# OTCW-FX1
For Chilled Water A/C Systems

OPERATOR'S MANUAL

Technicold Marine Systems | www.technicold.com
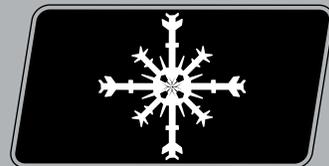
TECHNICOLD
by NORTHERN LIGHTS

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TECHNICOLD
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OPERATOR'S MANUAL
for FX-1 Air Handler Control

Read this operator's manual thoroughly before starting to operate your equipment.
This manual contains information you will need to run and service your new unit.

Table of Contents

NOTES: All items labeled COMP should be considered Electric Heater applications.

INTRODUCTION

The FX-1 Air Handler Control is designed for use with Marine Chilled Water Air Conditioning Systems. The FX-1 Air Handler Control has a universal power supply that operates on 115, 230, 50 or 60 Hz AC power. The FX-1 Air Handler Control 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 indicates ° F or ° C. Room temperature sensor is placed in the return air stream.
- Fan speed is adjusted automatically as the set point is approached.
- Six [6] programmable manual fan speeds. 19 programmable parameters for custom installations.
- Away Mode for controlling relative humidity.
- Universal AC power supply.
- Nonvolatile memory retains settings without batteries.
- Programmable display brightness control for night use.

⚠ **I M P O R T A N T !** ⚠

The system's air temperature sensor is located in the return air stream.
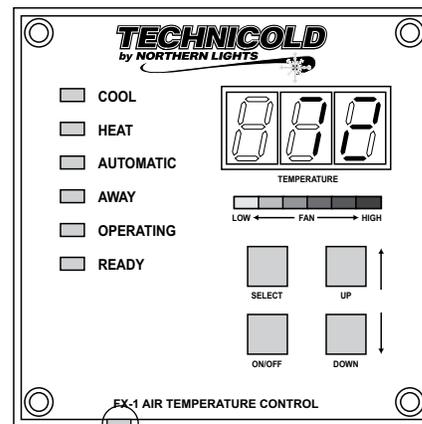
If the optional Display Panel air sensor is used, the display MUST be located on an inside wall, NOT in direct sunlight.

OPTIONAL FEATURES

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

   Electric Heat Chill Chaser Option
   Outside air temperature sensor

Read This Manual Completely Before Proceeding!

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

If you require assistance prior to or during the installation of the FX-1 Air Handler Control call Technicold by Northern Lights at 945-421-1717 or Fax your questions to Technicold at 954-421-1712. The FX-1 Air Handler Control is covered under existing Technicold Warranty Policy. Incorrect installation, neglect and system abuse are not covered under Technicold'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 four [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.
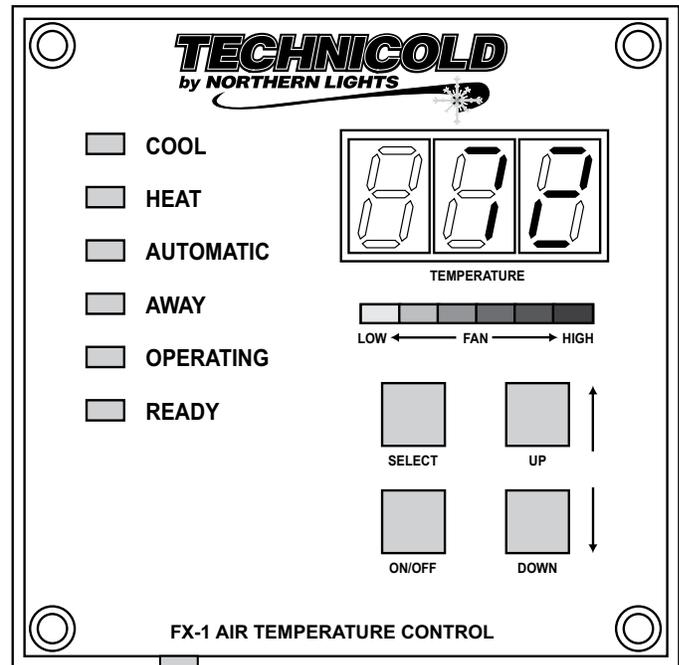
THREE DIGIT DISPLAY The inside [supply] temperature is displayed whenever the control is turned on. The display provides a read out of the inside air temperature.

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

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

AUTOMATIC LED The automatic 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 controlled 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 10.

OPERATING LED The system operating status [water valve open or closed] is indicated by the operating LED.

READY LED The Ready LED is illuminated when the breaker is turned on and power is applied to the control. It remains on whether the power button is in the On or Off mode.

OVERVIEW

FX-1 Air Handler Control 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 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. 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 fan speed. The fan will operate at the speed selected and will not change speeds with room temperature. See page 10 of this manual for programming instructions.

The fan can be programmed to cycle on and off with the Heating and Cooling demand.

NORMAL HEATING OR COOLING CYCLE

When heating or cooling is called for the water valve switches to the appropriate mode. Four [4] seconds later the automatic fan control adjusts the fan to the proper speed. When the demand is satisfied, the water valve cycles off and the fan returns to low speed. If cooling is required, the water valve will not open unless adequate cooling water is available. The fan will remain in low speed until adequate cooling water is available. If heating is required the valve will not open unless adequate heating water is available. The fan remains on until adequate heating water is available. The water temperature can be viewed by simultaneously pressing the Up and Down Buttons while in the On Mode. Heat will be supplied when no heating water is available if the Optional Electric Heater [Chill Chaser] has been installed.

While in a Heating or Cooling Mode the controller 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 new mode, Heating or Cooling, FX-1 Air Handler Control will maintain a two degree differential.

AWAY-MODE

While in the on mode, press the Select Button until the Away Mode LED is lit. 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 system is allowed a maximum of one hour running time to reach the desired temperature. Four (4) hours after the temperature is satisfied or the Cooling Mode times out, the cycle is repeated. During the humidity cycle the Operating LED is lit while the system is Cooling.

MEMORY

FX-1 Air Handler Control 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.
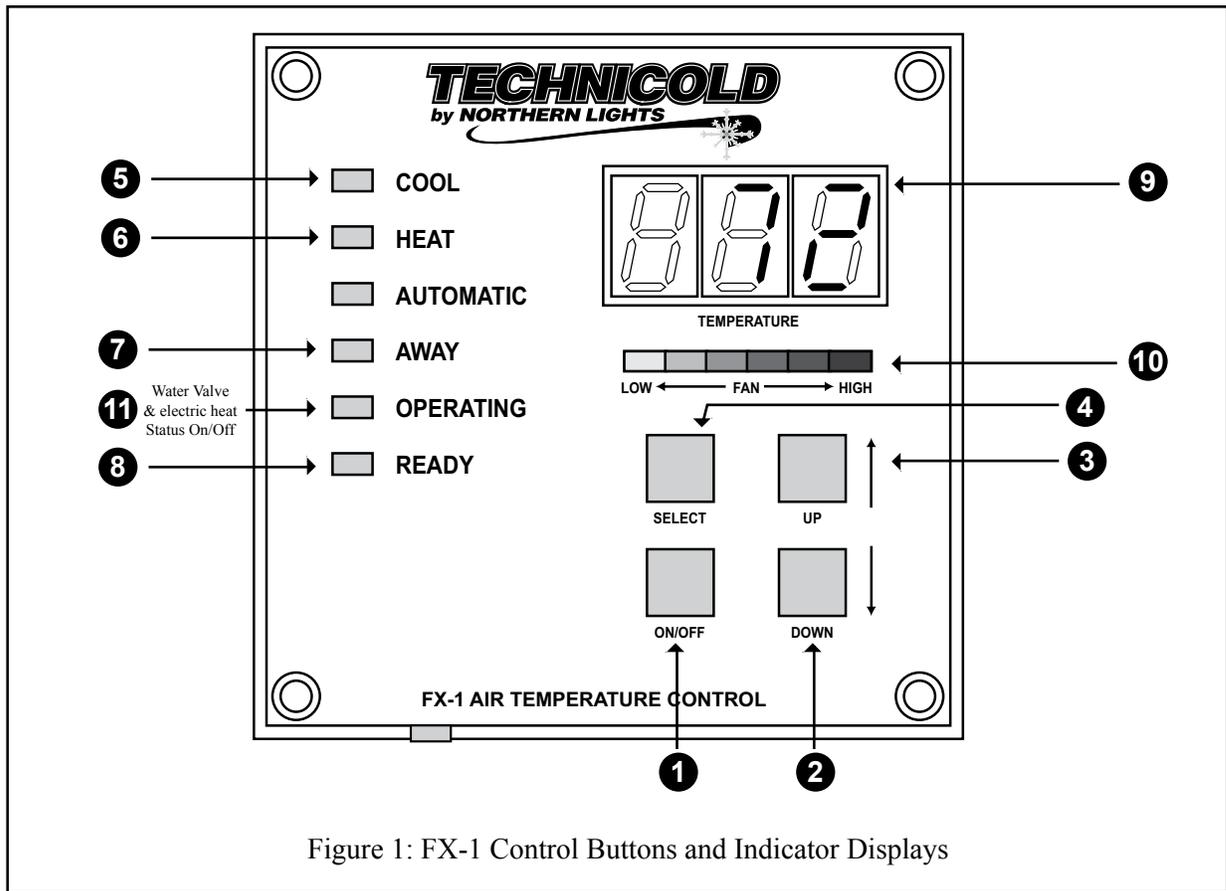

Figure 1: FX-1 Control Buttons and Indicator Displays

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 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 Water In 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 with the down button to display the Water In 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 Air Handler Control 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.

OPERATOR CONTROLS AND DISPLAY PANEL

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

6. **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.

7. **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.

8. **READY LED** The Ready LED is on whenever AC voltage is present. The ready LED remains on whether the control is in the On and Off modes.

9. **THREE DIGIT SEVEN SEGMENT DISPLAY** The inside air temperature is displayed in the window whenever the control is turned on. This reading indicates the temperature from the return air stream.

The display also indicates program information, and fault codes.

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".

```
☐  COOL

☐  HEAT

☐  AUTOMATIC

☐  AWAY

☐  OPERATING

☐  READY
```

10. **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.

11. **OPERATING STATUS LED** The Operating LED is on when the water valve is on. The Operating LED is off when the water valve is off. The Operating LED also indicates when the optional electric heater is turned on.
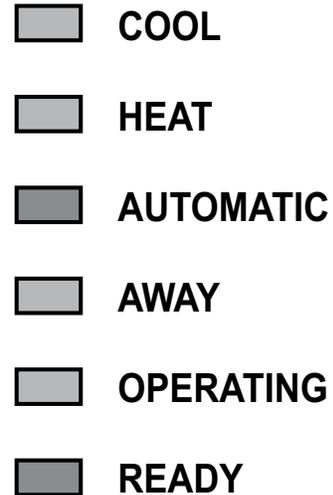
DUAL BUTTON FUNCTIONS

Simultaneously press the Up and Down buttons, while in the On Mode, to view the circulation water temperature at the air handler.

Simultaneously press the Up & Down Buttons while in the Program Mode to set new custom programming defaults.

Off Mode

When the FX-1 Air Handler Control 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 Ready 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

Cooling only is available for customers that do not want automatic cooling and heating operation. 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.

Heating Mode Only

Heating only is supplied for customers that require the system to not automatically switch from the heating to the cooling mode. 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.

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 the water valve to be turned on for heating or cooling the Operating LED will turn on when the valve is on and will turn off when the valve is off. 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.

☐ COOL

☐ HEAT

☐ AUTOMATIC

☐ AWAY

☐ OPERATING

☐ READY
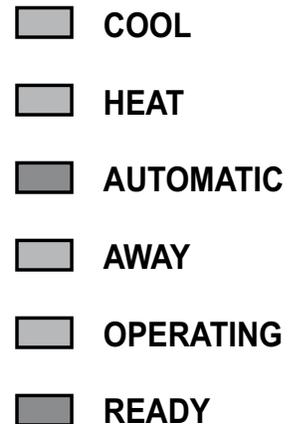
Away Mode

While in the On Mode, press the Select Button until the Away Mode LED is illuminated. The first humidity 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 system is allowed a maximum of one hour running time to reach the desired temperature. Four (4) hours after the temperature is satisfied or the one hour timer runs out the cycle is repeated. During the humidity cycle the Operating LED is lit while the water valve is turned on and the system is cooling.

NOTE! _Away mode should only be used when the boat is unoccupied._

FAN MODE

Automatic Fan Mode

FX-1 Air Handler Control has six automatic fan speeds available, with speeds increasing from lowest [1] to highest [6]. Automatic fan mode allows the FX-1 Air Handler Control 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 in cooling mode. 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.

Fan Speeds

LOW ←——— FAN ———→ HIGH
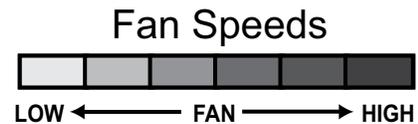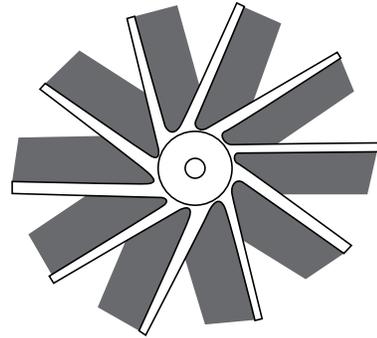
PROGRAM MODE

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. The FX-1 Air Handler Control is shipped with factory programmable default settings which are stored in permanent memory and can be recalled at any time.

Enter and unlock the program mode.

"figure 2: SUDS" enter program mode
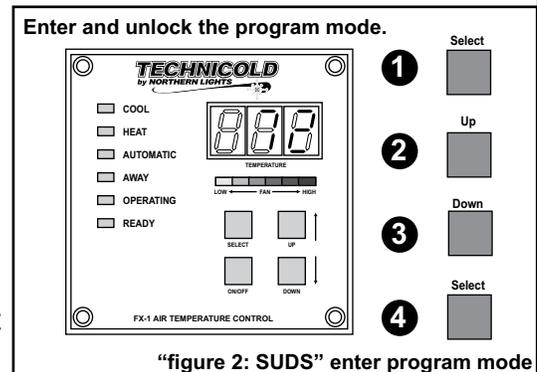
WARNING

Severe electrical disturbances can sometimes upset the FX-1 Air Handler Control 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.

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 Air Handler 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.
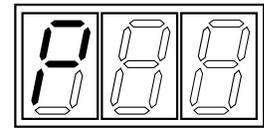
Parameter P1
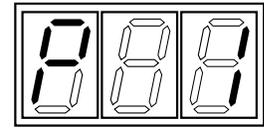
Auto Fan
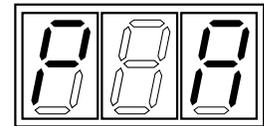
Restore Memorized Default Settings

*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 Air Handler Control returns to the off mode. The software version number is always displayed when you exit the program mode.

Software ID
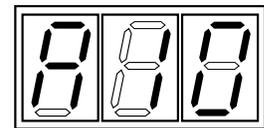
Increment from one program parameter to the next by pressing the select button while in the program mode. Press and release the select button to advance to the desired parameter. Use the up and down buttons to change the program parameter values. The programmable parameters range from P-1 through P-19.

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 required.

Exiting the Program Mode
There are two methods to exit the program mode. Press the power button and the FX-1 Air Handler 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 off 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 Technicold about the system or programming the FX-1 Air Handler Control be sure to have the software identification number available.

PROGRAMMABLE PARAMETERS

There are nineteen (19) programmable parameter locations with their Factory Default Settings listed in this section. The table below describes these parameters, along with the original Factory Default Settings and permitted values.

Program #	Description	Default	Range
P-1	Fan Speed operation: Auto or Manual	A=Automatic	A=Automatic 1 thru 6 Manual 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	Unused - Reserved for future options	N/A	N/A
P-5	Temperature Sensor Calibration	0	Ambient - 10° F
P-6	Unused - Reserved for future options	N/A	N/A
P-7	Unused - Reserved for future options	N/A	N/A
P-8	Unused - Reserved for future options	N/A	N/A
P-9	Unused - Reserved for future options	N/A	N/A
P-10	Display Brightness Control	13 = Maximum	4 = Low 13 = Maximum
P-11	Display $^{\circ}$ Fahrenheit or $^{\circ}$ Celsius	$^{\circ}$ F	$^{\circ}$ F = Fahrenheit Displayed $^{\circ}$ C = Celsius Displayed
P-12	Outside Air Temp Sensor Only When Alt Air Sensor is Not Required	Off	Off = Alt Air Available On = OAT Sensor Only
P-13	Reverse Fan Speeds During Heating Mode	rEF = Reversed	nor = Normal Fan Operation rEF = Reversed Fan In Heating
P-14	Continuous Fan or Cycle Fan with Demand	con = Continuous Fan Operation	CYC = Cycle Fan On Demand con = Continuous Fan Operation
P-15	Chill Water Heating or Electric Heat Only	nor = Chill Water Heat Only	nor = Chill Water Heat Only ELE = Electric Heater Installed
P-16	Fan Motor Type Selection - Shaded Pole or Split Capacitor	SP = Shaded Pole	SP = Shaded Pole SC = Split Cap. Fan Motor
P-17	Reset Memorized Programming Defaults	nor = Normal	rSt = Reset Defaults
P-18	Water Valve Forced Open 4 Hours to Bleed the Chill Water System	nor = Normal Operation	nor = Normal Operation OPn = Valve Forced Open
P-19	Ambient Air to Chill Water Temperature Differential	15 $^{\circ}$ F	5 $^{\circ}$ F to 25 $^{\circ}$ Fahrenheit

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

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.

P-2: HIGH FAN LIMIT
The upper fan speed limit can be tailored to suit various motors and operating conditions. The high fan limit is adjusted with the system installed and operational. The range of values are 56 through 85 and represent arbitrary units. Setting a higher number, results in a higher fan speed, setting lower numbers, lowers the high fan speed limit. Use the up and down buttons to select the desired high fan speed limit. The factory default setting is eighty-five (85).

P-3: LOW FAN LIMIT
The low fan limit determines the lowest output allowed for the low fan speed. The range of values for the low fan speeds are 30 through 55, in arbitrary units. Use the up and down buttons to select the desired low fan speed limit. Setting a higher number results in a higher fan speed. Setting lower numbers lowers the low fan speed limit. The factory default setting is 45.
IMPORTANT ! Once the high and low fan speed limits are set, the unit will automatically readjust to produce six [6] equally spaced fan speeds in both the automatic and manual fan speeds modes.

P-4: RESERVED FOR FUTURE OPTIONS
Program item P-4 is reserved for future options.

P-5: TEMPERATURE CALIBRATION
Use this feature to calibrate the air sensor within a range of ± ten (10) °F. Enter the program mode and the ambient temperature appears in the display. Use the up and down keys to select the desired offset. The temperature in the display will increase or decrease according to the offset programmed. The factory default setting is zero.

P-6, P-7, P-8 AND P-9: RESERVED
Program items P-6, P-7, P-8 and P-9 are reserved for future options.

P-10: DISPLAY BRIGHTNESS CONTROL
The display brightness can be adjusted to suit ambient cabin lighting conditions. The allowed settings are four (4) to thirteen (13), with four (4) being the dimmest and thirteen (13) the brightest. Typically a dark cabin will require a setting of four or five. A very bright cabin will require a setting of twelve or thirteen. The factory default setting is thirteen (13).

P-11: FAHRENHEIT OR CELSIUS SELECTION
The unit can be programmed to display either Fahrenheit or Celsius. Programming °F selects degrees Fahrenheit and programming °C displays degrees Celsius. The factory default setting is °F, Fahrenheit. When degrees Celsius (°C) is selected the readings are displayed in tenths, i.e. 22.2 °.

P-12: OUTSIDE AIR SENSOR OPTION
The ALT AIR jack can be used as an optional outside air temperature sensor input when the alternate air sensor is not required. Plug in the outside air sensor and program P-12 On. The outside temperature can be viewed from the Off Mode by simultaneously pressing the Up and Down Buttons. The outside air

temperature will appear in the display while both the Up and Down Buttons are depressed. Note: The OAT can only be viewed while FX-1 Air Handler Control is in the Off Mode.

P-13: REVERSE AUTOMATIC FAN SPEEDS DURING HEATING

The automatic fan speeds can be reversed during the heating mode to improve heat output in cooler climates. The fan speed is decreased as the temperature spread increases. The fan will speed up as the set point is approached. Lowering the fan speed when the cabin is cold raises the supply air temperature. The fan switches to low speed when the set point is satisfied and the water valve cycles off. The fan can be programmed to operate the same as in cooling by programming "P-13 nor" which represents normal fan operation during the heating cycle. The factory default is rEF, which reverses the automatic fan speeds during heating.

P-14: CYCLE FAN WITH THE COOLING OR HEATING DEMAND

The fan can be programmed to run continuously when the system is on or can be allowed to cycle with the compressor. When cycled with demand, the fan will operate only when heating or cooling is called for. To cycle the fan with the Heating or Cooling Demand select CYC. To operate the fan continuously select "con" which represents continuous fan operation. The factory default is continuous fan operation [con] when the system is on.

P-15: CHILL CHASER OPTION

Units may be equipped with Electric Chill Chaser or in line Electric Duct Heater. Chill Chasers are used when the main Chill Water system is in the Cooling Mode and a particular cabin requires heating. The chill chasers are also used to supplement Chill Water heating when necessary. Program P-15 for ELE to select the Electric Heat Chill Chaser Option. The factory default is "nor" which normally

selects Hydronic Heating and Cooling only. *IMPORTANT: Please note that option P-15 has to be programed for ELE to allow electric heat chill chaser operation.*

P-16: FAN MOTOR SELECTION

There are two basic fan motor types, shaded pole and split capacitor. Each motor reacts differently to speed control and each motor requires different timing for optimum fan speed variation. The default setting is "SC" which selects the split capacitor motor type, however, "SP" should be selected if a shaded pole type of fan motor is used in the system. Most air handlers are supplied with split capacitor type fan motors. The factory default is "SC" split capacitor fan motor type.

P-17: RESET MEMORIZED DEFAULTS

The default programming parameters can be reset by entering the program mode and selecting rSt. This will restore the programmable parameters to the values selected when the system was shipped. The program parameters listed on page 9 may be altered by Technicold, the installing dealer or the end user. Once new defaults are entered (see page 5, dual button functions) and memorized the NEW defaults will be reset. The original factory programmable parameters as listed on page 9 will have to be restored manually.

Why Memorize New Defaults?
Once the desired programming changes have been made and the system tests satisfactorily, your work can be saved as the new factory defaults. Your new defaults are initiated by simultaneously pressing and releasing the up and down buttons prior to exiting the program mode. New defaults can be initialized at any time by entering the program mode and following the above instructions. Once new defaults have been initialized the control will revert back to the new defaults whenever factory defaults are restored as described on pages 8 of this manual.

P-18: HYDRONIC VALVE FORCED OPEN
This feature allows service personnel to force the hydronic water valve open to facilitate bleeding air from the system. Selecting OPn will force the valve open for 4 hours while normal cooling and heating is maintained. The valve can be returned to normal operation anytime during the cycle by selecting nor which stands for normal operation.

P-19: AMBIENT TO WATER TEMPERATURE DIFFERENTIAL
The difference between ambient air temperature and hydronic water temperature is used to control water valve opening and closing. Selecting ten (10 ° F) opens the valve when water temperature is ten degrees less than ambient in cooling mode and fifteen degrees (15 ° F) greater than ambient in the heating mode. Figure two (2), shown below, illustrates the relationship between ambient air and hydronic water temperature using the factory default values.

Careful selection of the temperature differential can fully utilize the ships heating and cooling resources. For example, while in the cooling mode and using a ten degree value, the valve will open to allow some cooling while the hydronic system is coming down to temperature. The programmable range is 5 to 25 ° Fahrenheit and the Factory Default Setting is 15 ° F.

When equipped with an optional electric heater, the heater will overlap with the hydronic heat by twenty-two degrees Fahrenheit (22 ° F). The heater will turn on when heat is required and remain on until the hydronic water temperature exceeds the ambient by twenty-two degrees Fahrenheit or until the room temperature is satisfied. The electric heat is allowed to overlap the hydronic heat to supplement the main heating system during very cold conditions.

Note: Chart Used The Default Values! P-19

WATER TEMPERATURE		
+22°	Valve Open	Heater Off
+15°	Electric Heater and Valve Open	Valve Opens
+7°	Valve Hystersis	Valve Closes
	Electric Heater	
		Ambient
-7°	Fan Only	Valve Closes
-15°	Valve Hystersis	
	Valve Opens	

Figure 2: Ambient Air to Water Temperature Differential
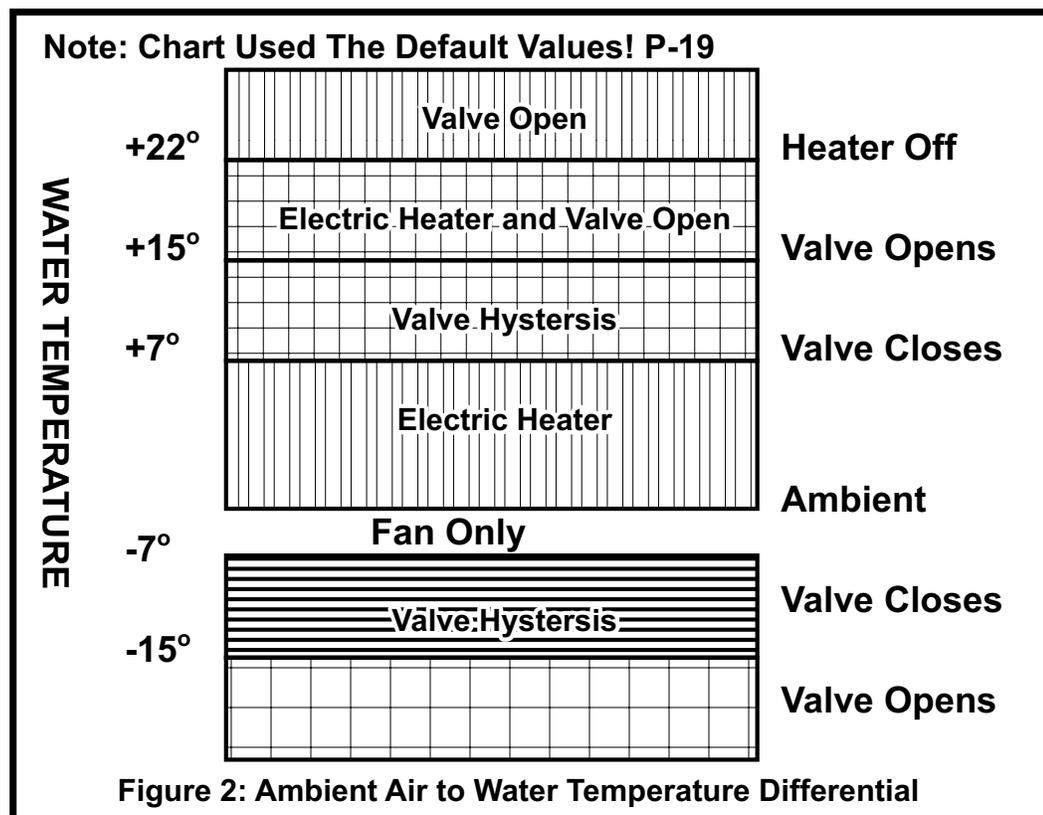
SPECIFICATIONS

SET POINTOPERATING RANGE ....55 ° F TO 85 ° F
AMBIENT TEMPERATURE OPERATING RANGE DISPLAYED ....55 ° F TO 85 ° F
SENSOR ACCURACY ....± 2 ° F AT 77 ° F
LOW VOLTAGE LIMIT 115 VOLT UNITS ....75 VAC
LOW VOLTAGE LIMIT 220 VOLT UNITS ....175 VAC
LOW VOLTAGE PROCESSOR RESET ....60 VAC
LINE VOLTAGE .... 115 THROUGH 230 VAC
FREQUENCY ....50 OR 60 HZ
FAN OUTPUT..6 AMPS @ 115 VAC
FAN OUTPUT ....6 AMPS @ 230 VAC
VALVE OUTPUT ....1/4 AMP @ 115 VAC
VALVE OUTPUT ....1/4 AMP @ 230 VAC
PUMP OUTPUT ....1/4 HP @ 115 VAC
PUMP OUTPUT ....1/2 HP @ 230 VAC
HEATER OUTPUT ....30 AMPS @ 115 VAC
HEATER OUTPUT ....20 AMPS @ 230 VAC
MINIMUM AMBIENT OPERATING TEMPERATURE ....0 ° F
MAXIMUM AMBIENT OPERATING TEMPERATURE...180 ° F
MAXIMUM RH CONDITIONS .... 99% NON CONDENSING
POWER CONSUMPTION ....LESS THAN 5 WATTS

DIMENSIONS

DISPLAY PANEL ....3.75" X 3.75"
PANEL CUT OUT .... 3.150" X 3.150"

CABLE LENGTHS

DISPLAY CABLE...STANDARD 15'
ALTERNATE AIR SENSOR .... STANDARD 7'
WATER SENSOR .... STANDARD 7'

SYSTEM INPUTS

1 .... INSIDE AIR TEMPERATURE SENSOR
1..ALTERNATE AIR TEMPERATURE SENSOR [OPTIONAL]
1...CHILLWATER WATER INLET TEMPERATURE SENSOR

NOTES:

Maximum length of display cable is fifty (50) feet. Sensor cable lengths should be limited to 50 feet.

The water sensor and alternate air sensors are included with the standard control package.

WIRING DIAGRAM

To FX-1 Display

To the Water Inlet Sensor

To Alternate or Outside Air Sensor

DISPLAY

OAT/H2O

FREON
LOW HIGH

PCB-370-00Y

PRETEST   FINAL TEST   QC

ALT.AIR

POWER

CUT FOR LP

CH

JP3

JP2

JP1

Electric Heat Relay

Valve Relay

Cut this jumper for chilled water applications

COMP COM

COMP RUN

PUMP L-1

PUMP L-2

Valve L-1

AC C-1

AC C-2

FAN L-2

FAN L-1

MICRO AIR CORP   FX1-MAX

GND

L1   AC   L2

L-1

L-2

WATER VALVE

L-2   FAN   L-1

L-2

L-1

ELECTRIC

HEAT STRIP

Important: Chill Jumper must be cut with this configuration !

INSTALLATION OVERVIEW

RETURN AIR
GRILLE

FX-1 ELECTRICAL BOX
AND POWER MODULE

SENSOR
OR
OPTIONAL
LOCATION

8 CONDUCTOR SHIELDED
DISPLAY CABLE

AC WIRE
HARNESS
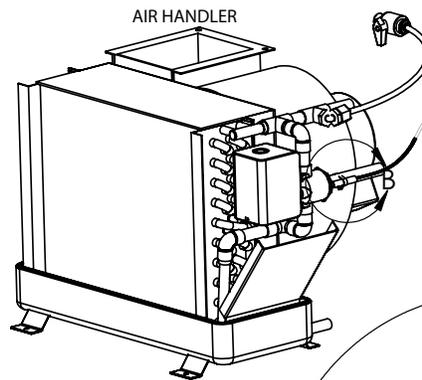
AIR HANDLER

6 CONDUCTOR SHIELDED
SENSOR CABLE

COOL

HEAT

AUTOMATIC

AWAY

OPERATING

READY

TEMPERATURE

LOW ◄── FAN ──► HIGH

SELECT

UP

ON/OFF

DOWN

FX-1 AIR TEMPERATURE CONTROL

WATER
INLET SENSOR:
INSULATE AFTER
ATTACHING
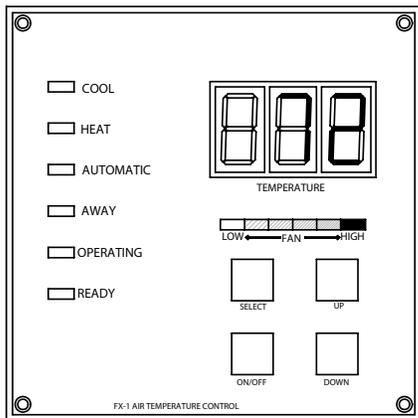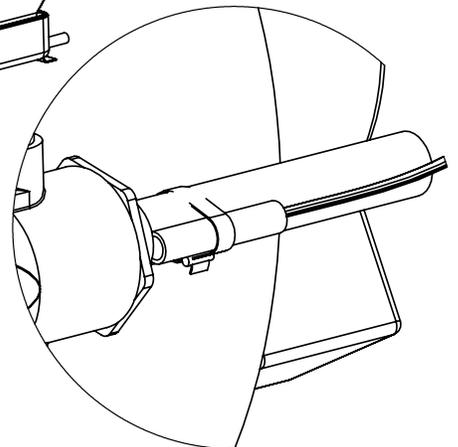
FX-1 CONTROL WITH UV LAMP
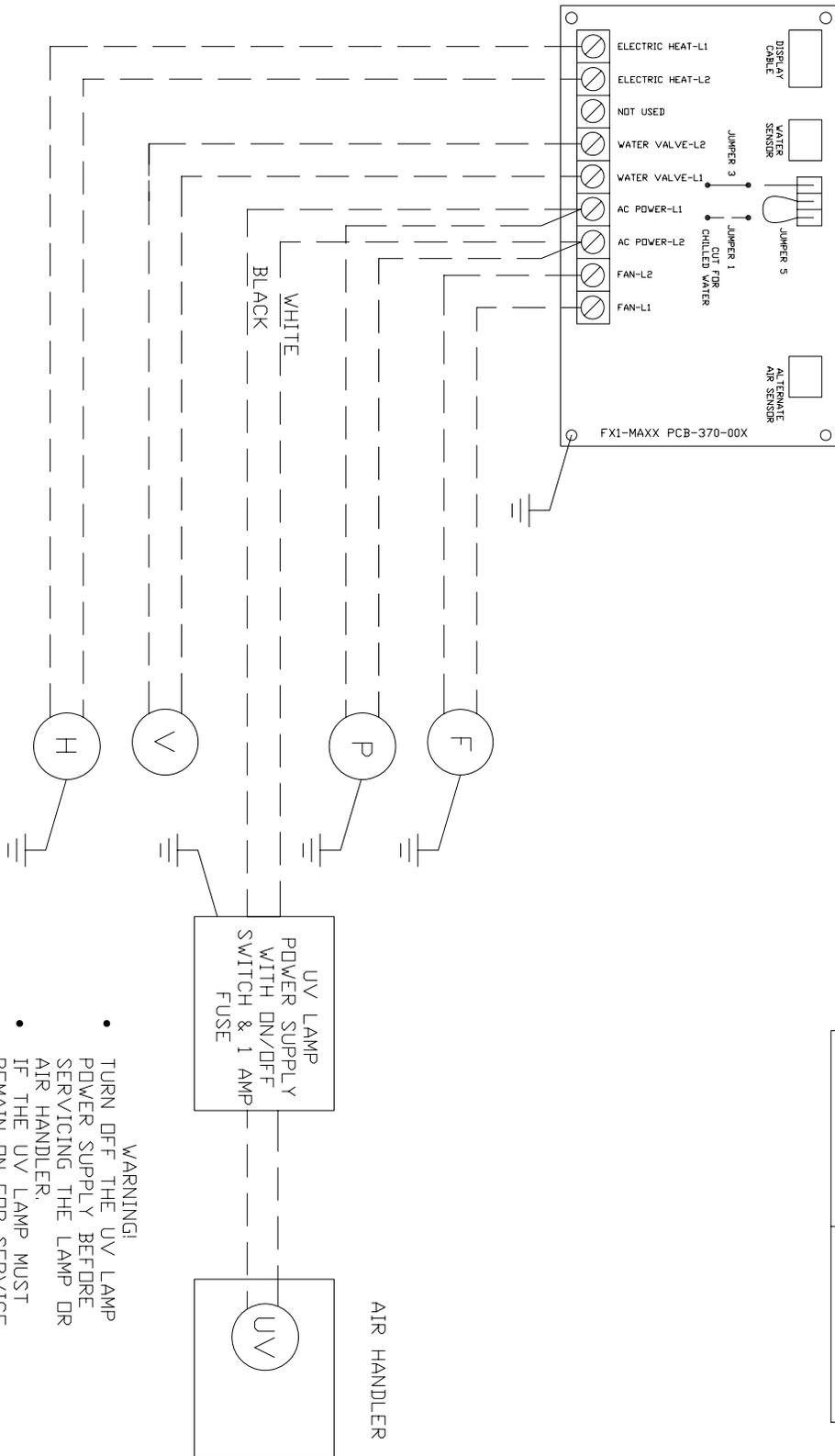
ELECTRIC HEAT-L1
ELECTRIC HEAT-L2
NOT USED
WATER VALVE-L2
WATER VALVE-L1
AC POWER-L1
AC POWER-L2
FAN-L2
FAN-L1

DISPLAY CABLE

WATER SENSOR

JUMPER 3

JUMPER 5

JUMPER 1
CUT FOR CHILLED WATER

ALTERNATE AIR SENSOR

FX1-MAXX PCB-370-00X

CHILLED WATER APPLICATION

BLACK
WHITE

H   V   P   F

UV LAMP
POWER SUPPLY
WITH ON/OFF
SWITCH & 1 AMP
FUSE

WARNING!

• TURN OFF THE UV LAMP
  POWER SUPPLY BEFORE
  SERVICING THE LAMP OR
  AIR HANDLER.

• IF THE UV LAMP MUST
  REMAIN ON FOR SERVICE
  USE APPROPRIATE EYE AND
  SKIN PROTECTION.

• TURN OFF UV LAMP POWER
  SUPPLY BEFORE REMOVING
  AND CLEANING AIR FILTER.

• USE ONLY THE AIR FILTER
  SUPPLIED WITH THE UV
  LAMP APPLICATION.

UV

AIR HANDLER

LEGEND	
NOMENCLATURE	DESCRIPTION
F	FAN
P	POWER SUPPLY
UV	UV LAMP
V	WATER VALVE
H	ELECTRIC HEATER

FX-1 CONTROL WITH UV LAMP FIELD WIRING

AIR HANDLER

UV

LEGEND

NOMENCLATURE	DESCRIPTION
F	FAN
P	POWER SUPPLY
UV	UV LAMP
V	WATER VALVE
H	ELECTRIC HEATER

WARNING!

- TURN OFF THE UV LAMP POWER SUPPLY BEFORE SERVICING THE LAMP OR AIR HANDLER.
- IF THE UV LAMP MUST REMAIN ON FOR SERVICE USE APPROPRIATE EYE AND SKIN PROTECTION.
- TURN OFF UV LAMP POWER SUPPLY BEFORE REMOVING AND CLEANING AIR FILTER.
- USE ONLY THE AIR FILTER SUPPLIED WITH THE UV LAMP APPLICATION.

UV LAMP
POWER SUPPLY
WITH ON/OFF
SWITCH & 1 AMP
FUSE

F

V

H

P

CHILLED WATER APPLICATION

FOR DX USE ONLY

FX2 PCB-360-00F

DISPLAY CABLE

WATER SENSOR

ALTERNATE AIR SENSOR

FAN-L1
FAN-L2
WATER VALVE-L1
WATER VALVE-L2
NOT USED
ELECTRIC HEAT-L1
ELECTRIC HEAT-L2
AC POWER-L2
AC POWER-L1

WHITE
BLACK
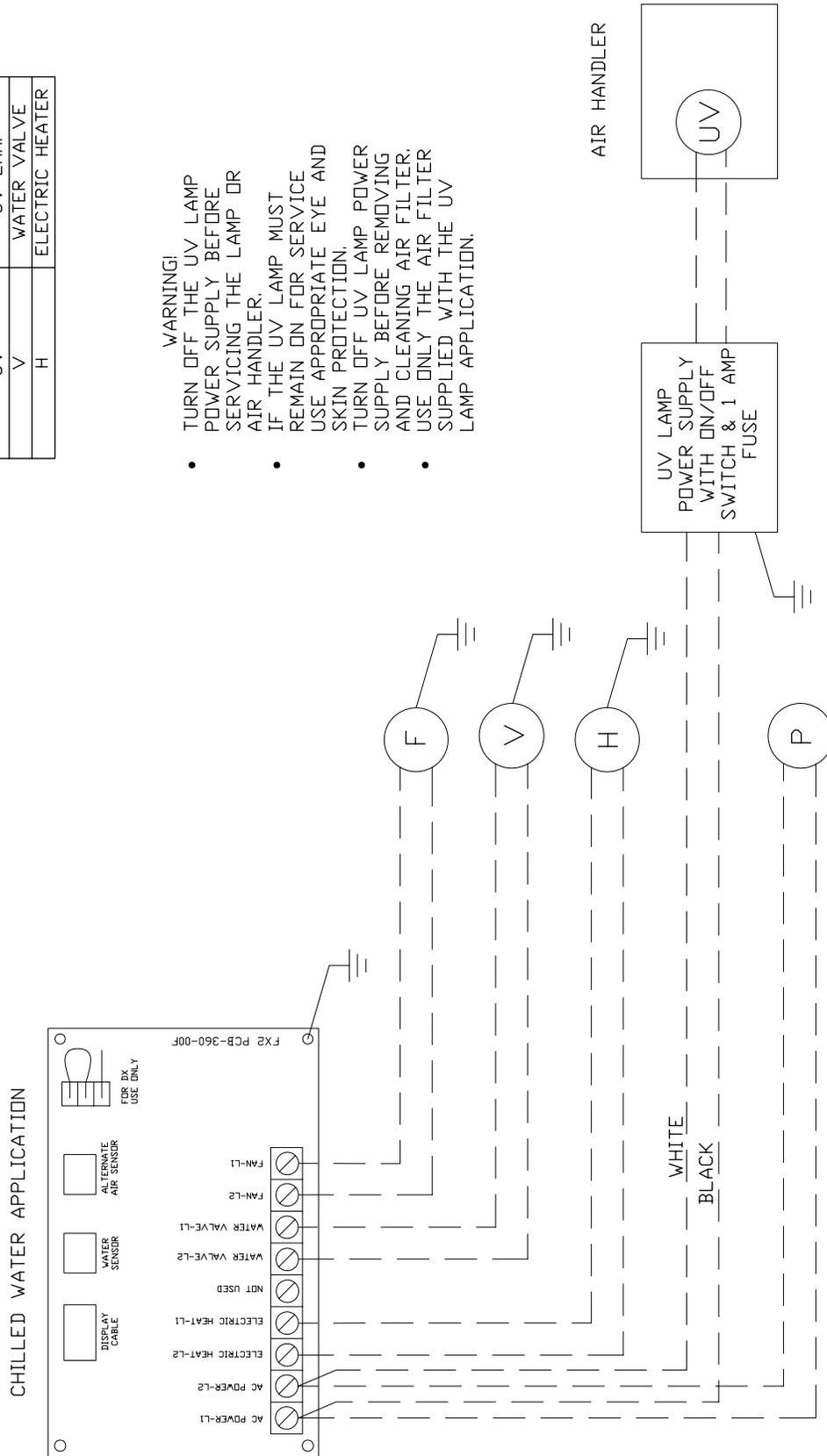
DRAWING SHOWN WITH
OPTIONAL CHILL-CHASER ELECTRIC HEAT
AND UV LAMP WITH FUSED POWER SUPPLY.

FX-1 DISPLAY WITH FX-2 CIRCUIT BOARD

FX-1

PWR

PCB-3601-00F

DISPLAY

OUTSIDE

ALT. AIR

SERVICE FREON

AC L-1
AC L-2
COMP RUN-L2
COMP COM-L1
PUMP L-1
PUMP L-2
VALVE L-1
FAN L-2
FAN L-1

PURR
YEL
BLK

JP9

JP11

JP7
REMOVE JP7 FOR LP
JP8
REMOVE JP8 FOR CHILL
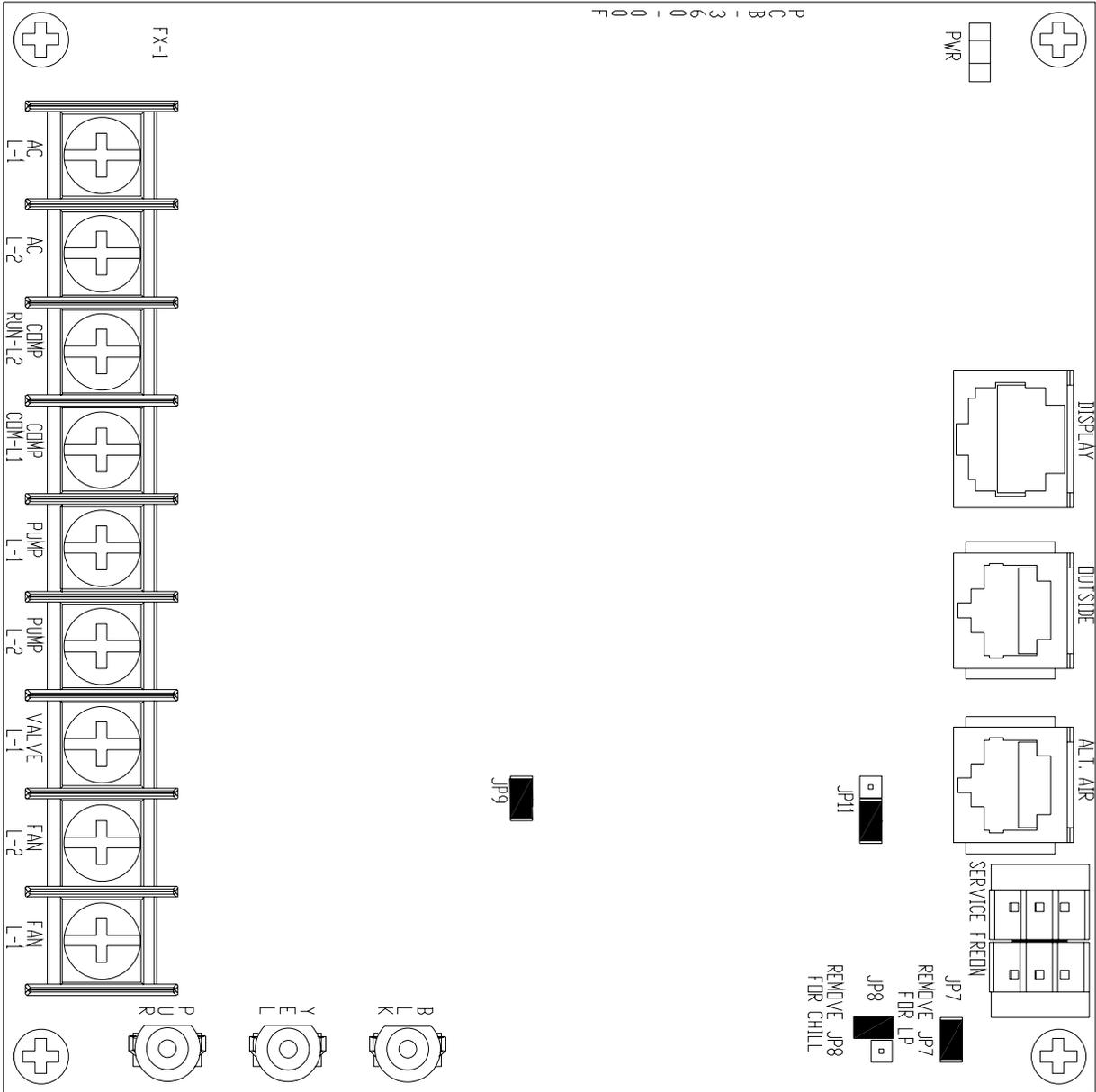
"FX Series" jumpers configuration for
FX-2 circuit board:
JP9 is installed
Pins 2 and 3 of JP11 are shorted

FX-1
FX-1 Maxx
FX-1 Hideaway

PROBLEM	PROBABLE CAUSE	SOLUTIONS
• No lights in the display and the system does not heat or cool. Power on reset does not occur when AC power is applied.	• AC breaker is not turned on or AC power is not available. • Display cable or jacks broken or dirty. • Display cable is improperly assembled. • AC input is less than 75 VAC.	• Check for AC power at circuit breaker. • Check for AC power at module input. • Clean all jacks and plugs. • Try another known good display cable. • Check the system wiring diagram. • Check for proper AC power.
• The system operates but there is no water valve and no heat or cool lights.	• The set-point is satisfied!	• Raise or lower the set-point to allow the unit to cycle.
• The display toggles between AAA and zero (0), and the system will not run.	• The face plate air sensor is shorted or the display cable has been shorted or damaged. • The face plate air sensor is open or the display cable is broken.	• Clean all plugs and jacks. • Try an alternate air sensor or replace the display with a known good display. • Try a known good display cable. • Check the existing display cable for screws, staples and other damage.
• System displays room temperature but there is no fan or water valve.	• Set-point is satisfied and P-14 is programmed to cycle the fan on demand. • See page 9 of this manual.	•Raise or lower the set-point to allow the system to cycle on... Check P-14
• The system operates but there is no fan. • The fan runs but only on high speed, lower speeds are not available • The fan runs very slow and is noisy.	• The fan wiring is incorrect. • Ducting is restricted or fan is miswired or triac has failed in closed mode. • Fan triac has failed or motor is defective.	• Check and correct fan motor wiring • Check for proper duct sized, correct any ducting restrictions and check wiring. Return the module for fan output triac or return module for repair or call for service.
• System operated but valve and heater outputs appear to be reversed.	• Jumper JP1 not removed from the module board.	• JP1 must be removed for the module to function as an air handler control.

FX-AIR HANDLER CONTROL STUCK BUTTON CHART

STUCK BUTTON	DISPLAY BEHAVIOR
POWER	From the Off Mode, the control will reset ("888") and the display will go blank. From the On Mode, the display will not resent, Ambient Temp. is displayed, all outputs work but no buttons function.
SELECT	
UP	
DOWN	

DISPLAY PROBLEM	POSSIBLE CAUSES
No display and the buttons do not work	• The cable is assembled backwards • Pin 1 is open • Pin 3 is open
No buttons, no display but the fan is running.	• Pin 5 is open • Check bimini jumper for proper location
No relays turning on, display is on, buttons operate and fan is running	• Pin 2 is open • Pin 1 and Pin 2 are shorted • Pin 4 is open
No fan output	• Pin 6 is open
All relays are on, no fan operation and no display	• Pin 2 is shorted to pin 3

WARRANTY INFORMATION

The Limited Warranty applies to the following product lines:TECHNICOLD Air Conditioning and Refrigeration Products Technicold manufacturerer NORTHERN LIGHTS, INC. (herein "NLI") extends to the purchaser and user (herein "Owner") of the product the following limited warranty (herein "Warranty"). Please read it carefully.

Technicold Air Conditioning and Refrigeration Products	
Warranty Period	
Product	12 Months
Parts and Labor	12 Months
Parts	24 Months

NLI'S WARRANTY AND RESPONSIBILITIES

Subject to the terms and conditions set out below, NLI warrants the product and its factory installed parts to be free from defects in material and workmanship under normal use and service.
If the product is purchased for and used primarily in a commercial endeavor, the Warranty period shall extend from the date of delivery to the original end user for a period of twelve (12) months with no limit on hours of use. If the product is purchased for and used primarily in personal, family or household use, the warranty period shall extend from the date of delivery to the original end user for a period of twelve (12) months with no limit on hours of use. Original parts shall be warrantied for a period of twenty-four (24) months from date of delivery.

The obligation of this Warranty shall be limited to repairing or replacing any part of the product which NLI agrees is defective in materials or workmanship under normal use and service during the warranty period. If during the warranty period the product or any of its parts are found to be defective because of workmanship or materials, it will be repaired or replaced without charge if the Owner prepays the transportation charges and returns the item to NLI's authorized warranty dealer. To find the location of the nearest NLI authorized warranty dealer, contact NLI at the address, e-mail address, or telephone or fax numbers in this publication.

Upon request by the Owner and agreement by NLI, repair of product or replacement of parts under this Warranty may be completed at a place other than at an NLI authorized warranty dealer. See "Owner's Responsibilities" on the next page.

NLI'S WARRANTY AND RESPONSIBILITIES

Within thirty (30) days of purchase, Owner or authorized agent of Owner must complete, sign and deliver to NLI the Warranty Registration Card in order to validate this warranty. Owner must break in unit as described in the "Operating Procedures" section of the Operator's Manual.

At the time of presentation of product for service under this Warranty, the Owner or authorized agent must present evidence of the date of original purchase of the product.

If pre-approved repair of product or replacement of parts under this Warranty is completed at a place other than an NLI authorized warranty dealer, Owner shall pay NLI's or its authorized dealer's reasonable travel expenses.

Owner shall pay costs of any labor required to remove and reinstall the product and/or parts thereof, any premium for overtime labor requested by the Owner and costs for transporting the product and/or parts thereof to and from the place where warranty work is performed.

WARRANTY LIMITATIONS

This warranty will not apply to equipment put into service more than twenty-four (24) months from date of shipment from factory, and will not apply in any country with which trade is restricted or banned by the U.S. Department of State, at or after the time of sale or claim.

If the product is used primarily in a commercial endeavor, neither NLI nor any company affiliated with NLI will be liable for general damages, including bodily injuries, except as set forth above, or for incidental consequential damages, including, but not limited to, loss of use, loss of profits, loss of production, expense of substitute equipment or other commercial loss or for damage to property in which equipment is installed. The same limitations shall apply to a product used for personal purposes with respect to all non-personal injuries, general, incidental and consequential damages.

Some countries or states do not fully allow the above exclusions or limitations of general, incidental or consequential damages, so the above exclusions or limitations may not apply to you.

This Warranty extends only to the original parts, accessories and products.

This Warranty is transferrable to a new Owner during the warranty period. No transfer forms or fees are required.

This Warranty does not extend to failure resulting from an accident or disaster or from Owner or operator abuse or neglect (such as operating without proper maintenance of equipment, including pumps, filters and electrical connections.)

Service parts worn out by usage and not due to defects in workmanship or material are not covered by this Warranty.

NLI is not responsible for failure resulting from improper repair or use of defective parts or parts not approved by NLI.

NLI is not responsible for failure of product or parts resulting from improper installation or unauthorized modifications.

NLI is not responsible for failure caused by negligent handling or abuse in installation or storage in improper environment which results in corrosion or freezing damage to equipment.

NLI is not responsible for failure caused by any third party's transportation damage to NLI's product.

NLI is not responsible for damage if any warning alarm system is ignored.

## *NO REPRESENTATIONS AND LIMITATIONS OF IMPLIED WARRANTY*

This written Warranty is in lieu of all other express warranties, obligations or limitations. If this equipment is used primarily in a commercial endeavor, no implied warranty, including that of merchantability and fitness for a particular purpose is extended. If the product is used primarily in personal, family or household use, any implied warranty, including that of merchantability and fitness for a particular purpose, shall be limited to twelve (12) months.

Some countries or states do not allow limitations on

how long an implied warranty lasts, so the above limitations may not apply to you.

No person is authorized to make any representations or promised on behalf of NLI or to modify the terms or limitations of this Warranty in any way except in writing and signed by an authorized employee of NLI.

This warranty gives you specific legal rights, and you may have additional statutory rights which vary from one country or state to another.

OTCW-FX 4/14

TECHNICOLD
by NORTHERN LIGHTS