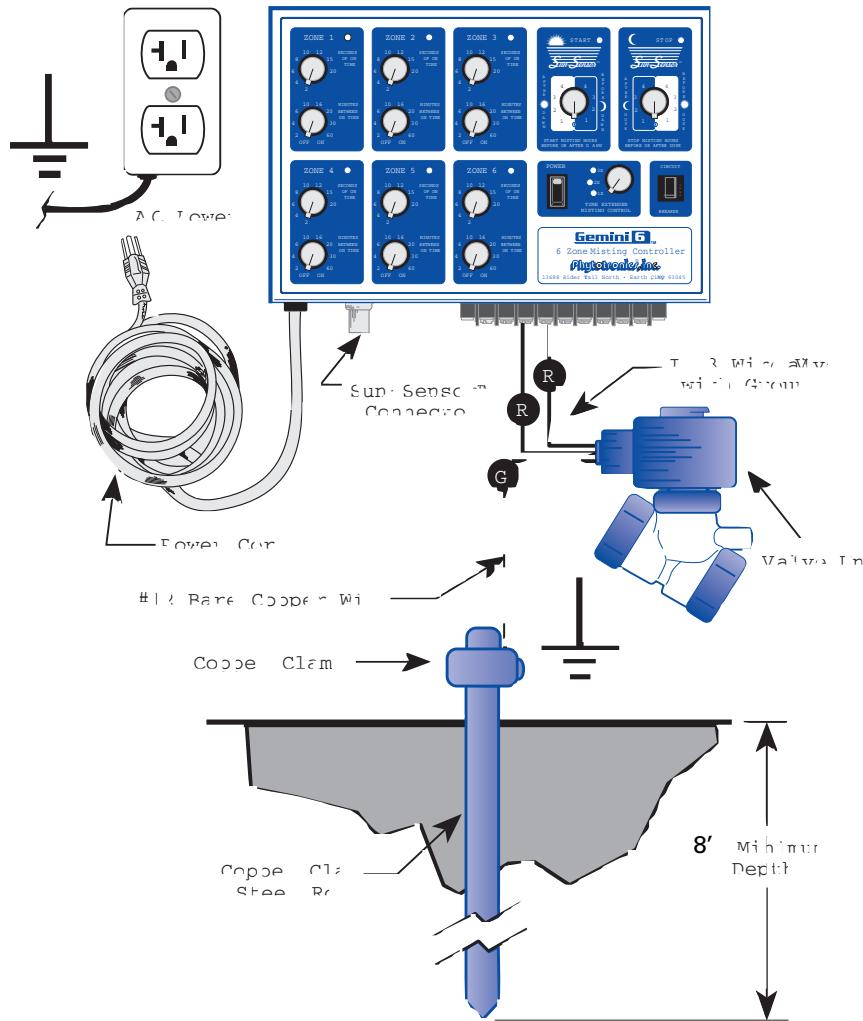


GROUNDING PROCEDURES FOR PHYTOTRONICS™ CONTROLLERS



Phytotronics, inc.

**THANK YOU FOR
PURCHASING
A PHYTOTRONICS®**

Gemini 2™

and/or

Gemini 6™

AUTOMATIC MISTING CONTROLLER

"4 BEFORE, 4 AFTER"

INSTRUCTION MANUAL

Revised 3/97

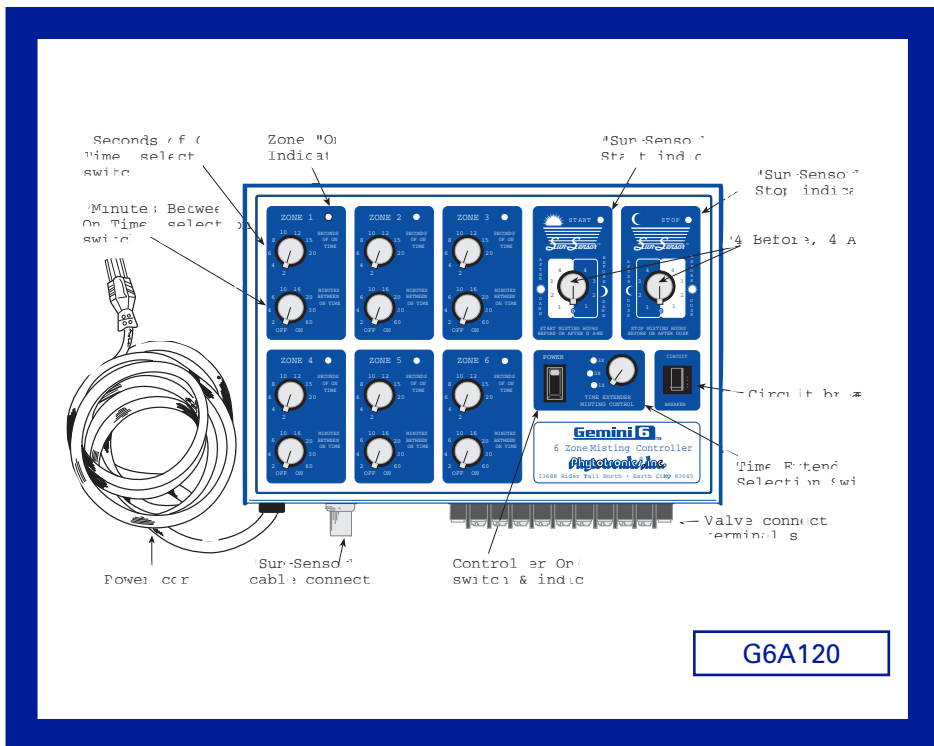
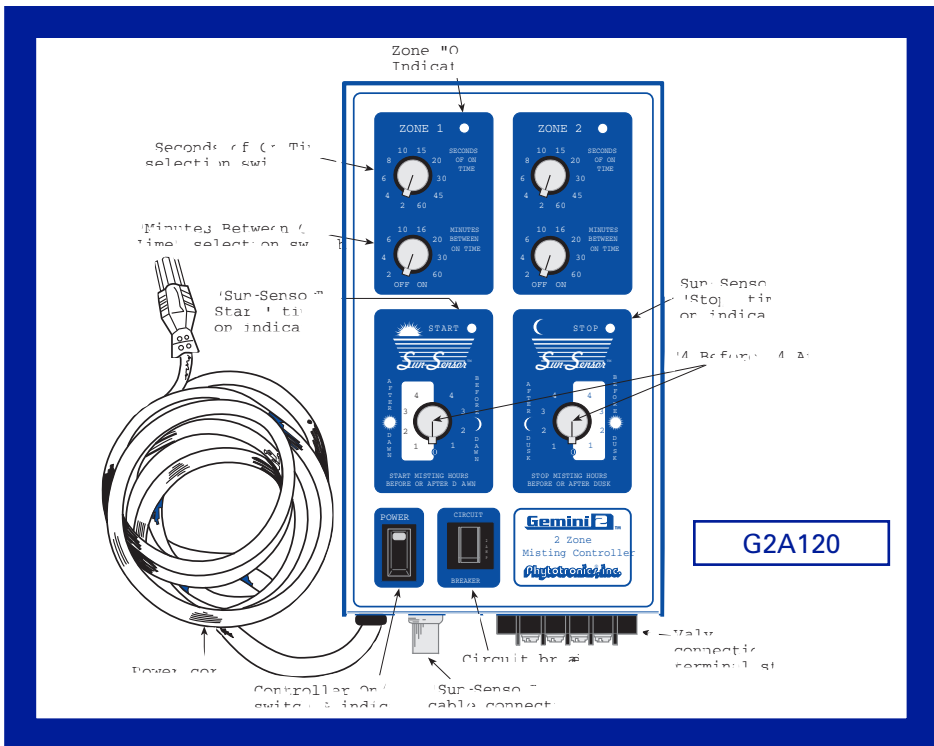
Phytotronics, inc.

13688 Rider Trail North • Earth City, MO 63045
314-770-0717 • Fax 314-506-4587

PLEASE READ ENTIRE INSTRUCTION MANUAL
(INCLUDING LIMITED WARRANTY) BEFORE INSTALLATION.

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IN CERTAIN CIRCUMSTANCES, SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

Repair Policy

Authorization to return products for service (whether or not under warranty) must first be obtained by calling 314-739-6202 or writing to **Phytotronics®** Customer Service, 13688 Rider Trail North, Earth City, MO, 63045. Any product returned without proper authorization will not be accepted, and will be returned to the sender.

Product under warranty which is in need of repair is to be returned, postage prepaid, with a copy of the sale receipt or invoice and an explanation of the malfunction or defect. Product determined by us to be covered by the limited warranty will be, at our option, repaired or replaced and returned by standard UPS delivery service at no charge.

Product which requires service beyond the warranty period is to be returned, postage prepaid, with a check or money order made payable to **Phytotronics®, Inc.**, for \$60.00. The standard charge for service and repair is \$60.00 and includes a 90 day original purchase limited warranty and return by standard UPS delivery service.

If the product requires service or repair in excess of the standard \$60.00 service charge, you will be contacted by **Phytotronics®** Customer Service to determine appropriate action. **Phytotronics®** Customer Service will provide an estimate of repair costs to you which will include a 90 day original purchase limited warranty and return by standard UPS delivery service.

Product which is inspected but not repaired or which is beyond repair will be subject to a minimum \$25.00 service charge to cover inspection and return by standard UPS delivery service. The remaining \$35.00 will be refunded to you.

If you request return by express or overnight delivery services, or postal services other than UPS, you will be billed for the additional charges incurred.

We will make every reasonable effort to repair and ship your controller within 72 hours of receipt. Our standard repair policy and practice require that every unit, whether new or repaired, be fully tested and inspected for proper operation.

THE LIMITATIONS DESCRIBED UNDER THE LIMITED WARRANTY APPLY TO ANY REPAIRED OR REPLACED PRODUCT, WHETHER OR NOT UNDER WARRANTY.

Loaner Policy

Customers in need of a loaner controller may contact **Phytotronics®, Inc.** at (314) 739-6202. Loaners are available for up to 21 days to those who need the use of a controller while theirs is being repaired. The handling charge for loaners is \$35.00 and includes UPS freight charges for delivery of a loaner to customers in the continental United States. Loaners are shipped regular UPS unless the customer requests and agrees to pay for second day air or next day air UPS service. **Phytotronics®, Inc.** reserves the right to require a \$35.00 prepayment and a \$300.00 deposit prior to sending a loaner to customers who have been delinquent in the past, are currently past due, or do not have a previously established charge account.

NOTE: All fees for repairs and services described above are in U.S. dollars.

In certain circumstances, some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

WHEN THIS LIMITED WARRANTY DOES NOT APPLY

This warranty does not cover claims resulting from failure to follow instructions on installation and use, neglect, misuse, accident, modifications, alterations, mis-application or repairs made by you or others, use of unauthorized attachments, use on a current or voltage other than specified, overloading, or failure due to an act of God.

REMEDIES

If a covered defect appears during the warranty period, we will (at our sole option) repair or replace the defective product with no charge for service or parts, provided that the product is delivered at your expense to our authorized service center. Parts and/or replacement product supplied under this warranty may be new or rebuilt at our option. Parts or products replaced will be our property. Any product which is repaired or any replacement product will be covered under this warranty for the remainder of the one year period or for 30 days after repair or replacement, whichever is longer. If it is not practical to repair or replace the product, we will refund the purchase price of the product to you.

THIS IS YOUR EXCLUSIVE REMEDY FOR BREACH OF THIS WARRANTY OR OF ANY IMPLIED WARRANTY OR OF ANY OTHER OBLIGATION ARISING BY OPERATION OF LAW OR OTHERWISE.

WHAT IS NOT COVERED BY THE LIMITED WARRANTY

The warranty does not include reimbursement for the expenses of labor, transportation, installation, removal or any other expenses which may be incurred by you. For instructions on how to obtain warranty service, call 314-739-6202 or write to **Phytotronics® Customer Service, 13688 Rider Trail North, Earth City, MO, 63045** and see the accompanying Repair Policy.

IN NO EVENT SHALL WE BE LIABLE OR RESPONSIBLE FOR PUNITIVE, EXEMPLARY, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, LOST PROFITS, REVENUES OR SAVINGS ARISING OUT OF THE BREACH OR PERFORMANCE OF ANY WARRANTY OR THE USE OR INABILITY TO USE THIS PRODUCT FOR ANY PURPOSE WHATSOEVER.

YOUR EXCLUSIVE COMPENSATION FOR LOSS OR DAMAGE ARISING FROM PURCHASE, USE, REPAIR OR REPLACEMENT OF ANY PRODUCT SHALL BE LIMITED TO AN AMOUNT EQUAL TO THE PURCHASE PRICE OF THE PRODUCT. THIS LIMITATION OF LIABILITY SHALL BE APPLICABLE TO ANY CLAIMS PRESENTED TO US

CUSTOMIZING CONTROLLERS — Gemini™ controllers can be customized in a variety of ways, including adaptations to differing power sources (24V, or 50 Hz operation). If there are other kinds of horticultural products you would like to see manufactured, call Phytotronics® with your needs.

QUICK START INSTRUCTIONS

1. Mount the controller per the instructions on page 7 of the manual.
2. Turn the controller power switch to "Off".
3. Plug the controller power cord into a grounded outlet.
4. Connect your solenoids to the terminal strip. Attach one wire to the appropriate "Z" (zone) terminal and one wire to the "C" (common) terminal.
5.
 - a. Install the Sun-Sensor™ cable and Sun-Sensor™. Make sure the sensor is located in an area that will be exposed to daylight (greater than 150 footcandles).
 - or
 - b. Install the Sun-Sensor™ bypass plug
6. Adjust the "On" and "Minutes Between On times" as desired. Adjust the "Sun-Sensor™ Start" and "Stop" times to "0".
7. Turn the controller power switch to "On".

After a delay of about one minute, the controller will begin automatic operation.

UNDERSTANDING YOUR CONTROLLER

"POWER" SWITCH

The "Power" switch turns on and off all power to the Gemini 2™ and Gemini 6™ controllers and is located on the front panel. When the "Power" switch is in the "Off" position, neither the internal timers nor the Sun-Sensor™ are operational, and 24VAC power to the valve connector is off. Safety requirements dictate that the controller be turned off when it is being installed or serviced, or when valves are being attached to or removed from the controller.



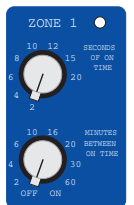
The Gemini 6™ "Power" Switch is located next to the "Time Extender". One of the LED indicators on the "Time Extender" will light up when the power is on. When none of the "Time Extender" LED indicators are lighted, this indicates power is off.

The Gemini 2™ "Power" switch has a green LED indicator on the upper portion of the switch that will light when power is on. When the Gemini 2™ "Power" switch is depressed on the lower portion of the switch, the LED indicator is not lighted and this indicates the power is off.

ZONE CONTROL STATIONS

Your new Gemini™ controller has either two or six zone control stations depending on the model you have purchased. Each zone control station contains the following three items:

- 1) zone "On" indicator (LED lamp);
- 2) "Seconds of On Time" rotary switch; and
- 3) "Minutes Between On Time" rotary switch.

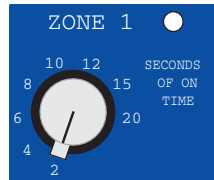
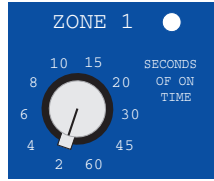


ZONE "ON INDICATOR" (LED LAMP)

The zone "On" indicator is a light located at the top right of each zone control station on your new Gemini™ controller. The light is an indication that 24VAC power is being delivered to the valve. For example, the zone "On" indicator to the right of "Zone 1" will light up when power is being delivered to the valve.

"SECONDS OF ON TIME"

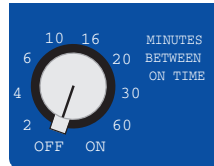
The "Seconds of On Time" selector is located in the top portion of the zone control station. This selector controls the amount of time 24VAC output power will be delivered to the appropriate valve. "Seconds of On Time" selections are different for Gemini 2™ and Gemini 6™ controllers, and are listed below:



Model	"Seconds of On Time" Available
Gemini 2™	2, 4, 6, 8, 10, 15, 20, 30, 45 and 60
Gemini 6™ (1X)	2, 4, 6, 8, 10, 12, 15 and 20
Gemini 6™ (2X)	4, 8, 12, 16, 20, 24, 30 and 40
Gemini 6™ (3X)	6, 12, 18, 24, 30, 36, 45 and 60

"MINUTES BETWEEN ON TIME"

The "Minutes Between On Time" selector is located at the bottom of each zone control station. This controls the interval, or amount of time between the start of each cycle, when 24VAC power is delivered to the corresponding valve. The "Off" position will prohibit any valve operation. The "On" position will force the valve into continuous operation. [The "On" and "Off" positions are considered manual operations and, as such, will override all other controller settings, including "Sun-Sensor Before or After".](#) "Minutes Between On Time" selections for Gemini 2™ and Gemini 6™ controllers are listed below (note that the Time Extender feature of the Gemini 6™ increases the "Minutes Between On Time"):

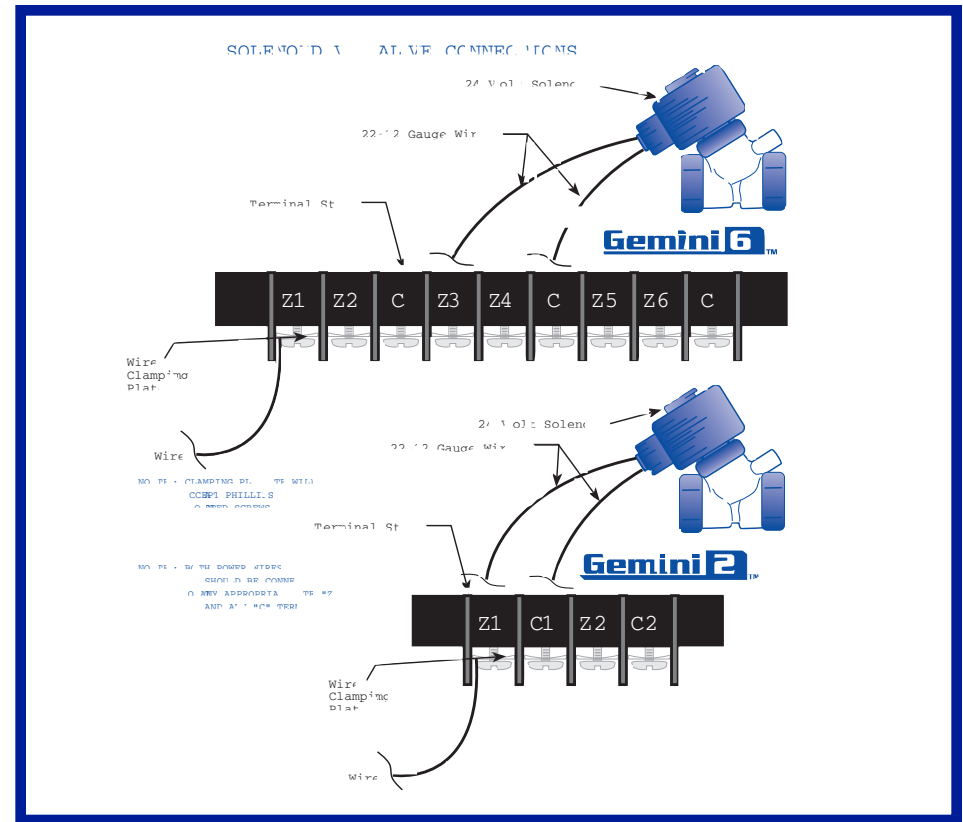
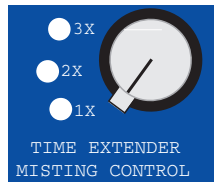


Model "Minutes Between On Time" Available

Gemini 2™	OFF, 2, 4, 6, 10, 16, 20, 30, 60 and ON
Gemini 6™ (1X)	OFF, 2, 4, 6, 10, 16, 20, 30, 60 and ON
Gemini 6™ (2X)	OFF, 4, 8, 12, 20, 32, 40, 60, 120 and ON
Gemini 6™ (3X)	OFF, 6, 12, 18, 30, 48, 60, 90, 180 and ON

"TIME EXTENDER" (GEMINI 6™ CONTROLLERS ONLY)

Gemini 6™ controllers are equipped with an additional feature, the "Time Extender", which will multiply the "Seconds of On Time" and "Minutes Between On Time" by one ("1X"), two ("2X") or three ("3X"), depending on switch position. Selection of the "1X" position indicates that the "Seconds of On Time" and "Minutes Between On Time" periods will be as they are marked. Selection of the "2X" position will **double** the "Seconds of On Time" and "Minutes



LIMITED WARRANTY

Phytotronics®, Incorporated ("we") warrant to the original purchaser ("you") that the product or system accompanying this warranty (the "product") will be free from defects in material and workmanship existing at the time of manufacture and appearing within one (1) year from the date of original purchase. This warranty applies only when the product is stored, installed, operated and maintained in accordance with our recommendations, and when used under proper and normal use.

THIS WARRANTY SHALL BE EXCLUSIVE AND, TO THE EXTENT PERMITTED BY LAW, SHALL BE IN LIEU OF ANY OTHER WARRANTIES, WRITTEN OR ORAL, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TO THE EXTENT IMPLIED WARRANTIES MAY NOT BE DISCLAIMED, THE DURATION OF SUCH WARRANTIES, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, IS EXPRESSLY LIMITED TO THE ONE YEAR PERIOD OF DURATION OF THIS LIMITED WARRANTY.

You have successfully cycled the Gemini™ misting controller through a full day of operation, starting the misting operation at dawn and stopping the operation with a simulated dusk.

DIAGNOSTICS

If a switch is not operating correctly, the light associated with that switch will flash. The only exception is the "Seconds of On Time" and "Minutes Between On Time" which share the zone light. When a zone light is flashing that zone's output defaults to off.

CONNECTING SOLENOID VALVES TO THE CONTROLLER

VALVE CONNECTOR

Solenoid valves are connected to the Gemini™ controller via a terminal strip located on the bottom right of the controller. Gemini 2™ controllers have a four-position strip for connection of two valves. Gemini 6™ controllers have a nine-position strip for connection of six valves.

Each terminal of the terminal strip is labeled with either a "Z" or "C" marking. The "Z" terminal markings refer to the respective zone of the misting controller. "C" terminals are common and are grounded thru the controller. The terminal strip accepts 22 to 12 gauge wire, and will require either a phillips or slotted screwdriver for wire attachment.

One wire from each solenoid valve should be connected to the appropriate "Z" terminal of your choice. The second wire from each solenoid valve should be connected to one of the "C" terminals.

For grounded valves (valves with three wires), the ground wire may remain: 1) disconnected; 2) connected to a "C" terminal; or, 3) connected to a metal grounding rod or water line.

Always turn the controller "Power" switch off or switch all zone's "Minutes Between On Time" to the "Off" position before connecting valves to the controller. Connecting valves to active zones may cause power surges which may damage the controller or solenoid valve.

NIGHT GREENHOUSE ENTRY

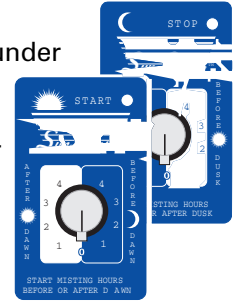
If access to the greenhouse is required after dusk or during night hours after the controller has automatically stopped misting operations, you may need to take certain precautions to prevent triggering a false sense of dawn by lighting the greenhouse. If the Sun-Sensor™ is located such that lights within the greenhouse, or reflections of such light will cause the controller to start automatic operation, you will need to temporarily disconnect the Sun-Sensor™ cable.

Between "On Time" periods, and selection of the "3X" position will **triple** these periods. The "Time Extender" does not affect the Sun-Sensor operation. **Times selected for "Sun-Sensor™ Start" and "Sun-Sensor™ Stop" are not multiplied by the "Time Extender" settings.**

NOTE: Each Gemini 2™ and Gemini 6™ selector has a fixed stop position at the minimum and maximum selectable time. **DO NOT** force the selector past the minimum or maximum times available for your model.

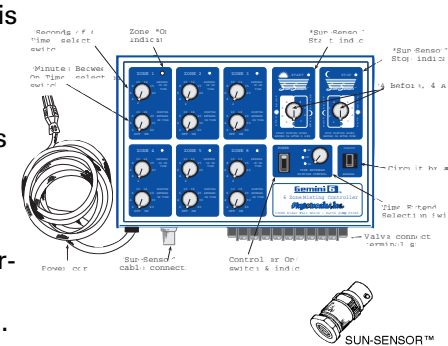
SUN-SENSOR™ CONTROLS

The Sun-Sensor™ is designed to operate your system under full automatic control, independent of the season, but dependent on daylight hours. The Sun-Sensor™ system consists of a remotely-mounted solid-state photosensor and **two** operating controls: 1) "Sun-Sensor™ Start"; and 2) "Sun-Sensor™ Stop"; both located on the front panel of the Gemini™ controller.



SUN-SENSOR™ CELL & CABLE

The heart of the Sun-Sensor™ system is the photosensor. The photosensor is located on the end of a 25' shielded cable which is connected to the Gemini™ controller. The photosensor is mounted in a nickel-plated housing to inhibit rust and corrosion, and is user replaceable should the device become damaged, lost, or fail to operate properly. The photosensor is water resistant and may be cleaned with a damp cloth.

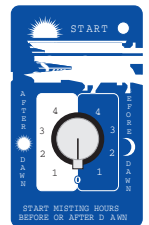


BYPASS PLUG

To be used in place of the Sun-Sensor™ cell and cable when it is desirable to operate the controller non-stop, as if it were daytime 24 hours a day. Utilizing the bypass plug disable the Sun-Sensor feature and the controller will operate continuously.

"SUN-SENSOR™ START"

At the "Sun-Sensor™ Start" control you will select the amount of time before or after dawn you want the controller to begin automatic operation. The controller's ability to predict the time of sunrise is based on accumulating 24 hours of photosensor data. The "Sun-Sensor™ Start" indicator will be on as the controller counts down the selected time until misting begins. As misting begins, the indicator will turn off (and the appropriate zone control station indicator will turn on). The following "Sun-Sensor™ Start" times are available:



Model

Gemini 2™ and Gemini 6™

On Times Available (in hours)

0, 1, 2, 3 and 4
(before or after dawn)

"SUN-SENSOR™ STOP"

You may select the amount of time before or after dusk that the controller will end automatic operation. The "Sun-Sensor Stop" indicator will be on as the controller counts down the selected time until automatic operation ends for the day, at which time the indicator will turn off. The following "Sun-Sensor™ Stop" times are available:

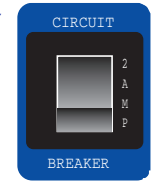
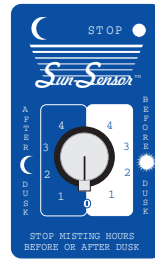
Model	Stop Time (in hours)
Gemini 2™ and Gemini 6™	0, 1, 2, 3 and 4 (before or after dusk)

NOTE: *The controller must accumulate a valid 24-hour set of transitions prior to operating in the before dawn or dusk mode; that is, the daylight and the dark times (or vice versa) must total 24 hours. Prior to accumulating this valid 24-hour set of transitions, the "Before Dawn" times will all default to sunrise and the "Before Dusk" times will default to sunset.*

"CIRCUIT BREAKER"

Each controller is supplied with a 2 AMP circuit breaker to prevent damage to the valve wiring and low wattage solenoid valves by interrupting the 24VAC power to the valves. The Gemini 2™ and Gemini 6™ continuously monitors the valves for an overload condition. An overload condition exists when either a single zone's or the total number of active zones' power requirements exceed the manufacturer's recommended power. **When the unit determines that an overload condition exists, all outputs are turned off and all indicator lights will flash.** If excessive current "trips" the circuit breaker, a small white tab will protrude from the front of the circuit breaker. The breaker may be reset, and power restored, by allowing sufficient time for the circuit breaker to cool, and then fully depressing the small white tab. Should the "short circuit" still exist, the breaker will again trip and interrupt service. The internal circuitry is now protected by a fuse. If this fuse blows, the unit should be returned for service.

NOTE: *Whenever the circuit breaker trips or the unit detects an overload condition, it is recommended that all valves and valve wiring be inspected for short circuits. Excessive tripping of the circuit breaker will shorten its lifetime, requiring factory service. Short circuits may be caused by crossed wiring, improper grounding tech-*



"Seconds of On Time" and "Minutes Between On Time" switches.

SUN-SENSOR™ TESTING

Obscure the Sun-Sensor™ from light by covering the sensor head with an opaque material such as black tape or thick dark cloth, to simulate dusk. After the Sun-Sensor™ delay of approximately four minutes, the "Sun-Sensor™ Stop" light will come on, indicating that the light level has dropped below the level of dusk (150 footcandles). If the "Sun-Sensor™ Stop" light does not turn on, check the covering on the sensor to be sure that it is obscured from any light source.

Turn the "Sun-Sensor™ Stop" switch to the "0" position and the "Sun-Sensor™ Stop" light will go out after a maximum of 30 seconds. A "Sun-Sensor™ Stop" time of "0" will cause the misting operation to end approximately four minutes after the sensor is exposed to insufficient light (dusk). The Gemini™ controller has now ended automatic misting operation and the zone light indicators will stop sequencing.

OPERATIONAL NOTES

After Dawn or Dusk Modes

If you are operating in the "After Dawn" or "After Dusk" setting and change the "Sun-Sensor™ Start" or "Sun-Sensor™ Stop" time when their respective light is off, the light will not turn back on. If the misting operations are active (daytime), they will remain active. If stopped (night), misting operations will remain stopped, and the adjustment of time will always take effect on the next occurrence of dawn or dusk.

If you change the "Sun-Sensor™ Start" or "Sun-Sensor™ Stop" time when the light is on and you are operating the controller in the "After Dawn" or "After Dusk" setting, the change will take effect immediately; causing the controller to either begin or stop operation immediately, or to extend the time delay before starting or stopping operation.

Before Dawn or Dusk Modes

If you change the "Sun-Sensor™ Start" or "Sun-Sensor™ Stop" time when the light is on and you are operating the controller in the "Before Dawn" or "Before Dusk" setting, the change will take effect the next day. If the misting operations are active (daytime), they will remain active. If stopped (night), misting operations will remain stopped, and the adjustment of time will always take effect on the next occurrence of dawn or dusk.

If you are operating in the "Before Dawn" or "Before Dusk" setting and change the "Sun-Sensor™ Start" or "Sun-Sensor™ Stop" time when their respective light is off, the change will take effect immediately; causing the controller to either begin or stop operation immediately, or extend the time before starting or stopping operation.

- 6) Turn on power to the Gemini™ controller by pressing the upper half of the "Power" switch.

Immediately after the application of power, all green lights will momentarily turn on. The green light in the "Sun-Sensor™ Stop" switch will come on and remain on for approximately 45 seconds. For the Gemini 6™ controller, the "Time Extender" light indicating "1X" operation will also be on. For the Gemini 2™ controller, the green light on the "Power" switch will remain on. Should the above sequence of light indicators not be observed, turn the "Power" switch off. Check the Sun-Sensor™ cord and power cord connections, wait at least one minute, and re-start the controller.

NOTE: *Up to 30 watts of valve drive power are available at one time with your Gemini™ Controller.*

SUN-SENSOR™ START

Immediately after power up and approximately one minute of operation (sunlight), the Sun-Sensor™ will take effect, and the controller will begin automatic operation. The "Sun-Sensor™ Stop" should be off and the "Sun-Sensor™ Start" light will turn on. The Gemini™ controller always begins timing operation in the stop or night mode. If the "Sun-Sensor™ Stop" light does not turn off within 45 seconds, and the "Sun-Sensor™ Start" light does not turn on after one minute, check the location and orientation of the sensor to be sure that it is not obscured from the light source.

CHECKING THE SUN-SENSOR™ AND MISTING OPERATION

TESTING MISTING OPERATIONS

Turn the "Sun-Sensor™ Start" switch to the "0" position. The "Sun-Sensor™ Start" light will go out after a maximum of 60 seconds. A "Sun-Sensor™ Start" time of "0" will cause the misting operation to begin approximately four minutes after the sensor is exposed to sufficient light (dawn). The Gemini controller is now operational. (The one minute delay occurs ONLY on power up. When the controller is in operation, the sensor has to be exposed to sufficient light [dawn] for roughly four minutes before misting operation begins.)

Turn the "Seconds of On Time" switches to the maximum time (60 seconds for Gemini 2™ controllers and 20 seconds for Gemini 6™ controllers).

Turn the "Minutes Between On Time" switches to the minimum time of "2" minutes.

The Gemini™ misting controller will now begin automatic zone cycling. Each zone light will come on sequentially, indicating that 24VAC power is being supplied to the solenoid valves. If a zone light fails to come on, or if the zones fail to sequence properly, check for the proper settings of the

niques, damaged valves, moisture collection, or an internal controller malfunction.

OPERATIONAL NOTES/ZONE SEQUENCING

Two internal time clocks in the Gemini™ controllers provide misting control and Sun-Sensor™ delay times. Both clocks start when the controller power is turned on. Even though dawn and dusk times change each day, the controller will begin the misting cycle with "Zone 1" each day. However, dusk may interrupt the misting cycle at anytime.

INSTALLING YOUR CONTROLLER & SUN-SENSOR™

CONTROLLER LOCATION

Selecting the proper location for mounting your new Gemini™ controller is important, and there are several guidelines you should follow to ensure long and satisfactory service.

- 1) **Heat:** Avoid locations with excessive heat, such as areas with extended exposure to direct sunlight and locations near heaters or boilers.
- 2) **Ventilation:** Provide adequate ventilation to the controller. Do not mount the controller in a closed box without good ventilation. Allow a minimum of 3" clearance on all sides of the unit to allow proper air flow and avoid excessive heating of the unit.
- 3) **Liquids:** Select a location where the controller is away from misting or direct flooding from liquids.
- 4) **Power:** For 120VAC models, locate the controller in close proximity (within 9') to a grounded, three-prong outlet. On 24VAC models, locate the controller within an approximate reach (25') of the power transformer. The use of extension cords is not recommended. Route the power cords away from walkways and high traffic areas.

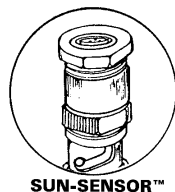
CONTROLLER MOUNTING

Mark the mounting screw locations. Pre-drill the marked locations with a 1/8" or smaller starter hole. Install two bottom mounting screws, leaving approximately 1/16" between the head of the screw and the mounting surface. Test fit the controller by inserting the bottom mounting holes over the heads of the mounting screws. Loosen or tighten the mounting screws as required to provide a snug fit between the controller and mounting surface. Install two upper mounting screws by resting the controller on the two bottom screws, and tightening the upper mounting screws.

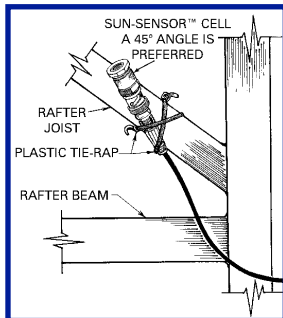
SUN-SENSOR™ MOUNTING

The Sun-Sensor™ may be tied to a beam or truss, overhead supply line,

conduit, or any other rigid mounting surface as required. Several trial locations and orientations may be necessary to fit the Sun-Sensor™ to your misting operation. Use the following information to guide you in your application:



- 1) Pointing the Sun-Sensor™ in an easterly direction can cause a premature dawn and dusk detection by up to 30 minutes.
- 2) Pointing the Sun-Sensor™ in a westerly direction can cause a late dawn and dusk detection by up to 30 minutes.
- 3) Mounting the Sun-Sensor™ in a perfectly vertical position may cause dust or debris to accumulate and interfere with proper operation. Avoid vertical (90°) mountings.
- 4) When night entry to the greenhouse is frequent, or night-lights are used, locate the Sun-Sensor™ in positions above, or obscured from, the light source.
- 5) Avoid locations where liquid or fertilizer deposits may accumulate on the Sun-Sensor™ lens.
- 6) Mount the Sun-Sensor™ securely to prevent movement and changes in position relative to the light source.
- 7) Use the plastic cord clips to retain the Sun-Sensor™ cord away from walkways and high traffic areas.
- 8) The Sun-Sensor™ function has a built-in delay of one minute on power up and four minutes thereafter prior to activating the "Start" or "Stop" function. The purpose of the delay is to allow a user to enter a dark area, turn on a light while going to the controller and turn it off prior to the controller counting down.



SENSOR LOCATION

Dusk-To-Dawn

Typical locations for mounting the Sun-Sensor™ would be in the upper sections of the greenhouse truss, in an area where the sensor will be exposed to normal sunlight hours.

Artificial Light

For applications where misting operations are needed when using supplemental lighting, locate the sensor in close proximity to the light source. The wide-angle view of the sensor does not require the sensor to be pointed directly at the source. Proper orientation of the sensor to detect both daylight hours and the extended hours of artificial light will require trials. Should misting operation need to be suspended, direct the Sun-Sensor™ Cell away from the artificial light source.

Bench Mounting

For special application, the Sun-Sensor™ may be located within the crop canopy or directly above it to control the misting requirements by the amount of light the crop is subjected to. Care should be taken in this application to protect the sensor head from flooding or misting by using a clear, transparent covering. Be sure that the sensor is not obscured from the light source by leaves or other materials.

STARTING YOUR CONTROLLER

After you have mounted and programmed your Gemini™ misting controller and Sun-Sensor™, and wired and tested the solenoid valves, you are ready to begin misting operations.

NOTE: *Improper grounding of the controller power may result in damage during power surges and lightning storms, as well as void the warranty of the Gemini™ controller. 24VAC models require a minimum 40VA isolation transformer, provided by the user, and neither line should be earth-grounded. Do NOT connect solenoid valves to the controller before verification and trial operation.*

CONNECTING THE SUN-SENSOR™

The Sun-Sensor™ cord is connected to the Gemini™ controller by a BNC type "push and twist" connector located on the bottom left (as pictured) of the controller. To attach, center the cable to the connector, apply a light push to insert the cable in the connector, and twist lock the connector into place with a clockwise motion.

CONNECTING THE AC POWER CORD OR 24VAC LINE

Be sure the Gemini™ controller power switch is off. For 120VAC models, plug the three-prong power cord into a properly grounded outlet. For 24VAC models, attach the two power wires to the output terminals of an isolation plug-in type transformer. (A transformer may be purchased from Hummert International, Item Catalog No. 19-0755-1, telephone number. 1-800-325-3055.)

TURNING ON THE POWER

For first time start-up of your new Gemini™ controller, follow these procedures.

- 1) Turn all of the zone control stations' "Minutes Between On Time" switches to the "Off" position.
- 2) Turn all of the zone control stations' "Seconds of On Time" switches to the maximum time.
- 3) Turn the "Sun-Sensor™ Start" switch to the "0" position.
- 4) Turn the "Sun-Sensor™ Stop" switch to the "0" position.
- 5) For the Gemini 6™ misting controller, turn the "Time Extender" switch to the "1X" position.