



MICRO·GROW

CONTROL SYSTEMS INC.

WWW.MICROGROW.COM

**GROWCOM
GREENHOUSE
CONTROL SYSTEMS**

GROWMASTER SERIES INSTALLATION PROCEDURES

CONTROL MOUNTING

Mount the control panel in an accessible location. Make sure that the location is free of vibration and in close proximity to the Relay/Contactor cabinet or other equipment. Always consider voltage drop of electrical current when locating the Relay/Contactor cabinet or other equipment. Securely mount the Growcom control.

SWITCHING CONTACTORS AND RELAYS

The control panel will operate the greenhouse equipment via load contactors and load relays.

ALL LOAD CONTACTORS USED MUST HAVE A SURGE SUPPRESSOR INSTALLED ACROSS THE COIL OF THE 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. 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, and 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 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 75 VA machine tool transformer. For a system that has more than three (3) load contactors connected, use a 150 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 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/shade 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 over current 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 and shade limit switches at the individual control panels.

GROWMASTER GROWCOM

OPERATING INSTRUCTIONS

GROWCOM SERIES

The Growcom Series is a complete greenhouse computer system for one zone. Two (2) sets of ventilation outputs, maintained cooling, maintained heating, air circulation, fogging outputs.

PROGRAMMING LIGHTS

RUN: Indicates that the system is in the running mode.

SET PROGRAM: All temperatures, humidity levels, and other information are set here.

SET REPORTS: This will enable the REPORT feature of the Growmaster.

SET CALIBRATION: This will put the Growmaster in the calibration mode.

SET SYSTEM: Set the clock, set the day, midday, evening, and night criteria here.
Set system identifications.

SET COOLING: Set the criteria for all the maintained cooling outputs here.

SET HEATING: Set the criteria for all of the maintained heating outputs here.

SET VENTILATION: Set the criteria for all of the staged ventilation output(s) here and the criteria for the staged shade output (if available)

SET FOGGING: Set the criteria for all of the fogging outputs here.

SET DEHUMIDIFY: Set the dehumidify functions here.

PROGRAMMING SWITCHES

There are three (3) main programming switches located on the Growmaster front panel. These are:

RUN-SET SWITCH

RUN: Puts the control in the RUN mode

SET: Puts the control in the SET mode in order to set all functions as outlined on the programming lights

PRIOR - NEXT SWITCH

PRIOR: Advances to the prior item in the menu

NEXT: Advances to the next item in the menu

VALUE UP - VALUE DOWN SWITCH

VALUE UP: Increases the value in the display

VALUE DOWN: Decreases the value in the display

(The VALUE switch is also used to toggle between selected item choices available)

SET PROGRAM

The **SET PROGRAM** mode allows the grower to set all of the temperatures, humidity levels, and other settings. In this mode the normal day to day settings will be entered. No details such as time delays, differentials, etc. are entered here. Refer to the individual SET modes for the individual criteria settings. The screen will display the first selected item to set the program on. The screen will also indicate by flashing whether the setting will apply to DAY, MIDDAY, EVENING or NIGHT.

1. Enter the SET PROGRAM mode.
2. Use the **PRIOR-NEXT** switch to advance to the desired item to set.
3. Use the **VALUE** switch to increase or decrease the desired value.
4. Use the **PRIOR-NEXT** switch to advance to the next desired item to set.
5. Return to the RUN mode.

COOLING 1 DAY: (80) 80 80 80

Set the desired value for the flashing segment. Set for DAY, MID (Midday), EVE (Evening) and NGT (Night). You may disable the MID and EVE settings in the SET SYSTEM mode if desired.

As you continue to toggle through the display in the SET PROGRAM mode, all pre-programmed features will come up for similar settings. Set all of these in the same manner as above.

RUN REPORTS

The RUN REPORTS mode allows the grower to run selected reports on the sensor history.

1. Enter the RUN REPORTS mode.
2. Use the **PRIOR-NEXT** switch to advance to the desired report.
3. Continue to use the **PRIOR-NEXT**.

DISPLAY REPORT (INSIDE)

Select the desired report for display.

CALIBRATE

The **CALIBRATE** mode is used in order to calibrate all of the sensor readings. It is also used to calibrate the vent and shade positions in the event that they have been moved manually and do not match the Growmaster display as to the percentage opening. Calibration should always be done with a good thermostat or humidity indicator, and when conditions have been calm for a period of time. Late afternoon or early morning is best, without solar influence.

1. Enter the CALIBRATE mode.
2. Use the **PRIOR-NEXT** switch to advance to the desired item to calibrate.
3. Use the **VALUE** switch to increase or decrease the display reading.

CALIBRATE: AIR TEMP 1 80° F

Set the desired value. The calibration procedure should be done with a reliable thermometer, out of direct solar influence when calibrating temperatures. Use a wet and dry bulb to calculate humidity.

GROWMASTER GROWCOM PROGRAMMING INSTRUCTIONS

SET SYSTEM

Use the SET SYSTEM mode to:

- Set the system clock and date
- Manually view the systems sunrise and sunset times
- Adjust the system Photocell
- Set custom ID that will be displayed during the RUN mode
- View pre-programmed Input and Output configurations
- Set ID code for use with the Growlink PC communications program
- Set desired times for the DAY, MIDDAY, EVENING and NIGHT settings to apply
- Determine times of day either by sunrise, sunset or clock settings, or a combination of means, by which DAY, MID, EVE and NGT will apply

1. Enter the SET SYSTEM mode.
2. Use the **PRIOR-NEXT** switch to advance to the desired item to set.
3. Use the **VALUE** switch to increase or decrease the display reading. Also use this switch to toggle desired choices that the system has internally provided.

SET CLK (12:00) PM
MON 01/02/09

Set the correct time and date.

SUNRISE 7:00 AM
SUNSET 8:00 PM

These are the current values that the control is sensing for sunrise and sunset. There is no need to change these values; the control will update automatically.

CUSTOM SYSTEM ID
(OFF)

By changing this to PROGRAM, you may enter a custom ID that will appear on display when the system is running. This may include the name of the range or other information. If PROGRAM is selected, then use the **VALUE** switch to select the desired alphanumeric information and the **PRIOR-NEXT** switch to advance to the next digit. A black space may also be selected if desired.

DAY MODE
(AT SUNRISE)

Select how the four (4) modes of operation; DAY, MID, EVE and NGT will be affected. You may choose a switching action at SUNRISE, PRE-SUNRISE, (Sunset for EVE and NGT) or TIMED. You may also choose NOT IN USE to disable EVE and MID if desired.

REVIEW I/O
ASSIGNMENTS ? (N)

Use this selection to review the assigned Inputs and Outputs for your system.

REMOTE ID CODE: (0)

Not applicable if not using the Growlink program. Set the ID code here for the Growlink remote PC program available from Micro Grow Greenhouse Systems Inc.

LINK AIR 1 TO OUTPUT (1)

Select the output that the Air Circulation output will be linked to.

AIR 1 ON IF OUTPUT IS (ON)

Select when to turn on the Air Circulation output or, if the output is a vent or other staged device set the stage of operation desired to energize the Air Circulation output.

(IF VENT) AIR 1 ON IF OUTPUT IS (<=)(CL)

SET COOLING

Use the SET COOLING mode to:

- Set desired cooling stage temperature separations and differentials
- Set internal time delays that will prevent rapid cycling
- Determine if any cooling stages will be activated during the dehumidify functions
- Choose either immediate dehumidify or delayed dehumidify function

1. Enter the SET COOLING mode.
2. Use the **PRIOR-NEXT** switch to advance to desired item to set.
3. Use the **VALUE** switch to toggle between desired choices that system has internally provided.

COOLING 1 STAGES (2° SEP.) 2° DIF.

Set the desired separation and desired differential of the cooling stages here. The separation is the total number of degrees that separate each stage of operation. Once an output or a stage has been activated, the differential is the amount of temperature change required that will cancel the operation of that stage or output.

COOLING 1 TIMING (2 SEC.)

Set the desired time delay here. The time delay will be active on both energizing and de-energizing stages.

COOLING 1 STG (1) ON IMMED DEHUM

Set the desired stages of operation here that will be activated by the dehumidify functions. You may choose either the **IMMEDIATE** or the **DELAYED** dehumidify functions for a particular stage.

SET HEATING

Use SET HEATING mode to:

- Set desired heating stage temperature separations and differentials
- Set internal time delays that will prevent rapid cycling
- Determine if heating stages will be activated during the dehumidify functions
- Choose either the immediate dehumidify or delay dehumidify function

1. Enter the SET HEATING mode.
2. Use the **PRIOR-NEXT** switch to advance to the desired item to set.
3. Use the **VALUE** switch to toggle between desired choices that the system has internally provided.

HEATING 1 STAGES (2° SEP.) 2° DIF.

Set the desired separation and differential of the heating stages here. The separation is the total number of degrees that separate each stage of operation. Once an output or a stage has been activated the differential is the amount of temperature change required that will cancel the operation of that stage or output.

HEATING 1 TIMING (2 SEC.)

Set the desired time delay here. The time delay will be active on both energizing and de-energizing stages.

HEATING 1 STG (1) ON IMMED DEHUM

Set the desired stages of operation that will be activated by the dehumidify functions here. You may choose either the IMMEDIATE or the DELAYED dehumidify functions, or both for a particular stage.

SET VENTILATION

Use SET VENTILATION mode to:

- Set the number of desired stages of the vent openings
- Set desired position of each stage
- Set actual total opening time for the vent itself
- Let the system know if there is a safety time delay in vent control being used
- Set dehumidify functions of the vent, both immediate and timed
- Set vent temperature differentials and temperature stage separations
- Set vent system timing
- Set total number of shade opening position stages
- Set system timing for the shade system
- Set solar level differential
- Set maximum closed position for shade system
- Set actual total opening time for shade system itself
- Let system know if there a safety delay present in actual shade control
- Set heat retention feature of the shade system

The programming allows the vent to be linked to a cooling stage or to an override input.

1. Enter the SET VENTILATION mode.
2. Use the **PRIOR-NEXT** switch to advance to the desired item to set.
3. Use the **VALUE** switch to toggle between desired choices that the system has internally provided.

OPEN VENT 1 IN (4) POSITIONS

Set the desired number of ventilation stages here. The system can operate the vent in up to eight (8) separate stages. If the output is connected to a pad vent system, then enter "PAD VENT". The Growmaster Growcom will now open the pad vent with the cooling stages as they turn on.

VENT 1 POS 1 10% OPEN

Set the desired percentages of opening here for each stage. The final stage will always be set to maximum vent position.

VENT 1 MAX POS (100) % OPEN

Set the desired maximum position for the vent.

OPENING TIME VENT 1 3:00

Set the actual time that the vent takes to run from its fully closed position to fully open. This time is critical, as the system will use this to determine correct openings.

**SAFETY DELAY FOR
VENT 1 (5) SEC**

If your vent control system is equipped with a time delay relay that protects the vent against false reversals, enter the number of seconds here. If you are in doubt whether your system has a time delay, simply manually energize the vent. If the vent starts to move immediately, there most likely is no time delay protection. You may choose NONE as one of the choices.

**LINK VENT 1 TO
COOLING STAGE (NO)**

Use this feature to link a set of vents to a particular cooling stage if desired. A possible use for this would be in the event that roof vents, as well as active cooling such as exhaust fans are in use. This feature will allow the user to link the roof vents to close to a low position when the cooling stages are active. This would allow the air to be drawn across the entire range and not through the roof vents by the exhaust fans. This setup is not applicable to "PAD VENT".

**VENT 1 (CLOSED)
ON COOL STAGE 1**

If a link is made to a cooling stage, the system will then ask what vent position during that cooling stage.

**LINK VENT 1 TO
OVERRIDE INP (NO)**

Use this setting if any override inputs are in use. Override inputs can come from the use of a Weather Station, or other external device.

**MX VENT POS
ON OVERRIDE 1 (CL)**

If a link is made to an override input, the system will then ask what the maximum vent position should be during that override input period.

**VENT 1 STG (1)
ON IMMED DEHUM**

Set the desired stages of operation here that will be activated by the dehumidify functions. You may choose either the IMMEDIATE or the DELAYED dehumidify functions, or both for a particular stage. This setup is not applicable to "PAD VENT".

**VENT 1 STAGES
(2° SEP.) 2° DIF.**

Set the desired separation of the ventilation stages here, and also the desired differential. The separation is the total number of degrees that separate each stage of operation. Once an output or a stage has been activated the differential is the amount of temperature change required that will cancel the operation of that stage or output. This setup is not applicable to "PAD VENT".

VENT 1 TIMING (2 SEC.)

Set the desired time delay here. The time delay will be active on both energizing and de-energizing stages. This setup is not applicable to "PAD VENT".

The following instructions are for setting up the staged shade outputs. If the controller does not have any outputs labeled "SHADE 1 OPEN" or "SHADE 1 CLOSE", disregard the following instructions.

**CLOSE SHADE 1
IN (4) POSITIONS**

Set the desired number of stages here for the shade system.

**SHADE 1
DELAY (5 MIN.)**

This will be the time delay that the system must see in order to move the shade system covered or uncovered. This will be the amount of time that the solar level must maintain in order to cause movement.

**SHADE 1
DIFF. (40) W/M²**

This is the differential of the shading system. This is the amount of light that is necessary in order to cause a change in the system.

**SHADE 1
MAX (100%) CLOSED**

Use this setting if it is desired not to have the shade system close to 100% at any time. Use this if the shade materials do not allow air passage and it is desired to always leave the shade system slightly open.

**SHADE 1
CLOSE TIME 3:00**

Enter the actual time that it takes the shade system to go from a fully open position, to a fully closed position. This is critical as the computer will use this time to determine the shade position.

**SHADE 1
SAFETY DELAY (5) SEC**

If your shade control system is equipped with a time delay relay that protects the vent against false reversals, enter the number of seconds here. If you are in doubt whether your system has a time delay, simply manually energize the shade system. If the shade system starts to move immediately, there most likely is no time delay protection. You may choose NONE as one of the choices.

**SHADE 1
HEAT RET 1 (DISABLED)**

The shade operation offers a heat retention feature. It is possible to use the shade system as an energy curtain. If you choose to ENABLE this, you may then select the following choices:

- 1. Activate the Heat Retention Feature by a mode of operation (EVE, NGT, etc.)**
- 2. Activate the Heat Retention Feature if a sensor is below or above a particular setting.**

You may cancel the heat retention feature based also on the above criteria. (There are two (2) separate heat retention programs for the shade system)

**GO TO (0) % IF
MODE = DAY**

Enter the percent covered that you want the shade system to go to during heat retention.

**GO TO 0% IF
MODE = (DAY)**

Select the mode that you want the shade system to be activated for heat retention

**AND
(AIR TEMP 1) >=80**

Select the sensor to be used to activate the shade system for heat retention. You may also choose to ignore any sensors if you like. This will activate the system simply on modes of operation (DAY, MID, EVE, NGT).

**AND
AIR TEMP 1 (>=) 80**

Select the condition for the sensor set point for heat retention.

**AND
AIR TEMP 1 >= (80)**

Select the set point for the activation of heat retention.

**CANCEL HEAT RET 1
IF MODE = (MID)**

Select the mode to cancel the heat retention.

**OR
AIR TEMP 1 <= (60)**

Select the temperature to cancel the heat retention.

**MAX POS (UNCOV'D)
IF VENT 1 ACTIVE**

Use this if the shade materials do not allow air passage and it is desired to always leave the shade system slightly open when the ventilation system is operating.

SET FOGGING

The SET FOGGING mode is used to set the temperature and humidity differentials and the system timing for the fogging output. The grower can also select if the fogging system should be maintained on or pulsed in this mode.

1. Enter the SET FOGGING mode.
2. Use the **PRIOR-NEXT** switch to advance to the desired item to set.
3. Use the **VALUE** switch to toggle between desired choices that the system has internally provided.

FOG 1 DIFF. (2)° TEMP 2% RH

Set the desired differential of the fogging stage. The differential is the amount of temperature decrease that the sensor must see before turning off the fogging stage.

FOG 1 DIFF. 2° TEMP (2)% RH

Set the desired differential of the fogging stage. The differential is the amount of humidity increase that the sensor must see before turning off the fogging stage.

FOG 1 TIMING (2 SEC.)

Set the desired time delay here. The time delay will be active on both energizing and de-energizing stages.

FOG 1 (MAINTAINED)

Fogging output may be commanded in two ways, maintained or pulse. Maintained will turn on the output until the humidity increases into the controlling band. Pulsed will allow the grower to enter the run and wait time to more slowly increase the humidity level.

FOG 1 ON (2 SEC.)

Select the desired running time for the fogging system.

FOG 1 OFF (2 SEC.)

Select the desired waiting time for the fogging system.

SET DEHUMIDIFY

The SET DEHUMIDIFY mode is used to:

- Set the dehumidify functions to either enable or disable
- Set run time of the immediate and the delayed dehumidify functions
- Set repeat time for the dehumidify feature
- Set dehumidify differential
- Set maximum heat loss and gain for the dehumidify mode

1. Enter the SET DEHUMIDIFY mode.
2. Use the **PRIOR-NEXT** switch to advance to the desired item to set.
3. Use the **VALUE** switch to toggle between desired choices that the system has internally provided.

DEHUM 1 (DISABLED)

You may select how to disable the dehumidify feature. Dehumidify may be disabled upon an override input. The dehumidify feature can be disabled all together if desired.

DEHUM 1 IMM RUN TIME (10) MIN

Enter the time to allow Immediate dehumidify to run.

DEHUM 1 DLY RUN TIME (10) MIN

Enter the time to allow Delay dehumidify to run.

IF DEHUM FAILS REPEAT IN (2:00) H

Enter the time to repeat the dehumidify if unable to lower the humidity.

DEHUM 1 DIF. (2)% RH

Set the desired differential for dehumidify. The differential is the amount of humidity decrease that the sensor must see before disabling dehumidify.

DISABLE DEHUM IF BELOW HTSP BY (5)°

Set the maximum heat loss below the normal heating set point temperature. This will disable any cooling stages activated during dehumidify. This prevents too much heat loss in the range during dehumidify.

DISABLE DEHUM IF ABOVE HTSP BY (5)°

Set the maximum heat gain above the normal heating set point temperature. This will disable any heating stages activated during dehumidify. This prevents too much heat gain in the range during dehumidify.

GROWMASTER GROWCOM OUTPUTS

TRANSFORMER NOTE:

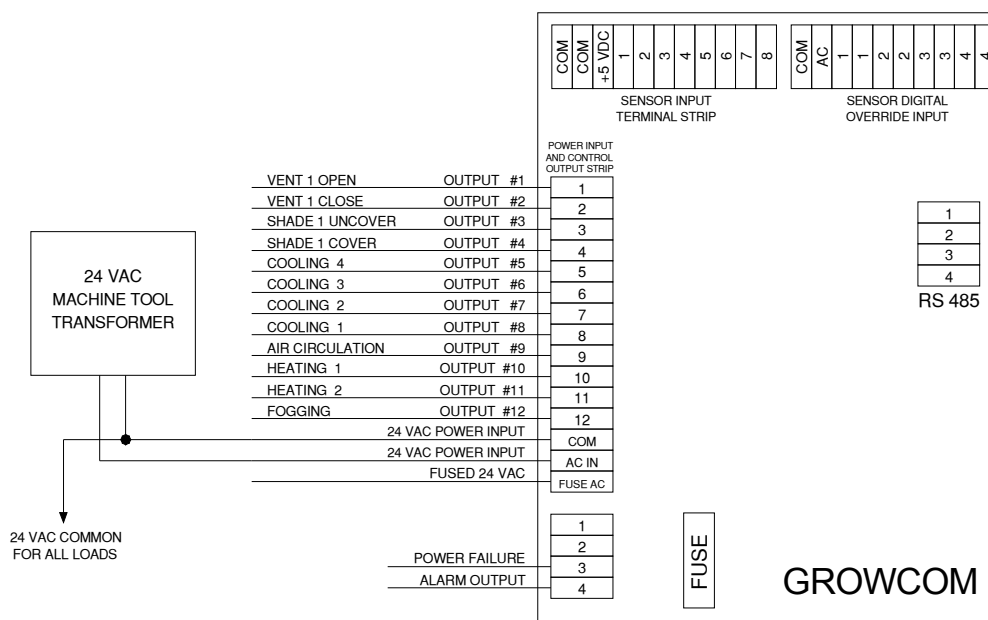
Use a Machine Tool Variety only.
150 VA is recommended. If a smaller sized transformer is used, adjust the fuse protection accordingly. (See fuse note)

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.
(2 amps total if a 50 VA transformer is in use)

FUSE NOTE:

IMPORTANT: Do not exceed 6 Amps for the fuse rating when using a 150 VA transformer or 2 Amps when using a 50 VA transformer.
Use a Slow Blow variety.



ALL CONNECTED 24 VAC LOAD RELAYS AND CONTACTORS MUST HAVE A SURGE PROTECTION DEVICE INSTALLED ACROSS THE COILS. SURGE SUPPRESSION DEVICES ARE AVAILABLE UPON REQUEST.

ALL CORRECT LOAD CONTACTORS AND CONTROL RELAYS ARE AVAILABLE FROM MICRO GROW GREENHOUSE SYSTEMS. 150 VA MACHINE TOOL TRANSFORMERS ARE ALSO AVAILABLE FROM MICRO GROW. SEE YOUR DISTRIBUTOR OR CALL MICRO GROW FOR REQUIRED CONNECTION DEVICES AND ACCESSORIES.



MICRO GROW GREENHOUSE SYSTEMS, INC.
42065 Zevo Dr., Unit B-1
Temecula, CA 92590
Phone 951.296.3340 Fax 951.296.3350

Project

GROWCOM OUTPUTS

Drawn by

SC

Date

2/22/10

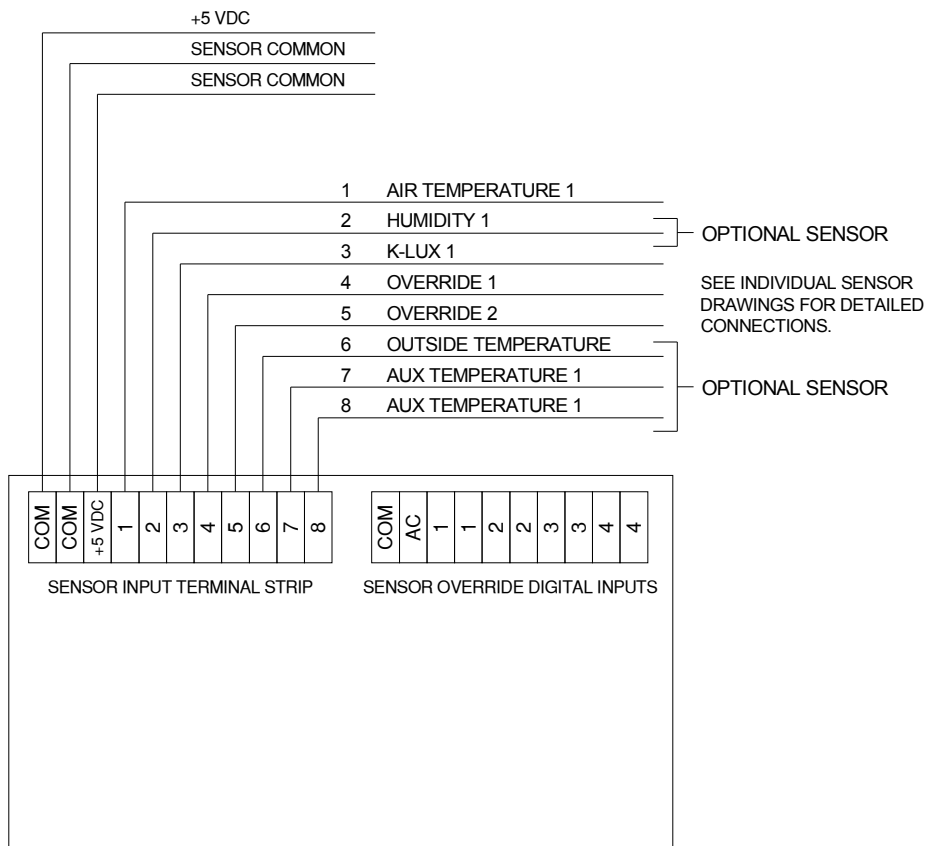
Distributor

N/A

Order ID

N/A

GROWMASTER GROWCOM INPUTS



MICRO GROW GREENHOUSE SYSTEMS, INC.
 42065 Zevo Dr., Unit B-1
 Temecula, CA 92590
 Phone 951.296.3340 Fax 951.296.3350

Project

GROWCOM INPUTS & OVERRIDE INPUTS

Drawn by

SC

Date

2/22/10

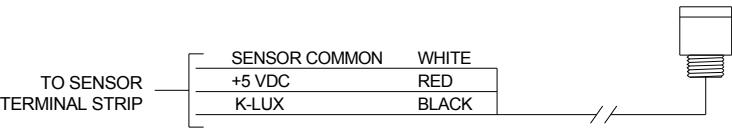
Distributor

MICRO GROW

Order ID

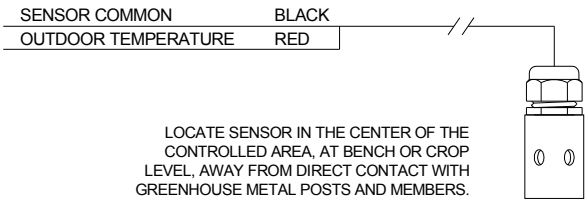
N/A

OUTDOOR K-LUX SENSOR



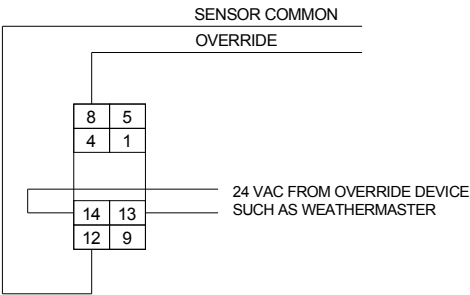
SOLAR SENSOR MUST BE MOUNTED OUTDOORS, IN MANNER THAT IT RECEIVES UNOBSTRUCTED SUNLIGHT AND IS POINTED IN UPWARD DIRECTION. (SOUTH SIDE RECOMMENDED)

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.

OVERRIDE INPUT



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

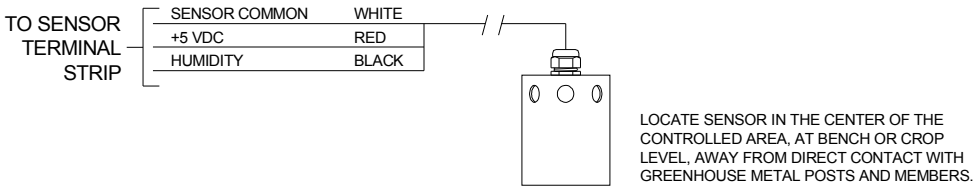


MICRO GROW GREENHOUSE SYSTEMS, INC.
42065 Zevo Dr., Unit B-1
Temecula, CA 92590
Phone 951.296.3340 Fax 951.296.3350

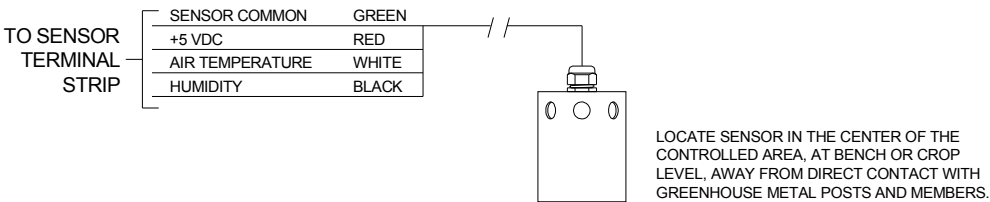
Project				
GROWCOM SENSORS				
Drawn by	Date	Distributor	Order ID	
SC	2/22/10	MICRO GROW	N/A	

GROWCOM OPTIONAL SENSORS

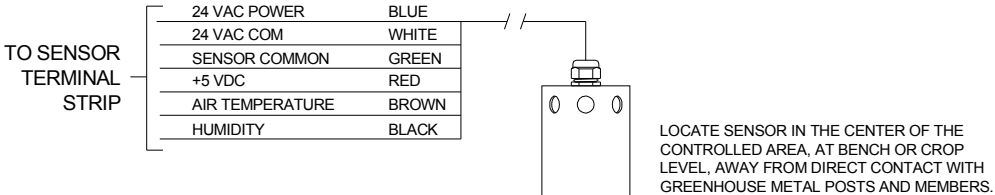
NON-ASPIRATED HUMIDITY SENSOR



NON-ASPIRATED AIR TEMPERATURE & HUMIDITY SENSOR



ASPIRATED AIR TEMPERATURE & HUMIDITY SENSOR



MICRO GROW GREENHOUSE SYSTEMS, INC.
 42065 Zevo Dr., Unit B-1
 Temecula, CA 92590
 Phone 951.296.3340 Fax 951.296.3350

Project

GROWCOM OPTIONAL SENSORS

Drawn by

SC

Date

2/22/10

Distributor

MICRO GROW

Order ID

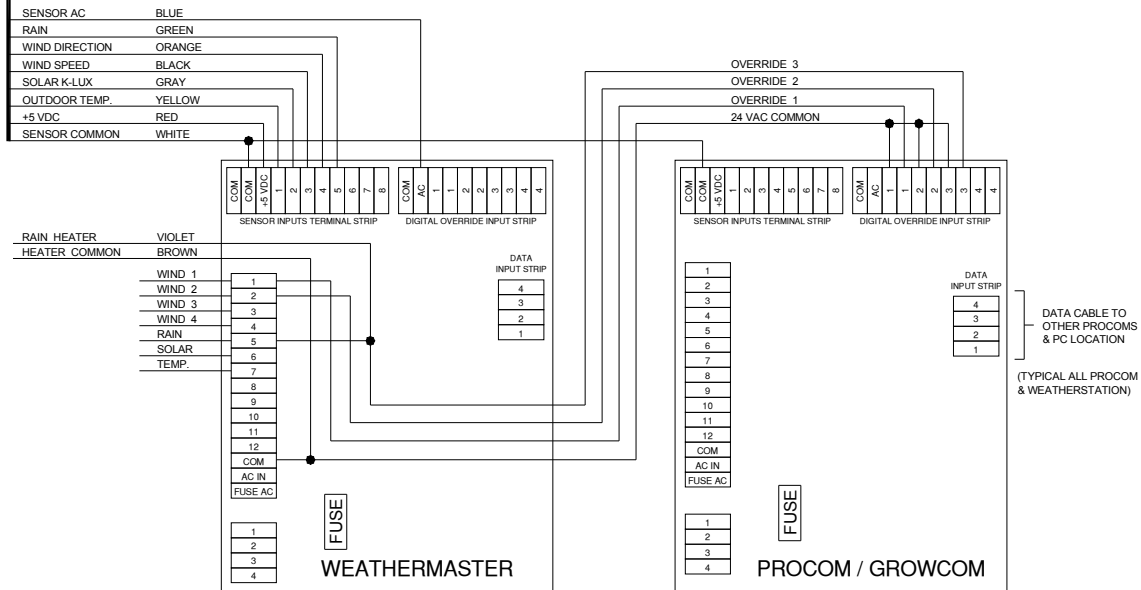
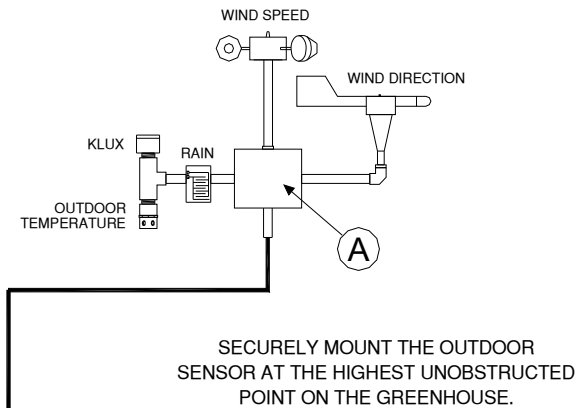
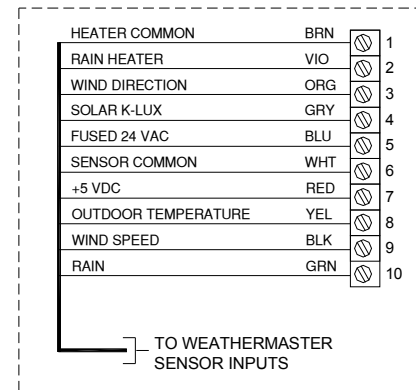
N/A

TYPICAL WEATHERMASTER TO PROCOM / GROWCOM CONNECTION

NOTE:

ALL WIRE CONNECTIONS ARE
TO BE MADE AT TERMINAL
STRIPS WITHIN THE CONTROLS.
DO NOT SPLICE WIRES.

DETAIL A (INSIDE WEATHERMASTER)



MICRO GROW GREENHOUSE SYSTEMS, INC.
42065 Zevo Dr., Unit B-1
Temecula, CA 92590
Phone 951.296.3340 Fax 951.296.3350

Project

WEATHERMASTER TO PROCOM / GROWCOM

Drawn by

Date

Distributor

Order ID

SC

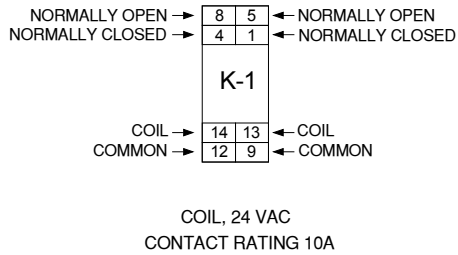
2/22/10

MICRO GROW

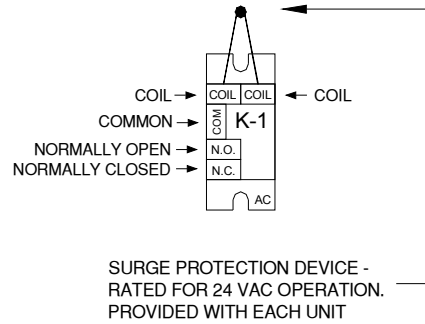
N/A

RELAY NOTES

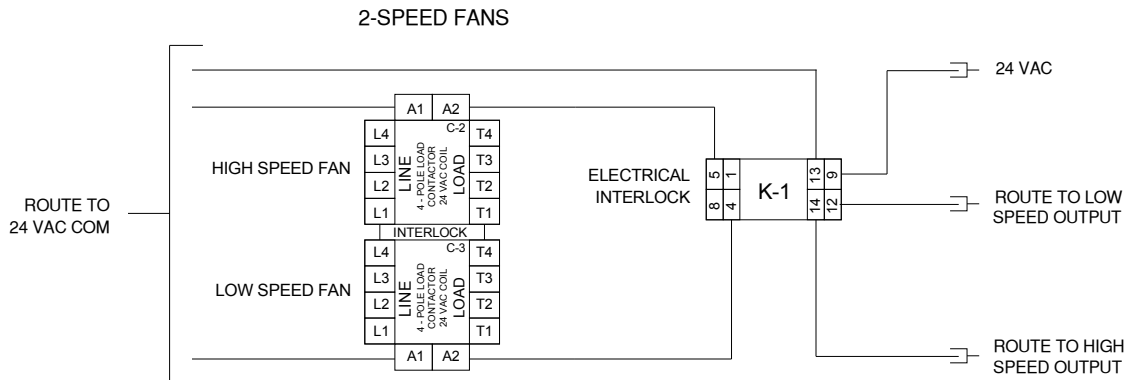
CONTROL RELAY, DPDT



HASCO RELAY



TYPICAL CONNECTION FOR 2-SPEED LOAD CONTACTOR USED FOR 2-SPEED FANS



MICRO GROW GREENHOUSE SYSTEMS, INC.
42065 Zevo Dr., Unit B-1
Temecula, CA 92590
Phone 951.296.3340 Fax 951.296.3350

Project

RELAYS & 2-SPEED CONTACTORS

Drawn by

SC

Date

2/22/10

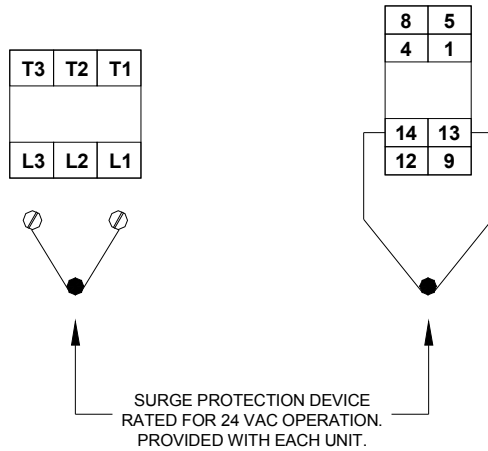
Distributor

N/A

Order ID

N/A

INSTALLATION OF SURGE PROTECTION DEVICES ON LOAD CONTACTORS & LOAD RELAYS



RELAY NOTES:

RELAYS ARE DPDT

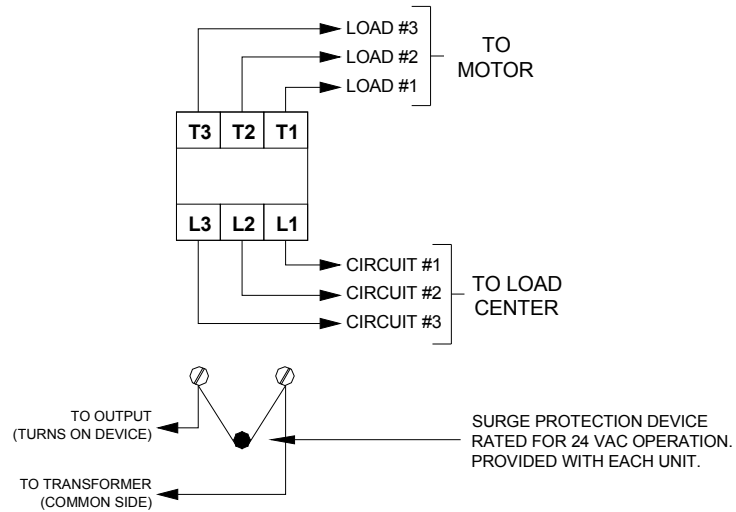
14, 13 = 24 VAC COIL
12, 9 = COMMON TERMINALS
8, 5 = NORMALLY OPEN TERMINALS
4, 1 = NORMALLY CLOSED TERMINALS

CONTACTOR NOTES:

L3, L2, L1 = LINE
T3, T2, T1 = LOADS

CONNECTION OF LOADS TO A CONTACTOR

FOR LOADS OVER 10 AMPS & LESS THAN 30 AMPS



MICRO GROW GREENHOUSE SYSTEMS, INC.
42065 Zevo Dr., Unit B-1
Temecula, CA 92590
Phone 951.296.3340 Fax 951.296.3350

Project

CONTACTORS & RELAYS

Drawn by
SC

Date
2/22/10

Distributor
N/A

Order ID
N/A

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 products only. This warranty excludes any and all damages caused 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.