MasterStat

Evaporative Cooler Control

Product Specifications

Champion Cooler

1 Introduction

1.1 General Description

The 2-speed Evaporative Cooler Control comprises a Wall Control unit, connected by three wires to the Appliance Controller. The Appliance Controller is intended to be mounted in or near the evaporative cooler itself, while the Wall Control is attached to a wall in the environment intended to be controlled.

1.2 Overview

The Wall Control presents the User Interface controls and LCD temperature display. It has a 3-way screw-terminal connection for the cable running from the Appliance Control.

The Appliance Control is designed to operate a 2-speed fan motor, a small water pump motor, and an optional water purge pump.

2 Functional Requirements

2.1 Hardware Requirements

2.1.1 Connection

Connection between the Wall Control and Appliance Controller is made by 3 wires, terminated at each end in 3-way screw terminals.

2.1.2 Wall Control Inputs

2.1.2.1 Temperature

An on-board sensor is used for temperature measurement. Control range is from 50°F to 90°F

Absolute accuracy	± 2°F
Resolution	1°F

2.1.3 Buttons

2.1.3.1 Mode

Pressing this button will toggle between 'Auto', 'Manual' and 'Off' modes. In 'Auto' mode, the pump and fan will be controlled by the control based on Set Temperature and 'Auto' will display on the LCD. In 'Manual' mode, the fan and pump can be controlled separately, and 'Manual' will be displayed on the LCD. In 'Off' mode, the unit will be off and neither 'Manual' nor 'Auto' will be displayed on the LCD.

2.1.3.2 Pump

Pressing the button in 'Manual' mode toggles the pump On and Off. If the control is in 'Auto' mode, pressing this button will change it to 'Manual' mode and toggle the pump On and Off.

2.1.3.3 Fan

Pressing this button will cycle the fan speed from High to Low to Off. If the control is in 'Auto' mode, pressing this button will change it to 'Manual' mode and will toggle between fan speeds with each button press. As the Fan has two speeds, the characters 'Fan Lo' are displayed on the LCD at Low-speed and 'Fan Hi' at High-speed. This is stored in memory the next time the Fan mode is activated. The LCD will display the fan speed immediately upon button press, however, the relay to switch the fan speeds will have a 2 second time delay.

2.1.3.4 Timer

Pressing the 'Timer' button will activate or deactivate the timer delay. When the timer delay mode is active, the LCD display will show the time remaining in 1 hour increments. The 'Up' and 'Down' arrow buttons will increase or decrease the set time.

When the 'Up' button is pressed, the time on the display will increase in 1 hour increments from 1 hour to 12 hours. Once 12 hours is displayed, if the button is pressed again, the display will indicate 1 hour and subsequent presses will continue to increase the time. When the 'Down' button is pressed, the time on the display will decrease in 1 hour increments. Once 1 hour is displayed, the next button press will change the display to 12 hours and subsequent presses will continue to decrease the time. If either 'Up' or 'Down' button is held depressed for greater than 2 seconds, the set hour will be increased/decreased at a rate of 1 hour every ¼ second until the button is released.

If the timer period has already partially expired, pressing the 'Up' or 'Down' buttons shall cause the timer delay to go to the next set period. (ie. if the countdown timer reaches 1 hour 40 mins, by pressing the 'Up' button, the timer shall jump to 3 hours).

Whenever the Timer mode is active, the word 'Timer Delay' and the time will be displayed in 1 hour increments on the display (i.e. 'Timer Delay 12 hours'). While changing the time or when 'Timer' button is pressed to activate the timer function, the word 'Timer Delay' on the display will flash on/off every second and will remain flashing until 5 seconds after last button push. The period countdown and any changes to the timer function will start after the 5 seconds from last button push.

When the countdown reaches 0, the Timer mode is no longer active, and the current mode of operation is maintained. The 'Timer Delay' and time on the display will then not be shown.

If the unit is active when the 'Timer' button is pressed, the unit will switch off after the period has elapsed.

If the unit is already off, the unit will resume the last active mode after the period has elapsed. If any button is pressed besides 'Timer', the display will indicate the last saved setting. The next button press will change the mode or settings that will become active after elapsed time period. After 5 seconds of last button push, the settings will be saved and the display will return to show just the room temperature and the 'Timer Delay' time. After timer period has elapsed, the unit will operate at the last saved settings.

2.1.3.5 Set Temperature Adjustment

The Set Temperature (the target temperature during Cool mode) may be altered using the 'Up' and 'Down' buttons, but only while in 'Auto' mode (or Timer countdown).

When changing the set temperature, the display changes from 'ROOM' to 'SET' temperature indication.

The Set Temperature is increased by 1°F for each subsequent 'Up' press. If the key is held depressed for greater than 2 seconds, the temperature is increased at a rate of 1°F every ¼ second until the key is released.

The Set Temperature is decreased by 1°F for each subsequent 'Down' press. If the key is held depressed for greater than 2 seconds, the temperature is decreased at a rate of 1°F every ¼ second until the key is released.

The display reverts to 'Room' temperature indication after 5 seconds of no button activity or a change in mode selection, whichever comes first.

2.1.4 Outputs

2.1.4.1 Display Indicators

2.1.4.1.1 Auto/Manual Mode

When in 'Auto' mode, the word 'Auto' will be displayed. When in 'Manual' mode, the word 'Manual' will be displayed. When in the 'Off' mode neither 'Auto' nor 'Manual' will be displayed.

2.1.4.1.2 Pump Mode

When pump is activated and the fan is not, the LCD will display 'Pre-Wet'. If the fan and pump are activated, then 'Cool' will be displayed on the LCD. When in Auto mode and during pre-wet (no fan), the text 'Pre-Wet' will flash on/off every second on the LCD.

2.1.4.1.3 Fan Mode

When the Fan is running, the LCD displays 'Fan Lo' when the Fan is running at Low-Speed, or 'Fan Hi' at Full-Speed. If the pump is running as well as the fan then 'Cool' will also be displayed. If only the fan is running and not the pump, then 'Vent' will be displayed.

2.1.4.1.4 Timer Mode

When the timer mode is active, 'Timer Delay'and the number of hours remaining will be displayed in 1 hour increments from 1 through 12. When the timer period has expired, the 'Timer Delay' and 'hour' will no longer be displayed on the LCD.

2.1.4.1.5 Temperature

The LCD normally displays the word 'Room' and current measured room temperature.

When setting the Set temperature, the word 'Set' will be displayed instead of 'Room'.

2.1.5 Appliance Controller

2.1.5.1 Fan Motor Control

The control is designed to control a 2 speed motor up to 1HP @120VAC or 2HP @ 240VAC.
Connection is by a screw terminal block (common, Low speed, High speed).

2.1.5.2 Pump Motor Control

Pump control up to 240VA.
Connection is by a screw terminal block (supply in, supply out)

A 3.15-Amp 'Slo-Blo' (Time lag) fuse is fitted in series with the Pump and Purge Pump circuits.

2.1.5.3 Water Purge Pump/Valve

A Water Purge Pump/Valve may be fitted, up to 240VA.
Connection is by a screw terminal block (supply in, supply out)
This circuit shares the same fuse protection as the Pump motor.

2.1.6 Auto/Cool Function

At temperatures 4°F or more, above the Set Temperature, the Fan speed is 'High' and the pump is on.

When the temperature falls to 1°F above the Set Temperature, the Fan speed reduces to 'Low', while the pump remains on.

If the temperature continues to fall to 2°F below the Set Temperature, the Fan and pump switches off.

The unit then waits until the temperature exceeds the Set Temperature by 1°F whereupon the pump is switched on and the Fan operates at 'Low' speed.

2.1.7 Pre-wet Function

When selecting 'Auto' mode, if the pump has been inactive for greater than 30 minutes and the fan is inactive, the pump is switched on for 90 seconds before the fan starts. This is called 'Pre-wet' and allows the pads to soak in water. During this time "Pre-Wet" is indicated on the display.

If required, the Pre-wet can be bypassed by entering 'Manual' mode by pressing 'Mode' button then reselecting 'Auto' mode; the fan and pump will come on together.

2.1.8 Water Purge Function

During operation, the unit will purge the water for a period of 5 minutes for every 12 or 8 hours of pump operation, depending on the setting as per section 2.1.10 below. During these 5 minutes the Pump will continue to operate.

2.1.9 Power Resume Function

If power is interrupted while the unit is operating, the unit will resume in the mode active during power loss. This will be true for 'Auto' or 'Manual' modes; any 'Timer' operation will be cancelled and the unit will remain 'Off'.

2.1.10 Special Access Mode

If the 'Pump' and 'Fan' buttons are pressed simultaneously and held for longer than 5 seconds, a Purge function will be initiated, and the Purge interval will change from the factory default (12 hours) to an 8 hour period.

Performing the same operation again will then toggle between these settings.

In each case, the new period (12h or 8h) will appear in the display for 2 seconds to confirm the change.

3 Electrical Requirements

3.1 Operating Voltage Range

Nominal operating voltage 120/240VAC 50/60 Hz

3.2 Grounding

Common Grounding connections are to be made external to the Appliance Control PCB assembly. This is done by use of a Wire-nut (supplied), where the wiring enters the enclosure of the Appliance Controller.

4 Environmental Requirements

4.1 Temperature

Nominal operational ambient 32 -110°F (0-40°C).
Storage Ambient 32-185°F (0-60°C).

4.2 Enclosure

Appliance Control Box designated as rainproof

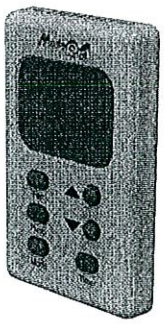
5 Mechanical Requirements

5.1 Packaging

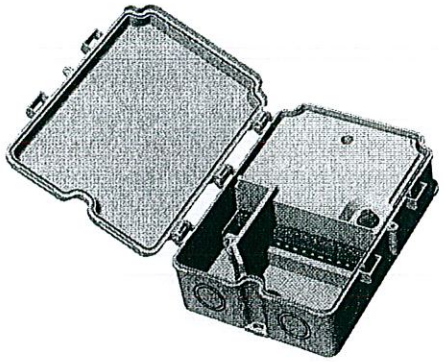
Color box, with graphics on all 4 sides and top. Wall control to be placed on top of appliance control box and protected inside packaging.

Plastic film for LCD Display on Wall Control to protect screen.

5.2 Artistic Impression of Wall Control



5.3 Artistic Impression of Appliance Control Assembly



6 Authority Approvals

6.1 Standards to be met

Obtain UL Listing so it could be sold separately from the unit. Must meet UL 873 Temperature-Indicating and Regulating Equipment

7 Options

7.1 Option 1: Backlight Display

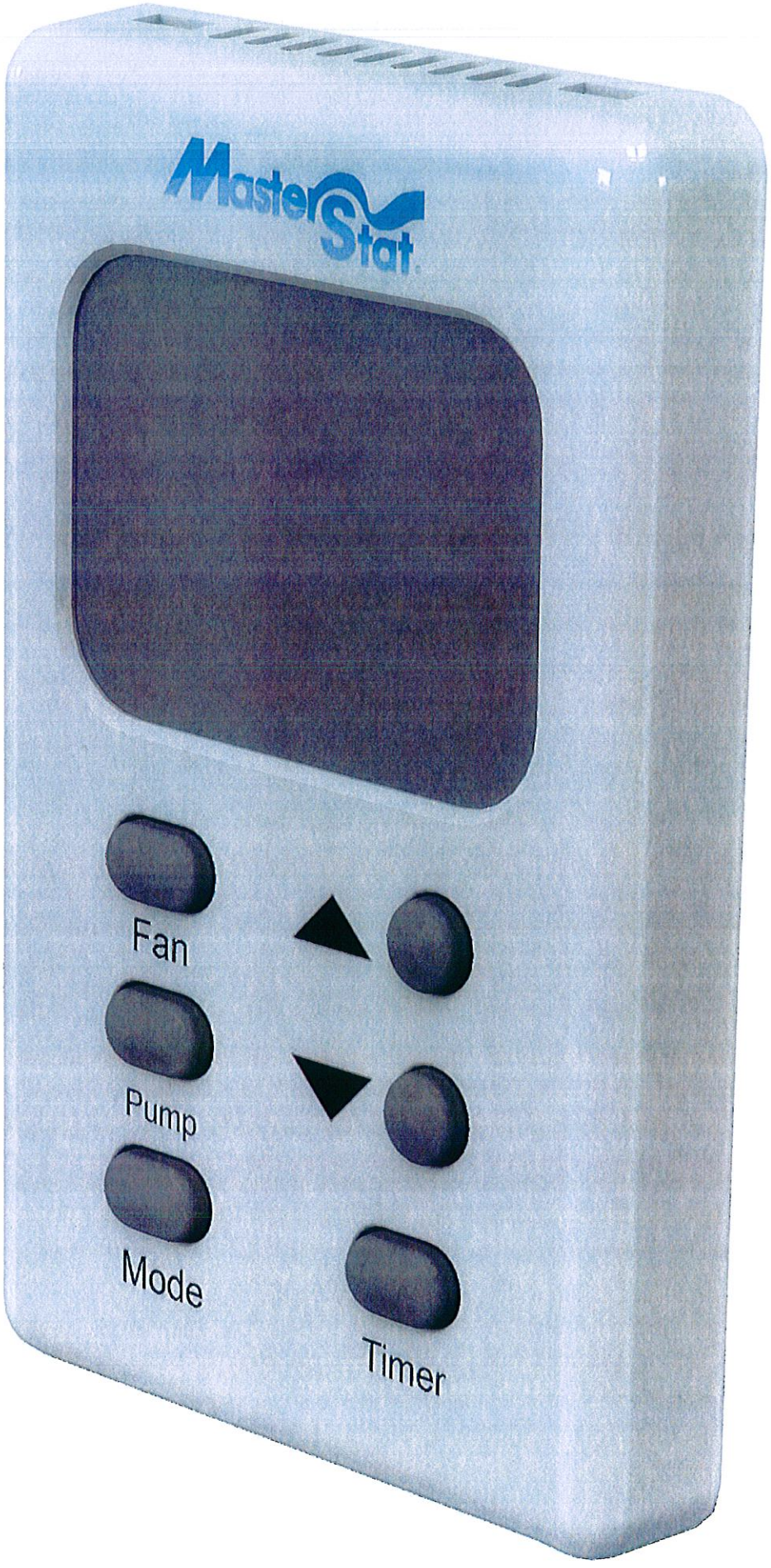
Have a backlit display on theLCD to light up display in a dark room. The back light will activate when any button has been pressed and will deactivate after 5 seconds of last button press.

7.2 Option 2: Humidity Control

Have the ability to control the pump based on humidity in the air. If the humidity goes above a set limit, then the pump will turn off. Once the humidity goes below the set limit, the pump will be turned back on.

This option can be turned on or off by pressing and holding down the pump button for 5 seconds. After these 5 seconds, this option is active and the set humidity can be changed by using the 'Up' or 'Down' buttons. After 5 seconds of the last button push, the set humidity will be active and no addition changes can be made until entering setup again.

While option is active, the LCD will display 'Humidity'. When changing the set humidity a '%' will be indicated on the display.


MasterStat
Fan
Pump
Mode
Timer