

# **MICRO GROW**

## **GREENHOUSE SYSTEMS, INC**

26111 YNEZ RD., SUITE C-4, TEMECULA, CA 92591 PHONE (909)-296-3340 FAX (909)-296-3350

**Growmate**  
**Growmate Plus**

# **INSTALLATION PROCEDURES**

## **GROWMASTER AND GROWMATE SERIES OF CONTROLLERS**

### **PANEL MOUNTING**

Mount the control panel in an accessible location. Make sure that the location is free of vibration and in close proximity to the devices being controlled. Always consider voltage drop of electrical current when locating the control panel. Securely mount the panel.

### **SWITCHING CONTACTORS AND RELAYS**

The control panel will operate the greenhouse equipment by way of load contactors and load relays. **ALL RELAYS AND LOAD CONTACTORS USED MUST HAVE A SURGE SUPPRESSOR INSTALLED ACROSS THE COIL OF THE RELAY OR LOAD CONTACTOR.** These surge suppressors are readily available from Micro Grow Greenhouse Systems, Inc. All load contactors and relays are also readily available from Micro Grow Greenhouse Systems, Inc. To decide which to use, follow this guide:

#### **LOAD CONTACTORS:**

Exhaust fans, pad pumps, horizontal air flow fans, heating pumps, fan jets, large heaters, crop lighting, and all other larger electrical loads over 1/6 H.P.

#### **LOAD RELAYS:**

Signal switching such as the small control lines for gas fired heaters, control lines for vent and shade system controls, small loads such as motorized shutters, other loads up to 1/6 H.P.

#### **CUSTOM CONTACTOR AND RELAY PANEL AVAILABLE**

A custom built load contactor and load relay panel is available from Micro Grow Greenhouse Systems, Inc. This panel will contain all the required switching apparatus for your project, as well as a correctly sized machine tool transformer. Contact Micro Grow Greenhouse Systems, Inc. for pricing and availability.

### **TRANSFORMERS**

The control panel will be powered by a 24 VAC transformer. It is most important to use a MACHINE TOOL TYPE. A Machine Tool Transformer is a heavy duty variety that will allow for high inrush currents that are associated with the use of load contactors and relays. Micro Grow Greenhouse Systems, Inc. stocks these types of transformers. Use no smaller than a 50 VA Machine Tool Transformer. For a system that has more than three load contactors connected, use a 100 VA Machine Tool Transformer.

### **ELECTRICAL CIRCUITS**

The electrical circuit that feeds the machine tool transformer must have no other loads connected to it. This will prevent damaging surges from other related electrical devices. Follow all local and national codes in the connection of all the greenhouse equipment. Always allow for voltage drop conditions. Always consider that the greenhouse is a wet environment. Always follow the code rulings for disconnect switches and overcurrent

devices on greenhouse equipment. **USE A QUALIFIED AND LICENSED ELECTRICIAN AT ALL TIMES.**

## **WIRING METHODS**

Always use stranded wire when connecting cables or conductors to the actual circuit board of the control panel. This will allow flexibility. Use no smaller than #18 gauge stranded wire for all outputs. Use no smaller than the recommended wire size of stranded cable for inputs, generally #22 gauge.

## **SENSOR CONDUCTORS:**

Route sensor conductors separately from control conductors. This is very important so as to reduce electrical interference. Never route sensor conductors in conduits used for other voltages. This is in violation of the electrical code and will cause dangerous interference to the control system. Always locate the actual sensor in the center of the range that is being controlled for accurate readings. Do not allow the sensor to come in contact with any greenhouse structure member such as a post that would give off any radiated heat and cause a false temperature reading. Do not locate the sensor where a particular piece of equipment would cause false readings, such as a heater blowing directly on the sensor. Mount all wind/rain sensor in a clear area, free of any wind obstructions.

## **CONTROL CONDUCTORS:**

Route all control conductors separately from sensor conductors. This is very important so as to reduce electrical interference. Control conductors may be routed in conduits that contain other power system wiring only if the insulation material on the conductors is the same as the power system wiring. Consult the national electrical code or local codes if in doubt about the insulation ratings of the wire in use. Remember, always use a qualified and licensed electrician.

## **VENT SYSTEMS, SHADE SYSTEMS, ROLL UP CURTAINS**

When connecting a vent system, shade system, or roll up curtain ventilation system to the control panel, you must use a separate control box designed for that particular vent or shade system. These are readily available from Micro Grow Greenhouse Systems, Inc. Generally these separate control boxes feature overcurrent protection for the particular motor on the vent or shade system, provisions for direct limit switch connections, and a manual means of operating the vent or shade system independent of the main control system. These separate control boxes will connect the main control system either directly through the outputs of the control system, or they will require control relays for interconnection to the main control system. Consult the individual instructions that come with the vent or shade controls for detailed information.

## **SYSTEM TESTING**

It is always important to completely and fully test the electrical system by energizing circuits and verifying equipment operations before automatically operating the

equipment from the control panel. This would include setting all the vent and shade limit switches at the individual control panels.

## **PROGRAMMING SWITCHES**

There are two main programming switches located on the Growmate and Growmate Plus front panel. These are:

### **RUN-SET SWITCH**

**RUN** - Returns the control to the run mode.

**SET**-Advances through the program lights to program the system.

### **VALUE SWITCH**

**UP**-Increases the value of the displayed item.

**DOWN**-Decreases the value of the displayed item.

## **PROGRAMMING LIGHTS**

The programming lights or LED's indicate the mode that the system is in when programming or operating.

### **For the Growmate**

**RUN** - System is in the running mode.

**COOLING** - This will light when setting cooling temperatures.

**HEATING** - This will light when setting heating temperatures.

**SET MODE** - This will light when setting up the day, night and DIF modes.

**SET CLOCK** - This will light when setting the internal time clock.

**CALIBRATE** - This will light when the system is in calibration mode.

**SPECIAL** - This will light when setting the cooling and heating time delays.

### **For the Growmate Plus**

**RUN** - System is in the running mode.

**COOLING** - This will light when setting cooling temperatures.

**HEATING** - This will light when setting heating temperatures.

**DEHUMIDIFY** - This will light when setting the dehumidify setpoint. (Optional sensor required).

**SET MODE** - This will light when setting up the day, night and DIF modes.

**SET CLOCK** - This will light when setting the internal time clock.

**CALIBRATE** - This will light when the system is in calibration mode.

**SPECIAL** - This will light when setting the cooling and heating time delays.

## **TO PROGRAM DEHUMIDIFY SETPOINTS (for Growmate Plus only and if using optional humidity sensor)**

### **DAY DEHUMIDIFY SETPOINTS:**

1. Toggle the **SET** switch down until the **DEHUMIDIFY** light is on by itself and the **DAY MODE** indicator on the LCD display is flashing, release the switch.
2. Hold the **VALUE** switch either **UP** or **DOWN** until the desired value is reached, release switch.

### **NIGHT DEHUMIDIFY SETPOINTS:**

1. Continue to hold the **SET** switch down until the **NIGHT MODE** indicator on the LCD display is flashing on the LCD display along with the **DEHUMIDIFY** LED light, release the switch.
2. Hold the **VALUE** switch either **UP** or **DOWN** until the desired **NIGHT** value is displayed, release switch.

## **TO SET THE DAY, NIGHT, AND DIF MODE TIMES**

The control can detect night automatically with the use of an external photocell. If no photocell is connected, it will use the internal 24 hour time clock. You can also use a combination of both if desired.

1. Continue to depress the **SET** switch until the **SET MODE LED** is on and the **DAY MODE** indicator on the LCD display is on. The word "**PHO**" will be displayed. This indicates that the control will use the photocell to go into the day mode. If the internal time clock is desired to be used, use the value switch to advance to a time day setting. The first value will be hours. Depress the **SET** switch again to set the minutes, and again to set AM or PM.
2. Depress the **SET** switch again so that the **SET MODE LED** is on and the **NIGHT MODE** indicator on the LCD display is on. Repeat the same procedure as in the above **DAY MODE** setting for the desired **NIGHT MODE** selection.
3. Depress the **SET** switch again so that the **SET MODE LED** is on and the **DIF MODE** indicator on the LCD display is on. If DIF is not to be activated, adjust the flashing value to "**OFF**". If DIF is to be activated, adjust the flashing value to indicate the number of hours before sunrise to go into DIF. Depress the **SET** switch again and adjust the flashing value to indicate the number of hours after sunrise to come out of DIF.

### **To Set the Clock:**

1. Toggle the **SET** switch until the **SET CLOCK LED** is on. The item to be set will be flashing. Use the **VALUE** switch to raise or lower the flashing value. The first value will be hours. Depress the **SET** switch again to set the minutes, and again to set if it is AM or PM.
2. Return to the **RUN** mode by toggling the **RUN-SET** switch up.

### **To Set Time Delay**

1. Toggle the **SET** switch until the **SPECIAL** and **COOLING LED** is on. The item to be set will be flashing. Use the **VALUE** switch to raise or lower the flashing value. This is the amount of time delay that the control has before turning on or off an output.
2. Return to the **RUN** mode by toggling the **RUN-SET** switch up.

## **RUN MODE**

After all settings have been made, return to the **RUN** mode by toggling the **SET** switch down until the **RUN LED** light is on, release switch. The control will return to the **RUN** mode by itself when no other switches are depressed after a timed delay.

## **HIGH and LOW HISTORY**

The control will automatically track the high and low readings for the past 24 hours for both inputs. The control will automatically display the high and low reading for the temperature and humidity (if in use).

## **TO CALIBRATE THE CONTROL**

To calibrate the control system, follow these instructions:

1. Determine the actual temperature at the sensor location. It is best to do this either in the evening or early morning. The solar effect of the greenhouse will provide an inaccurate temperature reading. Always use a good calibration thermometer, digital or mercury, and allow the temperature to stabilize before proceeding. Make sure that all greenhouse heating or cooling equipment has been off, or has not changed operation status for several minutes before calibration. This will help to insure accurate readings.
2. At the control panel, toggle the **SET** switch till the **CALIBRATE LED** is on. This will put the control in the calibration mode. Once the control is in the calibration mode, hold the **VALUE** switch either **UP** or **DOWN** to enter a new temperature reading in the display. Release the switch when the desired value is reached.
3. Return to the **RUN** mode by holding the **RUN-SET** switch up until the **RUN LED** light is on, release switch.

## **DIP SWITCH SETTINGS**

The control system allows for customization of temperature separations and differentials between stages, and the selection of either Fahrenheit or centigrade modes of operation. These are determined by the settings of the DIP switches located on the inside of the circuit board of the control. Refer to the drawing of the actual control connections to set these DIP switches.

## **PHOTOCELL**

The control is equipped with a photocell to detect day and night modes. The photocell is located on the bottom side of the control enclosure. Keep the photocell clean and unobstructed.

## **OPERATIONAL TIPS.**

Keep the cover securely fastened always. The enclosure is a weatherproof, gasket fitted device, but will not provide this degree of protection with the front cover open. In selecting the equipment for each stage, try to minimize energy use with the primary cooling or heating stages. This will insure a lower crop shock effect, and in turn, save on energy costs.

## **CONTROL CARE AND UPKEEP**

Keep the front panel of control securely closed always. Prevent unauthorized personnel from changing the control settings or switches. Periodically clean the temperature sensor elements with a clean damp cloth to prevent any build-up.





# GROWMATE

# smid

MODE  
DAY  
NIGHT  
DIF

CURRENT HIGH LOW

70F

THE DISPLAY WILL ALTERNATE BETWEEN THE CURRENT TEMPERATURE, AND THE HIGHEST AND LOWEST READING DURING THE LAST 24 HOURS. THE CURRENT TIME OF DAY AND MODE ARE ALSO DISPLAYED.

EASY FRONT PANEL TOGGLE SWITCHES FOR PROGRAMMING AND CALIBRATION

RUN SET

COOLING HEATING DEHUMIDIFY SET MODE SET CLOCK CALIBRATE SPECIAL

STATUS LIGHTS FOR EASY PROGRAMMING OF SEPARATE COOLING AND HEATING TEMPERATURES FOR DAY AND NIGHT SETTINGS, OPTIONAL DEHUMIDIFY, CALIBRATION AND MODE SELECTIONS ARE FEATURED.

MICRO • GROW  
GREENHOUSE SYSTEMS, INC.

ON OFF AUTO

COOLING 5  
COOLING 4  
COOLING 3  
COOLING 2  
COOLING 1  
AIR CIRCULATION  
HEATING 1  
HEATING 2

EACH OUTPUT HAS A FRONT PANEL MOUNTED SWITCH TO SELECT THE MODE OF OPERATION. THE PARTICULAR OUTPUT MAY BE LEFT OFF, MANUALLY OPERATED, OR LEFT IN THE AUTOMATIC POSITION OF OPERATION.

LIGHTED STATUS INDICATORS WILL SHOW ANY STAGE IN OPERATION, EITHER MANUAL OR AUTOMATIC.



## MICRO GROW GREENHOUSE SYSTEMS, INC

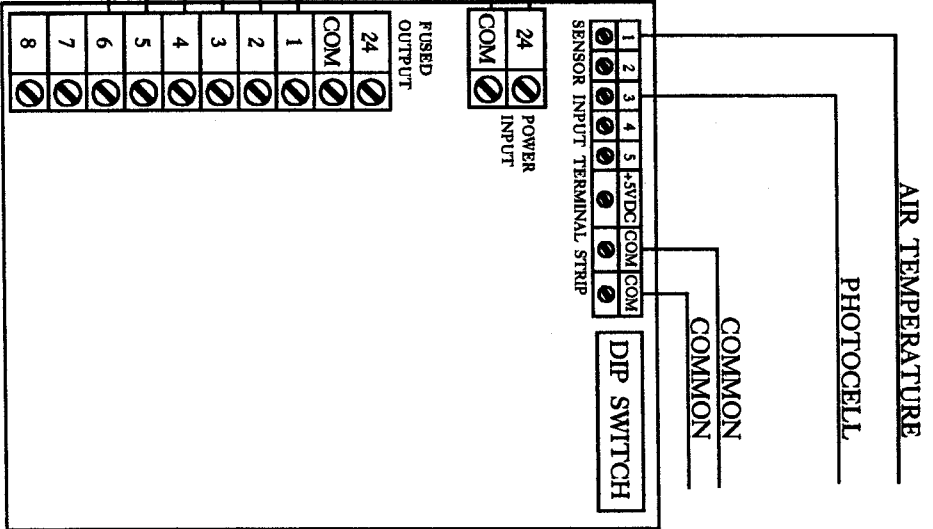
26111 Ynez Road, Suite C-4  
TEMECULA, CA 92591

Phone (909)-695-7280 FAX (909)-695-7282

24 VAC  
MACHINE TOOL  
TRANSFORMER

24VAC POWER INPUT  
24VAC POWER INPUT  
24 VAC  
COMMON  
FOR ALL  
LOADS

COOLING 3 OUTPUT #1  
COOLING 2 OUTPUT #2  
COOLING 1 OUTPUT #3  
AIR CIRCULATION OUTPUT #4  
HEATING 1 OUTPUT #5  
HEATING 2 OUTPUT #6



AIR TEMPERATURE

PHOTOCELL

COMMON

DIP SWITCH

24 POWER INPUT

FUSED OUTPUT

24	COM	1	2	3	4	5	6	7	8
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

**TRANSFORMER NOTE:**

USE A MACHINE TOOL VARIETY ONLY 100 VA IS RECOMMENDED. IF A SMALLER SIZED TRANSFORMER IS USED, ADJUST THE FUSE PROTECTION ACCORDINGLY. (See fuse note)

**OUTPUT NOTE:**

THE CONTROL OUTPUTS ARE RATED AT 1 AMP EACH MAXIMUM. DO NOT EXCEED THIS OR DAMAGE MAY RESULT. DO NOT EXCEED 1 AMP FOR ANY SINGLE OUTPUT OR 4 AMPS TOTAL FOR ALL OUTPUTS. (2 AMPS TOTAL IF A 50 VA TRANSFORMER IS IN USE)

**FUSE NOTE:**

IMPORTANT: DO NOT EXCEED 4 AMPS FOR THE FUSE RATING WHEN USING A 100 VA TRANSFORMER OR 2 AMPS WHEN USING A 50 VA TRANSFORMER. USE A SLOW BLOW VARIETY.

**DIP SWITCH CONFIGURATION**

**HEATING SEPARATION AND DIFFERENTIAL**

- #1 OFF #2 OFF 2 DEGREES (Factory Default Setting)
- #1 OFF #2 ON 3 DEGREES
- #1 ON #2 OFF 1 DEGREE
- #1 ON #2 ON 4 DEGREES

**COOLING SEPARATION AND DIFFERENTIAL**

- #3 OFF #4 OFF 2 DEGREES (Factory Default setting)
- #3 OFF #4 ON 3 DEGREES
- #3 ON #4 OFF 1 DEGREE
- #3 ON #4 ON 4 DEGREES

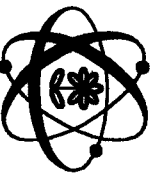
**AIR CIRCULATION (NORMAL OPERATION):**

- #5 OFF TURN OFF WHEN COOLING 1 TURNS ON (Factory Default Setting)
- #5 ON TURN OFF WHEN COOLING 2 TURNS ON

**DISPLAY MODE**

- #7 OFF FAHRENHEIT (Factory Default Setting)
- #7 ON CENTIGRADE

ALL CONNECTED 24 VAC LOAD RELAYS AND CONTACTORS MUST HAVE A SURGE PROTECTION DEVICE INSTALLED ACROSS THE COILS. SURGE SUPPRESSION DEVICES ARE SUPPLIED WITH EACH UNIT.  
ALL CORRECT LOAD CONTACTORS AND CONTROL RELAYS ARE AVAILABLE FROM MICRO GROW GREENHOUSE SYSTEMS. 50 AND 100 VA MACHINE TOOL TRANSFORMERS ARE AVAILABLE FROM MICRO GROW GREENHOUSE SYSTEMS. SEE YOUR DISTRIBUTOR OR CALL MICRO GROW FOR IMMEDIATE SHIPMENT OF ALL REQUIRED CONNECTION DEVICES AND ACCESSORIES.



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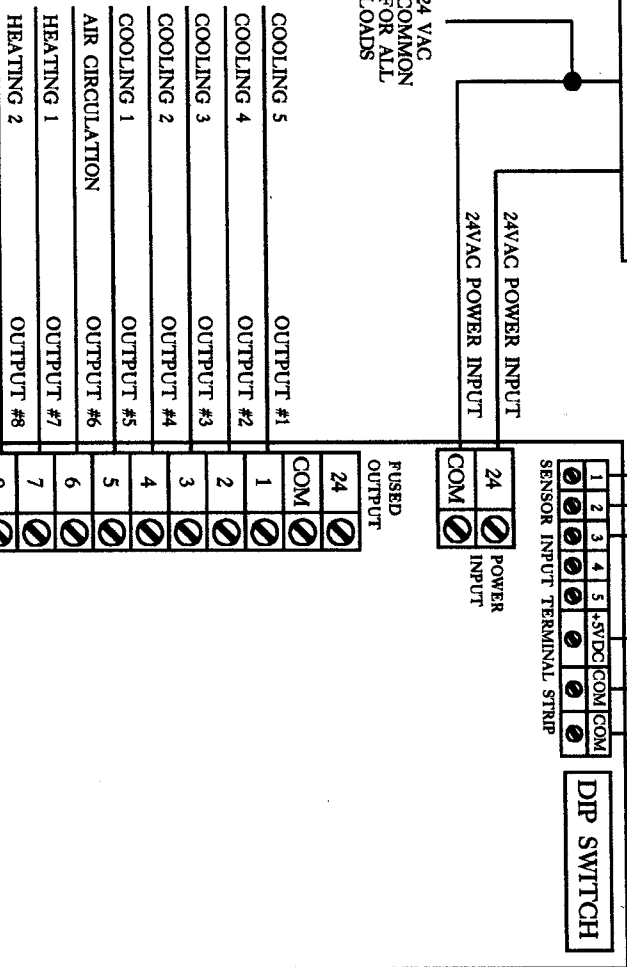
**GROWMATE**

REVISED  
01/16/02

By  
GH

24 VAC  
MACHINE TOOL  
TRANSFORMER

24 VAC  
COMMON  
FOR ALL  
LOADS



AIR TEMPERATURE  
OPTIONAL HUMIDITY  
PHOTOCELL

+5 VDC  
COMMON  
COMMON

DIP SWITCH

1 2 3 4 5 +5VDC COMMON COMMON

24 POWER INPUT

COM

FUSED OUTPUT

24

COM

OUTPUT #1

OUTPUT #2

OUTPUT #3

OUTPUT #4

OUTPUT #5

OUTPUT #6

OUTPUT #7

OUTPUT #8

COOLING 5 OUTPUT #1  
COOLING 4 OUTPUT #2  
COOLING 3 OUTPUT #3  
COOLING 2 OUTPUT #4  
COOLING 1 OUTPUT #5  
AIR CIRCULATION OUTPUT #6  
HEATING 1 OUTPUT #7  
HEATING 2 OUTPUT #8

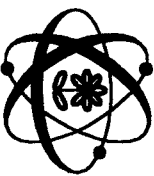
ALL CONNECTED 24 VAC LOAD RELAYS AND CONTACTORS MUST HAVE A SURGE PROTECTION DEVICE INSTALLED ACROSS THE COILS. SURGE SUPPRESSION DEVICES ARE SUPPLIED WITH EACH UNIT.  
ALL CORRECT LOAD CONTACTORS AND CONTROL RELAYS ARE AVAILABLE FROM MICRO GROW GREENHOUSE SYSTEMS, 50 AND 100 VA MACHINE TOOL TRANSFORMERS ARE AVAILABLE FROM MICRO GROW GREENHOUSE SYSTEMS. SEE YOUR DISTRIBUTOR OR CALL MICRO GROW FOR IMMEDIATE SHIPMENT OF ALL REQUIRED CONNECTION DEVICES AND ACCESSORIES.

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Phone 909.296.3340 Fax 909.296.3350



**TRANSFORMER NOTE**

USE A MACHINE TOOL VARIETY ONLY 100 VA IS RECOMMENDED. IF A SMALLER SIZED TRANSFORMER IS USED, ADJUST THE FUSE PROTECTION ACCORDINGLY. (See fuse note)

**OUTPUT NOTE**

THE CONTROL OUTPUTS ARE RATED AT 1 AMP EACH MAXIMUM. DO NOT EXCEED THIS OR DAMAGE MAY RESULT. DO NOT EXCEED 1 AMP FOR ANY SINGLE OUTPUT OR 4 AMPS TOTAL FOR ALL OUTPUTS. (2 AMPS TOTAL IF A 50 VA TRANSFORMER IS IN USE)

**FUSE NOTE**

IMPORTANT: DO NOT EXCEED 4 AMPS FOR THE FUSE RATING WHEN USING A 100 VA TRANSFORMER OR 2 AMPS WHEN USING A 50 VA TRANSFORMER. USE A SLOW BLOW VARIETY.

**DIP SWITCH CONFIGURATION**

**HEATING SEPARATION AND DIFFERENTIAL**

#1 OFF #2 OFF 2 DEGREES (Factory Default Setting)

#1 OFF #2 ON 3 DEGREES

#1 ON #2 OFF 1 DEGREE

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**COOLING SEPARATION AND DIFFERENTIAL**

#3 OFF #4 OFF 2 DEGREES (Factory Default setting)

#3 OFF #4 ON 3 DEGREES

#3 ON #4 OFF 1 DEGREE

#3 ON #4 ON 4 DEGREES

**AIR CIRCULATION (NORMAL OPERATION)**

#5 OFF TURN OFF WHEN COOLING 1 TURNS ON (Factory Default Setting)

#5 ON TURN OFF WHEN COOLING 2 TURNS ON

**DISPLAY MODE**

#7 OFF FAHRENHEIT (Factory Default Setting)

#7 ON CENTIGRADE

**IF DEHUMIDIFY OPTION IS IN USE:**

**AIR CIRCULATION (During Dehumidify)**

#6 ON TURN ON IF NOT ALREADY ON

#6 OFF LEAVE IN CURRENT STATE

**DEHUMIDIFY MAXIMUM RUNNING TIME:**

#8 OFF 10 MINUTES

#8 ON 30 MINUTES

**DEHUMIDIFY TRY AGAIN TIME:**

#9 OFF 30 MINUTES

#9 ON 60 MINUTES

**DEHUMIDIFY DIFFERENTIAL:**

#10 OFF 2% RH

#10 ON 4% RH

**DEHUMIDIFY COOLING STAGE:**

#11 OFF COOLING 1

#11 ON COOLING 2

**DEHUMIDIFY HEATING STAGE:**

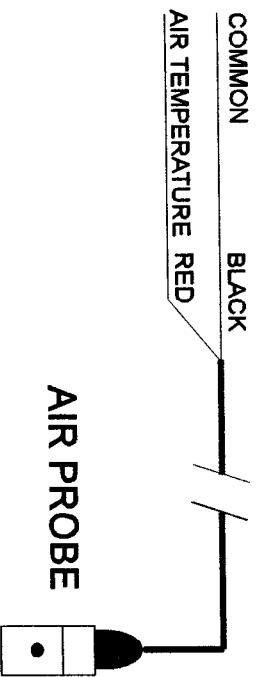
#12 OFF NONE

#12 ON HEATING 1

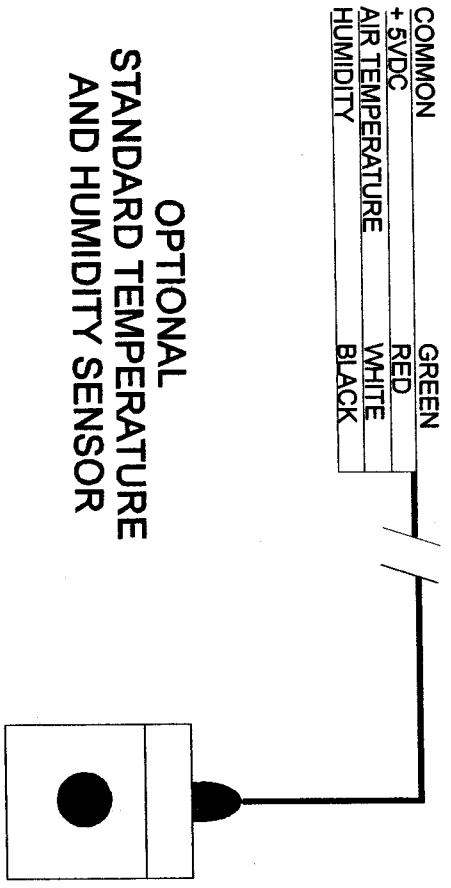
GROWMATE PLUS

REVISED  
01/16/02

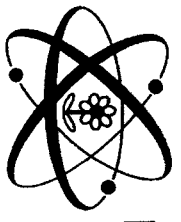
By  
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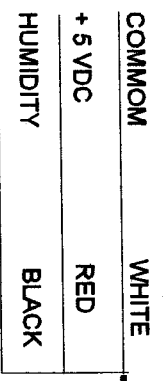
Locate in the center of controlled area away from direct contact with greenhouse metal posts and members.



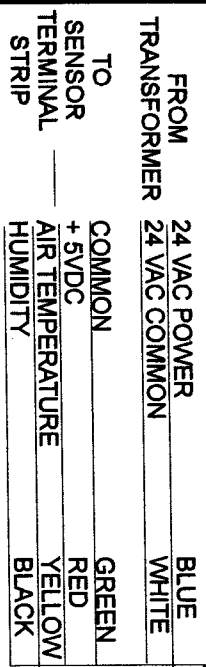
Locate in the center of controlled area away from direct contact with greenhouse metal posts and members.



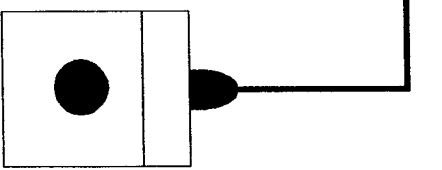
**MICRO GROW GREENHOUSE SYSTEMS, INC**  
 26111 Ynez Road, Suite C-4  
 TEMECULA, CA 92591  
 Phone (909)-695-7280 FAX (909)-695-7282



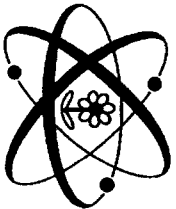
Locate in the center of controlled area away from direct contact with greenhouse metal posts and members.



Locate in the center of controlled area away from direct contact with greenhouse metal posts and members.

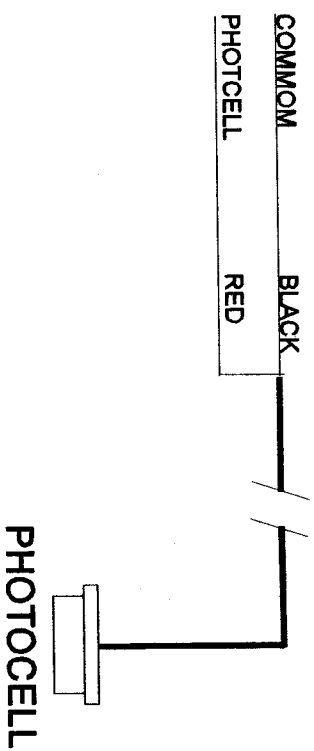


**GROWMATE AND GROWMATE PLUS SENSORS SHEET 1 OF 2**



**MICRO GROW GREENHOUSE SYSTEMS, INC**

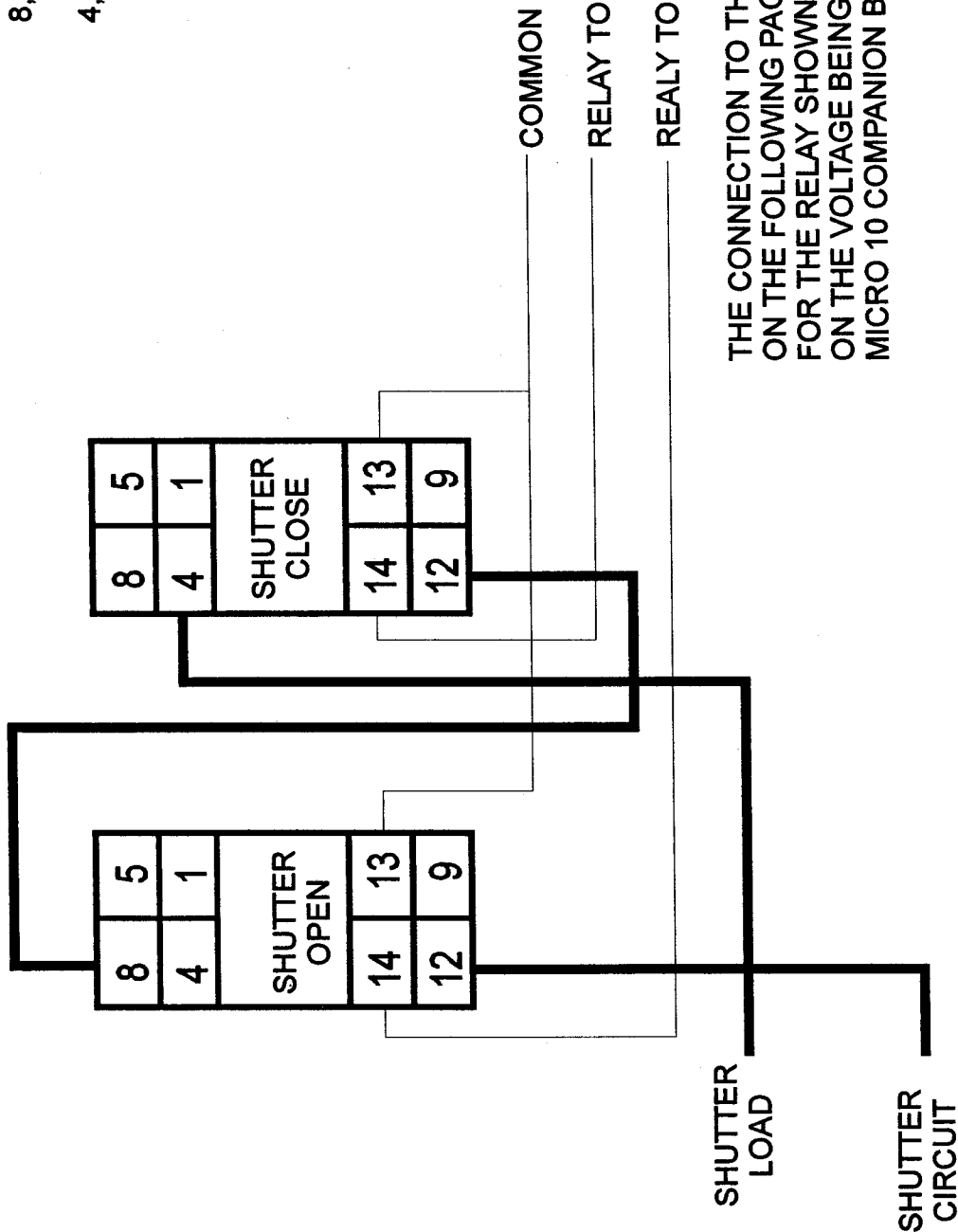
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**GROWMATE AND  
GROWMATE PLUS  
SENSORS  
SHEET 2 OF 2**

**RELAY NOTES:**

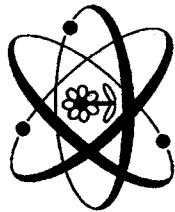
- RELAYS ARE DPDT
- 14,13..24 VAC COIL
- 12,9.....COMMON TERMINALS
- 8,5.....NORMALLY OPEN
- TERMINALS
- 4,1.....NORMALLY CLOSED
- TERMINALS

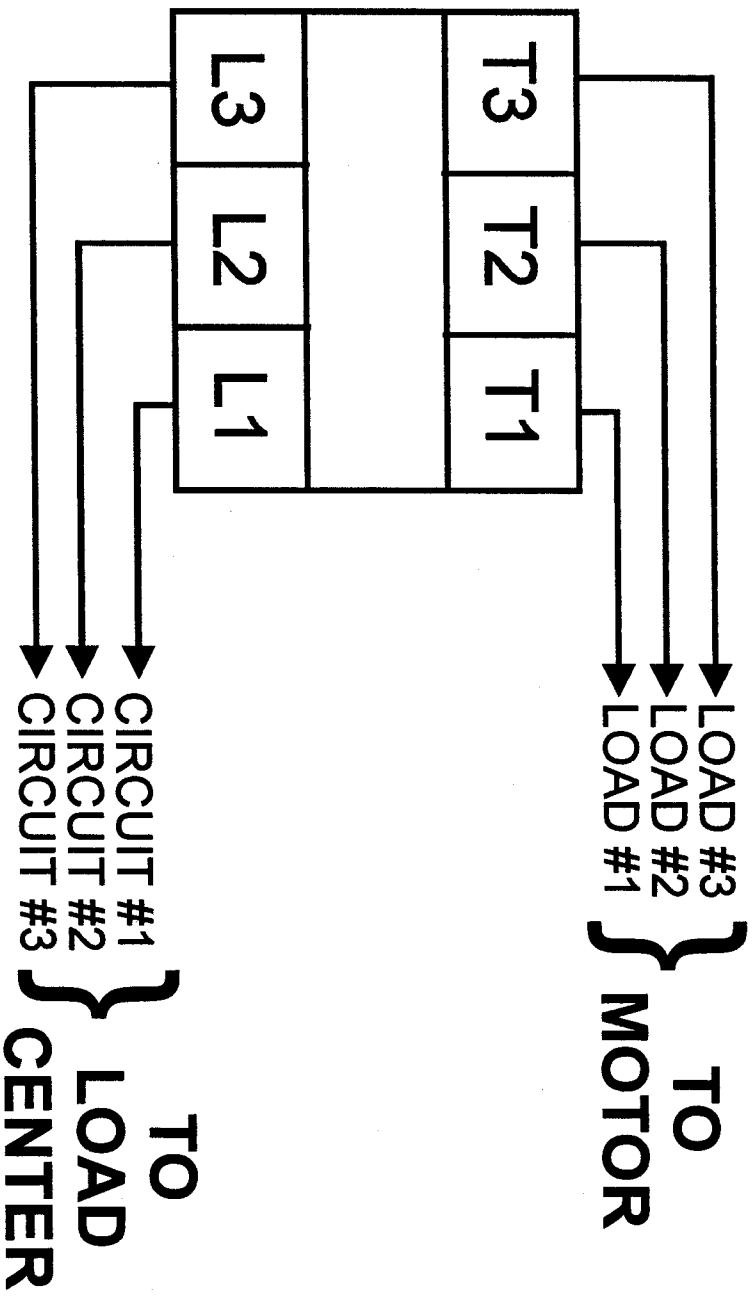


THE CONNECTION TO THE MICRO 10 IS SHOWN ON THE FOLLOWING PAGE. THE COIL VOLTAGE FOR THE RELAY SHOWN ABOVE IS DEPENDENT ON THE VOLTAGE BEING SUPPLIED TO THE MICRO 10 COMPANION BOX.

**GABLE SHUTTER TO MICRO 10**

**MICRO GROW GREENHOUSE SYSTEMS, INC**  
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 TEMECULA, CA 92591  
 Phone (909)-695-7280 FAX (909)-695-7282



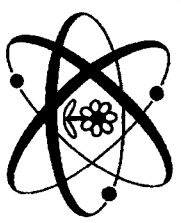


TO OUTPUT TO  
TURN ON DEVICE

TO TRANSFORMER  
(COMMON SIDE)

COIL

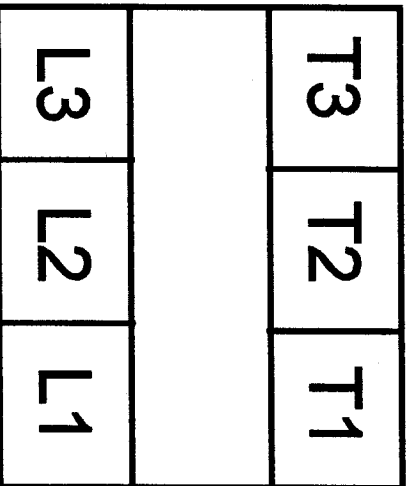
SURGE PROTECTION DEVICE -  
RATED FOR 24 VAC OPERATION.  
PROVIDED WITH EACH UNIT



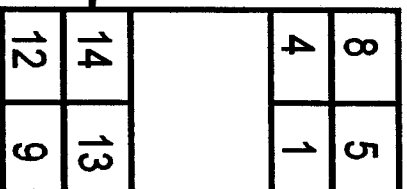
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**CONNECTION OF  
LOADS TO A LOAD  
CONTACTOR.**  
 FOR LOADS OVER 10 AMPS  
 AND LESS THAN 30 AMPS



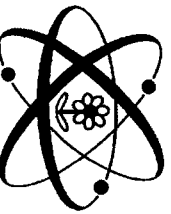
SURGE PROTECTION DEVICE -  
 RATED FOR 24 VAC OPERATION.  
 PROVIDED WITH EACH UNIT



CONTACTOR NOTE:  
 LINES ON L3, L2, L1  
 LOADS ON T3, T2, T1

RELAY NOTES:

RELAYS ARE DPDT  
 14,13..24 VAC COIL  
 12,9....COMMON  
 TERMINALS  
 8,5.....NORMALLY OPEN  
 TERMINALS  
 4,1.....NORMALLY  
 CLOSED  
 TERMINALS



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INSTALLATION OF SURGE  
 PROTECTION DEVICES ON  
 LOAD CONTACTORS AND  
 LOAD RELAYS



## **LIMITED WARRANTY**

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