Simplicity, Accuracy,

Solatel

PLANT PRO ENVIRONMENTAL CONTROLLER

CONTROL YOUR GARDEN WITH PLANT PRO™

MAXIMIZE YOUR YIELD
Precision control of all the variables in your grow environment can greatly maximize YIELD. The microprocessor based Plant Pro™ hydroponics controller offers exact electronic timing for lighting, irrigation, ventilation, and CO_2 dispensing. Accurate measurements from environmental sensors allow Plant Pro™ to maintain the perfect environment for your plants to thrive in.

PRECISION MEASUREMENT AND TIMING
Solatel's solid state environmental sensors feature much higher accuracy than the usual mechanical sensors found in many grow environments. Timing is digital and is more accurate then dials and pointers.

EASY SETUP
The Plant Pro™ unique simplified interface allows for easy, quick setup using only two control knobs and a large digital display. One knob to select a setting, a display to show the setting, and a second knob to change the setting.

ENVIRONMENTAL SENSORS
Temperature, Humidity, and Flood sensors come standard with the Plant Pro™. Photocell (light) and CO_2 sensors are available as options. Our environmental sensors come with flexible 10 ft. cables that allow for optimum placement of sensors in the grow space. This provides for better accuracy and, if desired, allows the Plant Pro™ to be located outside the grow environment for easy monitoring and adjustment. Place the sensors for best measurement, place the controller for easy access. Optional 15 ft. extension cables increase the standard 10 ft. sensor cables to 25 ft. total for even more placement flexibility.

VISUAL FEEDBACK
The large, easy to read, digital display shows the time of day, timed function settings, sensor threshold settings, and actual sensor levels. Sensors displayed include Temperature, Humidity, optional CO_2 , and optional Photocell. Time of day and sensor levels can be displayed individually or the display can be set to rotate through all (pausing at each one for two seconds). The status of the entire system can then be seen at a glance. For those extremely concerned about any light at night, the Plant Pro™ display can be set to be off at night.

AIR CONTROL
The Plant Pro™ monitors the garden's air environment for temperature, humidity and CO_2 level (with optional CO_2 sensor). Using thresholds set for these sensors, the vent fan is activated to maintain the desired levels for the plants you are growing.

CO2 DISPENSING
CO_2 is dispensed only during the day while the vent fan is off. When CO_2 dispensing ends, an adjustable fan delay allows time for maximum CO_2 absorption before the vent fan turns on. There are two CO_2 dispensing modes:
• **Timed Mode:** Set interval and duration for CO_2 dispensing.
• **Monitor Mode:** Optional Solatel CO_2 monitor plugs directly into the Plant Pro™ with no additional equipment required. You simply set the desired CO_2 level on the controller's display and it maintains that level of CO_2 in the grow environment. The controller shows both room CO_2 level and desired CO_2 level.

FLOOD
A Flood sensor is standard equipment on the Plant Pro™. It protects from damage due to accidental overflow of the irrigation system (such as root or leaf-clogged drain lines) or a broken pipe. It is usually located by the nutrient reservoir and shuts off pumps (as well as the rest of system) in the event of an overflow.

SUNLIGHT
Ordinarily, the Plant Pro™ functions are based on an internal time clock. However, with an optional Photocell sensor, its functions can also be based on natural light (sunlight). This is used by greenhouse growers who use sunlight or a combination of sunlight and artificial light. Irrigation, ventilation, and CO_2 dispensing operate the same in sunlight or artificial light. There are three user selectable photocell modes:
• **Natural Duration Mode:** The Plant Pro™ is controlled by sunrise and sunset instead of its internal time clock. Artificial lighting plugged into the Plant Pro™ goes on and off at the same time as natural lighting. This mode is also used when there is only natural lighting.
• **Fixed Duration Mode:** Artificial light comes on at sunrise for a period of time set by the user.
• **Total Duration Mode:** Set the total time you want the garden to have light. If the length of natural light is insufficient, the artificial lighting will come on at sunset to make up the difference.

ENVIRONMENTAL SENSORS & ACCESSORIES

Sensors use the latest integrated circuit solid state technology for precision measurement. They are well ventilated for good air circulation around the sensing element. They have screw holes or hangers for easy mounting. Each sensor comes with a 10 foot cable that plugs into the Plant Pro™. Extension cables available.

Temperature Sensor (TMP-1)

Integrated circuit temperature sensor is more accurate, reliable and faster responding than a mechanical sensor. Sensor range: 32-110ºF ± 2ºF accuracy at 77ºF (typical), sensor response time: 100% of reading in 4 minutes, resolution: 1ºF.

Humidity Sensor (HUM-1)

Integrated circuit humidity sensor is more accurate, reliable and faster responding than a mechanical sensor. Sensor range: 0-100% rH, ± 3% rH accuracy, response time: less than 1 minute, resolution: 1% rH.

Flood Sensor (FLD-1)

Turns off system when wet. Conductivity threshold: approximately 1 uSiemens, response time: 1-2 seconds. Safe low voltage / low current source: 5 VDC at 0.000003 Amp (maximum).

CO2 Monitor (CO2-200)

Optional CO_2 monitor is a non-dispersive infra-red analyzer designed for measuring air CO_2 concentration in the indoor grow environment. It can monitor and control the CO_2 environment when attached to the Plant Pro™. Concentration levels in PPM (Parts Per Million) are set and monitored on the Plant Pro's™ large digital display. Includes wall plug-in power supply. Sensor range: 0-2000 PPM, accuracy: ±5% of reading or ±75 PPM (whichever is greater), response time: less than 1 minute, resolution: 10 PPM.

Photocell (Light) Sensor (PHO-1)

Optional photocell sensor has an arbitrary scale of 0-100 with a resolution of 1 unit. Synchronizes Plant Pro™ with sunlight or other light source.

Extension Cables (CAB-2)

Optional 15 ft. extension cable increases 10 ft. sensor cable to 25 ft. total. Plant Pro™ controller can be outside of growing area. Set of 4.

ADJUSTABLE SETTINGS

- **Lamp Control:** Lamp Start, Lamp Duration
- **Pump Control:** Pump Interval, Pump Duration
- **Fan Control:** Fan Max Temperature, Fan Max Humidity, Fan CO_2 Delay
- **CO2 Control:** CO_2 PPM (for optional CO_2 monitor), CO_2 Interval, CO_2 Duration
- **Time Clock:** Set Time Hours, Set Time Minutes
- **Sunlight Synchronization:** Photocell (for optional Photocell sensor)
- **Miscellaneous:** Clear Faults (for Flood sensor), Options

ADVANCED OPTIONS

Pump: Normally Off at night. Options: moisture cycle at night, pump cycling 24 hours a day, aeroponics mode for 1 minute on / 3 minutes off (typically requires Solatel Power Expander).
Vent Fan: Normally controls temperature and humidity day and night. Options: vent fan off at night, fresh air cycle at night.
Switching Point Offset: Select one of four offsets for Temperature and Humidity sensors and optional CO_2 sensor.

OWNER'S MANUAL

We have received much praise for our comprehensive, well illustrated Owner's Manual. We are confident you will find it a great asset in setting up a Plant Pro™ in your hydroponics or greenhouse environment.

PLANT PRO™ SPECIFICATIONS

Case:	Extra tough flame retardant ABS plastic withstands possible harsh grow environments.
Power Supply:	120VAC, 60Hz, 15 Amps. Internal current consumption < 0.5 Amp.
Outlets:	Four outlets: lamp, pump, vent fan and CO_2. 12 Amps each outlet, 14.5 Amps total. To control more amps, use a Solatel Power Expander.
Controller:	9.9" x 7.9" x 2.5", 3 lb. 3oz.

LAMP PRO AND PWX POWER CONTROL PRODUCTS

POWER CONTROL OVERVIEW

Solatel manufactures the Lamp Pro series of timers and the PWX series of Power Expanders (which require an external timer or controller). There are both 120V and 240V models. The 120V models include standard 120V power cords and outlets. For 240V models, the power cord is connected to a 240V service. It has unterminated wires which allow hard wiring or the addition of a plug appropriate for an available outlet. It has outlets that are the type used for 240V equipment, NEMA 6-15R. This eliminates the risk of accidentally plugging a 120V device into a 240V outlet - a danger on products with 120V type outlets actually supplying 240V. If the circuit supplying power to the product cannot provide the rated current or the building circuit breaker cannot handle the inrush current at turn-on, then this will reduce the number of devices that can be controlled. These products can be used with lamps, pumps, fans, or other devices. Some products include outlet sequencing. First two outlets turn on, 20 seconds later the next two, and 20 seconds after that the final two, from left to right. This allows time for the start-up current surge ("inrush") of two devices (such as lamps) to finish before the next two create their inrush current. This reduces circuit breaker tripping and other electrical problems. Turn off is sequenced with 5 second delays.

LAMP PRO TIMERS

The Solatel Lamp Pro series of timers are easy to use with a single Select knob that clicks to any of 16 time settings. Settings include an accelerated 18 hour day cycle running ON 6 hours / OFF 12 hours. Thirteen normal 24 hour day settings cover ON 8 / OFF 16, ON 9 / OFF 15, ON 10 / OFF 14, and so on, to ON 20 / OFF 4, in 1 hour increments. These provide for growing both short day and long day plants. Also included are continuously ON and OFF settings.

PWX POWER EXPANDERS

• The Solatel PWX Power Expander series lets you control more devices without tripping circuit breakers. Both 120V and 240V models are controlled by a 120V controller or timer. A typical plug-in controller, such as Solatel's Plant Pro, is limited in the current that can be drawn from it because of the 15 Amp rating of the typical 120V outlet. This allows control of only a single 1000 Watt lamp. Adding a Power Expander allows control of additional lamps, pumps, fans, or other devices. Multiple Power Expanders can be used to control a large number of devices.

• A Power Expander has two cords and two to six outlets. The power cord is connected to the appropriate voltage source (120V or 240V). This provides current to all of the outlets. The trigger cord plugs into a 120V controller or timer and provides the control signal which switches the outlets on or off. The trigger cord draws very little current and can therefore be plugged in to a controller along with other 120V devices being switched. The trigger cord can be lengthened by using any standard 120V extension cord.

LP120S Lamp Pro Timer (120V 15A)

The LP120S lets you control 6 standard 120V type outlets. Total current of all outlets is 15A and can be divided between them in any way desired. Comes pre-wired with a 6 ft. power cord with a standard 120V plug. Sixteen settings: accelerated 18 hour day ON 6 hours / OFF 12 hours, standard 24 hour days from ON 8 to ON 20 in one hour increments, and continuously ON or OFF. Outlet pairs are sequenced: 20 second on delay, 5 second off delay.
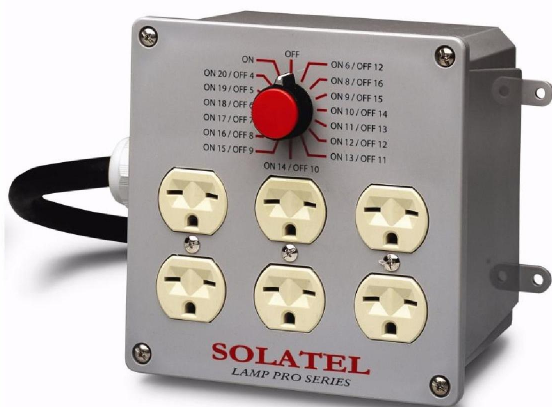
LP240S Lamp Pro Timer (240V 30A)

The LP240S lets you control up to six 1000 watt 240 volt lighting systems. Comes pre-wired with a 10 gauge 6 ft. power cable with unterminated wires. This is connected to a 240V 30A service. This can be done by hard wiring or the addition of a plug appropriate for an available outlet. The LP240S has 6 outlets that are the type used for 240V equipment. This eliminates the risk of accidentally plugging a 120V device into a 240V outlet. Sixteen settings: accelerated 18 hour day ON 6 hours / OFF 12 hours, standard 24 hour days from ON 8 to ON 20 in one hour increments, and continuously ON or OFF. Outlet pairs are sequenced: 20 second on delay, 5 second off delay.

PWX-1 and PWX-D20 Power Expanders (120V 15A)

These let you control two standard 120V outlets. Total current of both outlets is 15A and can be divided between them in any way desired. They come pre-wired with a 6 ft. power cord with a 120V plug and a 6 ft. trigger cord with a 120V plug. The trigger cord can be connected to any 120V timer or controller and draws little current. The trigger cord turns on both outlets at once. The PWX-D20 is similar but has a 20 second on delay. This allows time for previous device's start-up current surge to finish before devices plugged into the PWX-D20 are turned on. There is no delay at turn off.

PWX240-4 Power Expander (240V 20A)

The PWX240-4 lets you control up to four 1000 watt 240 volt lighting systems. Comes pre-wired with a 12 gauge 6 ft. power cable and a 6 ft. trigger cord with a 120V plug. The trigger cord can be connected to any 120V timer or controller and draws little current. The trigger cord turns on all four outlets at once. The power cable has unterminated wires and connects to a 240V 20A service. This can be done by hard wiring or the addition of a plug appropriate for an available outlet.

PWX240-6 and PWX240-S Power Expanders (240V 30A)

These let you control up to six 1000 watt 240 volt lighting systems. They come pre-wired with a 10 gauge 6 ft. power cable and a 6 ft. trigger cord with a 120 volt plug. The trigger cord can be connected to any 120V timer or controller and draws little current. The power cable has unterminated wires and connects to a 240V 30A service. This can be done by hard wiring or the addition of a plug appropriate for an available outlet. The PWX240-6 trigger cord turns on all six outlets at once and does not sequence. The PWX240-S is similar but sequences the outlet pairs: 20 second on delay, 5 second off delay. The PWX240-S trigger cord can also be connected to a 240V device if the plug is changed to the needed type.

PWX240-U Power Expander (240V 20A + 120V 20A)

The PWX240-U lets you control up to four 1000 watt 240 volt lighting systems. Comes pre-wired with a 10 gauge 6 ft. power cable and a 6 ft. trigger cord with a 120V plug. The trigger cord can be connected to any 120V timer or controller and draws little current. The trigger cord turns on all four 240V outlets at once. PLUS: two 120V outlets that are always on with an added 10 amps each. The trigger cord has no effect on the 120V outlets. Typical 120V outlet usage: circulation fan that is on 24/7, a timer controlling a pump, or even a timer or controller that triggers the 240V outlets on and off. The power cable has unterminated wires and connects to a 240V 30A four wire service (neutral wire required). This can be done by hard wiring or the addition of a plug appropriate for an available outlet.

TIMER NOT INCLUDED

GAS PRO CO$_2$ GENERATOR

MAXIMIZE YIELD WITH GAS PRO

CO$_2$ ENRICHMENT CAN PROVIDE UP TO 50% INCREASE IN YIELD IN HIGH PERFORMANCE GARDENS

CO$_2$ USAGE

CO$_2$ (carbon dioxide) is needed by plants for proper growth. In an indoor environment it is quickly depleted, which slows or even stops growth. CO$_2$ can be added by either a cylinder of CO$_2$ or by burning cheaper and easier to obtain propane or natural gas. Under ideal combustion, only CO$_2$ and water vapor are produced. A furnace burns gas, uses the heat, and discards the combustion gases. A CO$_2$ generator generally does the opposite - it uses the combustion gases (CO$_2$) and discards or redirects the heat. A furnace is optimized for maximum heat, a CO$_2$ generator for cleanest CO$_2$. A CO$_2$ generator is best suited for a larger grow room with temperature and humidity under good control. The Gas Pro is designed to be controlled by a timer or CO$_2$ controller, not for continuous operation.

OPERATION

First, the pilot burner gets gas and a high voltage spark lights it. Then the spark turns off and the main burners get gas. The pilot then lights them. If the pilot goes out (and also the main burners, as one would re-light the other), the main burner gas is shut off and the pilot tries to light again. When the Gas Pro is off, gas is shut off to both pilot and main burners. When operating, cool air is drawn in through the lower slots on the front and back. Hot gases, including CO$_2$, rise up and are forced out the upper slots by the heat exchanger baffle. If cool air is forced into one cooling duct, the baffle is cooled and heat is sent out the other duct.

FEATURES
- Faster, more reliable, more efficient, electronic spark ignition compared to other methods.
    - Better than standing / continuous pilot - they must be manually lit, burn all the time, waste gas.
    - Faster than glow plug - no time needed for glow plug to heat up, spark ignites immediately.
    - More reliable - in a glow plug ignition system, the most likely part to fail is the glow plug.
    - Automatic re-lighting - if pilot and main burners go out, main gas shuts off, spark re-lights pilot, then main gas turned on.
- Easier to add optional CO2-400 controller.
    - Just plug CO2-400's 10 ft. cable into connector on side of Gas Pro.
    - Extension cable providing 25 ft. total length is available.
    - No separate power supply - draws power from Gas Pro.
    - Safer 24 VAC operation - no 120 VAC at controller.
- More cost effective than bottled CO$_2$ for larger grow rooms.
- Both Propane and Natural Gas models available.
    - Propane is readily available at many gas stations and hardware stores – easier to find than bottled CO$_2$.
    - Natural Gas is delivered to many buildings by pipeline from gas utility - no hauling tanks out for refill.
- Strong 18 gage steel enclosure - powder coated for heat and rust resistance.
- Open hook hangers for easier overhead mounting.
- Heat exchanger for optional forced air cooling of Gas Pro.
- Slots for air in and CO$_2$ out - safer than big holes or large open area.
- Two sizes - 6 burner and 12 burner.

PROPANE MODEL

Propane is readily available at many gas stations and hardware stores. An empty tank can be brought in for refill or exchange for a prefilled tank of the same type. Because it uses portable tanks, set up is easy. Propane (C_3H_8) is the most popular member of the LP (Liquefied Petroleum) or manufactured gas family. LP is also used to mean Liquid Propane. A propane tank is under pressure such that most of the propane is compressed into a liquid with the evaporated gas above. The gas is drawn off for burning. The regulator connects directly to the tank and reduces the pressure for delivery through the hose to the Gas Pro. The regulator uses the newer Type 1 tank fitting. If you have the older POL fitting, have your propane supplier change it.

NATURAL GAS MODEL

Natural gas is delivered to many buildings by pipeline from the local gas utility company. It is best suited for more permanent installations and is the cheapest gas available. It is 95% methane (CH_4). The utility typically delivers gas to a building at 5 to 15 psig. At the service entrance there is a meter and regulator which reduces the pressure for distribution within the building. The Gas Pro requires an inlet pressure of 5" to 7" W.C. (7" Water Column is approximately 1/4 psig). If gas is distributed in the building at that pressure, then no further reduction is required. If the gas pressure is higher, such as 2 psig, then a "pounds-to-inches regulator" (not supplied) is required to reduce it to 5" to 7" W.C.

COOLING DUCTS

The Gas Pro allows optional connection of forced air cooling to remove heat from the generator and growing area. Two duct fittings are on the top of the generator, separated from the combustion area (and hence CO_2) by a heat exchanger baffle. Use 4" flexible ducting with an inline fan to blow cool air into one side and run the other side outdoors to vent the hot air. The cooling ducts are useful in a grow room where temperature is generally under control but some of the added heat from the Gas Pro needs to be removed to maintain desired conditions.

CO2-400 CONTROLLER

The optional CO2-400 controller plugs directly into the Gas Pro. It has a 10 ft. long cable. An extension cable providing 25 ft. total length is available. Controller has a display and 3 buttons (SET, +, and -). Normally displays actual room CO_2 PPM. Buttons let you display and change the desired PPM setting. Uses 24 VAC from the Gas Pro - no separate power supply needed. Gas Pro power supply plugs into an outlet that is always powered.

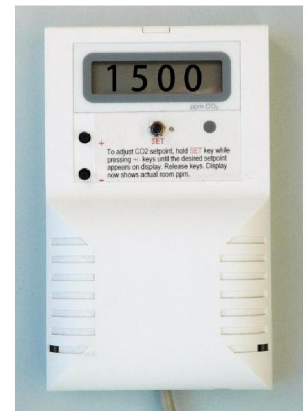## SPECIFICATIONS

- Power supply (input)   120VAC, 60Hz, 0.5 Amp
- Power cord (from power supply)   10' length, 18 AWG, 2 conductor
- Internal operation   24 VAC
- Gas hose (included in all models)   20' length, 3/8" ID, 3/8" female flare fitting at both ends
- Propane model gas connection   Regulator included with Type 1 fitting for direct attachment to propane tank
- Natural Gas model gas connection   Connects to 5" to 7" W.C. gas supply
- Dimensions   27" high (including ducts) x 21" wide x 8" deep
- Weight   40 Lbs.

PROPERTY	PROPANE		NATURAL GAS	
Model Number	GP-06-LP	GP-12-LP	GP-06-NG	GP-12-NG
Number of Burners	6	12	6	12
BTU/hr (nominal)	16,764	33,528	16,590	33,180
CO_2 cu. ft./hr (nominal)	20	40	16.5	33

MISCELLANEOUS CONTROL PRODUCTS

THP-100 Atmospheric Controller (120V 15A)

The THP-100 lets you control temperature, humidity, and CO_2 equipment. It includes thermostat (39" probe), humidistat and photocell. Two fan outlets reduce temperature & humidity. Two CO_2 outlets for timer or PPM controller, on only during day when fan is off. The THP-100 coordinates ventilation and CO_2. When temperature or humidity is above the dial settings, the vent fan turns on. This blows hot or humid air out of the growing area and fresh air is then drawn in. CO_2 is not dispensed when the fan is on because this would waste CO_2. It is only dispensed during the day when plants have light for photosynthesis. When connecting CO_2 equipment, a repeat cycle timer or CO_2 PPM concentration controller (not included) plugs into the THP-100. The CO_2 tank valve or CO_2 generator plugs into timer or controller. Includes 15A circuit breaker, 6 ft. power cord with 120V plug, and indicator lights for outlet status.

CO2-300 CO2 PPM Controller (120V 5A)

The CO2-300 lets you control room CO_2 PPM (Parts Per Million) concentration. Sensor Unit has a display and 3 buttons (SET, +, and -). Normally displays actual room CO_2 PPM. Using the buttons, you can display and change the desired PPM setting. Sensor Unit connects to Control Unit by 8 ft. cable. Control Unit plugs into 120V outlet. To defeat CO_2 dispensing when lamp is off, plug Control Unit into lamp timer or timer running the same schedule. CO_2 dispensing equipment (CO_2 tank valve or CO_2 generator) plugs into 120V outlet on Control Unit. If room CO_2 level is below setting, CO_2 is dispensed. Setting adjustable 0-2000 PPM.

FD-100 Flood Detector (120V 15A)

The FD-100 lets you detect overflow of water or nutrient if a pipe breaks or drains clog. Includes Flood Sensor connected by 10 ft. cable to Control Box with two 120V 15A outlets. FLOOD ON OUTLET is ON during flood and OFF during no flood. Flood could turn ON alarm. FLOOD OFF OUTLET does opposite - OFF during flood, ON during no flood. Flood could turn OFF pump timer. If sensor gets wet, in 2 seconds outlets change to Flood condition. Hold Switch selects automatic or manual reset. In No Hold position, if sensor dries out, in 2 seconds outlets change back to No Flood condition. If sensor gets wet later, new flood is detected. In Hold position, dry sensor is ignored and outlets stay in Flood condition until user resets switch.

Solatel Products Available From

Solatel strives to bring high quality cutting edge products at a reasonable price to the indoor growing market. All our products are designed and manufactured in the heart of Silicon Valley, USA. One year warranty on Lamp Pro and PWX power control products, two years on all others.

Proudly Made
in the USA