

The **FX-1 Control** is designed for use with all direct expansion, reverse cycle air conditioning systems. **FX-1** has a universal power supply that operates on 115, 230, 50 or 60 Hz AC power. FX-1 includes the following standard and optional features:

Standard Features

User friendly 4 button display panel requires no manual for basic operation.

Five volt logic and micro controller located in the display.

3-digit 7-segment display panel indicates °Fahrenheit or °Celsius.

Room temperature sensor integral in the display panel.

Automatic fan speed reduction as set point is approached.

Six [6] programmable manual fan speeds.

17 programmable parameters for custom installations.

AC voltmeter to protect valuable electrical components.

High and low Freon pressure sensor inputs.

Away Mode for controlling relative humidity.

De-Icing cycle to prevent evaporator coil icing.

Programmable multiple compressor staging delays.

Universal AC power supply.

Nonvolatile memory retains settings without batteries.

Programmable display brightness control for night use.

Optional Features

The following optional items can be added by plugging the device into the appropriate jack and making the necessary programming changes.

Outside air temperature sensor... No programming necessary.

Alternate air temperature sensor... No programming necessary.

Custom paintable display panels.

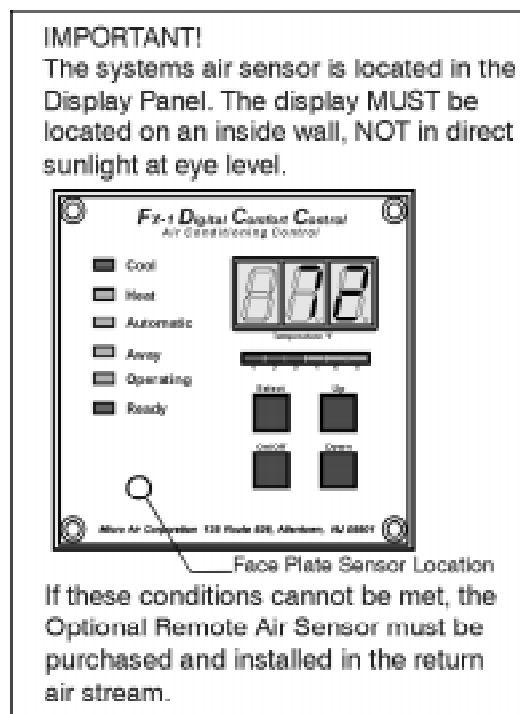
Pump Guard water sensor... Program setting of P-9 required.

This manual is designed to provide all the information necessary to insure proper installation and operation of the **FX-1**. Poor installation and **misunderstood** operating parameters will result in unsatisfactory performance and premature failure of the FX-1.

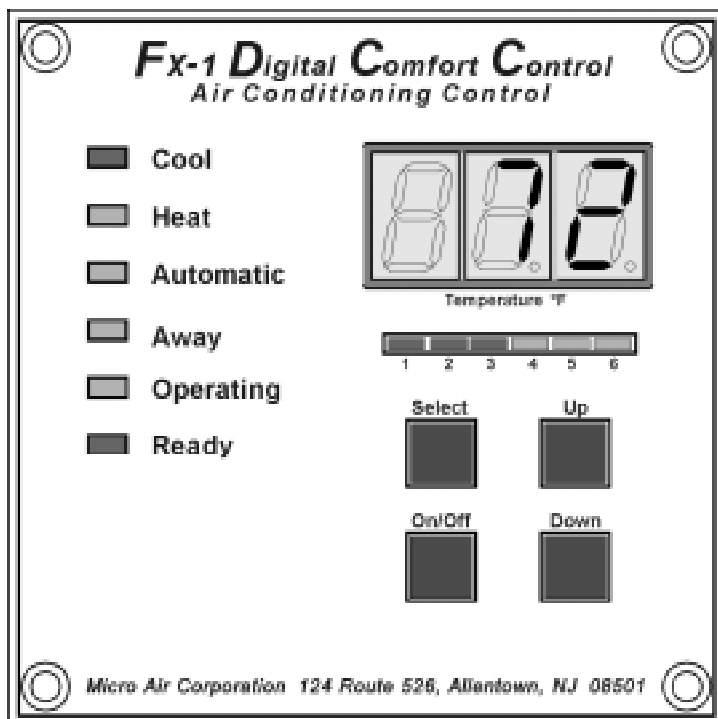
Read This Manual Completely Before Proceeding !

If you require assistance prior to or during the installation of the FX-1 call Micro Air at 609-259-2636 or Fax your questions to Micro Air at 609-259-6601.

The **FX-1** is covered under existing Micro Air Warranty Policy. Incorrect installation, neglect and system abuse are not covered under Micro Air's warranty policy.



POWER BUTTON Press the power button once to toggle the unit to the on mode. Press the power button again to toggle the unit to the off mode.



UP BUTTON Momentarily press and the set point will appear in the temperature display. The set point increases one degree each time the up button is pressed and released.

DOWN BUTTON Momentarily press and release to display the set point. The set point is decreased one degree each time the down button is pressed and released.

SELECT BUTTON The **select button** is used to select one of 4 Operating Modes. Press and release to advance to the next mode. Continue to press and release until the desired Operating Mode is reached. The mode selected is indicated by the Mode LED.

THREE DIGIT DISPLAY The inside [supply] temperature is displayed whenever the control is turned on. The display provides a readout of the inside air temperature.

HEAT MODE LED The heat mode LED is lit when Heating is selected.

COOL MODE LED The cool mode LED is lit when the Cooling is selected.

AUTO LED The auto LED is lit when the Automatic Heating or Cooling Mode is selected. The control will automatically switch to heating or cooling when this mode is selected.

AWAY MODE LED The away LED is lit when the Away Mode [Rh Control] is selected.

AUTO FAN SPEEDS The fan speeds are automatically reduced as the set point is approached.

FAN SPEED BAR GRAPH There are six [6] individual fan speed LED's. Each LED represents one [1] fan speed. Low fan [1] is indicated by illuminating the first LED. High fan speed is indicated by illuminating all six [6] LED's.

MANUAL FAN SPEEDS Manual fan speed settings are available via system programming. See the first programming item on page 9.

OPERATING LED The system operating status [compressor on or off] is indicated by the operating LED.

FX-1 is a user friendly, easy to operate, programmable temperature control.

Press the ON/OFF button once to engage the system. The Display indicates room temperature when the system is on and the Display is blank when the system is off.

Press and release the Select Button until the desired Mode LED is illuminated.

Set the desired room temperature by pressing the up or down button. The set point can be viewed by momentarily pressing and releasing the Up or Down Button.

Fan speed operation is automatic allowing fan speed to decrease as room temperature is approached. The fan speed decreases as the set point is approached. The fan will operate at low speed when set point is satisfied. Manual fan speeds can be selected by entering the program mode and selecting the desired manual fan speed. The fan will operate at the speed selected and will not change speeds with room temperature. See page 9 of this manual for programming instructions.

The fan can be programmed to cycle on and off with demand, allowing the fan to run only when cooling or heating is required. Normally the automatic fan speed operation is reversed in the heating mode, however, the fan can be programmed to operate the same as in the cooling mode.

NORMAL HEATING OR COOLING CYCLE

Select Cool only and cooling only will be supplied. The cabin temperature will be maintained within 2 ° F of the set point. Select Heat only and only heating will be supplied. The cabin temperature will be maintained within 2 ° F of the set point.

Select Automatic and both heating and cooling will be supplied as required. While in the Automatic Mode FX-1 will maintain a two degrees Fahrenheit (2 °F) temperature variation. A four degree swing is required to cause the unit to shift to the opposite mode. Once in a given mode, heating or cooling, FX-1 will maintain a two degree differential.

When the Heating or Cooling demand is satisfied, the compressor cycles off and the Automatic Fan returns to low speed. The fan speed will remain constant if Manual Fan Speed has been programmed.

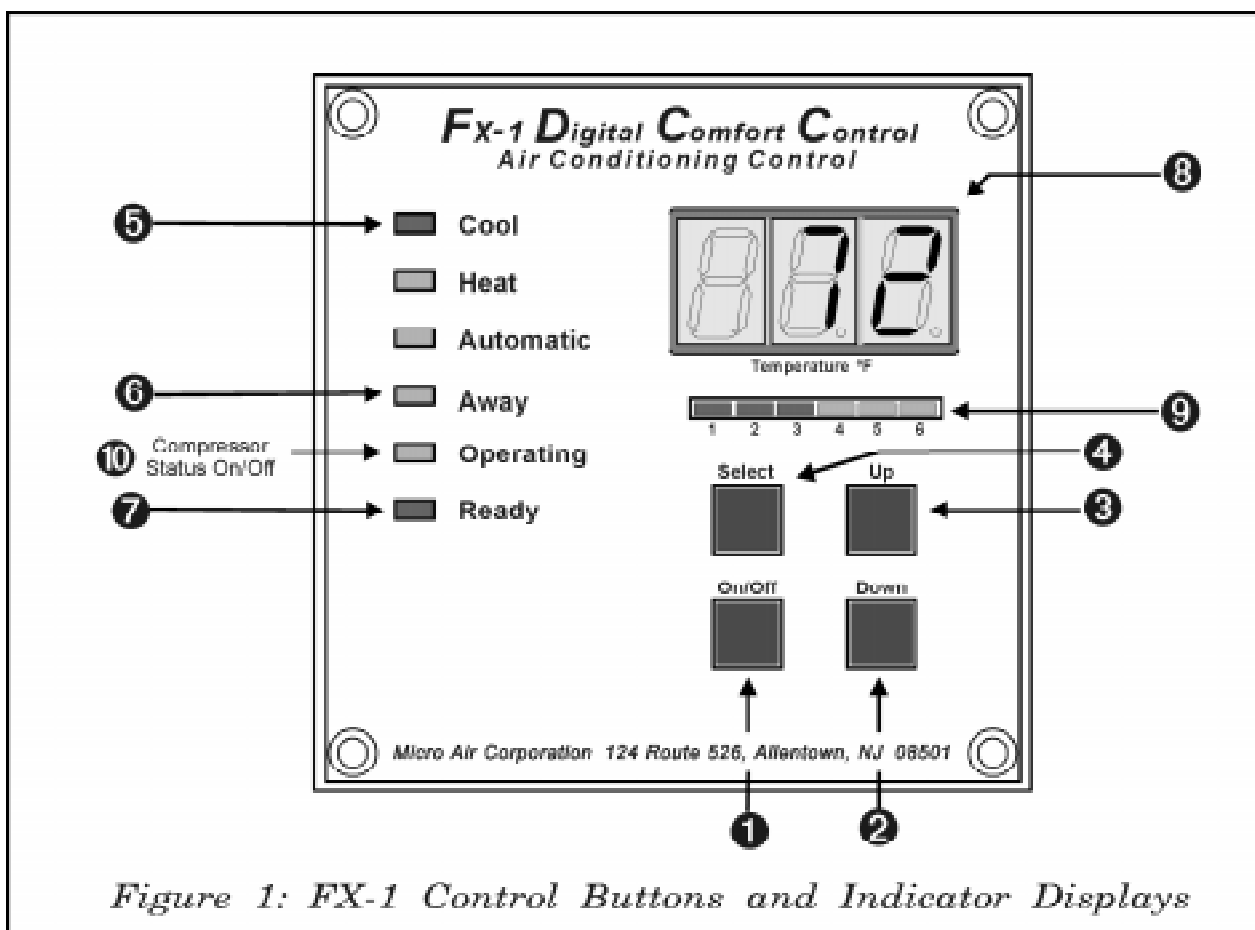
REVERSING VALVE OPERATION

The reversing valve is toggled to the opposite mode when heating or cooling is required to reduce the compressor starting surge. The valve will only toggle to the opposite mode when a cooling or heating cycle is called for and if the system has been off for less than seventy-five (75) seconds. The valve will also toggle if a cycle is interrupted from the display panel by pressing the power button ON/OFF, or changing the set point. Unnecessary valve toggling has been limited to reduce reversing valve noise. Valve toggling can be totally eliminated by programming the minimum compressor staging delay at seventy-five seconds (75) or greater.

Power on reset, which occurs when the system is powered up, will always initiate a valve toggle.

Memory: FX-1 has nonvolatile memory which requires no batteries or any form of backup power. When power is lost the operating parameters are retained indefinitely. When power is restored, the control resumes operating as last programmed. All operating and programming parameters are entered into nonvolatile memory instantly and are retained indefinitely.

Refer to figure 1 for the buttons locations and display functions listed on the following pages.



1. POWER BUTTON The power button is used to toggle between the **on** and **off modes**. Press the power button once to toggle the unit to the on mode. Press the power button again to toggle the unit to the off mode.

2. DOWN BUTTON Momentarily press and release the **down button** to display the set point. Press and release the **down button** to decrease the set point. The set point is decreased one degree each time the down button is pressed and released. The lowest set point allowed is 55 ° Fahrenheit. The down button is used in conjunction with the up button to display the outside air temperature when the control is on. The down button is also used to reduce program values in the program mode.

3. UP BUTTON Momentarily press the **up button** and the set point will appear in the temperature display. Press and release the up button to increase the set point one degree. The set point is increased by one degree each time the up button is pressed and released. The highest set point allowed is 85 ° F. The up button is used in conjunction with the down button to display the outside air temperature when the control is on. The up button is also used to increase program values in the program mode.

4. SELECT BUTTON The **select button** is used to select one of the four operating modes. Press and release the **select button** and the FX-1 will advance to the next mode. Continue to press and release the select button until the desired operating mode is reached. The mode selected is indicated by the Mode LED, i.e., Cool, Heat, Automatic or Away Mode.

5. COOL MODE LED The cool mode LED will be lit when the Cooling Mode has been selected.

HEAT MODE LED The heat mode LED will be lit when the Heat Mode has been selected. The heat mode LED is also lit when the optional electric heat is installed and the heat mode is selected. Electric heater status, on or off, is indicated by the Operating LED.

6. AWAY MODE LED The Away Mode LED will be lit when the Away Mode has been selected. This mode is used to control moisture during periods when the vessel is unoccupied.

7. READY LED The Ready LED is on whenever AC power is supplied to the control. The Ready LED remains on when the control is in both the ON and OFF Modes.

8. THREE DIGIT SEVEN SEGMENT DISPLAY The inside air temperature is displayed in the window whenever the control is turned on. The three digit 7 segment display provides a readout of the inside air temperature which is located in the face plate. An **optional alternate** air sensor is available for installations that cannot use the face plate sensor.

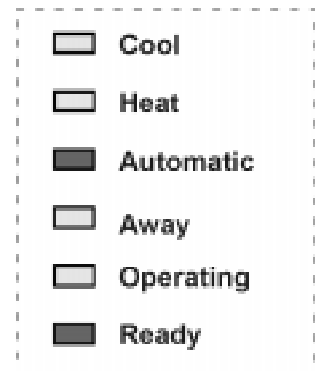
The display also indicates program information, fault codes and outside air temperature when the **optional outside air sensor** is installed.

The display will momentarily indicate the **set point** when either the **up** or **down** button is pressed and released.

When the control resumes operation after a power interruption all the display LEDs will turn on for one second. This is a normal operating condition and is referred to as "Power On Reset".

9. FAN SPEED BAR GRAPH There are six [6] individual fan speed LED's in the Fan Speed Bar Graph. Each LED represents one [1] fan speed. Low fan speed [1] is indicated by illuminating the first LED. High fan speed is indicated by illuminating all six [6] LED's. Any of the six [6] fan speeds available are displayed by illuminating the appropriate LED's.

10. OPERATING STATUS LED The Operating LED is **on** when the compressor is **on** and **off** when the compressor is **off**. The Operating LED also indicates when the optional electric heater is turned on.



DUAL BUTTON FUNCTIONS

Up & Down Buttons... Press the up and down button together and the outside air temperature will be displayed, providing the **OPTIONAL OUTSIDE AIR TEMPERATURE SENSOR** has been installed. No programming is required. **Press the UP & Down Buttons** simultaneously, while in the program mode, to set new custom programming defaults.

Power & Down Buttons... Simultaneously press the power and down buttons while viewing the Service Fault History Log clears the fault History Log.

Special button functions are implemented by pressing and holding a particular button while the controls' AC power is turned on.

1. Service History Log... View the service history log by pressing and holding the **select button** while turning on the AC power. Exit the service history log by pressing the **power button** once. Clear the service history log by simultaneously pressing the power and down buttons.

2. Self Test Mode... Press and hold the **power button** while AC power is applied to enter the self test mode. The self test is used to diagnose problems and test the air conditioning system. For complete details see page 15 of this manual.

3. View Hour Meter... To view the compressor hour meter, press and hold the **down button** while applying AC power. Maximum recorded time is 10,000 hours. The hour meter stops at maximum (10,000 hrs) and can only be reset by Micro Air Corporation. The hour meter functions are described fully on page 17 of this manual.

MODES OF OPERATION

Off Mode

When the **FX-1** is in the **off mode**, all control outputs are turned off. Program parameters and user settings are saved in nonvolatile memory. The program mode can only be accessed from the off mode. The power LED remains lit in the off mode.

On Mode

When the control is in the **on mode**, power will be supplied to the appropriate control outputs and the display will indicate the current state of operation. The operating and program parameters resume based on those stored the last time the unit was operating.

Cool Only Mode

When **Cool LED** is on, only the cooling systems are selected and operated as required. When the temperature drops below the set point, the system will **not automatically** switch to the heating mode. Cooling only is available for customers that do not want automatic cooling and heating operation. Systems without reverse cycle heating can have an optional electric heater installed should heating be required.

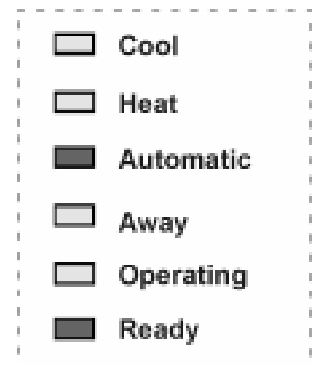
Heating Mode Only

When the **Heat LED** is on, only the heating systems are selected and operated as required. Should the temperature rise above the set point, the system will **not automatically** switch to the cooling mode. Heating only is supplied for customers that require the system to not automatically switch from the heating to the cooling mode.

Automatic Mode

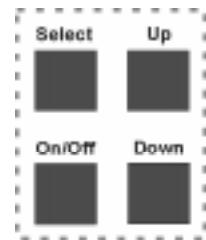
When the **Automatic LED** is on, both heating and cooling are supplied as required. The **heat** and **cool LEDs** will be lit according to the mode required. When the system requires compressor operation for heating or cooling the Operating LED will turn on when the compressor is on.

Temperature in a given mode will be maintained at two degrees Fahrenheit (2 ° F), however, a four degree difference is required to allow the control to change modes. Once in a new mode, the temperature will remain within two degrees Fahrenheit (2 ° F) of the set point.



Away-Mode

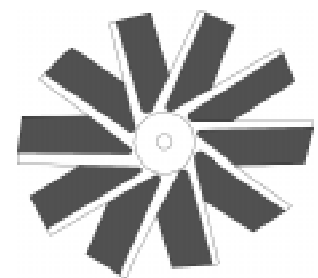
While in the **on mode**, press the Select Button until the Away Mode LED is illuminated. The first cycle will start in one minute. Every four (4) hours, the fan is started and air circulated for thirty (30) minutes. During this time the air temperature is sampled and entered into memory. The cooling cycle is started and continues until the temperature is lowered 2 ° F. The compressor is allowed a maximum of one hour running time to reach the desired temperature. Four (4) hours after the temperature is satisfied or the compressor times out, the cycle is repeated. During the humidity cycle the Operating LED is lit while the compressor is running.



FAN MODES

Automatic Fan Mode

FX-1 has six automatic fan speeds available. Speed six is high, three is medium and one is low or the slowest speed. Automatic fan mode allows the FX-1 to determine the required fan speed based on room temperature. The closer the room temperature is to the set point, the slower the fan will run. This permits a balance between the most efficient temperature control and slower, quieter fan speeds. Automatic fan operation is the **factory default**, however, manual fan speed control is available.



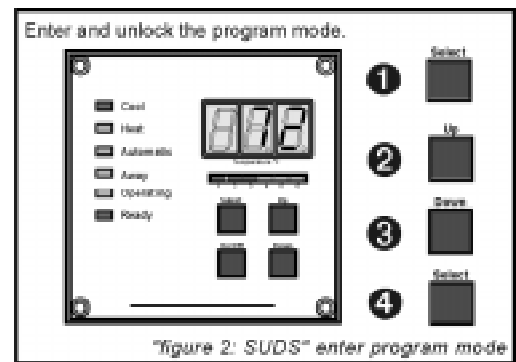
Manual Fan Mode

Program parameter one [1] is used to select one of the six (6) manual fan speeds available. Six (6) is the fastest and one (1) represents the slowest fan speed. Manual fan mode allows the user to select and maintain the desired fan speed manually. When a manual fan speed has been selected, the fan speed bar graph will indicate the speed selected by the number of LED's lit. Select speed 3, for example, and the first 3 LEDs in the fan bar graph will turn on. Manual Fan Mode is sometimes preferred when room temperature is constantly changing due to varying heat loads.



Program Mode Overview

The program mode is used to adjust the systems operating parameters to suit the particular needs of individual users. The program mode is also used to tailor the air-conditioning system for the most efficient operation within an installation. Installation variables such as, ducting, sensor location and system layout effect the perceived operation of the overall system. The program mode allows the system to operate as efficiently as possible under all conditions. **FX-1** is shipped with factory default settings which are stored in permanent memory and can be recalled at any time.

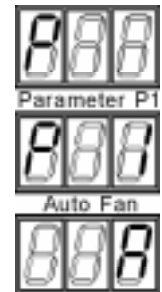


Warning

Severe electrical disturbances can sometimes upset the FX-1 operating sequences. Operator confusion related to program parameters can also cause, what seem to be, operational problems. Whenever there is any doubt as to the proper operation of the controller, Factory Default Parameters should be Re-initialized.

ENTERING PROGRAM MODE

The program mode can **only** be entered from the **off mode**. From the off mode and in the following order, press the **Select**, **Up**, **Down** and the **Select** buttons. These buttons have to be pressed and released in the order given. The letter "P" appears in the display. The buttons have to be pressed in the sequence described. Remember "**SUDS**"... It's the key to enter and unlock the program mode. The characters "P" then "P 1" followed by the parameter setting, appear in the display. The FX-1 control is now in the program mode. Exit the program mode, to the **off mode**, by pressing and releasing the **power** button.



NOTE: The control will exit the program mode and return to the **off mode** if no programming is attempted for one (1) minute.

Restore Memorized Default Settings

IMPORTANT ! The memorized default settings can be **restored** by entering the program mode and setting P-17 to **rSt**. Exit the program mode and the software version number appears in the display. The **memorized default settings** are restored and the FX-1 control returns to the **off mode**. The software version number is always displayed when you exit the program mode.



Increment from one **program parameter** to the next by pressing the **select button** while in the **program mode**. Press and release the select button to advance to the desired parameter. Use the **up** and **down buttons** to change the program parameter values. The **programmable parameters** range from P-1 through P-17.

Up and Down Buttons

The **up** and **down buttons** are used to select the data or set the desired limits for the parameter being programmed. This method is followed throughout the program mode, however, special instructions are included for individual functions as require them.

Exiting the Program Mode

There are two methods to exit the program mode. Press the power button and the **FX-1** control will return to the **off mode**. Not pressing any buttons or attempting any program changes for sixty (60) seconds will allow the control to exit the **program mode** to the **off mode**. Any programming changes that were made while in the program mode will be memorized and put into operation when the program mode is exited and the control is returned to the on mode.

Software Identification

The software version of the control is identified for one (1) second prior to the exit from the program mode. The software identification number, i.e. ("A10") will appear in the display for one second, then the control will return to the off mode.



Should there be any reason to contact Micro Air Corporation about the system or programming the FX-1 be sure to have the software identification number and serial number of the system available.

PROGRAMMING

P-1: Fan Speed Automatic or Manual

The program values allowed are A, followed by one (1) through six (6). Select "A" (factory default setting) for automatic fan speeds and the fan will operate in conjunction with room temperature. The further the room temperature is from set point, the faster the fan will run in the cooling mode. The fan speed will gradually decrease as the set point is approached and the fan will run at low speed (1) when the set point is satisfied. Select any one of six (6) manual fan speeds available, for example, select three (3) and the fan will operate at medium speed under all temperature conditions. When a manual fan speed is selected the fan will always operate at the speed selected and will not vary with room temperature.



Programmable Parameters

There are seventeen (17) programmable parameters with their Factory Default Settings listed in this section. The table below indicates what these parameters are, along with the permitted values and the original Factory Default Settings.

Program Number	Description	Default	Range
P-1	Fan Speed Operation... Auto or Manual	A = Automatic	A = Auto 1 thru 6 Manual Fan Speeds
P-2	High Fan Speed Limit (arbitrary units)	85	65 - 95
P-3	Low Fan Speed Limit (arbitrary units)	55	30 - 64
P-4	Compressor Staging Time Delay	15	5 - 135 seconds
P-5	Temperature Sensor Calibration	0	Ambient \pm 10° F
P-6	Failsafe Modes and Mnemonic High Freon Pressure - - HPF Low Freon Pressurer - - LPF Low AC Line Voltage - - LAC	3 = 4 Failures With 90 Second Restart Delay. Manual Reset is Required.	Off 1 = Continuous No Display 2 = Continuous W / Display 3 = 4 Failures Reset Required
P-7	Low AC Voltage Cut-Off	85 VAC (115vac) 185VAC (220vac)	Off - 75 to 120 (115 vac units) Off - 175 to 220 (220 vac units)
P-8	De-Icing Cycle	0	0 = Off 1 to 3 Minutes
P-9	Pump Sentry... Protects Pump and Compressor From Loss of Sea Water.	OFF	OFF On = Select 100°F to150°F
P-10	Display Brightness Control	13 = Maximum	4 = Low 13 = Maximum
P-11	Display ° Fahrenheit or ° Celsius	°F	°F = Fahrenheit Displayed °C = Celsius Displayed
P-12	Cycle Pump With Compressor or Continuous Pump	OFF = Cycle With Compressor	OFF = Cycle with Compressor On = Continuous Pump
P-13	Reverse Fan Speeds During Heating Mode	rEF = Reversed	nor = Normal Fan Operation rEF = Reversed Fan In Heating
P-14	Continous Fan or Cycle Fan with Compressor	con = Continuous Fan Operation	CYC = Cycle Fan With Comp. con = Continuous Fan Operation
P-15	Reverse Cycle Heating or Electric Heat	nor = Reverse Cycle Heating	nor = Reverse Cycle Heating ELE = Electric Heater Installed
P-16	Fan motor type selection... Shaded pole or split capacitor.	SP = Shaded Pole	SP = Shaded Pole Fan Motor SC = Split Cap. Fan Motor
P-17	Reset Memorized Programming Defaults	nor = Normal	rSt = Reset Defaults

Should any programming problems or confusion occur, reset the Memorized Default Settings by entering the program mode and setting P-17 to rSt.

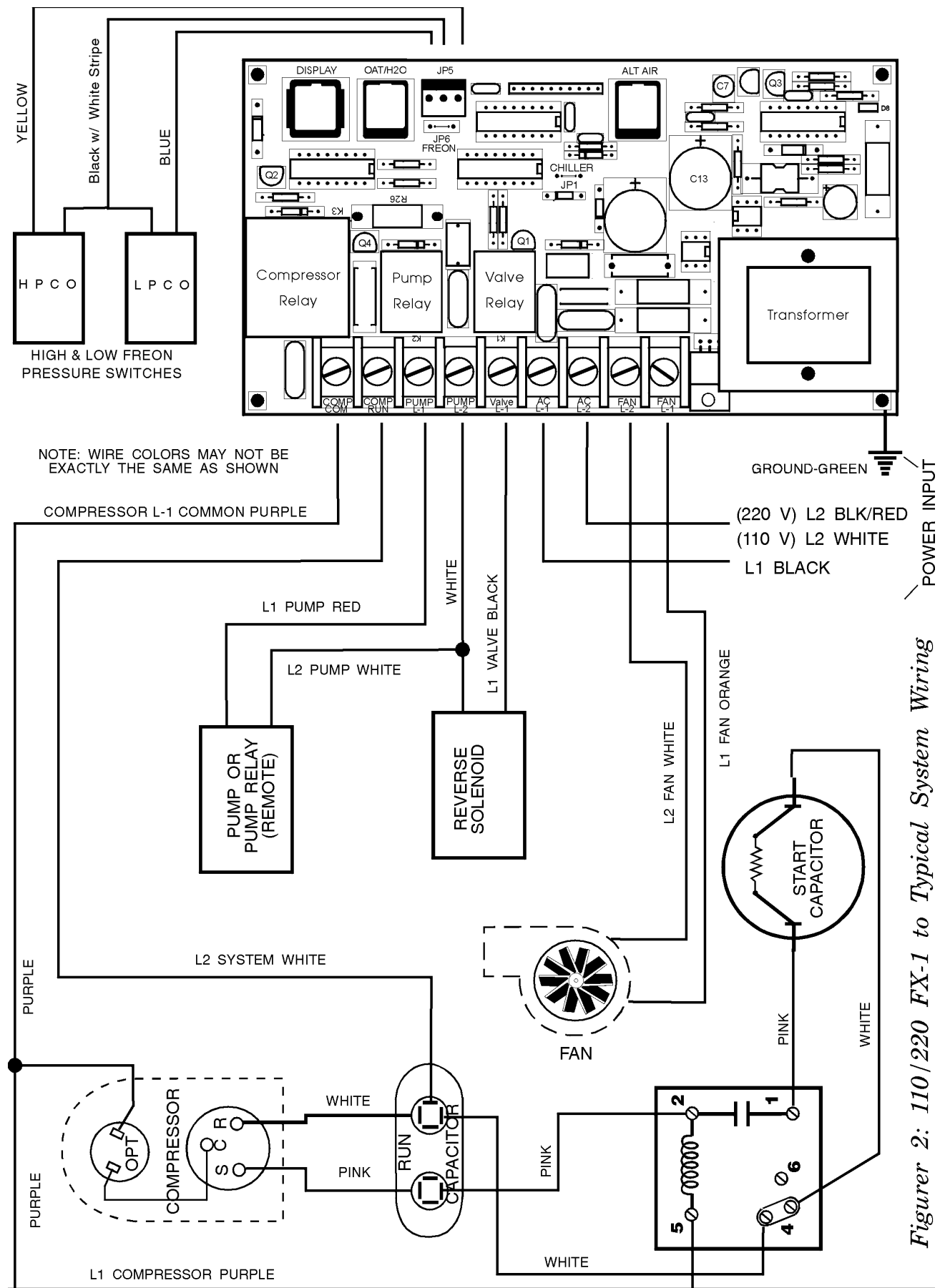


Figure 2: 110/220 FX-1 to Typical System Wiring

Optional Sensor Locations and Cable Connections

Optional Remote Air Sensor

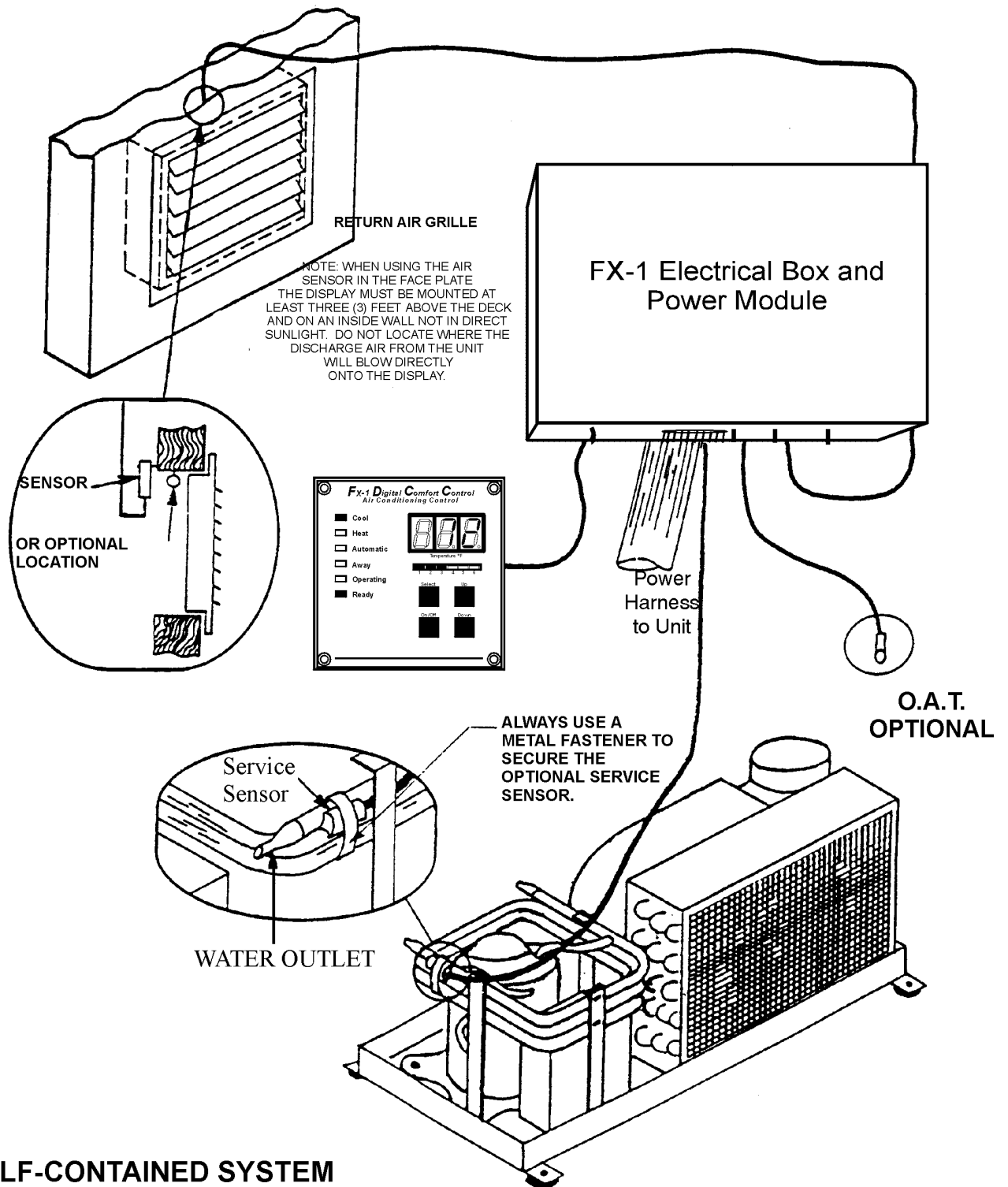


figure 3

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FX-1 Operations Manual
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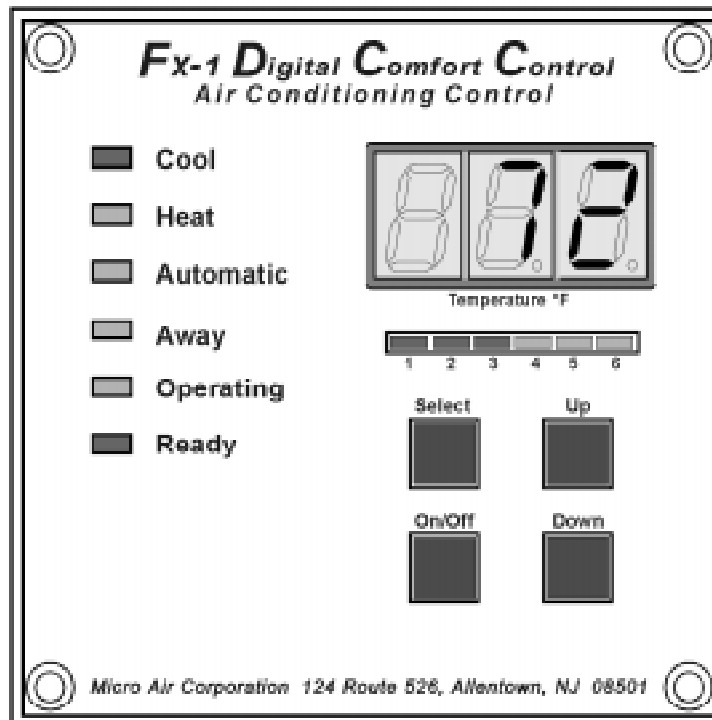
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FX-1 Direct Expansion Digital Control Operations Manual



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