SMX II Control Systems (DX)

❖OWNER/OPERATOR

English

Table of Contents

SMX II Control Systems • Introduction

⚠ *Warning*

This manual contains essential information concerning the operation of your SMX II control system. It is very important that you read and understand the contents of this manual before using the equipment, and it should be kept on the boat for future reference. If you have any questions about the contents of this manual, contact your local Cruisair dealer or the Dometic Service Department for assistance.

Introduction

The term “SMX II” refers to the overall product family of keypad/display controls and to the power/logic circuit board located in the a/c unit’s electrical box. There are three different keypad/displays that can operate an SMX II control system.

The three different keypad/displays are:

- **SMXIIAB** (previously known as SMX II) - rectangular in shape and larger than the other two, this was the standard for many years. (See *The SMXIIAB & SMXir Keypad/ Display* section.)
- **SMXir** - newer and smaller than the SMXIIAB, this contol has a hinged cover and an optional remote control. (See *The SMXIIAB & SMXir Keypad/Display* section.)
- **SMXht** - the newest “High Technology” keypad/display, this European style control fits into a decorative bezel and has many new features. (See *SMXht Keypad/Display Basic Operation & Programmer’s Guide* section)

If you have the new **SMXht**, familiarize yourself in general with the operation and programming sections of this manual, but go to the **SMXht Keypad/Display Basic Operation & Programmer's Guide** section for specific information on that control.

If you have an SMX Net control system, refer to the SMX Net Control Systems (DX) Installation and Operation manual.

The SMXIIAB & SMXir Keypad/Display

The SMXIIAB and SMXir keypad/displays are designed for user-friendly, logical operation. The button (or key) arrangements on the SMXIIAB and the SMXir are similar, and these keys perform the same respective functions. See next page for keypad/display diagrams.

1. **Data Display**
   Large LED readout which diplays the current setpoint, temperatures, programmed values and error messages.
2. **Cooling Indicator**
   Lights when compressor is running in Cool Mode.
3. **Heating Indicator**
   Lights when compressor is running in Heat Mode.
4. **Setpoint Indicator (SMXIIAB Display Only)**
   Lights when setpoint is displayed. Off when inside temperature is displayed.
5. **Set Key**
   Press the Set key to display your currently selected setpoint (the temperature you wish to maintain in the cabin). The Set key also is used to dim the Data Display.
6. **Up and Down Keys**
   Press Up or Down to raise or lower the setpoint. Press and hold keys for large changes. Note: if inside temperature is displayed, touching the Up or Down key will cause the setpoint to be displayed.
7. **Temp Key**
   Press once to display inside temperature. Press Temp twice, and the display will alternate between inside temperature and setpoint. Press again to return to inside temperature only.

Hint

You can display temperature in degrees Fahrenheit or Celsius.

8. **Off Key**
   Turns system off. Note that the Data Display remains on. You can continue to adjust setpoint, display temperature readings and activate the manual fan to circulate air while the system is in the Off Mode.
9. **Cool Mode Indicator**
   Lights when you press the Cool key to select the Cool Mode.
10. **Heat Mode Indicator**
    Lights when you press the Heat key to select the Heat Mode.
11. **Cool Key**
    Turns the system on in the Cool Mode.
12. **Heat Key**
    Turns the system on in the Heat Mode.

Hint

Press both Heat and Cool at the same time, and the system will automatically switch between Cooling and Heat Mode. When in this Automatic Switchover Mode, both the Cool and Heat indicators are lit.

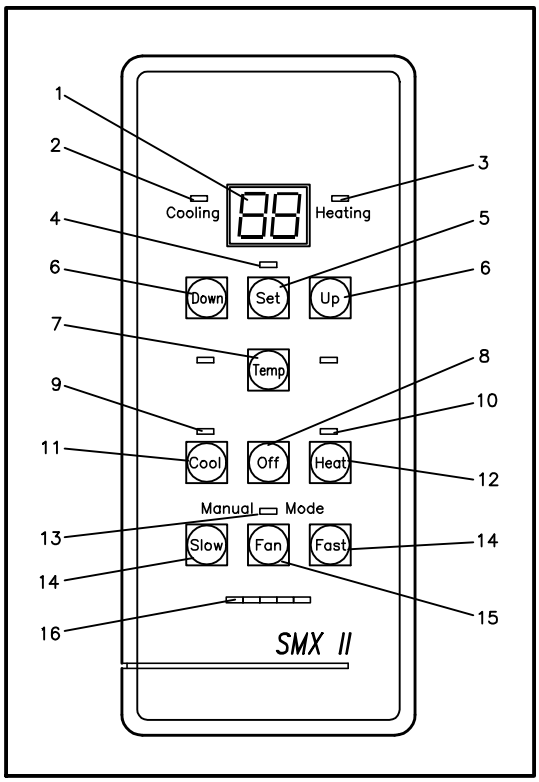
13. **Manual Fan Mode Indicator**
    Lights when fan is running in Manual Fan Mode.
14. **Slow and Fast Keys**
    Control fan speed when the fan is in the Manual Fan Mode. Pressing Slow or Fast key when in Automatic Fan Mode will change the system into Manual Fan Mode.
15. **Fan Key**
    Selects Manual or Automatic Fan Mode. Press once for manual control. Press Fan again to select automatic fan speed control. In this mode, the fan speed is controlled by the microprocessor as a function of the difference between setpoint and inside temperature. See the Fan Response Differential programming section.
16. **Fan Speed Indicators**
    Row of five small LEDs below Fan key that indicate the current fan speed.
17. **Inside Temperature Indicator (SMXir Display Only)**
    When illuminated, inside temperature is displayed. When light is off, setpoint is displayed.
18. **IR Receiver (SMXir Display Only)**
    Infrared remote receiver.
19. **Dehumid Key (Remote Control Only)**
    Changes system into the Humidity Control Program.
20. **Auto Switchover Key (Remote Control Only)**
    Places the system into Automatic Switchover Mode, so it will change from cooling to heating as needed.

Definitions

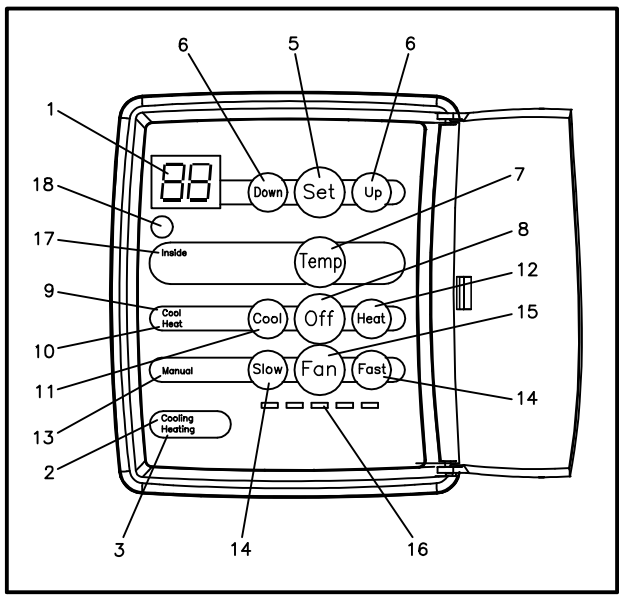
LED - Light Emitting Diode. An indicator light used to denote mode or operating status.

Setpoint - The desired room temperture that is set by programming the SMX control.

IR - Infrared



SMXIIAB Keypad/Display



SMXir Keypad/Display

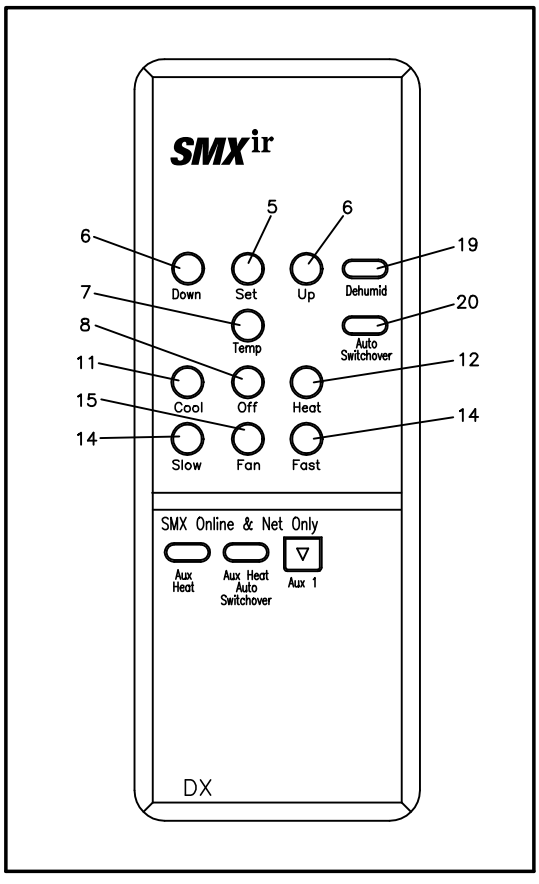
The SMXir Remote Control

The SMXir remote control keypad has the familiar layout of the ten button SMX keypad, and performs most of the same functions. The remote cannot be used to change program settings. Programming must be done at the keypad/display.

In addition to the standard keys, the SMXir remote also has two one-touch buttons that allow easy access to the humidity control program and the Automatic Switchover Mode.

The remote has three buttons that are not used on SMX II systems. The Aux Heat, Aux Heat Auto Switchover, and the Aux 1 buttons are for SMX Net systems only.

The SMXir remote control must be pointed at the SMXir keypad/display, which has the IR remote receiver. The remote will not work if the SMXir keypad/display has the optional full coverage door and the door is closed.



SMXir Remote Control

Basic Operation

Power On

When AC power is applied to the system at the circuit breaker, the SMX II microprocessor performs a self-check and retrieves the last operating configuration from permanent memory. This process takes about four seconds, after which the system will begin operating just as it had been when power was last turned off.

System Off

Press the Off key to turn the system off. Note that the Data Display remains energized even when the system is off. The fan can be turned on manually when the system is in the Off Mode.

Note

The SMX II has built-in protection against sudden power interruptions. The system automatically stores the current operating configuration in permanent memory every time any changes are made. (The new operation mode must be in affect for 30 seconds before it is saved into permanent memory.) When AC power is lost, the SMX II system retains these settings, and when AC power is restored it resumes operation using the same settings as before.

Selecting Setpoint

Press the Set key and the current setpoint will be displayed. Press the Up or Down key to change the setpoint.

Displaying Temperature

To display cabin temperature, press the Temp key. Press Temp twice for an alternating display of inside temperature and setpoint. Press again to return to inside temperature only.

Cool Mode

Press the Cool key to select Cool Mode. The Cooling Indicator will light to show that you have selected the Cool Mode.

The Cooling Indicator will be lit whenever the system is in the Cool Mode and the compressor is running. When the compressor cycles off, the Cooling Indicator turns off, but the Cool Mode Indicator remains on.

Heat Mode

Press the Heat key to select Heat Mode. The Heating Indicator will light to show that you have selected the Heat Mode.

The Heating Indicator will be lit whenever the system is in the Heat Mode and the compressor is running. When the compressor cycles off, the Heating Indicator turns off, but the Heat Mode Indicator remains on.

Automatic Switchover Mode

Press the Cool and Heat keys simultaneously for Automatic Switchover between Cool and Heat Modes. Both Cooling and Heating Indicators will light when the system is in the Automatic Switchover Mode.

For the SMXir Remote Control only - Press the Auto Switchover key to enter Automatic Switchover Mode.

Note that the Cooling or Heating Indicator will come on when the compressor is running to show that the system is running in the Cool or Heat Mode.

Manual Fan Speed Control

Press the Fan key to select Manual Fan Mode. The Manual Fan Mode Indicator will light to show that it is in the Manual Fan Mode. Then use the Slow and Fast keys to select the desired fan speed.

Note that you can use manual fan control to circulate air even when the system is in the Off Mode.

Automatic Fan Speed Control

Press the Fan key until the Manual Fan Indicator turns off. The system is now in Automatic Fan Mode. As the cabin temperture deviates from the setpoint temperture, the system will automatically adjust the fan speed. The fan will increase speed as the difference between the two temperatures increases, and slow down as the cabin temperature approaches setpoint. Once setpoint is achieved, the compressor cycles off and the fan continues running on low speed. See the Fan Response Differential programming section.

Adjusting Brightness

Pressing the Set key repetitively will dim the LED display. Keep pressing Set to return to full brightness.

Using The Humidity Control Program

When activated, the Humidity Control Program automatically turns the air conditioning system on at timed intervals to remove moisture from the air. The system is programmed at the factory for average values. To change the factory settings, see the Humidity Control Program section.

To start the Humidity Control Program:

- Press Off.
- Press Cool, Heat and Fan keys simultaneously. ***For the SMXir Remote Control only*** - Press the "Dehumid" key to enter Humidity Control Program.
- The Data Display will flash "HU", indicating that the program is active.
- To halt the program, press any key. The "HU" message will stop flashing.

Safety Note

Whenever the system is in the Humidity Control Program, all of the system safeguard controls remain active. For example, if the seawater flow fails or if line voltage falls below preset limits, the system will automatically shut down. Or, if AC power is interrupted, the system will automatically resume operation in the Humidity Control Program when power is restored.

Anti-Ice Routine

The SMX II control will occasionally shut down the compressor in the Cool Mode to allow any ice that may have formed on the evaporator coil to melt. The Anti-Ice Routine shutdown will occur only when the inside cabin temperature falls below 70°F (21°C).

During the ten minute cycle period, the compressor will shut off for 15 seconds for each degree below 70°F. For example, if the inside temperature is 67°F, the compressor will shut off for 45 seconds, and then run for nine minutes and 15 seconds, repeating on ten minute intervals.

Seawater Temperature

The basic principle behind an air conditioner is the movement of heat. In an air conditioner, heat is removed from the inside cabin air and transfered to the seawater. In reverse-cycle heating, the refrigerant flow is reversed and heat is extracted from the seawater and discharged into the living space. The efficiency of the system operation depends on both seawater and cabin temperatures.

In Cool Mode, the air conditioner will operate most efficiently in seawater temperatures below 90°F (32°C). At higher seawater temperatures, the unit will operate, but at a reduced capacity. A high-pressure shutdown may occur at higher seawater temperatures.

In Heat Mode, the opposite is true. As the seawater gets colder, there is less heat available, and the heating efficiency is reduced. Full heating capacity is obtained at approximately 55°F (13°C) seawater temperature. Performance drops to about 50% of rated capacity in 40°F (4.4°C) water. Below this, the system pressure can be so low that the unit will shut down on low-pressure fault. This problem is compounded when the cabin is also cold. See the Fault Shutdowns and Error Messages section.

⚠ *Warning*

Do not operate your air conditioning unit in water that is colder than 38°F (3.3°C). Doing so could lead to water freezing in the condenser coil which can cause damage to the unit.

Programming the SMX II System

SMX II control systems are programmed at the factory for average values. Some of the programmable functions may need to be adjusted to suit each individual application and the operator's personal preferences. (The SMXir Remote Control can not be used to program the system.)

To Enter, Use and Exit the Programming Mode

- To enter the Programming Mode: Press Off, then press Set. Successful entry into the Programming Mode is indicated by the presence of a decimal point to the right of the two displayed characters.
- See the following table and each individual program for specific instructions on using each programmable function. Press the keys indicated to select that particular function.
- Once a programmable function has been selected, then use the Up and Down keys to raise, lower or change its setting.
- Press Off to exit the Programming Mode.

Compressor Time Delay

(Factory Default: 0 seconds)

This function is used when there is more than one unit on the boat. To prevent electrical overload due to multiple compressors starting simultaneously when turning on power to the system, or when power is interrupted, each SMX II unit should be programmed with a different Compressor Time Delay.

Time delay can be set in one-second increments. On older systems (before 8/98) the time delay is set in ten-second increments, up to 70 seconds.

- Upon entering the Programming Mode, press the Down, Set and Up keys simultaneously. The delay in seconds will be displayed.

At initial power-up, you will see the countdown for each compressor on the Data Display, if you are in the Temp Mode. The countdown will not appear in the Set Mode.

Fahrenheit/Celsius Display

(Factory Default: Fahrenheit)

Temperature can be displayed in degrees Fahrenheit or Celsius.

- Upon entering the Programming Mode, press the Down, Temp and Up keys simultaneously.

Note

If you switch from Fahrenheit to Celsius for temperature displays, the Compressor Restart Differential will also operate on degrees Celsius. Thus, the factory set Compressor Restart Differential will be 1.5° Celsius, which is too much. To correct this, reset the differential value from 12 to 6. This will provide a differential of 0.75° C, or about 1.4° F.

This will also affect the Fan Response Differential, which is factory set at a value of 4, or 0.5° Fahrenheit. When changing from Fahrenheit to Celsius, you should reset the Fan Response Differential from 4 to 2. This will provide a fan differential of 0.25° C, or about 0.5° F.

Compressor Restart Differential

(Factory Default: 12 = 1.5°)

The Compressor Restart Differential is the temperature change needed for the compressor to cycle on and off. The factory setting of 1.5° Fahrenheit should be adequate for most applications. Differential selections are available in increments of 1/8°. Thus, to change the setting one degree, you should add or subtract 8 (for 8-eighths). If the temperature display is changed from Fahrenheit to Celsius, then the default should be changed from 12 to 6, which is about 0.75° Celsius.

- Upon entering the Programming Mode, press the Slow and Fan keys simultaneously. The Compressor Restart Differential will be displayed.

Hint

Be careful not to set your compressor restart differential too low, since it will cause the compressor to start and stop quite often. This will place an undue load on your electrical system and may shorten the life of the compressor.

Fan Response Differential

(Factory Default: 4 = 0.5°)

When the fan is in the Automatic Fan Mode, its speed is governed by how much the room temperature differs from the setpoint. The fan runs faster when the difference is greater. As the room cools or warms, and the temperature approaches setpoint, the fan slows down automatically. The Fan Response Differential can be adjusted from 1/4° to 4°, in 1/8° increments. If the temperature display is changed from Fahrenheit to Celsius, then the default should be changed from 4 to 2, which is about 0.25° Celsius.

The fan speed range is divided by the SMX II microprocessor into five equal increments. If the Fan Response Differential is set at 1/2°, then the fan speed will change 20% for each 1/2° of temperature deviation from setpoint. Lowering the fan speed differential will cause the fan to change speed more frequently as temperature changes. Raising the fan speed differential will result in slower fan speed changes for a given temperature change. The factory setting of 1/2° Fahrenheit is good for most applications, but you may wish to try a slightly higher setting in your salon and a lower setting in your stateroom.

- Upon entering the Programming Mode, press the Cool and Slow keys simultaneously. The differential will be displayed in increments of 1/8°.

Note

If the Compressor Restart and the Fan Response Differentials are both set to the factroy default, or a comparable range, and the Automatic Fan Mode is on, then the fan will not run at high speed unless the cabin temperature rises 2.5° Fahrenheit above setpoint.

Note

On SMX II systems built before 8/98, press Slow, Fan and Fast simultaneously to adjust Fan Response Differential.

Low Fan Speed Adjustment

(Factory Default: 38)

You can adjust the lowest fan speed to suit individual preferences. For instance, you may wish to decrease the low fan speed setting in your stateroom to minimize fan noise.

- Upon entering the Programming Mode, press the Down and Set keys simultaneously. The current low speed reference number will be displayed (factory set at 38).

Hint

You should normally keep the low fan speed at the highest possible setting, consistent with a comfortable noise level, for most efficient operation of your system. Running the fan speed too slow may have an adverse affect on the system and may cause the evaporator coil to freeze.

High Fan Speed Adjustment

(Factory Default: 60)

A blower will often reach its highest speed at a voltage lower than full line voltage. For example, at a line voltage of 120V, the blower might reach its fastest speed at 110V. At higher voltages, the bower speed will not increase significantly.

The High Fan Speed Adjustment allows you to set the maximum high speed voltage to the threshold of the blower high-speed response. SMX II devides the fan speed voltage steps into five equal increments (between the low speed and high speed adjustments). Accurately setting the High and Low Fan Speed Adjustments can help ensure that each fan speed increment step results in a noticeable change of fan speed.

- Upon entering the Programming Mode, press the Set and Slow keys simultaneously. The current high-speed reference number will be displayed (factory default is 60).
- While listening to the fan noise level, use the Up key to raise the displayed value past the point that you can hear an increase in the fan noise level.
- Press the Down key to lower the voltage until you hear a drop in fan speed, then raise that number up by 2 or 3 to ensure that it is set at the highest speed.

Fan Mode

(Factory Default: Continuous)

You can select continuous or intermittent fan operation. Select “C” and the fan will run continuously while the system is on. Select “I” for intermittent operation and the fan will cycle on and off with the compressor.

- Upon entering the Programming Mode, press the Down, Fan and Up keys simultaneously.

Hint

If you select intermittent fan operation, you should relocate the thermistor from the return air grill to a cabin wall where it can best sense the average room temperature. Check with your dealer or call the Cruisair Applications Department for more information.

AC Line Voltage Calibration

The SMX II control assembly has a built-in voltmeter that senses AC line voltage. The microprocessor automatically responds to sustained low-voltage conditions by shutting down the air conditioning system to prevent compressor damage. At installation, the SMX II voltmeter should be calibrated to line voltage within +/- 1%. To check or re-calibrate AC line voltage:

- Upon entering the Programming Mode, press the Down and Up keys simultaneously. Line voltage will be displayed in as the last two digits of the voltage. On 115V systems, 95V appears as “95”, 100V as “00”, and 120V as “20”. On 230V systems the last two digits of 1/2 of line voltage will be displayed, therefore, 190V will appear as “95”, 200V as “00”, and 230V as “15”.
- To check accuracy or to calibrate, turn off all on-board AC loads and measure the line voltage with an accurate voltmeter.

Temperature Calibration

The temperature sensor should be within one or two degrees of actual room temperature. To check or re-calibrate the sensor:

- Upon entering the Programming Mode, press the Set and Up keys simultaneously. The sensed temperature will be displayed.
- Place an accurate thermometer beside the sensor and compare the temperatures.

Factory Memory Reset

Use Factory Memory Reset to restore all programmed functions to the factory default settings.

To restore programmed functions to the default factory settings:

- Press the Off, Set and Fan keys simultaneously.
- Press the Set key.
- After a delay, the memory will be reset from stored values. After another delay, the display will come back on normally.

Humidity Control Program

The Humidity Control Program automatically operates the air conditioning system for a programmed time period to help control humidity in the boat. This dehumidification feature works in three stages:

1) The fan comes on at high speed to circulate air for ten minutes.

2) The fan then drops to low speed, and the compressor cycles on in the Cool Mode to dehumidify.

3) After the dehumidification cycle, the system turns off. The process repeats according to the programmed time period.

The compressor time delay setting will govern when the dehumidification cycle starts. Every one-second of compressor delay equals a six-minute advance into the dehumidification cycle.

The factory default settings are:

Precirculation cycle ..... 10 min.
Dehumidification cycle ..... 30 min.
Overall time period ..... 12 hours

The factory settings are adequate for most moderate climates and boats. For very humid climates, shorten the overall time period and extend the dehumidification time. In dry climates, select longer a overall time period between cycles and a shorter dehumidification time. The precirculation cycle time should not be changed.

Programming the Dehumidification Time

(Factory Default: 30 minutes)

The dehumidification time determines how long the compressor runs in the Dehumidification Mode. You can select 10, 20, 30, 40, 50 or 60 minutes. Select a longer dehumidification time in climates with high humidity.

- Upon entering the Programming Mode, press the Temp and Set keys simultaneously. The display will show the dehumidification time period in minutes.

Programming the Overall Time Period

Factory Default: 12 hours)

The overall time period determines how often the system performs the dehumidification process. You can select intervals of 2, 4, 6, 8, 10, 12, 14 or 16 hours. Chose a shorter time period in climates with high humidity.

- Upon entering the Programming Mode, press the Temp and Up keys simultaneously. The display will show the overall time period in hours.

Recommended Humidity Control Settings

Outside Temperature	Relative Humidity	Time Period	Dehumid. Time
Below 80˚ F (27˚C)	75-85%	12 hrs	10 min
	Above 85%	8 hrs	20 min
80˚ - 90˚ F (27˚ - 32˚C)	75-85%	10 hrs	30 min
	Above 85%	6 hrs	40 min
Above 90˚ F (32˚C)	75-85%	8 hrs	40 min
	Above 85%	6 hrs	60 min

SMXIIAB & SMXir Keypad/Display Programming Summary Table

Programmable Function	Keystroke Combination	Factory Setting	Range
Compressor Time Delay	Down & Set & Up	0	0 to 70 sec.
Fahrenheit/Celsius Display	Down & Temp & Up	F	F or C
Compressor Restart Differential	Slow & Fan	12	4 to 24
Fan Response Differential	Cool & Slow (Slow & Fan & Fast Before 8/98)	4	2 to 8
Low Fan Speed Adjustment	Down & Set	38	2 to 57
High Fan Speed Adjustment	Set & Slow	60	41 to 99
Fan Mode	Down & Fan & Up	C	C or I
AC Line Voltage Calibration	Down & Up	-	± 1%
Temperature Calibration	Set & Up	-	± 1%
Factory Memory Reset	Off & Set & Fan, then Set		
HU Precirculation	Temp & Down	10 Min.	10 Min.
HU Dehumidification	Temp & Set	30 Min.	See Humidity Control Program
HU Overall Time Period	Temp & Up	12 Hrs.	

Note: See the SMXht section for progamming that keypad/display.

Fault Shutdowns and Error Messages

The SMX II control contains built-in safeguards designed to protect your air conditioning system. These are described below.

Hint

Your system must be equipped with a high-pressure switch and low-pressure switch for the high- and low-pressure shutdown to operate. You should check with your dealer to make sure these important protective devices are installed properly.

Fault Codes

If an operational failure occurs, the display will flash one of the following fault code messages. Fault code displays are cancelled by pressing the Off key.

Fault Code	Meaning	Result
LO / AC (or 200V)	Operating voltage remained below 100V for three minutes for 230V system)	Shutdown
HI / PS*	Head pressure above 425 PSI	Shutdown
LO / PS*	Suction Pressure below 30 PSI	Shutdown
PE	Program error in software	Shutdown

** Note: The "PS" in the high-pressure and low-pressure fault warning should not be confused as "P5" on the SMX II LED Data Display.*

High-Pressure Shutdown

In the Cool Mode, if head pressure rises above 400-425 PSI (28-30 kg/cm^2) (usually caused by loss of cooling water flow, refrigerant gas overcharge or a fouled condenser) the SMX II will attempt three restarts, then shut down the entire system. The display will alternately flash "HI/PS". This is a sustained shutdown, and even when the pressure lowers after shutdown, the system will remain off until reset by pressing the Off key.

In the Heat Mode, a rise in head pressure above the set limit (usually caused by poor airflow or incorrect charge) will cause the compressor to cycle off for two minutes, allowing the heat in the coil to dissipate. This prepares the system for recycling in the Heat Mode. The compressor will then continue to cycle, based on input from the high-pressure switch, until the cabin temperature reaches setpoint, after which compressor cycling is automatically restored to normal operation.

Low-Pressure Shutdown

When installed, the optional low-pressure switch is monitored by the SMX II control. The low-pressure switch opens when the suction pressure drops below 30 PSI (2.11 kg/cm^2), and resets at 45 PSI (3.16 kg/cm^2). The low-pressure fault routine operates differently in the Cool and Heat Modes.

Cool Mode:

When the low-pressure switch first opens, the unit will run for two minutes, then shut down for 50 seconds. It will do this four times. If the switch has not closed, the unit will shut

down for 15 minutes, and alternately flash “LO/PS” on the display. After 15 minutes of shut down, the cycle stats again in which the unit runs for two minutes and then shuts down for 50 seconds.

If, after 18 attempted compressor starts, the low-pressure switch does not stay closed, the unit will go into a sustained shutdown and flash “LO/PS”.

If the low-pressure switch closes at any time before the sustained shutdown, the unit will then operate normally.

Heat Mode:

If the low-pressure switch opens, the fan will automatically change to low speed to try and raise system pressure. It will run for 11 minutes in this mode. Note that the fan speed can not be adjusted at this time. Any attempt to raise fan speed will result in “LO/PS” being flashed, while the unit continues to run.

After 11 minutes, the unit will run for two minutes, then shut down for 50 seconds. It will do this four times. If the switch has not closed, the unit will shut down for 15 minutes, and flash “LO/PS” on the display. After 15 minutes of shut down, the cycle stats again in which the unit runs for two minutes and then shuts down for 50 seconds.

If, after 18 attempted compressor starts, the low-pressure switch does not stay closed, the unit will go into a sustained shutdown and flash “LO/PS”.

If the low-pressure switch closes at any time before the sustained shutdown, the unit will then operate normally.

Low-Voltage Shutdown

The low-voltage protection feature is always active. If AC line voltage drops and remains below the limit, 100 volts for a 115V system or 200 volts for a 230V system, for more than three minutes, the SMX II shuts down the entire system. The display will flash “LO/AC”. This is a sustained shutdown, and the system will not resume operation even if the line voltage rises to normal levels. To reset, press the Off key.

Hint

For the low-voltage shutdown function to work properly, the SMX internal voltmeter should be calibrated. This should be done when the system is installed. To check or recalibrate line voltage, see the AC Line Voltage Calibration section.

Software Error

Whenever power is applied to the SMX II, the microprocessor goes through an automatic self-check and software loading process. If all is well, the SMX II loads the most recent operating configuration from its internal memory, and turns on normally. If a program fault is found during the self-check, the error message “PE” (Program Error) will be displayed.

Likewise, the self-diagnostic routine runs continuously whenever the SMX II system is on. If a system fault is detected, the system shuts down, and the “PE” error message appears.

If this message occurs, contact your nearest Cruisair dealer, or call the Factory Service Department for assistance. Please read the next paragraph before calling.

Determining Your Software Version and Revision Level

Prior to calling a dealer or the factory for service assistance, it’s helpful to know the software version and revision level for the SMX II system. To display this information:

- Press Off, then Set.
- Then press the Cool and Down keys simultaneously. The display will show the version number.
- Press Up once. The display will show the revision level number.

Initial Start Up

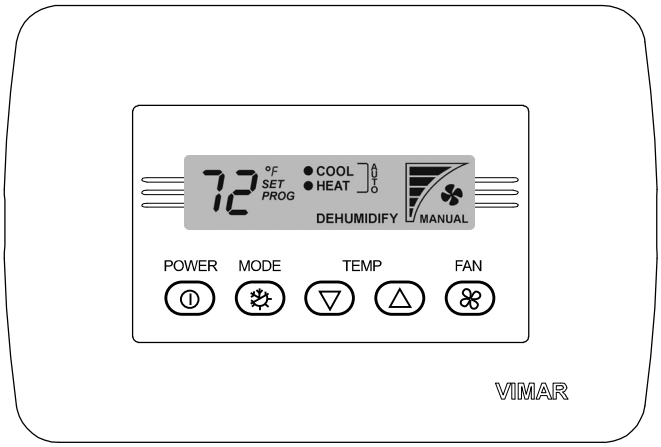
The following instructions apply to both self-contained and remote condensing systems.

1. Open the seacock (seawater inlet valve).
2. Turn on the circuit breaker for the air conditioner. If a pump relay is installed, the breaker for the pump must also be turned on.
3. Set the system for cooling or heating at the SMX II keypad, and adjust temperature setting so the unit will turn on.
4. Verify that water is flowing from the overboard discharge. If more than one unit is installed, then check all such discharges.
5. Allow unit to run for ten minutes at high fan speed. Check the temperature differential between discharge and return air by placing an accurate thermometer in front of the discharge grill and then in front of the return air grill.

   In the Cool Mode, the difference between the discharge and return should be 15 - 20°F (8.3 - 11.1°C), with normal ambient air and water temperatures. In the Heat Mode the differential can be as high as 25°F (13.9°C).

SMXht Keypad/Display Basic Operation & Programmer's Guide

This section deals specifically with the new SMXht keypad/display. Much of this keypad/display's operation and programming is similar to the older SMXIIAB & SMXir. General operation and programming is covered in more detail in the previous sections of this manual, and that information should be reviewed prior to operating the new SMXht. The following pages are specific to the new keypad/display.



SMXht Keypad/Display (shown here with bezel, which is sold separately).

Basic Operation

Turning the System On:

Press the POWER or MODE keys to turn the system on. In three seconds, the system will start operating in whatever mode it was running prior to the last shut down. Press the MODE key prior to three seconds (while the display is flashing) to change mode before system starts, or any time to change the mode while the system is on. The modes available are: Cool, Heat Auto Switchover (automatically switches from Cool to Heat Mode), or Dehumidification Mode. A solid dot will light up next to the words COOL or HEAT when the compressor is on and running in that mode.

Selecting the Setpoint:

Press the Up or Down Arrow keys to adjust the setpoint (press and hold keys to scroll); wait three seconds after powering up system. The word SET will appear in the display while setpoint is being adjusted. The setpoint range is 55-99°F (10-40°C). After selecting the desired setpoint temperature, if no buttons are pressed for three seconds, the display will automatically revert back to showing the inside cabin temperature. Inside cabin temperature is continuously displayed.

Adjusting the Fan Speed:

The Fan key is used to adjust the fan speed while in Manual Fan Speed Mode and to switch from Manual to Automatic Fan Speed Modes. The fan may be run manually whether the system is on or off. The word MANUAL appears in the display while in that mode. Automatic Fan Speed Mode may be operated only when the system is on. Fan behavior also depends on how the Fan Mode function is programmed - "C" for continuous or "I" for intermittent running with the compressor (see *SMXht Keypad/Display Programming Summary Table*).

Dimming the Display:

Press the MODE and Up Arrow keys simultaneously and repeatedly to select the display brightness setting.

Backlight Mode:

While in the Sleep Mode (backlight is off, see function #20) press any button to light the display, and then operate as usual.

Important Memory Function:

After changing modes, programming settings, setpoint, etc., wait at least 30 seconds before turning off main power supply in order for new settings to be maintained in memory.

Programming

SMXht must be in the Off Mode prior to entering Programming Mode; pressing the POWER key turns the display off or on. Once in the Off Mode, then:

1. Simultaneously press and hold the MODE and Down Arrow keys for three seconds. The word "PROG" will flash in the display while the buttons are being held. Successful entry into the Programming Mode is indicated when the word "PROG" stops flashing, and a flashing "1" appears in the display.
2. Use the Up or Down Arrow keys to scroll until the desired program Function Number is displayed. (See *SMXht Keypad/Display Programming Summary Table*.)
3. Press the MODE key to enter the desired function. The current value and the word "PROG" will be displayed.
4. Use the Up or Down Arrow keys to change the value of that program.
5. Press the POWER key to save the new settings, exit the Programming Mode, and return to the Off Mode.

Note: If SMXht is programmed for displaying °C (rather than the factory setting °F), then functions 3 & 4 should be adjusted. For function 3, the factory setting of 12 (or 1.5°F) should be changed to 7 (7/8 = 0.8°C). For function 4, the factory setting of 4 (or 0.5°F) should be changed to 2 (2/8 = 0.3°C). For these functions, 1°F (or 8) = 0.6°C (or 5).

Factory Memory Reset

To restore all programming functions to the Factory Setting, first switch to Off Mode and then simultaneously press and hold the POWER and MODE keys. Hold keys for three seconds while “00” flashes in the display. Successful memory reset is indicated by a “1” flashing back and forth across the display; release keys. System returns to the Off Mode.

NOTE: Performing a Factory Memory Reset will not change the value of Function Numbers 21 & 22. Also note that Function Number 2, which displays Fahrenheit or Celsius, reverts back to °F each time.

Fault Code Displays

If an operational failure occurs, such as low voltage or high/low pressure, a flashing fault code message will be displayed. Fault code displays are canceled by pressing the POWER key. (See *Fault Code Summary Table*.)

Fault Code Summary Table

Fault Code	Indication	Result
LO / AC	Operating voltage remained below acceptable limit for three minutes or more (100V for a 115V system or 200V for a 230V systems).	Shutdown
HI / PS*	Head pressure above 425 PSI.	Shutdown
LO / PS**	Head pressure below 30 PSI.	Shutdown
PE	Software program error.	Shutdown

** Indicates pump failure or loss of water flow.*
***Indicates loss of gas; or water too cold for heating during Heat Mode.*

SMXht Keypad/Display Programming Summary Table

Programmable Function	Function Number	Factory Setting	Range
Compressor Time Delay	1	0	0 - 70 sec
Fahrenheit/Celsius	2	F	F or C
Compressor Differential	3	12 (12/8 = 1.5˚)	2 to 31
Fan Response Differential	4	4 (4/8 = 0.5˚)	2 to 31
Low Fan Speed	5	38	2 to 57
High Fan Speed	6	60	41 to 99
Fan Mode	7	C	C or I
AC Line Voltage Calibration	8	-	± 1%
Temperature Calibration	9	-	± 1%
HU (Humidity) Precirculation	10	10 (min)	0 to 30 min
HU Dehumidification	11	30 (min)	10 to 60 min
HU Time Period	12	12 (hrs)	2 to 16 hrs
Variable or 2-Speed Fan (2-Speed Fan for SMX Net only)	13	F1 (variable)	F1 or F2 (2-Speed)
High to Low Speed Adjustment (2-Speed Fan for SMX Net only)	14	38	00 to 6E
Software Version	15	Current Version	
Software Revision	16	Current Revision	
Low Pressure Switch Test	17	OA = Okay FA = Fault	n/a
High Pressure Switch Test	18	OA = Okay FA = Fault	n/a
LED Segment Test	19	Lights all LED Segments	n/a
Backlight Mode	20	On	On = continuous SL = sleep mode
Select DX or TW power/logic board	21	dE	dE=DX or CH=TW (do not change)
Select SMXII power/logic board. (SMX Net will be available in future)	22	II	II or nE (do not change)

SMX II Control Systems • Troubleshooting

SMX II Quick Troubleshooting Guide

Problem: SMX display not on
Possible Solution:

1. Turn circuit breaker on
2. Check CX/CXP cable and connections
3. Replace keypad/display
4. Replace Power/Logic board

Problem: Erratic temperature display
Possible Solution:

1. Perform a Factory Memory Reset
2. Check temperature sensor, cable and connection
3. Ensure the temperature sensor is installed properly
4. Calibrate temperature
5. Replace Power/Logic board

Problem: Erratic system operation
Possible Solution:

1. Perform a Factory Memory Reset
2. Check CX/CXP cable and connections
3. Check temperature sensor, cable and connection
4. Replace keypad/display
5. Replace Power/Logic board

⚠ Warning

The Power/Logic board operates at 115VAC or 230VAC. Make sure the power is off before removing the cover of the Power/Logic box.

Contact an authorized Cruisair servicing dealer if the problem continues, or for replacement parts.

System Troubleshooting

Before you call for service, review this list. It may save you time and expense. This list contains common occurrences that are not a result of defective workmanship or materials. If you need service after trying these procedures, call your nearest Cruisair dealer.

Situation

The unit will not operate at all.

Problem/Solution

1. Blown fuse or tripped circuit breaker. Replace fuse with time delay type or reset breaker. Check for correct sizing.
2. Low voltage to unit. Check shore power supply and rating of electrical power cord to boat.

Situation

Air from the unit does not feel cool in the Cool Mode or warm in the Heat Mode.

Problem/Solution

1. The selector switch is set for Fan only. Switch the system into the Cool or Heating Mode.
2. The thermostat is set incorrectly. Set the thermostat for a cooler or warmer setting.
3. Water flow is restricted. Clear restriction. Clean strainer.

Situation

The unit operates but the cabin fails to cool normally.

Problem/Solution

1. Dirty air filter. Clean lint screen or air filter.
2. The thermostat is set too high. Reset the thermostat to a cooler setting.
3. The evaporator coil has iced. Turn the system to Fan only for five minutes, then restart.

Situation

Compressor cycles on and off.

Problem/Solution

1. Dirty air filter. Clean lint screen or air filter.
2. Water flow restriction. Clear restriction. Clean strainer.

Situation

Water dripping inside cabin.

Problem/Solution

1. Condensate drain is clogged. Clean out drain holes.
2. Blockage in hose. Clear hose. Check downhill routing of hose.

Condensate Drains

At least once every three months, check the condensate drains for obstructions by pouring a quart of water rapidly into the condensate pan. If it does not drain completely within 30 seconds, check the drain outlets for clogging. Remember that many air conditioning units have two drains and hoses, one at each end of the drain pan.

Air Filters

At least once a month, check the lint screen or filter behind the return air grill or on the face of the cooling/heating unit and clean if necessary.

Seawater Connections

Verify that all seawater connections are tight, and check for water flow from each unit's overboard discharge.

Seawater Pump

If the seawater pump has a plastic pump head, then the impeller is made of either plastic or rubber, and should be inspected after 300 hours of operation. Replace the impeller if it is worn. Whereas, if the pumps head is made of bronze, then the impeller is too, and regular maintenance is not needed as often.

Seawater Strainer

Check the seawater strainer daily. Remove any debris.

Refrigerant Gas

The refrigerant gas used in the air conditioning system is adequate for the life of the system. Routine "seasonal" charging of the system is not typically necessary.

Winterizing the System

Close the seacock and remove the inlet water hose from the air conditioner. Allow all water to drain from the system. Loosen the screws on the pump head to allow the water to drain from the pump. Drain and clean the seawater strainer.

Owner's Warranty Periods

As hereinafter described, Dometic Corporation limits the duration of any implied warranty to the duration of the underlying express warranty and also disclaims any liability for consequential or incidental damages arising from any application, installation, use or malfunction of any warranted product.

Section I

What does the Limited Warranty cover?

Products manufactured by Dometic Corporation (Dometic) are under limited warranty to be free from defects in workmanship or materials under normal use and service with the obligation of Dometic under this limited warranty being limited to replacing or repairing any component(s) which shall disclose defects within the time limits defined in **Section III** and which, upon examination by Dometic, shall appear to the satisfaction of Dometic to be defective or not up to specifications.

This Limited Warranty is made in lieu of all other express warranties, obligations, or liabilities on the part of Dometic. In addition, Dometic shall not be responsible for any incidental or consequential damages. In those instances in which a cash refund is made, such refund shall effect the cancellation of the contract of sale without reservation of rights on the part of the purchaser. **Such refund shall constitute full and final satisfaction of all claims which purchaser has or may have against Dometic due to any actual or alleged breach of warranty, either express or implied, including, without limitation, any implied warranty of merchantability or fitness for a particular purpose.** Some states do not allow the exclusion or limitation of incidental or consequential damages so the above limitation may not apply to you. The terms and conditions of this warranty shall be governed by the laws of the Commonwealth of Virginia.

The Dealer is not an agent for Dometic except for the purpose of administering the above warranty to the extent herein provided, and Dometic does not authorize the dealer or any other person to assume for Dometic any liability in connection with such warranty, or any liability or expense incurred in the replacement or repair of its products other than those expressly authorized herein. Dometic shall not be responsible for any liability or expense except as is specifically authorized and provided in this section.

Dometic reserves the right to improve its products through changes in design or material without being obligated to incorporate such changes in products of prior manufacture, and to make changes at any time in design, materials, or part of units of any one year's model, without obligation or liability to owners of units of the same year's model of prior manufacture.

This warranty gives you, the purchaser, specific legal rights, and you may also have other rights which vary from state to state. You also have implied warranty rights, including an implied warranty of merchantability, which means that your product must be fit for the ordinary purposes for which such goods are used. ***The duration of any implied warranty rights is limited to the duration of the express warranty as found in Section III.*** Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

Section II

What does this Limited Warranty not cover?

This Warranty Shall Not Apply to:

1. Failures resulting from improper installation or use contrary to instructions.
2. Failures resulting from abuse, misuse, accident, fire, or submergence.
3. Any part manufactured by Dometic which shall have been altered so as to impair its original characteristics.
4. Any parts which fail as a result of misuse, improper application or improper installation.
5. Items not manufactured by Dometic, i.e., items which are purchased from another manufacturer and supplied as received by Dometic without alteration or modification except as any part of an Dometic-manufactured unit or component.
6. Components or parts used by or applied by the purchaser as an integral part of products not manufactured by Dometic.
7. Warranty does not cover damage to components that comprise a Custom Wrapped Box Evaporator refrigeration system (aka: catch boxes, fish boxes, etc.) when the box is installed in such a way that the customer can move it. These damages may include, but are not limited to: crimped refrigerant linesets (copper tubing or flexible linesets), refrigerant leaks, moisture ingression into the refrigeration system, subsequent damage to condensing unit from being operated with low refrigerant charge or moisture in the system, broken refrigerant connections, broken thermostat sensors, and/or broken constant pressure valves.

Installation and application of Dometic components is not warranted by Dometic because Dometic has no control or authority over the selection, location, application, or installation of these components.

Section III

What is the period of coverage?

See the Limited Warranty Periods, document # L-0694, for the period of coverage.

All Dometic components bear a data plate on which there are model and serial numbers. The serial number is date coded. To determine whether or not any Dometic component is in warranty, proceed as follows:

1. Determine the manufacture date of the component from the serial number on the data plate. If you are not familiar with the date code, write or call the Dometic Customer Service Department at (804)746-1313, to obtain the manufacture date. The hours of the Customer Service Department are 8:00 am - 5:00 pm (USA, Eastern Time Zone) Monday through Friday excluding holidays.
2. It is possible that there might exist a considerable time lag between the date a component is manufactured and the date it is put in service. In such instances, the date of manufacture could indicate that the item is out of warranty. However, based on the date the equipment is first put in service, the item may still be covered by the Dometic warranty described in **Section I**. For proof of date put in service, Dometic will require a copy of the bill of sale of the Dometic equipment from the installer or new boat dealer to the original owner.

Section IV

How do you get service? Please Read the following Warranty Procedure.

WARRANTY PROCEDURE

If the failure of a Dometic component is determined to be covered under the Dometic warranty and the time in service is determined to be within the warranty time limit, the owner has the following three options:

1. Preferred option: Have a Dometic authorized Servicing Dealer perform the work needed. The customer should call Dometic's Service Department for a recommendation as to the closest dealer. If the customer already knows an authorized servicing dealer, the dealer should be contacted directly.
2. If the customer contacts Dometic's Service Department for a Servicing Dealer and Dometic has no one in that particular area, Dometic will authorize the use of a local service company and Dometic will work with the local company to assist in any way possible.
3. The customer may send his equipment back to the factory to have the repair work done. Dometic will make every effort to return the equipment to the customer within a three week time period. If the claim represents a legitimate warranty problem, Dometic will pay the freight both ways. Dometic prefers option one and two, if at all possible.

The customer may contact the Dometic Service Department at (804) 746-1313.

WARNING

Dometic Corporation (Dometic) manufacturers of Cruisair, Grunert, Marine Air, Sentry and Tundra Products, makes the following safety warnings concerning the application, installation, use and care of its products. Although these warnings are extensive, there may be specific hazards which may arise out of circumstances which we have not outlined herein. Use this as a guide for developing an awareness of potential hazards of all kinds. Such an awareness will be a key factor in assuring your SAFETY and comfort.

ELECTRICITY - Many Dometic products operate on 115, 230 or 440 volt AC power. Such voltages can be LETHAL; therefore, the chassis, cabinets, bases, etc., on all components must be grounded together and connected to the vessel's grounding system. Sparks can occur as switches, thermostats and relays open and close in the normal operation of the equipment. Since this is the case, ventilating blowers for the removal of hazardous fumes or vapors should be operated at least 5 minutes before and during operation of any Dometic product or group of Dometic products. All electrical connections must be covered and protected so accidental contact cannot be made by persons using the equipment, as such contact could be LETHAL.

ELECTROLYSIS - Electrical leakage of any component can cause electrolytic deterioration (electrolysis) of thru-hull components which could result in leakage serious enough to sink a vessel which could result in loss of life. All Dometic components must be kept clean and dry and checked periodically for electrical leakage. If any electrical leakage is detected, the component should be replaced or the fault causing the leakage corrected before the component is put back into service.

GAS - CRUISAIR, MARINE AIR, GRUNERT and TUNDRA components utilize R-22 (Chlorodifluoromethane), R134a refrigerant (Tetrafluoroethane), R-407C (which contains Diflouromethane (HFC-32), Pentafluoroethane (HFC125), and 1.1.1.2 - Tetrafluoroethane (HFC134a)), R404A (R125/R143a/R134 (44%/52%/4%)), or R417a, which are non-toxic, non-flammable gases; however, these gases contain no oxygen and will not support life. Refrigerant gas tends to settle in the lowest areas of the compartment. If you experience a leak, evacuate all personnel, and ventilate area. Do not allow open flames in the area of leaks because refrigerant gas, when burned, decomposes into other potentially LETHAL gases. Refrigerant components operate at high pressure and no servicing should be attempted without gloves, long-sleeved clothing and eye protection. Liquid refrigerant gas can cause severe frost burns to the skin and eyes.

VENTILATION - To cool or heat air, CRUISAIR, MARINE AIR and GRUNERT components are designed to move air through a heat exchanger by a blower or propeller fan. This design necessarily produces a suction on one side of the air handling component and a pressure on the other side. Air handling components must be installed so that the suction-pressure action does not: (1) pressurize an area to the extent that structural failure occurs which could cause harm to occupants or bystanders, or (2) cause a suction or low pressure in an area where hydrogen gas from batteries, raw fuel vapor from fuel tanks, carbon monoxide from operating propulsion engines, power generators or heaters, methane gas from sewage holding tanks, or any other dangerous gas or vapor could exist. If an air handling unit is installed in such a manner that allows potentially lethal gases or vapors to be discharged by the air handling unit into the living space, this could result in loss of life.

Maximum protection against the introduction of dangerous gases or vapors into living spaces can be obtained by providing living spaces which are sealed from all other spaces by use of airtight bulkheads and decks, etc., and through the introduction of clean air into the living space. Bear in mind that the advent of air conditioning, whether it be for cooling or for heating, naturally leads to the practice of closing a living space tightly. Never close all windows and doors unless auxiliary ventilating systems, which introduce clean outside air into the living space, are used. Always leave enough window and door openings to provide adequate ventilation in the event potentially lethal gases or fumes should escape from any source.

CONDENSATE - All cooling units produce water condensate when operating on the cooling cycle. This water must be drained from the cooling unit overboard. If condensate is allowed to drip on a wooden structure, rotting or decay and structural failure may occur which could result in loss of life. If condensate is allowed to drip on electrical components, deterioration of the electrical components could result in hazardous conditions. When an air conditioning system is in operation, condensate drains may be subjected to negative pressure. Always locate condensate drains as far as possible from points where engine waste and other dangerous gases are exhausted so no such dangerous gases can be drawn into the condensate drains.

Warning

Never sleep in a closed area on a boat when any equipment, which functions as a result of the combustion of a volatile fuel, is in operation (such as engines, generators, power plants, or oil-fired heaters, etc.). At any time, the exhaust system of such devices could fail, resulting in a build-up of LETHAL gases within the closed area.

Limited Warranty Periods

Please read and keep this document with your important paperwork. Use it as a reference in the future. If you have any questions, please contact the Dometic Corporation Service Department at (804)746-1313 for clarification.

Note: Any model or replacement part that has been installed due to a warranty failure will carry **only** the remainder of the original warranty. All warranties begin when the customer takes possession of the equipment. The warranty is extended to all owners of the equipment commencing the date the original owner takes possession of it. Proof of original purchase may be required. **Fuses** and **MOV's** are used as safety devices to protect Cruisair equipment against over-current conditions caused by lightning or inductive switching environments. **These are not covered under warranty.** We reserve the right to change our warranty policies and procedures as well as our warranty allowances without notice.

Cruisair Direct Expansion (DX) and Modulating Systems

- New, complete system installation using any member of the SMX family.

  The warranty includes the pump.

  2 year warranty including Parts and Labor

- New, complete system installation using an electro-mechanical control (3-knob).

  The warranty includes the pump.

  1 year warranty including Parts and Labor

- New, complete model sold as a partial system retrofit to an existing system.

  Includes SMX family.

  1 year warranty including Parts and Labor

Cruisair Tempered Water

- New, complete system installation using any member of the SMX family.

  2 year warranty including Parts and Labor

  NOTE: Excludes pump which has a 1 year warranty

- New, complete model sold as a partial system retrofit to an existing system.

  Includes SMX family.

  1 year warranty including Parts and Labor

Sentry Battery Chargers

- New SM and FR series installation.

  2 year warranty including Parts and Labor

- New G-series installation.

  1 year warranty including Parts and Labor

Refrigerators/Freezers/Fish Boxes

The below warranty periods do not apply to systems that are installed as described in Section II, item #7, of the Owner's Limited Warranty, document # L-0123.

- New installation of entire system including condensing unit, line sets, evaporator, etc.

  1 year warranty including Parts and Labor

- New complete model sold as a partial system retrofit to an existing Cruisair system.

  1 year warranty including Parts and Labor

- New installation of condensing unit only, with line sets, evaporators, etc. done by others i.e. not Cruisair pre-charged line sets and evaporators.

  1 year warranty including parts and labor on mechanical and electrical parts of condensing unit only.

Replacement Parts

- Replacement parts and components - example: A-509, 40401-30.

  90 day warranty, Parts only

- Replacement Compressors for other than Tempered Water Systems - example: R3101-16T, DX equipment - installed in an existing Cruisair system or a competitor's system.

  1 year warranty including Parts and Labor

- Replacement compressors for Tempered Water - example: 30130-36 installed in an existing Cruisair system.

  1 year warranty including Parts and Labor

- A Tempered Water compressor - example: 30130-36 installed with competitor's equipment.

  90 day warranty, Parts only

* The box denotes the part of the warranty that pertains to this particular product.

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