



ALCP2004 Loop Control Panel

Microtemp Controller II

Installation, Operation and Maintenance Manual

TABLE OF CONTENTS

	Page
Introduction	3
Specifications	3
Installation	3
1) Inspection:	3
2) Installing Controller:	4
3) Connecting Low Voltage Wiring:	4
4) Outputs:	4
5) Power Wiring:	6
6) Energizing Controller:	6
Operation:	7
Modes of Operation:	7
Programming:	8
Programming Examples:	8
Appendix A: Simulator Connection:	18
Appendix B: Troubleshooting:	19
Appendix C: Pump Override Input:	20
Data Sheets:	21

MICROTEMP CONTROLLER II

Introduction

The Microtemp Controller II (MT II) is a microprocessor based control that operates the main and standby circulating pump to control cooling, heating, and flow in a closed loop water source heat pump system.

The controller accomplishes this by controlling individual stages (outputs) of cooling and heating equipment with programmable set points. By making these set points programmable, various weather conditions and equipment sizes are easily accommodated. The MT II also monitors water flow in the loop. The MT II automatically activated a standby circulating pump upon flow lost.

The control also allows the loop pump to be turned "off" on a scheduled basis. An ambient temperature sensor and pump override input provide an override to the schedule when either the outside temperature of the building temperature falls below a specified set point, or by activation of the pump override input during scheduled "off" times.

Throughout this manual the words Microtemp Controller II will be used in the abbreviated form MT II.

Specifications

Electrical:

Input Voltage: 120 VAC +/- 10% @ 60Hz

Power: 4 Watts Max.

Operating Conditions:

Temperature: 45 to 110°F

Humidity: 0 to 90% non-condensing

Dimensions: 16.5"H x 15"W x 6.5"D

Control Outputs: 24 to 240 VAC @ 2.0 Amps Max. for each Output

Flow and Pump Override Input: DRY CONTACT ONLY

Temperature Inputs: 5 VDC @ 600 microAmps

Range: 0 to 130°F

Accuracy: +/- .5°F

Installation

INSTALLATION MUST BE DONE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND ALL APPLICABLE LOCAL CODES.

▲ WARNING

TO PREVENT DAMAGE TO PERSONNEL AND EQUIPMENT, DISCONNECT POWER BEFORE INSTALLING THE CONTROLLER.

INSTALLATION MUST BE DONE BY QUALIFIED PERSONNEL.

THE PANEL MUST HAVE A SOLID EARTH GROUND.

▲ WARNING

THE PANEL MUST NOT BE EXPOSED TO RAIN OR CONDENSING HUMIDITY. IF THE PANEL WILL BE EXPOSED TO MOISTURE, INSTALL IT IN A WATER TIGHT ENCLOSURE (RISK OF ELECTROCUTION AND EQUIPMENT DAMAGE).

▲ WARNING

TO PREVENT STATIC DAMAGE TO THE PANEL, INSTALLERS AND USERS SHOULD GROUND THEMSELVES PRIOR TO TOUCHING THE PANEL.

▲ WARNING

ALL LOW VOLTAGE WIRING (TEMPERATURE SENSORS, FLOW SWITCH, AND PUMP OVERRIDE) MUST BE IN A SEPARATE CONDUIT AND AWAY FROM 120 VAC WIRING.

▲ WARNING

PLACE POWER FOR CONTROLLER (120 VAC) IN A SEPARATE CONDUIT AND ON A SEPARATE BRANCH CIRCUIT.

- 1) Unpack and inspect the MT II

Installers should ground themselves to prevent static damage to the control.

While inspecting check the control for:

- A) Damage to the panel: if there is damage, notify the carrier immediately.
- B) All items on the packing list are in the box.
- C) The Plexiglas display windows are firmly attached to the control cover.
- D) The electronic control and output boards are firmly attached to the panel.

2) Installing the Controller

Install the MT II on a wall or mounting surface so that the panel can be wired with electrical conduit. The display on the panel should be approx. 60" above the floor (eye level) for good display viewing. (See fig. 1)

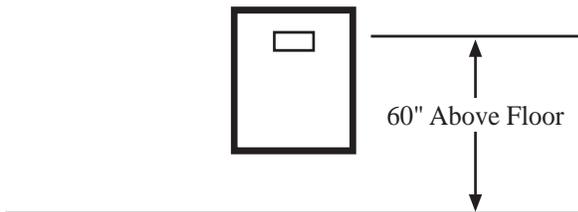


Figure 1

3) Connect the low voltage wiring.

▲ WARNING

ALL LOW VOLTAGE WIRING (TEMPERATURE SENSORS, FLOW SWITCH, AND PUMP OVERRIDE) MUST BE IN A SEPARATE CONDUIT AND AWAY FROM 120 VAC WIRING.

Temperature Sensors:

The MT II utilizes two temperature sensors, one for water loop temp. and another for ambient temp. (see fig. 2). Each sensor has three wires that connect into the MT II. A well is provided for installing the water sensors into the system.

The connections for the sensors, flow switch, and pump

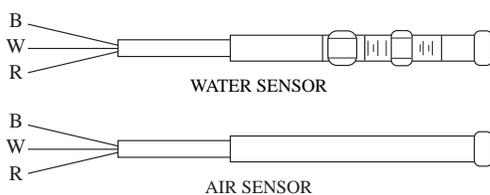


Figure 2

override are located inside the MT II panel (See fig. 3).

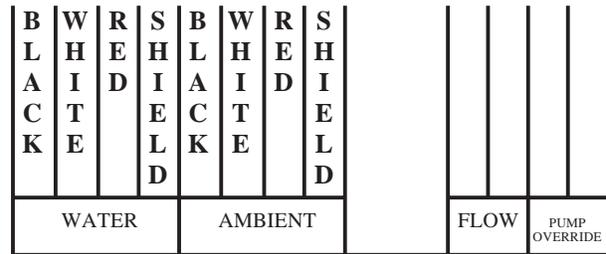


Figure 3

A sensor well comes with the MT II. Installation of the well provides a convenient method for sensor placement and service.

The sensors are supplied with 60' of cable. If shorter cables are desired, cut the cable and re-insert into the control. Figure 3a illustrates the wiring connections into the terminal block.

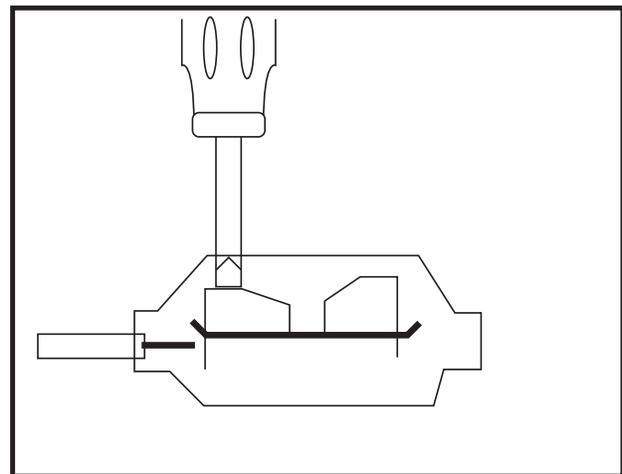


Figure 3a

4) MT II Outputs:

The MT II system consists of 16 or 24 solid state relays. Figure 4 shows the layout of the output boards.

Of the 16, or 24 solid state outputs located inside the panel, 4 are dedicated. They are: **Alarm, System Shutdown, Pump 1, and Pump 2**. There are also 12, or 20 undedicated outputs that can be wired to control system requirements. Figure 4 shows the layout of the output boards.

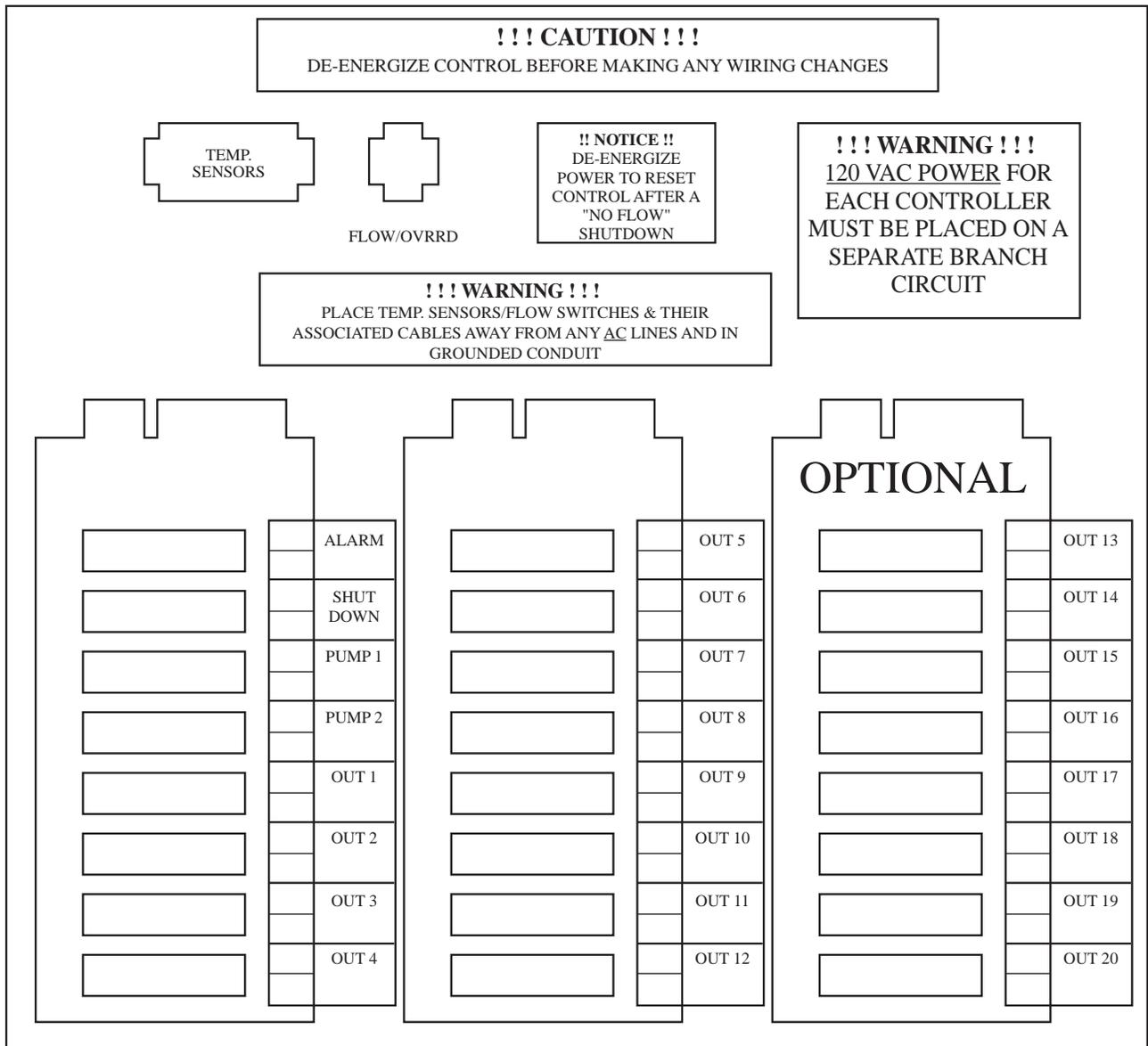


Figure 4

Figure 5 is an example of a two pump system with two stages of heating, and two stages of cooling. Since all outputs are fully programmable, any output (with the exception of the dedicated ones) can be used for heating or cooling. In this example Output 1 and Output 2 are used to operate boilers. Output 3 and Output 4 are controlling cooling towers.

The "Alarm" output can be connected to an external alarm that activates "High Temperature, Low Temperature, or No Flow" conditions.

When the Loop exceeds programmed safety limits the "Shutdown" output activates. A possible use for this output could be an automatic phone dialer.

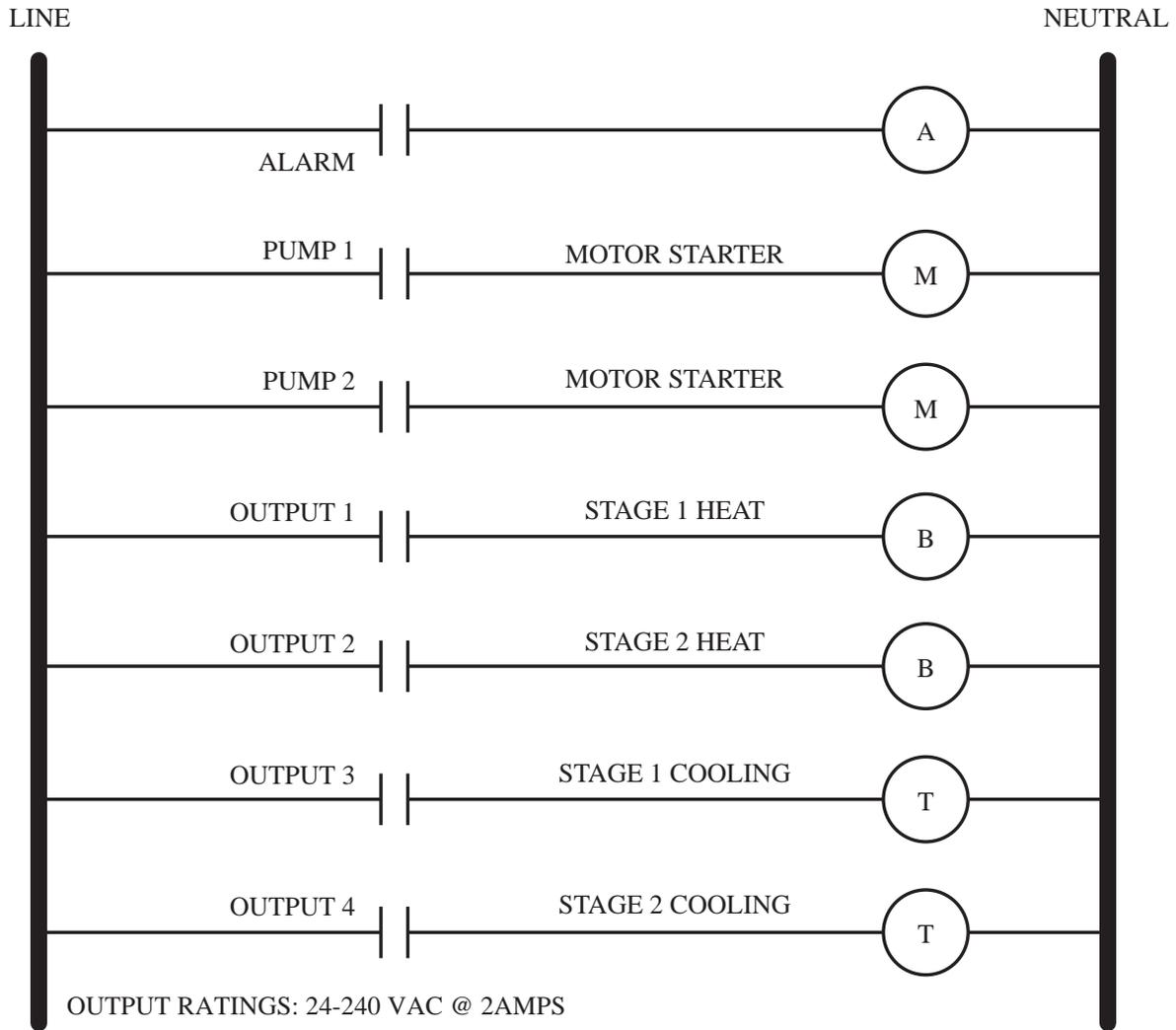


Figure 5

5) Power Wiring Connections:

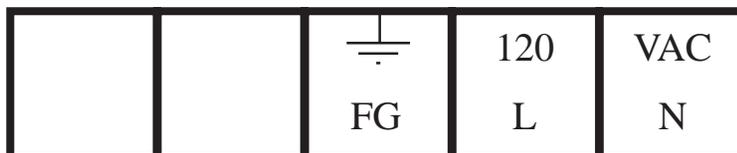
Power for the MT II is 120 VAC @ 60Hz. Power MUST be wired on a SEPARATE CIRCUIT. Connecting other devices in parallel with the MT II power may introduce electrical interference or noise to the control.

Use Figure 6 for Power Wiring Connections located inside the panel.

Make sure that either the temperature sensors or the simulator are connected to the control before applying 120 VAC.

6) Energize Power to Control:

- A) System status appears on the display.
- B) Power light and Pump (1 or 2) light illuminates.
- C) Pump (1 or 2) output activates.



L - LINE
N - NEUTRAL
FG - FIELD GROUND

Figure 6

Operation

MT II controls heating & cooling stages to maintain the loop water temperature. Each stage has programmable "on" and "off" temperature set points allowing control to be field modified to suit each installation.

When the "on" set point is greater than the "off" set point, the stage is a cooling stage (i.e. cooling tower). A cooling stage is activated when the Loop temp. rises above the "on" set point (88), and de-activates when the Loop temp. falls below the "off" set point (85).

When the "on" set point is less than the "off" set point, the stage is a heating stage (i.e. boiler). A heating stage is activated when the Loop temp. falls below the "on" set point (62) and de-activates when the Loop temp. rises above the "off" set point (65).

Programming the stage "on" and "off" temperature settings to 99 allows the stage to operate with respect to time. This function operates the stage by "time" only.

The MT II provides automatic switch over to a standby pump. The lead pump is programmable.

The control sequence for a "No Flow" condition is as follows:

- a) After 1 sec. "NO FL" appears on the display.
- b) After 10 sec. the control switches to the standby pump.
- c) If flow is restored, the standby pump remains active and "FLOW" reappears on the display. If the "No Flow" continues for another 10 sec. after the standby pump activates, then the "Alarm" light, and output activate, along with the "System Shutdown" light and output. NO FLOW SHUT-DOWN appears on the display.

MT II also includes a 24 hour time clock that allows the system pumps, and outputs to be turned off during unoccupied periods. An ambient sensor and pump override input are provided to override the scheduled off time. The override insures pump operation during night setback conditions to prevent freeze ups.

NOTE: If an output is programmed to operate on "time" only, it will not turn off when the pumps do. The output will operate on its own time schedule.

MT II displays alarms and shutdowns for "HIGH" and "LOW" loop water temperature conditions. A warning causes the "Alarm" light and output to activate. Programming different set points for warnings and shutdowns allows a warning to be given before a shutdown occurs.

Modes of Operation:

MT II has two modes of operation.

- 1) Run Mode
- 2) Program Mode

NOTE: TO ENTER PROGRAMMING MODE SEE PG. 8

Run Mode:

The run mode displays the current system status.

"WATER=77 OA=67"
"FLOW TUE 15:33"

Run mode display

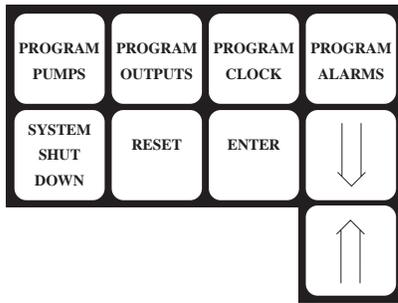
- a) Water Loop = **77°F**
- b) Ambient = **67°F**
- c) System has **Flow**
- d) The day and time - **Tuesday 3:33 pm (Mil. 15:33)**

Each output corresponds with a light on the front cover of the MT II. When a light for a particular output is "on" the relay activates also.

Program Mode:

Use the Program Mode to review or alter system status.

Key List



Programming

The following list describes each programming key:

-  Use to access the Program Mode and enter data into memory.
-  Used to change data during Program Mode. The "UP" arrow means increment and the "DOWN" arrow means decrement. May be single stepped or changed rapidly by keeping pressure on key for approx. 2 seconds.
- 
-  Used to return to the Run Mode from Program of system shutdown due to "High" or "Low" temperature. **** SEE NOTE 1****
-  Used to shut down the control without de-energizing.
-  Used to program pump operation, ambient override, and lock code.
-  Used to program outputs 1-20.
-  Used to program year, month, day, day of the week (1-7), hour, and minute.
-  Used to program low temp., high temp., low temp. shutdown, and high temp. shutdown.

Programming Information

Lock Code A 4 digit code entered into the control that allows access for programming. The default lock code is 5555.

Default Code A 4 digit access code that allows the user to completely clear the MT II memory. The code is 2715.

****NOTE 1**** To reset the control from a "NO FLOW" shutdown, power must be de-energized and then restarted.

Entering the Program Mode

The following programming examples will familiarize the operator with the MT II.

Example #1: Entering the Program Mode

Key Pressed	Display
	LOCK CODE 5555 **
	LOCK CODE 5555 **
	PROGRAM MODE

Pumps, outputs, times, alarms, and settings may be entered once in the program mode.

NOTE Unless the lock code is changed, 5555 allows access to the program mode.

Example #2: Programming output #5 to activate cooling at 75°F and de-activate at 73°F (remember to enter the **Program Mode** first).

Key	Display	Comment
	Program Out 01	
	Program Out 02	Increment output
	Program Out 03	Increment output
	Program Out 04	Increment output
	Program Out 05	Increment output
	Program Out 05 Temp On 060	Current temp. "on" setting
Keep constant pressure on		
 Key		
after 2 seconds the numbers will change rapidly	Program Out 05 Temp On 075	Setting changed to 75°F
	Program Out 05 Temp Off 062	Current "off" temp. setting
same procedure used in Temp On	Program Out 05 Temp Off 073	Setting changed to 73°F
	Program Out 05	Ready to program another output
	Program mode	Ready to program another function
	WATER=XX OA=XX FLOW DAY TIME	Back to Run mode

Example #3: Programming output #6 to activate heating at 76°F and de-activate at 80°F (remember to enter the **Program Mode** first).

Key	Display	Comment
	Program Out 01	
	Program Out 02	Increment output
	Program Out 03	Increment output
	Program Out 04	Increment output
	Program Out 05	Increment output
	Program Out 06	Increment output
	Program Out 06 Temp On 060	
Keep constant pressure on  Key		
after 2 seconds the numbers will change rapidly	Program Out 06 Temp On 076	Setting changed to 76°F
	Program Out 06 Temp Off 062	Current "off" temp. setting
same procedure used in Temp On	Program out 06 Temp Off 080	Setting changed to 80°F
	Program Out 06	Ready to program another output
	Program mode	Ready to program another function
	WATER=XX OA=XX FLOW DAY TIME	Back to Run mode

Example #4: Programming output #3 to activate at 3:30am and de-activate at 5:30pm Monday-Friday (remember to enter the **Program Mode** first).

Key	Display	Comment
	Program Out 01	
	Program Out 02	Increment output
	Program Out 03	Increment output
	Program Out 03 Temp On 065	Current temp. "on" setting
Keep constant pressure on  Key		
after 2 seconds the numbers will change rapidly upward	Program Out 03	Setting changed to 099
	Program Out 03 Temp Off 067	Current temp. "off" setting
Same procedure used in Temp On	Program Out 03 Temp Off 099	Setting changed to 099
	03 TIME ON 12:00 MON-FRI **	Current time setting
Use   Keys to change hour to 03	03 TIME ON 03:00 MON-FRI **	
	03 TIME ON 03:00 MON-FRI **	
Use   Keys to change min. to 30	03 TIME ON 03:30 MON-FRI **	Time On 3:30am

Key	Display	Comment
	03 TIME OFF 12:00 MON-FRI **	Current time setting
Press   Keys until 17 appears	03 TIME OFF 17:00 MON-FRI **	
	03 TIME OFF 17:00 MON-FRI **	
Press   Keys until 30 appears	03 TIME OFF 17:30 **	Setting changed to 17:30 (5:30pm mil)
	03 TIME ON12:00 SATURDAY **	Only on "time" MON-FRI
	PROGRAM MODE	
	WATER=XXX OA=XXX FLOW DAY TIME	Return to run mode

Example #5: Programming Pump #1 for continuous operation.

Key	Display	Comment
	PUMP ON 00:00 MON-FRI **	Current time setting
Press   Keys until hour = 24	PUMP ON 24:00 MON-FRI **	Pump on set to 24:00 (continuous operation Mon-Fri)
	PUMP ON 24:00 MON-FRI **	
	PUMP OFF 12:00 MON-FRI **	When using 24:00 "On" time an "Off" time isn't needed



PUMP OFF 12:00
MON-FRI **



PUMP ON 12:00
SATURDAY **

Press   Keys
until hour = 24

PUMP ON 24:00
SATURDAY **

Saturday cont. operation



PUMP ON 24:00
SATURDAY **



PUMP OFF 12:00
SATURDAY **



PUMP OFF 12:00
SATURDAY **



PUMP ON 12:00
SUNDAY **

Press   Keys
until hour = 24

PUMP ON 24:00
SUNDAY **

Sunday cont. operation



PUMP ON 24:00
SUNDAY **



PUMP OFF 12:00
SUNDAY **



PUMP OFF 12:00
SUNDAY **



OUTSIDE AIR TEMP
OVERRIDE XX

"XX" = Current setting

Press   Keys
to alter setting

OUTSIDE AIR TEMP
OVERRIDE NN

"NN" = New setting



AUTO CYCLE = 0
1=ON 0=OFF

Press   Keys
to change from 0 to 1



LEAD PUMP
1

Press   Keys
to change from 1 to 2



LOCK CODE 5555
**

Press   Keys
to alter digits 1&2



LOCK CODE 5555
**

Press   Keys
to alter digits 3&4



PROGRAM
MODE



WATER=XXX OA=XXX
FLOW DAY TIME

Back to Run mode

Example #6: Programming the clock (don't forget the lock code)

Key

Display

Comment



PROGRAM CLOCK
YEAR XX

"XX" = Current year setting

Press   Keys
to change year

PROGRAM CLOCK
YEAR 95



PROGRAM CLOCK
MONTH XX

"XX" = Current month setting

Press   Keys
to change month

PROGRAM CLOCK
MONTH NN

"NN" = New month setting



PROGRAM CLOCK
DATE XX

"XX" = Current day setting

Press   Keys
to change day

PROGRAM CLOCK
DATE NN

"NN" = New day setting



PROG CLOCK DAY
SUN=1, SAT=7 X

"X" = Current setting

Press   Keys
to change setting

PROG CLOCK DAY
SUN=1, SAT=7 N

"N" = New setting



PROGRAM CLOCK
HOUR XX

"XX" = Current hour setting

Press   Keys
to change hour

PROGRAM CLOCK
HOUR NN

"NN" = New hour setting



PROGRAM CLOCK
MINUTES XX

"XX" = Current minutes setting

Press   Keys
to change minutes

PROGRAM CLOCK
MINUTES XX

"XX" = New minutes setting



PROGRAM
MODE



WATER=XXX OA=XXX
FLOW DAY TIME

Return to run mode

Example #7: Programming Alarms (remember lock code)

Key	Display	Comment
	PROGRAM MODE	
	LOW TEMP ALARM XX	"XX" = Current setting
Press   Keys to change setting	LOW TEMP ALARM NN	"NN" = New setting
	HIGH TEMP ALARM XX	"XX"=Current setting
Press   Keys to change setting	HIGH TEMP ALARM NN	"NN" = New setting
	LOW TEMP SHUTDOWN XX	"XX"=Current setting
Press   Keys to change setting	LOW TEMP SHUTDOWN NN	"NN" = New setting
	HIGH TEMP SHUTDOWN XX	"XX"=Current setting
Press   Keys to change setting	HIGH TEMP SHUTDOWN NN	"NN" = New setting
	PROGRAM MODE	
	WATER=XXX OA=XXX FLOW DAY TIME	Return to run mode

Example #8: Programming a System Shutdown (don't forget the lock code)

Key	Display	Comment
	PROGRAM MODE	
	SYSTEM SHUTDOWN	Control is shut down until reset

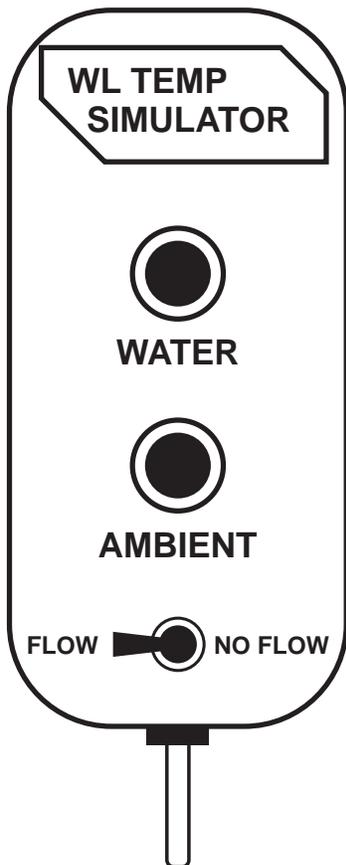
APPENDIX A SIMULATOR

The Simulator allows the user to easily check the operation of the MT II. We recommend that a simulator remain on site for testing purposes.

To use the Simulator:

- 1) De-energize Controller.
- 2) Disconnect temperature sensors and flow switch inputs.
- 3) Connect simulator (use Fig. A1).
- 4) Energize controller.

Rotating the "WATER TEMP" knob raises and lowers the water temperature to check operation of the program. To check a "No Flow" condition, switch the simulator to NO FLOW. The MT II runs through a NO FLOW sequence.



G R E E N	O R A N G E	B L U E	B L A C K	W H I T E	R E D	Y E L L O W	B R O W N	P U M P O V E R R I D E
WATER			AMBIENT			FLOW		PUMP OVERRIDE

Figure A1

APPENDIX B

TROUBLESHOOTING

POWER LIGHT OUT

- a) Check fuse: FU1, replace if necessary
- b) Check power cable from power supply to control board

If Power Light remains "out" Call GC Controls for service information.

TEMPERATURE SENSOR TESTING:

The temperature sensor can be easily tested in the field using a 9 volt battery and a digital volt meter.

SET METER TO DC VOLTS.

CONNECTIONS:

BLK SENSOR WIRE - BATTERY "-"
WHT SENSOR WIRE - METER VOLTS
RED SENSOR WIRE - BATTERY "+"
METER COMMON - BATTERY "-"

The voltage display on the meter is the actual temperature (ie. .750 volts = 75°F)

NOTE: If you should have any questions regarding the MT II, GC Controls is just a phone call away (607-656-4117).

APPENDIX C

PUMP OVERRIDE INPUT

By connecting thermostats (or switches) in parallel and wiring into the "pump override input" located inside the MT II, the system can be by-passed during pump time "off" conditions. Fig. C1 illustrates the connection to the control. If any set of contacts "close", the loop system activates. When the contacts "re-open", the system remains active for 30 minutes then de-energizes.

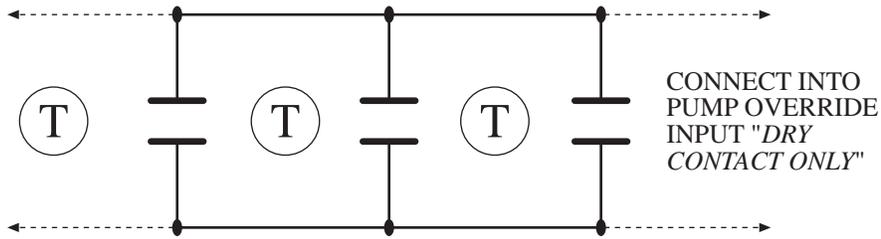


Figure C1

DATA SHEET

BUILDING _____
AND
LOCATION _____

PAGE _____ OF _____

OUTPUT# _____ TEMP ON _____ TEMP OFF _____ TIME ON _____ TIME OFF _____

COMMENTS _____

OUTPUT# _____ TEMP ON _____ TEMP OFF _____ TIME ON _____ TIME OFF _____

COMMENTS _____

OUTPUT# _____ TEMP ON _____ TEMP OFF _____ TIME ON _____ TIME OFF _____

COMMENTS _____

OUTPUT# _____ TEMP ON _____ TEMP OFF _____ TIME ON _____ TIME OFF _____

COMMENTS _____

OUTPUT# _____ TEMP ON _____ TEMP OFF _____ TIME ON _____ TIME OFF _____

COMMENTS _____

OUTPUT# _____ TEMP ON _____ TEMP OFF _____ TIME ON _____ TIME OFF _____

COMMENTS _____

OUTPUT# _____ TEMP ON _____ TEMP OFF _____ TIME ON _____ TIME OFF _____

COMMENTS _____

MICROTEMP CONTROLLER II DATA SHEET

PAGE _____ OF _____

TEMPERATURE ALARM SETTINGS:

LOW WARNING _____

LOW SHUTDOWN _____

HIGH WARNING _____

HIGH SHUTDOWN _____

COMMENTS: _____

PUMP TIMEOUT:

TIME OFF _____

TIME ON _____

COMMENTS: _____

AMBIENT OVERRIDE:

TEMP ON _____

TEMP OFF _____

COMMENTS: _____

LEAD PUMP # _____

AUTO CYCLE _____

COMMENTS: _____



LC001



ClimateMaster works continually to improve its products. As a result, the design and specifications of each product at the time of order may be changed without notice and may not be as described herein. Please contact ClimateMaster's Customer Service Department at 1-405-745-6000 for specific information on the current design and specifications. Statements and other information contained herein are not express warranties and do not form the basis of any bargain between the parties, but are merely ClimateMaster's opinion or commendation of its products.