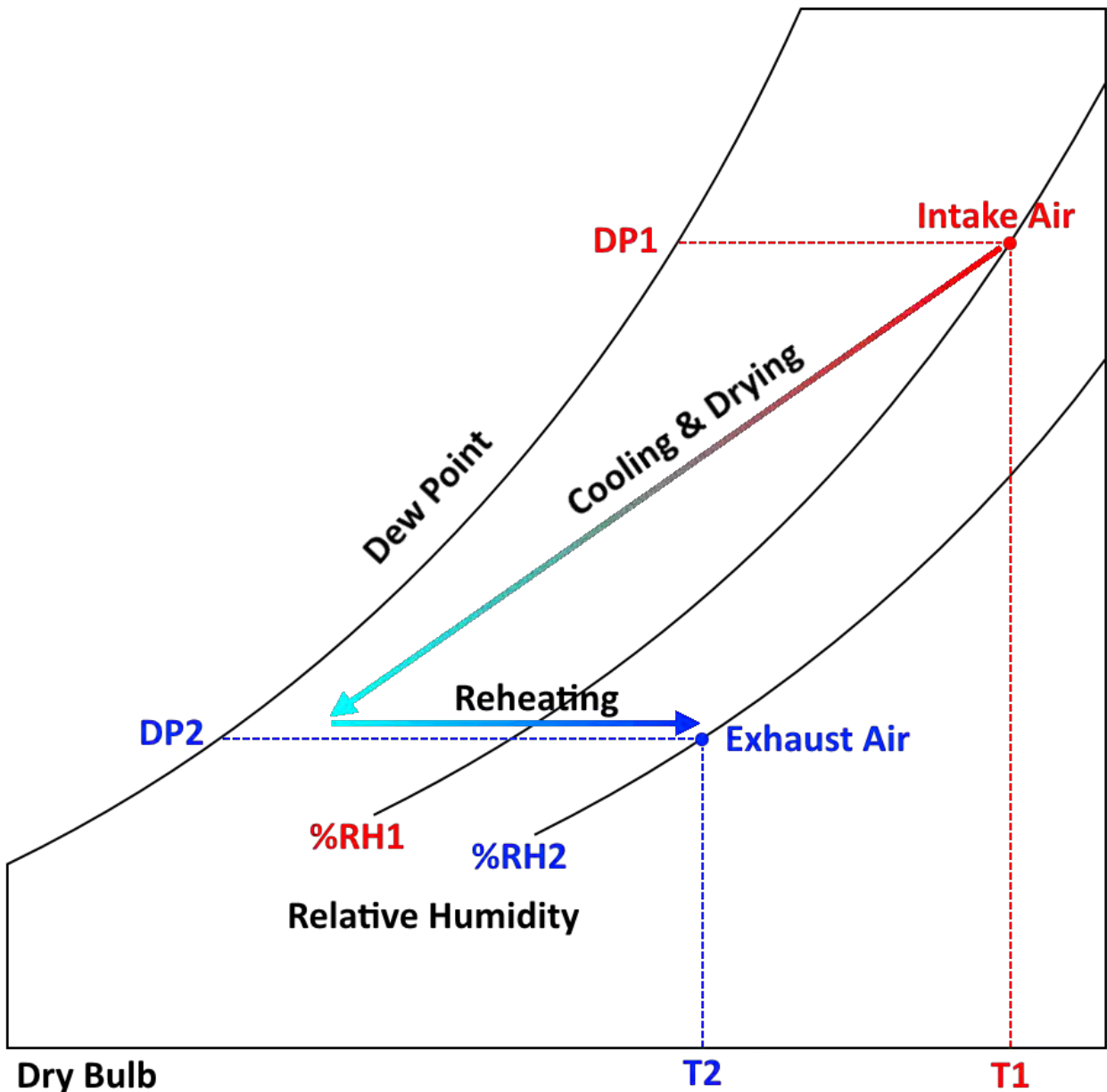

Figure 9 – Fresh Air Makeup (FAMU) Operation & Psychrometric Overview
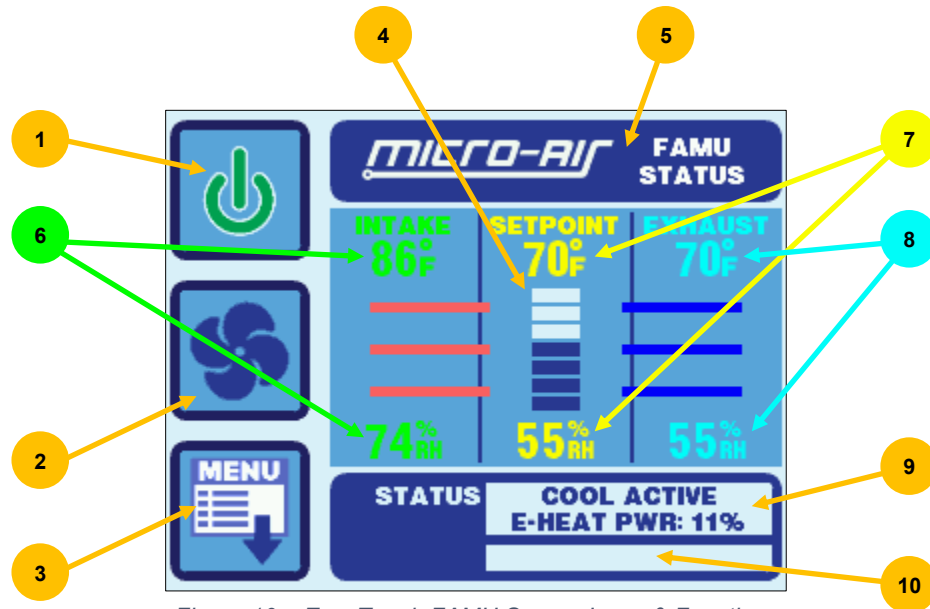
9.1 FAMU Operator Controls and Display

Figure 10 – EasyTouch FAMU Screen Icons & Functions

1. **Power On/Off Button** - Press and release to toggle between the ON (green) and OFF (red) operation.
2. **Fan Button** – The Fan button is used to control the fan speed. The Fan button will rotate when the fan is on, and will be stationary when the fan is off. See section 9.3 for more information on the controlling the fan speed.
3. **Menu Button** – The Menu button allows access to the EasyTouch Main Menu and all sub-menus beyond. See section 11 for more information on the menus.
4. **Fan Speed Indicator** – This indicator is a bar graph that shows the speed at which the fan is currently operating. There are 3 fan speeds with EasyTouch: 1 bar lit indicates low speed, 4 bars lit indicate medium speed, and 7 bars lit indicate high speed.
5. **Force Sleep Mode Button** - Press and release to force Sleep Mode to initiate immediately, if enabled. See section 15.3 for more information on Sleep Mode.
6. **Intake Temperature & Relative Humidity** – These values are the live temperature and relative humidity as read from the intake sensor, plugged into the "OUTSIDE / RH" jack.
7. **Set Point Temperature & Relative Humidity** – These values are the set point temperature and relative humidity currently assigned for the FAMU system. See section 12.5 (FAMU DX) or section 12.6 (FAMU CW) for more information on these set point values.
8. **Exhaust Temperature & Relative Humidity** – These values are the live temperature and relative humidity as read from the exhaust sensor, plugged into the "ALT. AIR / RH" jack.
9. **Operational Status & Fault Help Button** – This display area indicates the current operational status of the control, including standby and active states, fault states, fault recovery, and fault lockout. The status is split into two lines. The first line indicates the cooling operation status and the second line indicates the electric heater operation status. If a fault is active, touching this status area will display the Fault Help screen for the active fault. See section 9.3.2 for more information on fault displays.
10. **Filter Maintenance Status** – If enabled, this display area indicates when it is time to clean or replace the air filter. See section 12.1.6 for more information on the Air Filter Reminder.

9.2 FAMU Sequence of Operation

A general overview of the FAMU DX Sequence of Operation is shown in Figure 11, and a general overview of the FAMU CW Sequence of Operation is shown in Figure 12.

FAMU DX Operation Flowchart

Symbol Key:
T_{SP} = Set Point Temperature
DP_{SP} = Set Dew Point
T_I = Intake Temperature
DP_I = Intake Dew Point
RH_I = Intake Relative Humidity
T_E = Exhaust Temperature
Diff1 = Cooling Control Differential
Diff2 = Dew Point Control Differential
Diff3 = Heating Control Differential
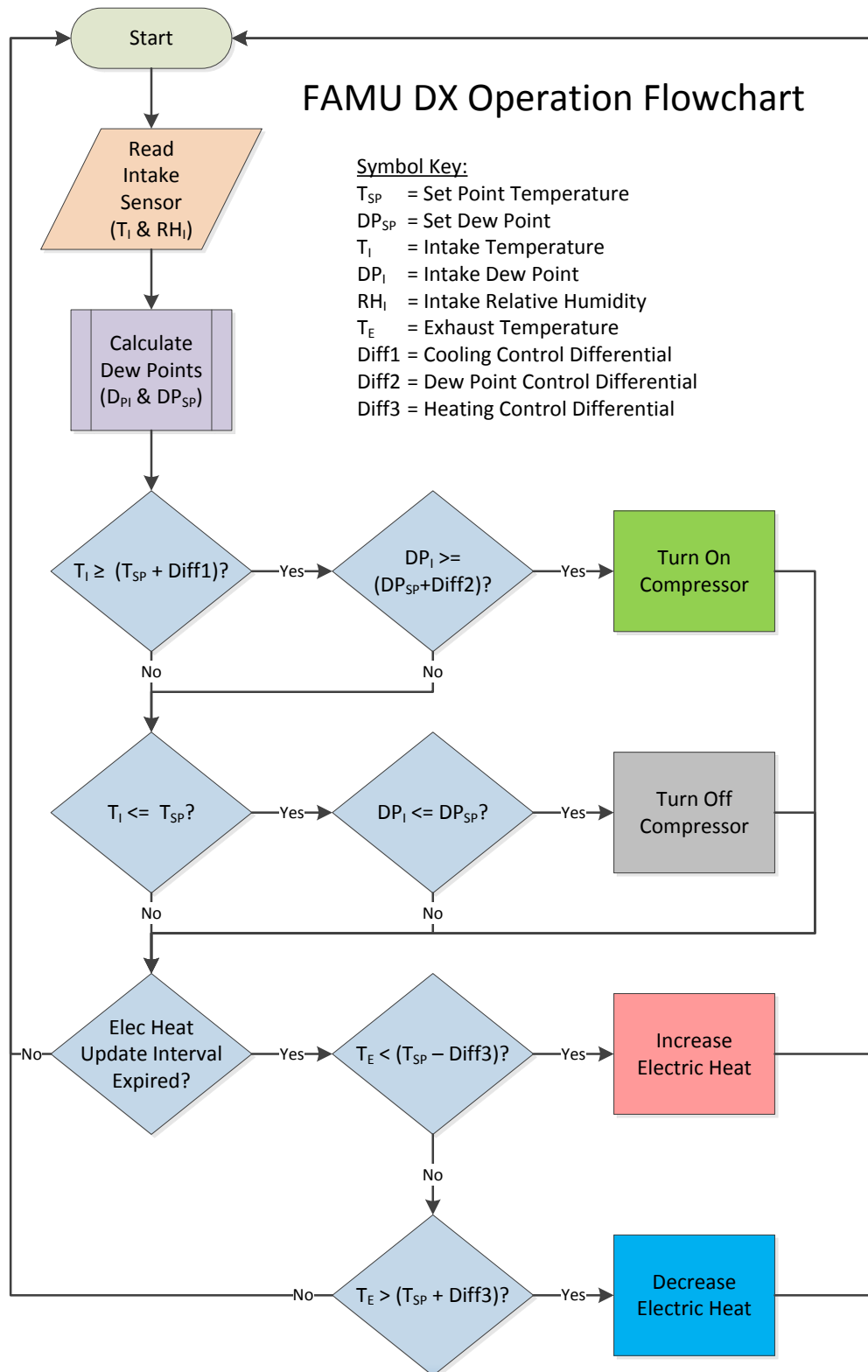
Figure 11 - FAMU DX Sequence of Operation

FAMU CW Operation Flowchart

Start

Read Intake Sensor (T_I & RH_I)

Calculate Dew Points (DP_I & DP_{SP})

Symbol Key:

T_{SP} = Set Point Temperature
DP_{SP} = Set Dew Point
T_I = Intake Temperature
DP_I = Intake Dew Point
RH_I = Intake Relative Humidity
T_E = Exhaust Temperature
T_{CW} = Chilled-Water Loop Temperature
Diff1 = Cooling Control Differential
Diff2 = Dew Point Control Differential
Diff3 = Heating Control Differential

$T_I \geq (T_{SP} + \text{Diff1})$? — Yes → $DP_I >= (DP_{SP} + \text{Diff2})$? — Yes → $T_{CW} < T_I$? — No

$T_{CW} < T_I$? — Yes → **Turn On Valve**

$T_I <= T_{SP}$? — Yes → $DP_I <= DP_{SP}$? — Yes → **Turn Off Valve**

Elec Heat Update Interval Expired? — Yes → $T_E < (T_{SP} - \text{Diff3})$? — Yes → **Increase Electric Heat**

$T_E < (T_{SP} - \text{Diff3})$? — No → $T_E > (T_{SP} + \text{Diff3})$? — Yes → **Decrease Electric Heat**
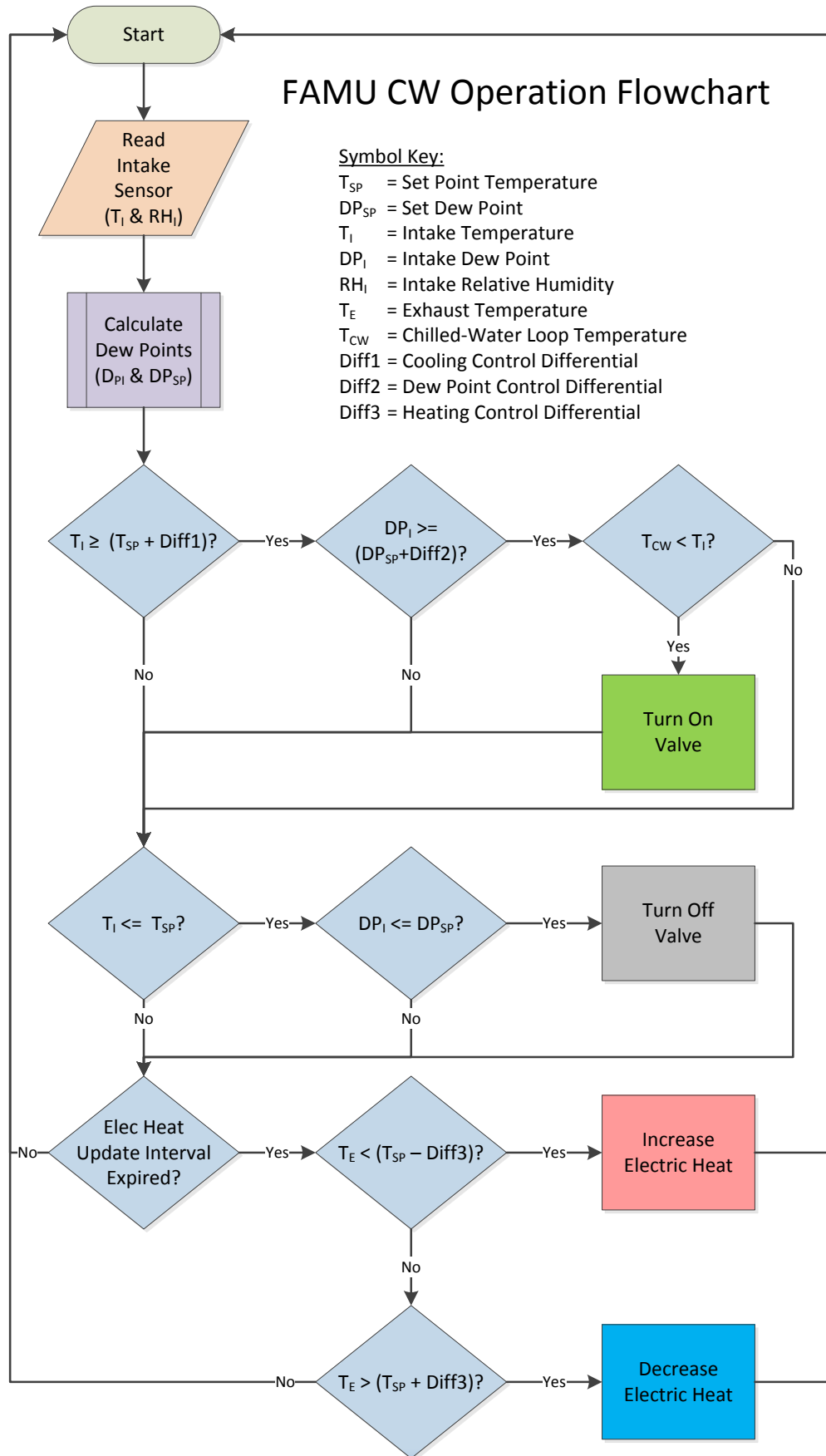
$T_E > (T_{SP} + \text{Diff3})$? — No

Figure 12 - FAMU CW Sequence of Operation

9.3 FAMU Settings & Recommendations

FAMU operation requires 3 important settings to insure proper operation of the system. Careful consideration is recommended for each setting as described in detail below.

9.3.1   Exhaust Temperature Set Point (*Factory default:* **70°F/21°C**)
This parameter sets the desired exhaust air temperature set point. The EasyTouch will apply the necessary cooling and/or heating to attain this exhaust temperature within 2°F/1°C. It is recommended that this setting be about equal to the lowest cabin control temperature set point in all the spaces affected by this FAMU exhaust air.

9.3.2   Exhaust Relative Humidity Set Point (*Factory default:* **50%**)
This parameter sets the desired exhaust air relative humidity. The EasyTouch will apply the necessary cooling and/or heating to achieve a relative humidity that is at or below this setting. Depending on the intake air temperature and relative humidity, it is recommended that this setting be about equal to the desired relative humidity for all cabin spaces.

9.3.3   Fan Speed Setting (*Factory default:* **Medium**)
This parameter sets the fixed fan speed for all FAMU operation. Fan speeds are therefore always manual during FAMU operation, and there is no automatic fan speed adjustment. It is highly recommended that the fan speed be set to achieve the following:

   a) *High enough* to provide the minimum number of air exchanges per hour as specified for the spaces affected by this FAMU system.
   b) *Low enough* to achieve the Exhaust Temperature and Relative Humidity Set Points.

IMPORTANT:
If the FAMU system is unable to achieve the Exhaust Temperature and Relative Humidity Set Points, it is recommended that the Fan Speed Setting be reduced.

NOTE:
The selected Fan Speed, low, medium or high, can be more finely adjusted by using setting the corresponding Fan Speed Programming Parameter. See section 12.2 for more information on how to more precisely adjust the selected fan speed.

10. FAULTS

There are a total of six different faults that the EasyTouch can declare. Only one applies during CW operation and all six apply during DX operation.

When a fault is declared, it is displayed in the Status Area of the Home, Main, FAMU, and System Status screens. Once the fault has cleared, the system will automatically delay 2 additional minutes (except for the EasyStart Fault) and display "FLT DLY", "FAULT DLY" or "FAULT DELAY", before restarting a cooling or heating cycle. At anytime during the fault condition or fault recovery delay, pressing and releasing over the top of the fault status on the Main screen will display help information for the particular fault. See section 16.2 for more information on Fault Help.

Certain faults indicate a serious problem for the air conditioner. Any four faults of these types during a single cooling or heating cycle will result in a **LOCKOUT** condition. Once a lockout occurs, the system will not restart automatically. Operator intervention is required. To clear a lockout condition, power must be cycled (turned off and back on again) via the Power button on the Home, Main, or FAMU display screens. The fault count being monitored for lockout will be reset to zero upon the termination of the cooling or heating cycle, or if power is cycled.

NOTE: The Air & FAMU Sensor Faults results in an immediate lockout condition. All other faults affect lockout as described below.

10.1 Air Sensor Fault (DX & CW, immediate lockout)

Main Screen Display: "FAULT SENSOR"
Status Screen Display: "FAULT INSIDE SENSOR"
Fault History Display: "SENSOR IN"

The EasyTouch can utilize one of 3 different temperature sensors for its Inside Temperature display and use for control purposes:

- Built-in Display Temperature Sensor
- Alternate Air Temperature sensor plugged into the main FX1/FX2 control board
- Cabin Combination Temperature/Humidity sensor plugged into the "INTAKE" jack on the FX2 Humidity Option Daughterboard (rev G1 and older, if equipped)
- Cabin Combination Temperature/Humidity sensor plugged into the ALT. AIR / RH" jack on the FX2 (rev J and newer) ".

Normally, the inside temperature sensor selection is determined automatically. (See section 12.1.16 for details on how to select the Inside Temperature sensor.) If a specific sensor is selected and it malfunctions, or all of the potential inside temperature sensors have malfunctioned, the Air Sensor Fault will be declared. Depending on which temperature sensor is required, replacing the failed external temperature sensors or replacing the display itself may be necessary to remedy the problem.

10.2 FAMU Sensor Faults (FAMU only, immediate lockout)

FAMU Screen Display: "FAULT INTAKE SENSOR" or "FAULT EXHAUST SENSOR"
Status Screen Display: "FAULT INTAKE SENSR" or "FAULT EXHST SENSR"
Fault History Display: "SENSOR IN" or "SENSOR EX"

When FAMU is selected as the System Type (see section 9), both an intake and exhaust combination temperature/humidity sensor need to be installed into the "OUTSIDE / RH" and "ALT. AIR / RH" jacks, respectively, at all times. If either of these sensors fails to provide temperature and relative humidity information, one of these faults will be declared. Check and replace the sensors as necessary, with only approved types.

10.3 High Pressure Fault (DX & FAMU DX only, contributes to lockout count)

Main Screen Display: "FAULT HIGH PS"
FAMU Screen Display: "FAULT HIGH PRESSURE"
Status Screen Display: "FAULT HIGH PRES"
Fault History Display: "HIGH PRES"

The High Pressure Fault occurs whenever the system's high pressure switch opens during compressor operation or whenever it is open just before compressor start-up.

1. If the high pressure switch is open while the compressor is off, the most likely cause is an open connection in the pressure switch itself.
2. If the high pressure switch opens while the compressor is operating in COOL mode, the most likely cause is poor seawater flow or a fouled condenser.
3. If the high pressure switch opens while the compressor is operating in HEAT mode, the most likely cause is poor air flow through the evaporator, possibly due to a clogged air filter.

10.4 Low Pressure Fault (DX & FAMU DX only, contributes to lockout count)

Main Screen Display: "FAULT LOW PS"
FAMU Screen Display: "FAULT LOW PRESSURE"
Status Screen Display: "FAULT LOW PRES"
Fault History Display: "LOW PRES"

The Low Pressure Fault occurs whenever the system's low pressure switch opens during compressor operation and remains open for at least 10 minutes, or whenever it is open just before compressor start-up.

1. If the low pressure switch is open while the compressor is off, the most likely cause is loss of refrigerant charge in the system due to a leak.
2. If the low pressure switch is open while the compressor is operating in COOL mode, the most likely causes are low refrigerant charge or cold seawater.
3. If the low pressure switch is open while the compressor is operating in HEAT mode, the most likely causes are low refrigerant charge or cold inside air temperature. Setting the fan speed to manual low can sometimes remedy low pressure faults in HEAT mode.

10.5 Low AC Fault (DX & FAMU DX only, no lockout)

Main Screen Display: "FAULT LOW AC"
FAMU Screen Display: "FAULT LOW AC"
Status Screen Display: "FAULT LOW AC"
Fault History Display: "LOW AC"

The Low AC Fault occurs whenever the AC line voltage is below the *Low-Voltage Monitor* parameter setting during compressor operation for at least 5 minutes, or whenever it is below just before compressor start-up. By default, the Low-Voltage monitor is not enabled. See section 12.3.3 for more information on how to enable and set the voltage threshold for the Low-Voltage Monitor.

10.6 Pump Sentry Fault (DX & FAMU DX only, contributes to lockout count)

Main Screen Display: "FAULT PUMP"
FAMU Screen Display: "FAULT PUMP SENTRY"
Status Screen Display: "FAULT PUMP SENTRY"
Fault History Display: "PUMP SNTRY"

The Pump Sentry Fault occurs whenever the Service sensor temperature exceeds the *Pump Sentry* parameter setting during compressor operation, or if it drops below 45°F/7°C (if *Electric Heat* is not enabled; see section 12.1.14). Refer to section 6.3 for more information on how to install the optional Service sensor, and section 12.3.5 for more information on how to enable and set the temperature threshold for the Pump Sentry.

10.7 Overcurrent Fault (DX & FAMU DX only, contributes to lockout count)

Main Screen Display: "FAULT OVRCURR"
FAMU Screen Display: "FAULT OVERCURRENT"
Status Screen Display: "FAULT OVERCURRENT"
Fault History Display: "OVERCURR"

The Overcurrent Fault occurs whenever the system's total AC current load exceeds the Current Limit parameter setting for at least 30 seconds (sustained) or at any time prior to compressor startup while the control is turned on. This fault protects the control board electronics, wiring, and compressor for possible further damage.

The causes of overcurrent vary. Check the compressor and other AC loads for proper operation. Also refer to the possible causes listed under the High Pressure Fault (section 10.3).

10.8 Lost AC Fault (DX & FAMU DX Only, no lockout)

Main Screen Display: "FAULT LOST AC"
FAMU Screen Display: "FAULT LOST AC"
Status Screen Display: "FAULT LOST AC"
Fault History Display: "LOST AC"

The Lost AC Fault occurs whenever the EasyTouch detects that the AC line voltage has been lost during compressor operation (i.e. a brownout condition). Brownout conditions can cause compressors to stall very quickly (<50ms), so this detection protects the compressor by shutting down the compressor relay output and waiting for the normal fault recovery delay before attempting a compressor restart.

10.9 EasyStart Fault (DX & FAMU DX only, contributes to lockout count)

Main Screen Display: "FAULT EASYSTR"
FAMU Screen Display: "FAULT EASYSTART"
Status Screen Display: "FAULT EASYSTART"
Fault History Display: "EASYSTART"

The EasyStart Fault occurs whenever the EasyStart daughterboard system detects a problem with the compressor during startup and during normal operation. This fault remains active for 5 minutes, and so there is no additional 2-minute fault delay sequence after it is cleared as with all other faults.

The causes of EasyStart faults can be deciphered by examining the fault LEDs displayed on the EasyStart daughterboard during the active fault. Refer to the chart below and also printed on the daughterboard itself to determine the exact cause of the fault, and take appropriate action from there to remedy the cause.

	EasyStart LEDs Lit		
EasyStart Fault	**D6**	**D3**	**D4**
Overcurrent		X	
Overload (Klixon) Open	X		
Power Interruption		X	X
Compressor Stalled	X		X
Open Wire Connection	X	X	X

11. MENU AND SETTINGS OVERVIEW

The Main Menu is accessed from the Main screen by pressing the MENU button.   The Main Menu consists of 6 items on 2 pages (screens) as shown in Figure 13. All menus are hierarchically designed. All sub-menus and the various parameter settings available are accessed starting from the Main Menu. All of the parameter settings are stored in non-volatile memory and they are always retained, even when the battery is removed. A unique set of parameter settings can be saved and recalled, or factory default settings can also be recalled. Refer to sections 12.5, 12.8, and 12.9 for more information on memorizing and recalling settings.
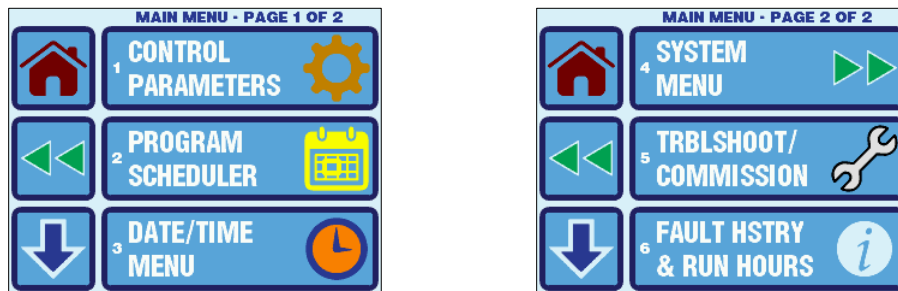

Figure 13 – Main Menu Display Screens

NOTE:
When the EasyTouch loses power, all of the parameter settings and the mode of operation are retained indefinitely. When power is restored, the control resumes operation as last programmed. The EasyTouch also has a battery to supply power to the real-time clock. If the battery has completely discharged or has been removed, only the time and date settings will be lost and will require resetting upon the next power up.

11.1 Menu Screen

All menu screens are constructed identically as shown in Figure 14. There are three large buttons to choose from three sub-menu or parameter setting choices. Paging through the menu is possible by using the DOWN ARROW button, and the current page number is always shown at the top. The menu page will wrap around to page 1 again after the last page has been reached.

1. **Home -** Press this button at any time to return to the Home Screen.
2. **Back -** Press this button to return to the previous screen.
3. **Scroll Down -** Press this button go to the next page in the menu.
4. **Menu Selection Options -** Press any of these buttons to choose a new sub-menu or modify a parameter setting.

11.2 Settings Screen

All of the parameter settings screens are constructed identically as shown in Figure 15. Some parameters are numeric and some are text choices. In all cases, the UP/DOWN arrows allow adjustment of the setting, and the SAVE button allows saving of the setting in non-volatile memory.
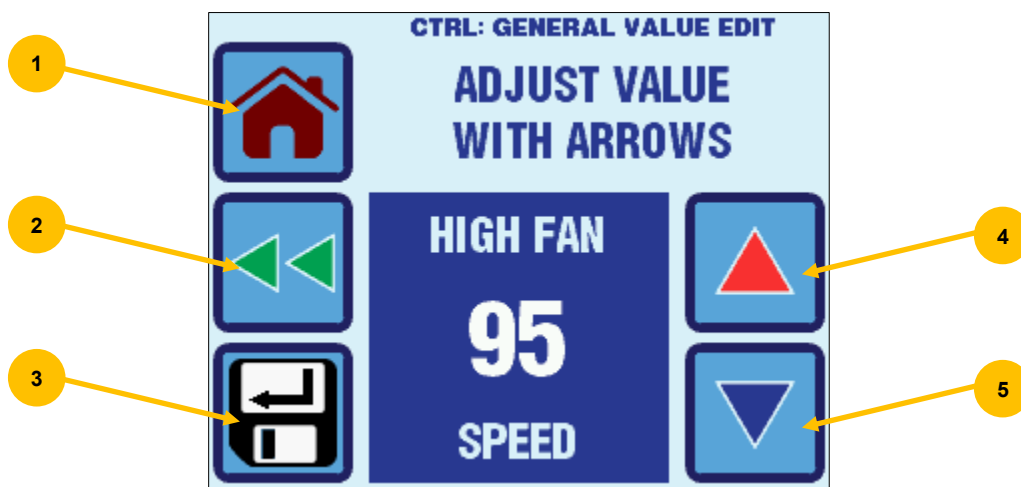
Figure 15 – EasyTouch Settings Screen Layout

1. **Home -** Press this button at any time to discard any changes and return to the Home Screen.
2. **Back -** Press this button to discard any changes and return to the previous screen.
3. **Up** - Press the button to increase the setting to the next value or selection.
4. **Down** - Press the button to decrease the setting to the previous value or selection.
5. **Save -** Press this button save the desired setting change.

12. CONTROL PARAMETERS MENU

The Control Parameters Menu allows the adjustment of all the parameter settings that affect the physical operation and configuration of the air conditioning system. Typically, the settings in this menu are accessed only by qualified technical service person or a knowledgeable user. To access the Control Parameters Menu, go to Main Menu and select Control Parameters.

The Control Parameters Menu consists of 6 items on 2 pages as shown in Figure 17. Page 1 of the menu will differ depending on whether the system is configured for DX, CW, FAMU DX, or FAMU CW operation. Please see section 12.1.1 for more information on the *System Type Selection*.
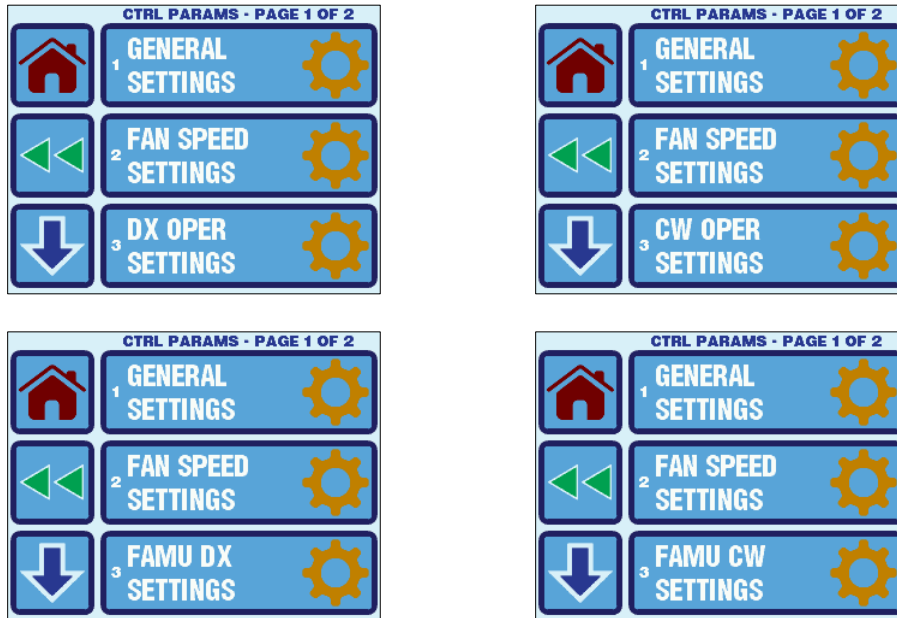

Figure 16 – Control Parameters Menu Screen – Page 1 of 2 (shown for various System Types)
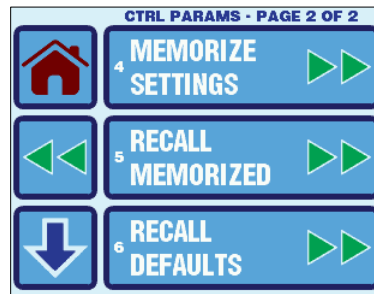

Figure 17 – Control Parameters Menu Screen – Page 2 of 2

12.1 General Settings

To access the General Settings, go to the Main Menu, select Control Parameters, and then select General Settings. The parameters available in the General Settings Menu depend on the setting of the first parameter in the listing, *System Type Selection.* See section 12.1.1 for more information on this parameter. For standard DX/CW Operation, the General Settings Menu consists of 19 items on 7 pages as shown in Figure 18, and for FAMU Operation it consists of 11 items on 3 pages as shown in Figure 19.
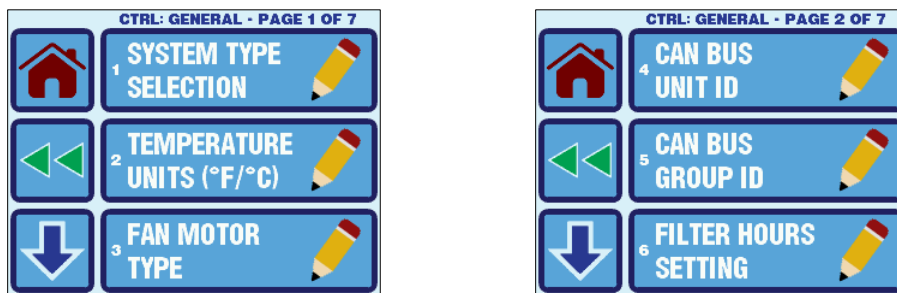
Figure 18 – EasyTouch General Settings Menu Screens for Standard DX/CW System
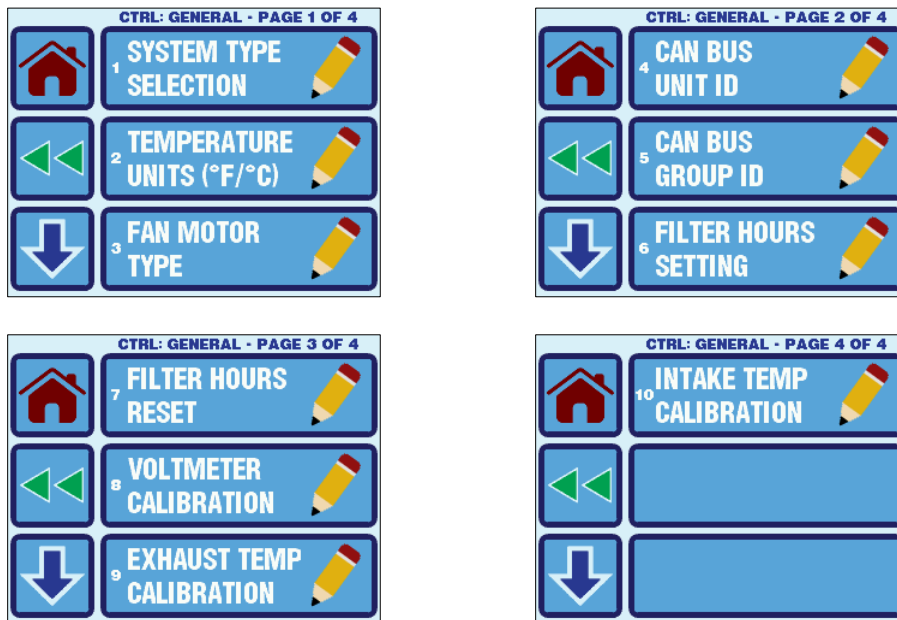

Figure 19 – EasyTouch General Settings Menu Screens for FAMU System

Refer to Table 2 for a quick reference to the General Settings. Click the hyperlinks in the table to refer to the sections that follow providing further details on each setting.