



GROTRON ELITE

CONTROLLER

Acme Engineering & Manufacturing Corporation
P O Box 978, Muskogee, OK 74402
Phone 918/682-7791 Fax 800/382-2263
www.acmehort.com

INSTALLATION PROCEDURES

Grotron Elite Controller

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 ACME Eng. & Mfg. All load contactors and relays are also readily available from ACME Eng. & Mfg. 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 Acme Engineering. This panel will contain all the required switching apparatus for your project, as well as a correctly sized machine tool transformer. Contact Acme Engineering for pricing and availability.

TRANSFORMERS

A 24 VAC transformer will power the control panel. 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. 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. If using a weather station, mount the 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, 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. 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 Grotron Elite 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.

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 HEATING AND COOLING TEMPERATURES

DAY TEMPERATURE SETPOINTS:

1. Toggle the **SET** switch down until the **COOLING** LED 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.

The cooling temperatures for the day mode are now set. For heating:

1. Toggle the **SET** switch down until the **HEATING** LED 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.

YOU CANNOT PROGRAM THE HEATING TEMPERATURES HIGHER THAN THE COOLING TEMPERATURES.

NIGHT TEMPERATURE SETPOINTS:

1. Continue to toggle the **SET** switch down until the **NIGHT MODE** indicator on the LCD display is flashing on the LCD display along with either the **COOLING** or the **HEATING** light, release the switch.

2. Hold the **VALUE** switch either **UP** or **DOWN** until the desired NIGHT value is displayed, release switch.

TO PROGRAM DEHUMIDIFY SETPOINTS (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 the 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/CLOCK** 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 preferable, use the value switch to advance to a time of 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/CLOCK** 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/CLOCK** 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, "**bEF.X.X**", to indicate the number of hours before sunrise to go into DIF. Depress the **SET** switch again and adjust the flashing value, "**AF.X.X**", 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 MODE/CLOCK** LED is on and the Grotron Elite is showing the current time. 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 stage operations. 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

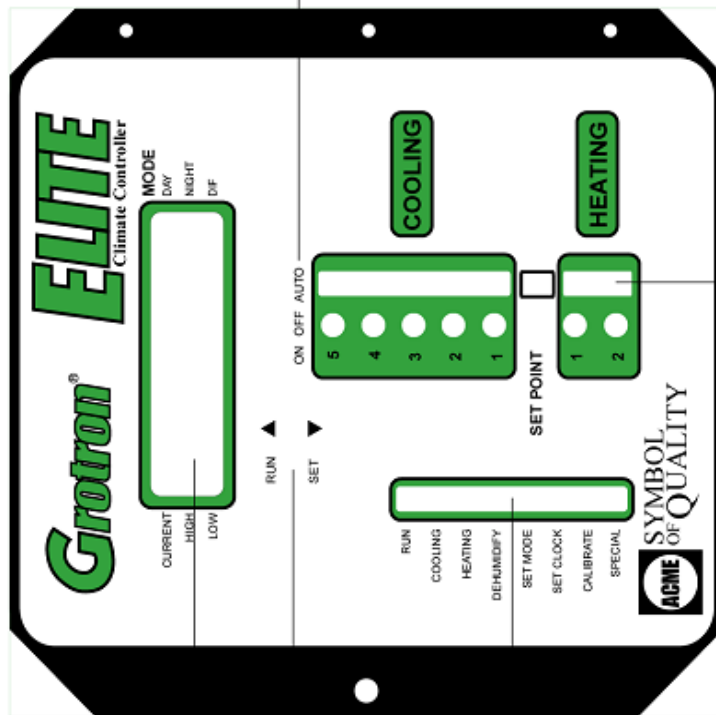
The control is equipped with a photocell to detect day and night modes. The photocell is located on the bottom side of the control enclosure. Keep the photocell clean and unobstructed.

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.



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.

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

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.

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 60 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 60 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

IF DEHUMIDIFY OPTION IS IN USE:

AIR CIRCULATION (During Dehumidify):
 #6 ON TURN ON IF NOT ALREADY ON
 #6 OFF LEAVE IN CURRENT STATE

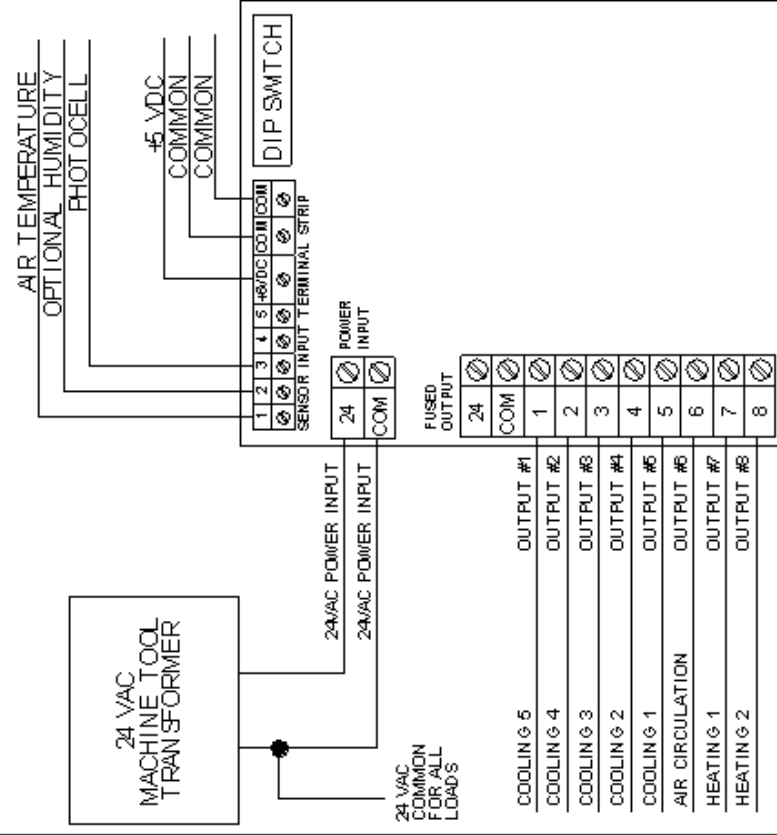
DEHUMIDIFY MAXIMUM RUNNING TIME:
 #8 OFF 10 MINUTES
 #8 ON 30 MINUTES

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

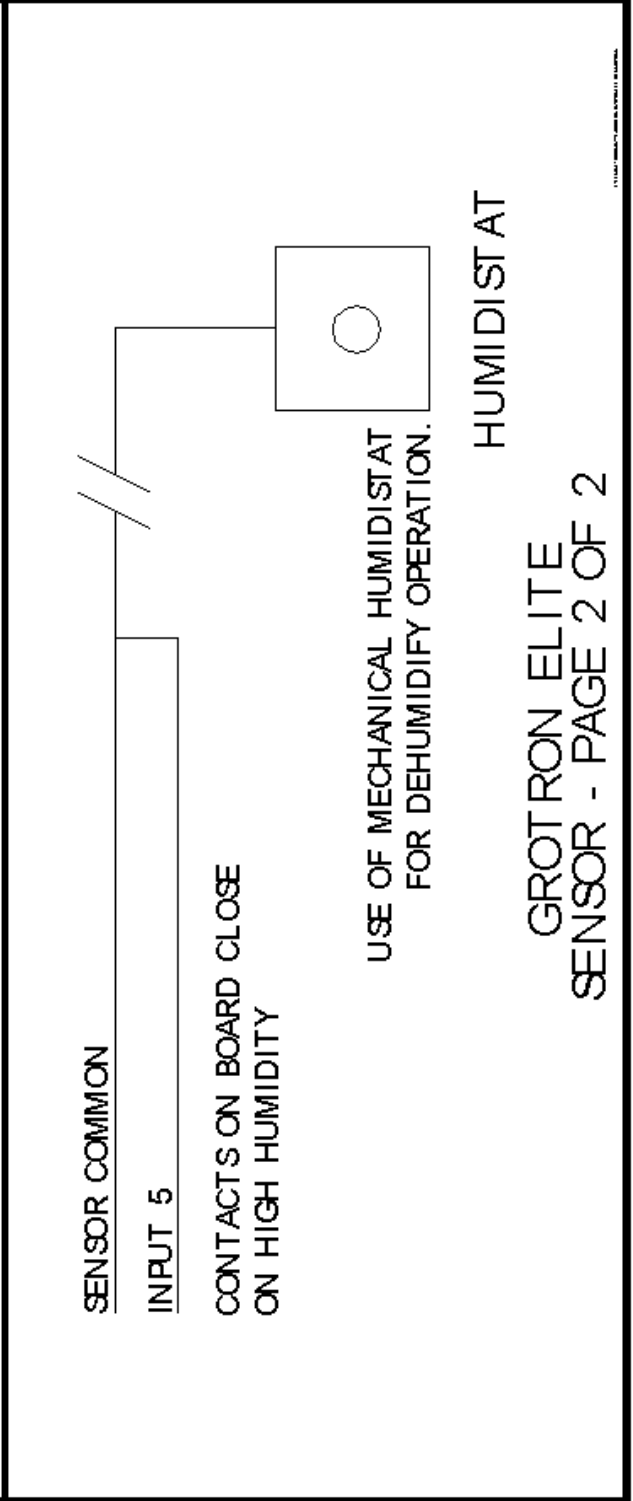
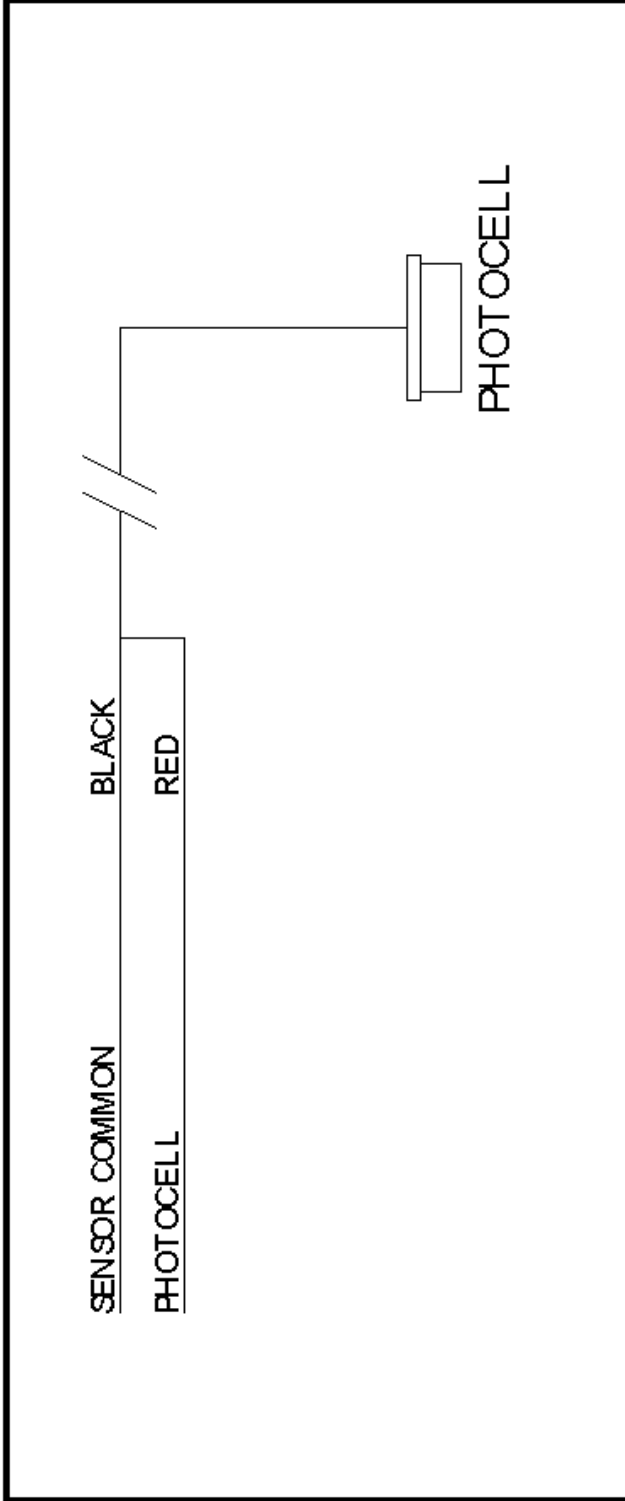
DEHUMIDIFY HEATING STAGE:
 #12 OFF NONE
 #12 ON HEATING 1



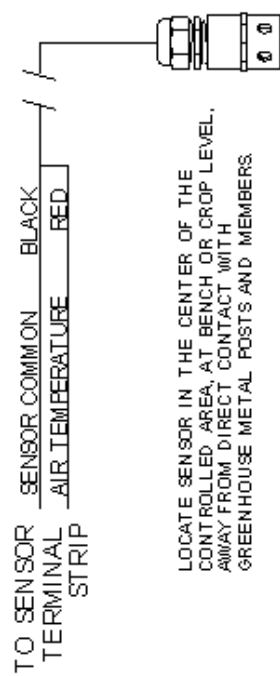
ALL CONNECTED 24 VAC LOAD RELAYS AND CONTACTORS MUST HAVE A SURGE PROTECTION DEVICE INSTALLED ACROSS THE COILS. SURGE SUPPRESSION DEVICES ARE SUPPLIED WITH EACH UNIT.

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.

GROTRON ELITE

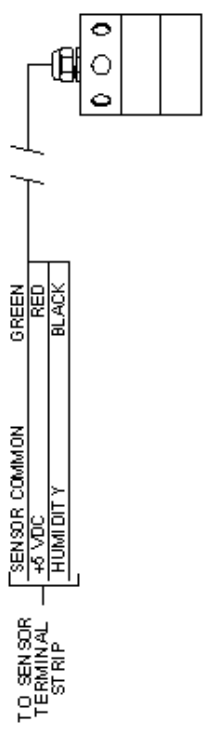


AIR TEMPERATURE SENSOR



LOCATE SENSOR IN THE CENTER OF THE CONTROLLED AREA, AT BENCH OR CROP LEVEL, AWAY FROM DIRECT CONTACT WITH GREENHOUSE METAL POSTS AND MEMBERS.

OPTIONAL NON-ASPIRATED HUMIDITY SENSOR



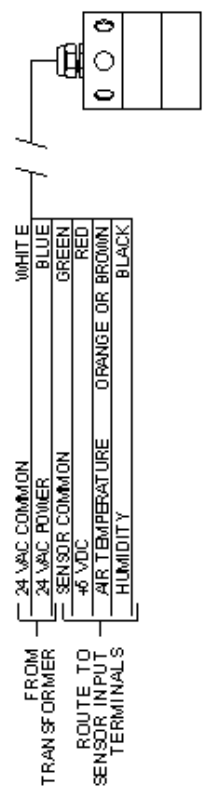
LOCATE SENSOR IN THE CENTER OF THE CONTROLLED AREA, AT BENCH OR CROP LEVEL, AWAY FROM DIRECT CONTACT WITH GREENHOUSE METAL POSTS AND MEMBERS.

OPTIONAL NON-ASPIRATED AIR TEMPERATURE & HUMIDITY SENSOR



LOCATE SENSOR IN THE CENTER OF THE CONTROLLED AREA, AT BENCH OR CROP LEVEL, AWAY FROM DIRECT CONTACT WITH GREENHOUSE METAL POSTS AND MEMBERS.

OPTIONAL ASPIRATED AIR TEMPERATURE AND HUMIDITY SENSOR

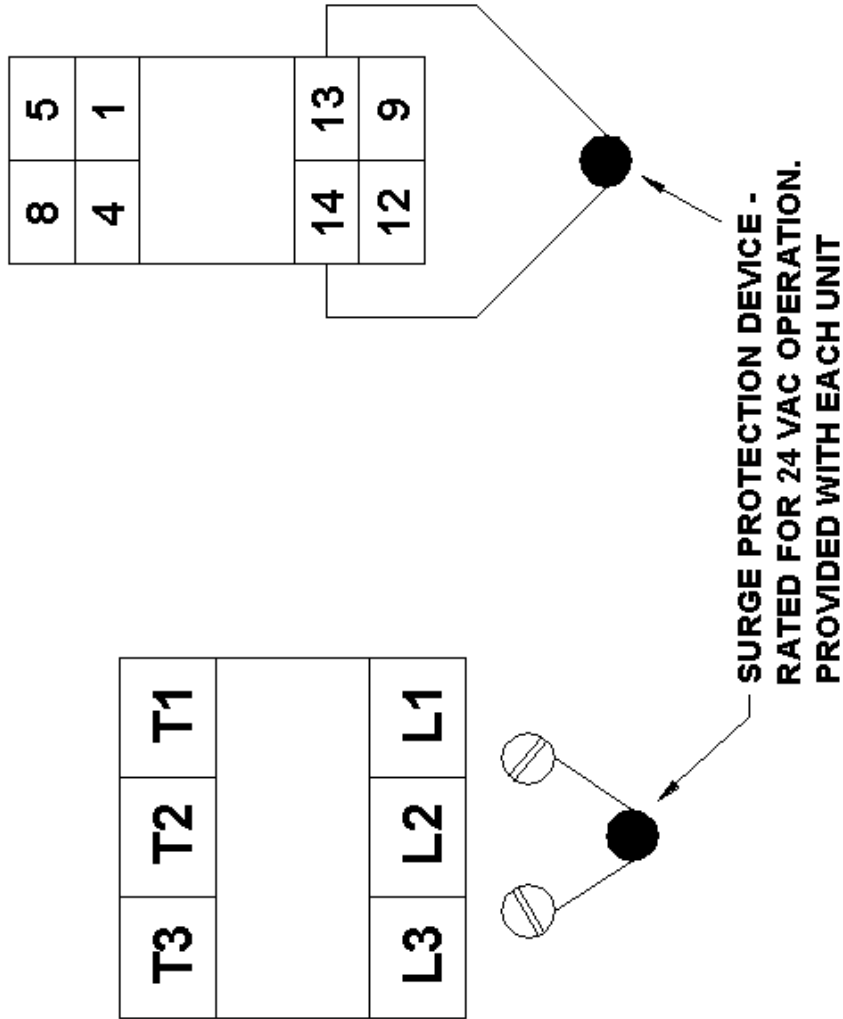


LOCATE SENSOR IN THE CENTER OF THE CONTROLLED AREA, AT BENCH OR CROP LEVEL, AWAY FROM DIRECT CONTACT WITH GREENHOUSE METAL POSTS AND MEMBERS.

Project	INSTALLATION OF SURGE PROTECTION DEVICES		
Drawn by	EB	Date	8/10/05
Checked by	N/A	Date	N/A
Order #	N/A		

CONTACTOR NOTES
 LINES ON L3, L2, L1
 LOADS ON T3, T2, T1

RELAY NOTES:
 RELAYS ARE DEDICATED
 14, 13 24 VAC COIL
 12, 9 COMMON TERMINALS
 8, 5 NORMALLY OPEN
 TERMINALS
 4, 1 NORMALLY CLOSE
 TERMINALS



INSTALLATION OF SURGE
 PROTECTION DEVICES ON
 LOAD CONTACTORS AND
 LOAD RELAYS

11/10/05 BY: EB, DATE: 8/10/05

TERMS AND CONDITIONS OF SALE

ACCEPTANCE All orders and sales are subject to written approval and acceptance by an executive officer of Acme Engineering & Manufacturing Corporation at Muskogee, Oklahoma, (the "Company") and are not binding on the Company until so approved.

DELIVERY All shipping and delivery dates are estimated only. No delays in delivery will subject the Company to any costs, damages or fees for late delivery. Delivery of the products herein specified shall be made F.O.B. point of shipment, unless otherwise stated. The Company shall not be liable for delay due to causes beyond its reasonable control, such as Acts of God, acts of the purchaser, acts of civil or military authorities, priorities, fires, strikes, floods, epidemics, war, riots, delays in transportation, car shortages, and inability, due to reasons beyond its reasonable control, to obtain necessary labor, material, or manufacturing facilities. In the event of such a delay, the date of delivery shall be extended for a period equal to the time lost by reason of the delay.

TERMS OF PAYMENT If, in the judgment of the Company, the financial condition of the purchaser at any time does not justify continuation of manufacture or shipment on the terms of payment specified, the Company may require full or partial payment in advance.

Pro rata payments shall become due as shipments are made. Each shipment or delivery shall constitute a separate sale, and the default of any shipment or delivery shall constitute a separate sale, and the default of any shipment or delivery shall not vitiate the contract as to other shipments or deliveries.

PRICE ADJUSTMENT Prices are subject to change until the Purchaser's order has been accepted by the Company.

SALES AND SIMILAR TAXES The Company's prices do not include sales, use, excise, or similar taxes. Consequently, in addition to the price specified herein, the amount of any present or future sales, use, excise,

or other similar tax applicable to the sale of the product herein shall be paid by the Purchaser, or in lieu thereof the Purchaser shall provide the Company with a tax exemption certificate acceptable to the taxing authorities.

CANCELLATION Any contract resulting from the Purchaser's order may be canceled by the Purchaser only by negotiations and upon payments of reasonable cancellation charges which will take into account expenses already incurred and commitments made by the Company.

DESIGN CHANGES The Company reserves the right to make changes in design, improvements and additions in and to its products any time without imposing any liability or obligations to itself to apply or install the same in any product manufactured by it.

TITLE The title and right of possession of the products sold herein shall remain with the Company and such products shall remain personal property until all payments herein (including deferred payments whether evidenced by notes or otherwise) shall have been made in full in cash and the Purchaser agrees to do all acts necessary to perfect and maintain such right and title in the Company.

PRICE ADJUSTMENTS AND PROTECTION Prices on products manufactured by the Company are firm for shipment up to four months from the date of the original order entry. Such prices are subject to adjustment if shipment is made after four months and up to ten months from the date of the original order entry, if products are shipped ten months from the date of the original order entry, prices will be adjusted to the price in effect at the time of shipment automatically. All complete component accessory material manufactured by others and furnished with the Company's products such as motors, drives, vibration equipment, controls or other completely assembled component structures, are subject to adjustment to the price at time of shipment regardless of the date of original order entry.

SAFETY ACCESSORIES The Company manufactures products designed to serve multiple applications and offers a wide range of safety equipment, including guards and other devices, as may be required to meet customer specifications. Without exception, the Company recommends that all orders include applicable safety devices. Products ordered without applicable safety devices is clearly the responsibility of the Purchaser. Further, the Purchaser warrants that it has determined and acquired any and all safety devices required for products sold by the Company. Weather covers and guards for motor and V-belt drives, couplings, shafts and bearings, along with inlet and outlet screens, are optional accessories noted in the price list.

GOVERNING LAW The rights, obligations and remedies of Purchaser and the Company, the interpretation of these terms and conditions and the sale of products by the Company shall be governed by Oklahoma law, without regard to any principles of conflict of laws.

ARBITRATION Any dispute arising under or in connection with these terms and conditions or the sale of products shall be settled by binding arbitration administered by the American Arbitration Association under its Commercial Arbitration Rules, and judgment on the award rendered by the arbitrator may be entered in any court having jurisdiction thereof. The dispute shall be resolved by one neutral arbitrator who shall have no affiliation with either Purchaser or the Company and shall be selected by the American Arbitration Association office in Dallas, Texas. The arbitration proceedings shall be held in Muskogee, Oklahoma.

APPLICABLE DOCUMENTS The agreement between the Company and the Purchaser relating to the products includes these terms and conditions of sale, any applicable installation and maintenance instructions provided by the Company and any terms appearing on the Company's quotation, sales order acknowledgment and invoice.

WARNING Acme products are designed and manufactured to provide reliable performance but they are not guaranteed to be 100% free of defects. Even reliable products will experience occasional failures and this possibility should be recognized by the Purchaser and all End Users. If these products are used in a life support ventilation system where failure could result in loss or injury, the Purchaser and all End Users should provide adequate back-up ventilation, supplementary natural ventilation or failure alarm system, or acknowledge willingness to accept the risk of such loss or injury.

WARNING DO NOT use in HAZARDOUS ENVIRONMENTS where fan's electrical system could provide ignition to combustible or flammable materials unless unit is specifically built for hazardous environments. Comply with all local and national safety codes including the National Electrical Code (NEC) and National Fire Protection Act (NFPA).

CAUTION Guards must be installed when fan is within reach of personnel or within seven (7) feet (2.134 m) of working level or when deemed advisable for safety.

DISCLAIMER The Company has made a diligent effort to illustrate and describe the products accurately in all Company literature; however such illustrations and descriptions are for the sole purpose of identification and do not express or imply any warranty.

LIMITED WARRANTY

WARRANTY AND DISCLAIMER: the Company extends this limited warranty to the original purchaser and warrants that products supplied by the Company, shall be free from original defects in workmanship and materials for two years from date of shipment (except for the warranty periods noted for products listed below), provided same have been properly handled, stored, installed, serviced, maintained and operated. This warranty shall not apply to products which have been altered or repaired without the Company's express authorization, or altered or repaired in any way so as, in the Company's judgment, to affect its performance or reliability, nor which have been improperly installed or subjected to misuse, negligence, or accident, or incorrectly used in combination with other substances. The Purchaser assumes all risks and liability for results of use of all products.

Evaporative cooling pads are warranted to be free of defects in materials and workmanship for a period of two years from date of shipment provided same have been properly handled, stored, installed, serviced, maintained and operated; and further, not subjected to excessive heat, corrosive agents or chemicals, or mechanical abuse that may cause tearing, crushing or undue deterioration, nor used on a system or in a manner other than that for which it was designed as explained in the product literature.

The following products are warranted to be free of defects in materials and workmanship for the periods shown from date of shipment: Acme's exclusive duplex split pillow block bearings and shaft five years, belts one year, Polyethylene tubing 90 days, AIR40 Heater warranty one year, AIR40 Emitter warranty three years and DDP fan lifetime warranty on its propeller, cone, and housing.

LIMITATION OF REMEDY AND DAMAGES: All claims under this warranty must be made in writing and delivered to P. O. Box 978, Muskogee, Oklahoma, 74402, within 15 days after discovery of the defect and prior to the expiration of two years from the date of shipment by the Company of the product claimed defective, and Purchaser shall be barred from any

remedy if Purchaser fails to make such claim within such period.

Within 30 days after receipt of a timely claim, the Company shall have the option either to inspect the product while in Purchaser's possession or to request Purchaser to return the product to the Company at Purchaser's expense for inspection by the Company. The Company shall replace, or at its option repair, free of charge, any product it determines to be defective, and it shall ship the repaired or replacement product to Purchaser F.O.B. point of shipment; provided, however, if circumstances are such as in the Company's judgment to prohibit repair or replacement to remedy the warranted defects, the Purchaser's sole and exclusive remedy shall be a refund to the Purchaser of any part of the invoice price, paid to the Company, for the defective product or part.

The Company is not responsible for the cost of removal of the defective product or part, damages due to removal, or any expenses incurred in shipping the product or part to or from the Company's plant, or the installation of the repaired or replaced product or part.

The warranties set forth above do not apply to any components, accessories, parts or attachments manufactured by other manufacturers; such being subject to the manufacturer's warranty, if any. To the extent not prohibited by the manufacturer's warranty, the Company shall pass through to Purchaser such manufacturer's warranty.

THE COMPANY'S WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARISING BY LAW OR OTHERWISE, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY EXPRESSLY DISCLAIMED AND WAIVED. THIS WARRANTY CONSTITUTES THE COMPANY'S SOLE AND EXCLUSIVE WARRANTY FOR DEFECTIVE GOODS AND PURCHASER'S SOLE AND EXCLUSIVE REMEDY FOR DEFECTIVE PRODUCTS.

No employee, agent, dealer, or other person is authorized to give any warranties on behalf of the Company or to assume for the Company any other liability in connection with any of its products except in writing and signed by an officer of the Company.

REPLACEMENT PARTS If replacement parts are ordered, purchaser warrants that the original components in which these replacement parts will be placed are in satisfactory working condition, and

when said replacement parts are installed, the resultant installation will operate in a safe manner, at speeds and temperatures for which the original product was purchased.

TECHNICAL ADVICE AND RECOMMENDATIONS, DISCLAIMER: Notwithstanding any past practice or dealings or any custom of the trade, sales shall not include the furnishing of technical advice or assistance or system design. Any such assistance shall be at the Company's sole option and may be subject to additional charge.

The Company assumes no obligation or liability on account of any recommendations, opinions or advice as to the choice, installation or use of products. Any such recommendations, opinions or advice are given and shall be accepted at Purchaser's and End User's risk and shall not constitute any warranty or guarantee of such products or their performance.

LIMITATION OF LIABILITY The cumulative liability of the Company to the Purchaser and any other persons for all claims in any way relating to or arising out of the products, including, but not limited to, any cause of action sounding in contract, tort, or strict liability, shall not exceed the total amount of the purchase price paid for those products which are the subject of any such claim. This limitation of liability is intended to apply without regard to whether other provisions of this agreement have been breached or have proven ineffective even if the Company has been advised of the possibility of such claims or demands. In no event shall the Company be liable to the Purchaser or any other person for any loss of profits or any incidental, special, exemplary, or consequential damages for any claims or demands brought by the Purchaser or such other persons.

INDEMNITY The Company's maximum liability to Purchaser and to any end user is as set forth above. The Company makes no warranty to anyone for any products not manufactured by the Company and shall have no liability for any use or installation of any products (whether manufactured by the Company or other manufacturers) not specifically authorized by this sale. Purchaser acknowledges various warnings by the Company regarding the products and its installation and use. If the Company incurs any claims, lawsuits, settlements, or expenses (including attorney fees) for any loss, injury, death or property damage including, but not limited to, claims arising out of the Purchaser's or any end user's installation or use of the products, the Purchaser shall indemnify and hold the Company harmless.



**ACME ENGINEERING AND
MANUFACTURING CORPORATION**
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