



MICRO GROW

GREENHOUSE SYSTEMS, INC

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

Revision 1.1, 11-09-01

Growstat
Control System

INSTALLATION PROCEDURES

GROWSTAT 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 via 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 UL, custom pre-wired load contactor and load relay panel is available from Micro Grow Greenhouse Systems, Inc. This panel will contain all of 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 is to 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 this type of transformer. Use no smaller than a 40 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 a damaging surge from other related electrical devices. Follow all local and national codes in the connection of all of 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 maybe 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, ROLL UP CURTAINS

When connecting a vent system, or roll up curtain ventilation system to the control panel, you must use a separate control box designed for that particular vent 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 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 of the vent limit switches at the individual control panels.

Micro Grow Greenhouse Systems, Inc.

Growstat

Set Temperature:

1. Depress the **SET** switch once. The **OUTPUT 1** indicator will be on. Use the **VALUE** switch to set the correct desired setting. This will be the day mode setting. Depress the **SET** switch again to light the **NIGHT** indicator along with the **OUTPUT 1** indicator. Set the desired night level here.
2. (If DIF is not used, this instruction will not apply) If DIF is being used, the temperature setting for the DIF time period will be set next. Continue to depress the **SET** switch until the word "**DIF**" is displayed. The control will show the DIF temperature. Use the **VALUE** switch to set the desired DIF temperature.
3. Depress the **SET** switch again. The **OUTPUT 2** indicator will be on. Use the **VALUE** switch to set the all of the desired settings for output 2. Repeat for the night mode and DIF (if in use) as outlined above.
4. Return to the run mode by toggling the **RUN** switch up.

To Check High and Low History:

The control will automatically track the high and low readings for the past 24 hours for both inputs. To check them, depress the **SET** switch until the word "**HIGH**" appears in the display. The control will automatically indicate the highest reading for the past 24 hours. Depress the **SET** switch until the word "**LO**" appears in the display. The control will automatically indicate the highest reading for the past 24 hours. If you would like to reset these values, depress **VALUE** switch once while the system is in the high and low mode. The system will however automatically update these readings continuously.

To Set the Clock:

1. Continue to depress the **SET** switch until the **SET TIME** indicator 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 once more to set if it is AM or PM.

To Set the Day and Night 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 DAY MODE** indicator is on. If a photocell is connected to the system, adjust the hours setting till the word "**PHO**" appears in the display. If a photocell is not connected, a time can be set. Use the **VALUE** switch to change the setting.

2. Depress the **SET** switch again and repeat the above procedure to **SET NIGHT MODE**. If you do not want the NIGHT mode to be used, adjust the hours setting till "**OFF**" appears in the display.

To Activate the DIF Mode

The Growstat has a built in DIF mode of operation. The DIF mode is used to control plant growth based on a temperature differential between the day and night modes. The Growstat allows the user to set a special time for this mode. For truly automatic operation, a photocell should be used to automatically detect the actual sunrise time.

To set the DIF time period:

1. Continue to depress the **SET** switch while the **SET TIME** indicator is on while the **DIF** indicator is also lit. the word "**OFF**" will be shown. This means that the DIF mode is disabled. By toggling the **VALUE** switch, a number proceeded by a negative sign will be shown (**-8.0** example). This will be the number of hours before sunrise, or before the set day mode time that the Growstat will use to enter the DIF mode. Set any value in .5 hour increments desired. After this negative number is set, depress the **SET** switch again. A number will appear without a negative sign in front of it (**2.0** example). This will be number of hours after sunrise or after the set day mode that the Growstat will use to exit the DIF mode.

2. Return to the run mode when finished.

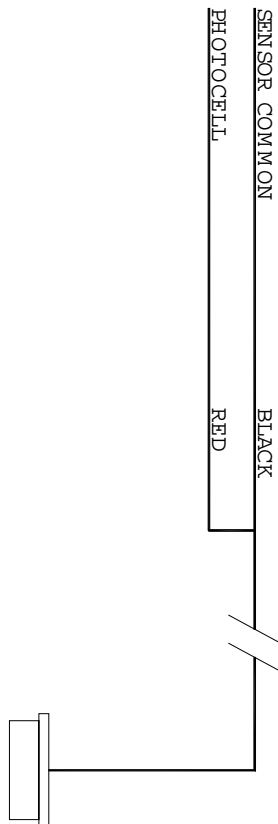
To Calibrate the Control:

The control can be calibrated easily. Calibration is best performed in the early or late hours to prevent the interaction of the solar influence. Using a good mercury or digital thermometer and hydrometer, obtain the value to calibrate the control to.

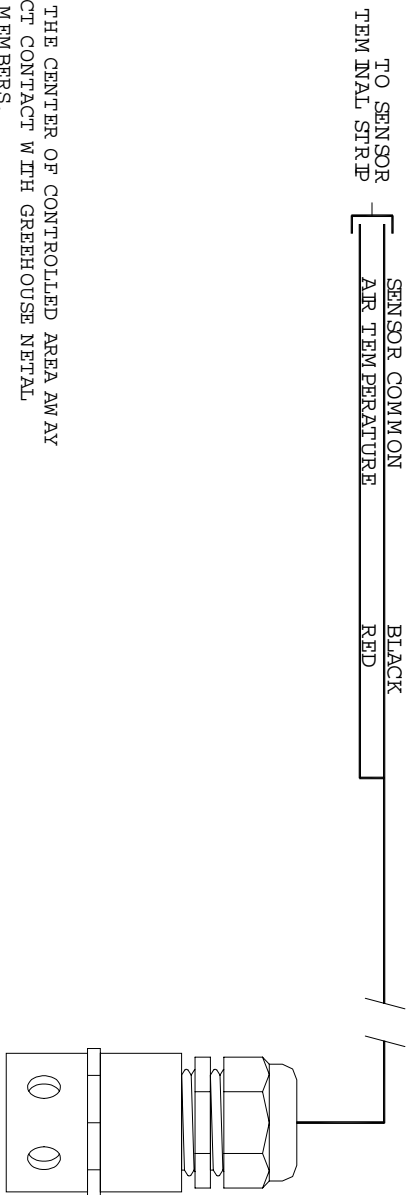
1. Continue to depress the **SET** switch until the **CALIB** is on the display. The first number to appear afterwards is the temperature. Use the **VALUE** switch to change the setting.

2. Depress the **SET** switch again and repeat the above procedure to set the humidity reading. Return to the run mode when finished.

PHOTOCELL



AIR TEMPERATURE SENSOR



LOCATE IN THE CENTER OF CONTROLLED AREA AWAY FROM DIRECT CONTACT WITH GREENHOUSE METAL POSTS AND MEMBERS.

GROW STAT SENSORS

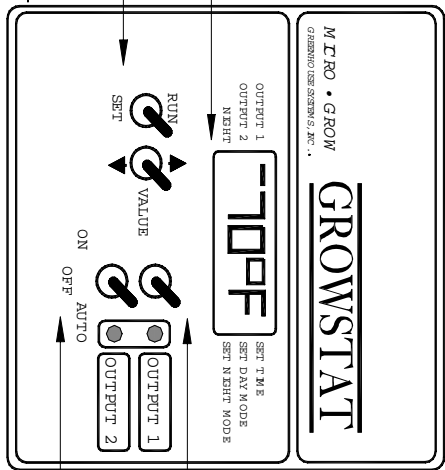


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Project				
G R O W S T A T S E N S O R S				
Drawn by	Date	Distributor	Order#	
GH	11/09/01	N/A	N/A	

GROW STAT

ACCURACY	TEMPERATURE +/-1 DEGREE F
READOUT	1/2" LCD, F OR C SELECTABLE
PROGRAMMING	TOGGLE SWITCH
MANUAL SWITCHES	ALL OUTPUTS
TIME DELAY	USER SELECTABLE
DIFFERENTIAL	USER SELECTABLE
ENCLOSURE	WEATHERPROOF, CLEAR COVER
VOLTAGE	24 VAC
PHYSICAL SIZE	6.625" W X 6.75" H X 4.625" D



LARGE, EASY TO READ DISPLAY FOR CURRENT, HIGH AND LOW TEMPERATURES.

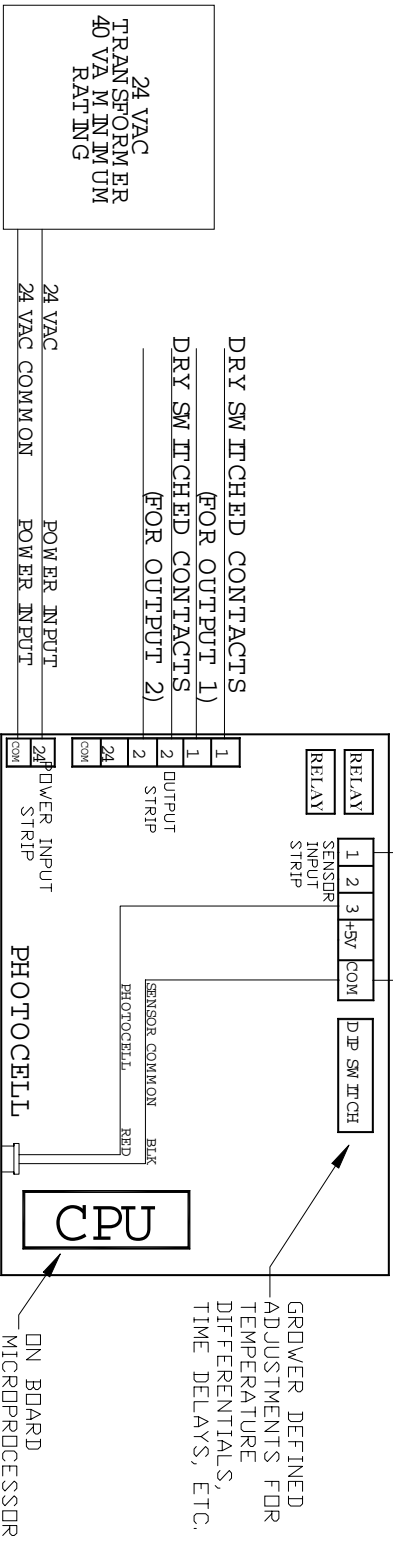
FRONT PANEL TOGGLE SWITCHES FOR EASY PROGRAMMING AND CALIBRATION.

WEATHERPROOF ENCLOSURE WITH LOCKABLE CLEAR, LEXAN COVER.

EACH OUTPUT HAS A FRONT PANEL MOUNTED SWITCH TO SELECT THE MODE OF OPERATION.

LIGHTED STATUS INDICATORS WILL SHOW ANY STAGE IN OPERATION.

LOCATE IN THE CENTER OF CONTROLLED AREA AWAY FROM DIRECT CONTACT WITH GREENHOUSE METAL POSTS AND MEMBERS



24 VAC TRANSFORMER 40 VA MINIMUM RATING

DRY SWITCHED CONTACTS (FOR OUTPUT 1)

DRY SWITCHED CONTACTS (FOR OUTPUT 2)

24 VAC POWER INPUT

24 VAC COMMON POWER INPUT

RELAY

SENSOR INPUT STRIP

1 2 3 +5V COM

DIP SWITCH

SENSOR COMMON

PHOTOCELL

CPU

ON BOARD MICROPROCESSOR

RED WHITE

TEMPERATURE SENSOR COMMON

AIR TEMPERATURE SENSOR 1

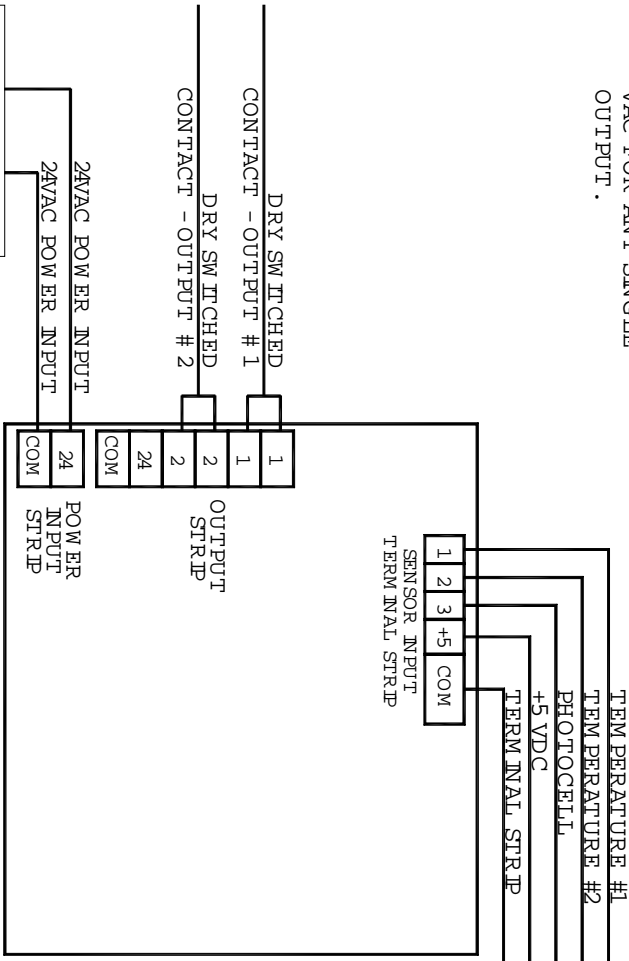
GROWER DEFINED ADJUSTMENTS FOR TEMPERATURE DIFFERENTIALS, TIME DELAYS, ETC.

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Project: GROW STAT

Drawn by: GH	Date: 11/09/01	Distributor: N/A	Order ID: N/A
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OUTPUT NOTE:
 THE CONTROL OUTPUTS
 ARE RATED AT 1 AMP @24
 VAC EACH MAXIMUM .DO
 NOT EXCEED THIS OR
 DAMAGE MAY RESULT .DO
 NOT EXCEED 1 AMP @ 24
 VAC FOR ANY SINGLE
 OUTPUT .



24 VAC
 MACHINE TOOL
 TRANSFORMER

GROW STAT INPUTS AND OUTPUTS

DIP SWITCH SETTINGS

- TEMPERATURE MODE
 - #1 OFF FAHRENHEIT
 - #1 ON CENTIGRADE
- PHOTOCELL
 - #2 ON PHOTOCELL IN USE
 - #2 OFF NO PHOTOCELL
- TEMPERATURE DIFFERENTIAL
 - #3 OFF #4 OFF 1 DEGREE
 - #3 ON #4 OFF 2 DEGREES
 - #3 OFF #4 ON 3 DEGREES
 - #3 ON #4 ON 4 DEGREES
- DIF ENABLE
 - #5 OFF DIF OFF
 - #5 ON DIF ON
- TIME DELAY
 - #7 OFF #8 OFF 2 SECONDS
 - #7 ON #8 OFF 30 SECONDS
 - #7 OFF #8 ON 60 SECONDS
 - #7 ON #8 ON 120 SECONDS
- OUTPUT DEFINITION
 - #11 OFF HEATING
 - #11 ON COOLING
 - #12 OFF HEATING
 - #12 ON COOLING

LIMITED WARRANTY

Micro Grow Greenhouse Systems, Inc. warrants that all of the products Micro Grow Greenhouse Systems, Inc. manufactures are free from defects at the time of shipment by Micro Grow Greenhouse Systems, Inc. This warranty covers defects in workmanship and materials. No warranty is extended on any parts, materials, or components manufactured by others and purchased by Micro Grow Greenhouse Systems, Inc., and any warranty on these materials is limited to the warranty supplied by the original manufacturer or supplier of said products only. This warranty excludes any and all damages cause by installation by unqualified individuals, damage by misuse or neglect, shipment damage, alterations to original manufacturing, and improper installation or use for any reason than intended by manufacturer. This warranty may not be altered in any manner except with the written authorization of one the officers or owners of Micro Grow Greenhouse Systems, Inc. The only and sole liability of Micro Grow Greenhouse Systems, Inc. under this warranty is limited to repairing, replacing or the issuance of credit for any products returned to Micro Grow Greenhouse Systems, Inc., during the warranty period of twelve (12) months from date of shipment. This warranty is specifically conditioned upon Micro Grow Greenhouse Systems, Inc. being notified in writing promptly upon discovery of any product defects by the buyer or end user. The product must then be returned prepaid to Micro Grow Greenhouse Systems, Inc. within the twelve month warranty period for inspection by Micro Grow Greenhouse Systems, Inc. Upon inspection of said product, Micro Grow Greenhouse Systems, Inc. will notify buyer or end user of its findings. At Micro Grow Greenhouse Systems, Inc. sole discretion, the product will be replaced, repaired or a credit will be issued for the original sale price of the product, provided that damage has not occurred due to misuse, neglect, improper use or installation as outlined above, shipping damages or accident.

MICRO GROW GREENHOUSE SYSTEMS, INC. SHALL NOT BE LIABLE FOR ANY DAMAGES BEYOND THE ACTUAL ORIGINAL COST OF THEIR PRODUCT EITHER DIRECTLY OR INDIRECTLY ARISING FROM DEFECTIVE PRODUCTS OR WORKMANSHIP.