

GAS PRO CO₂ GAS GENERATOR (PROPANE)



WARNING

- Use only with propane gas. Propane can cause fire or explosion if handled improperly.
- Installation to be done by qualified personnel only.
- Unit gets hot when operating, DO NOT TOUCH. Keep flammable materials away.
- High CO₂ levels (5000 PPM) are hazardous to people. Plants generally don't need more than 1500 PPM.
- Unit must be controlled by timer or CO₂ controller. Not for continuous operation.

FEATURES

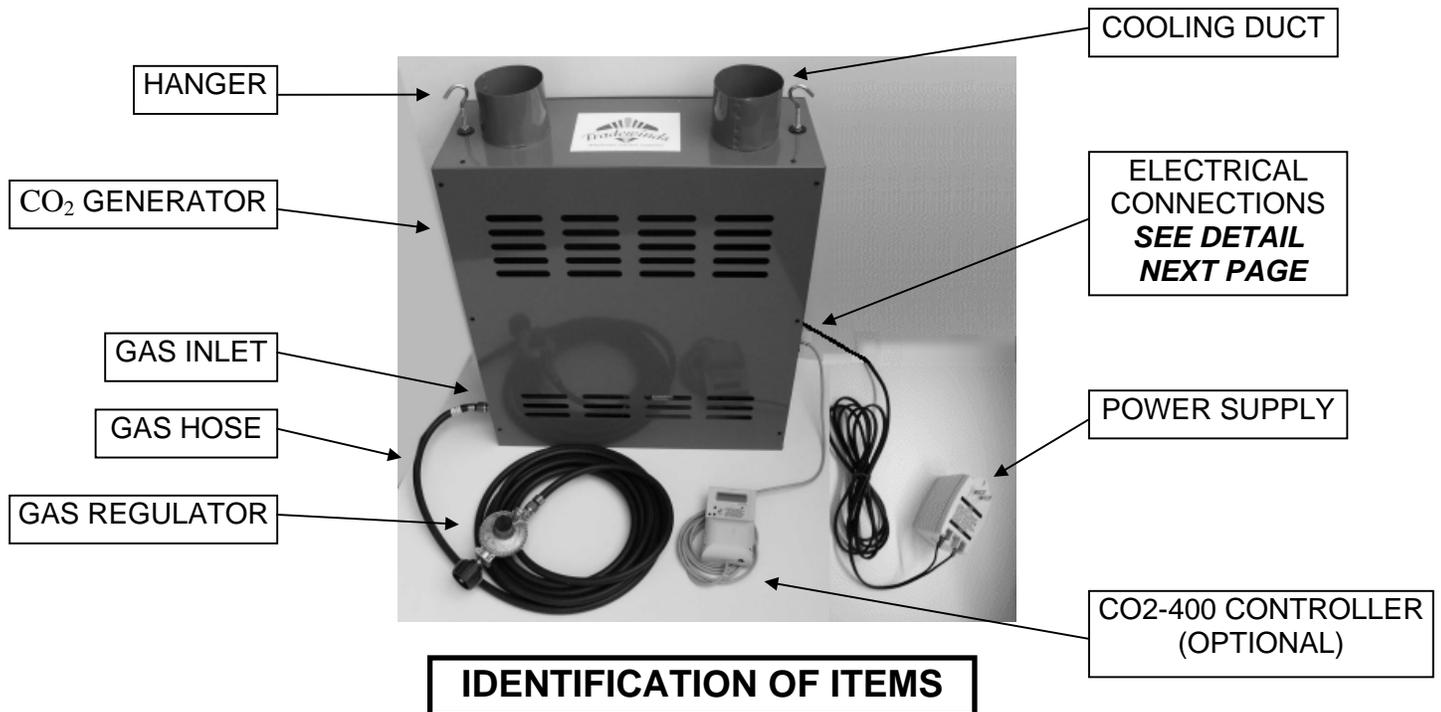
- ◆ Faster, more reliable, more efficient, electronic spark ignition compared to other methods.
 - Better than standing / continuous pilot - they must be manually lit, burn all the time, waste gas.
 - Faster than glow plug - no time needed for glow plug to heat up, spark ignites immediately.
 - More reliable - in a glow plug ignition system, the most likely part to fail is the glow plug.
- ◆ Easier to add CO₂-400 controller.
 - Just plug CO₂-400's 10 ft. cable into connector on side of Gas Pro. Extension cable available.
 - No separate power supply - draws power from Gas Pro.
 - Safer 24 VAC operation - no 120 VAC at controller.
- ◆ Heat exchanger for forced air cooling of Gas Pro.
- ◆ Slots for air in and CO₂ out - safer than big holes or large open area.
- ◆ Two models - GP-06-LP (6 burner) and GP-12-LP (12 burner).

INTRODUCTION

CO₂ (carbon dioxide) is needed by plants for proper growth. In an indoor environment it is quickly depleted which slows or even stops growth. CO₂ can be added by either a cylinder of CO₂ or by burning cheaper and easier to get propane. Propane (C₃H₈) is the most popular member of the LP (Liquefied Petroleum) or manufactured gas family. Butane is also a member but the LP model of the Gas Pro is only for Propane. LP is also used to mean Liquid Propane. A propane cylinder 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. Under ideal combustion, propane produces only CO₂ and water vapor. A furnace burns gas, uses the heat, and discards the combustion gases. A CO₂ generator generally does the opposite - it uses the combustion gases (CO₂) and discards or redirects the heat. A furnace is optimized for maximum heat, a CO₂ generator for cleanest CO₂. CO₂ generators are best suited for larger grow rooms with temperature and humidity under good control.

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INSTALLATION



Location of CO₂ Generator

The generator is mounted in the growing area such that the CO₂ can be distributed to the plants. Do not block the ventilation slots on the front or back. The generator can be set on a non-flammable material (not carpet or wood floor). If necessary, it can be set on a stable brick platform. It can also be hung by the two hangers. Use a metal chain or other metal support. Do not use a flammable material such as rope or plastic covered chain. Many hardware or home improvement stores will sell bulk chain cut to your desired length. Use chain rated for at least 50 LBs. Keep flammable materials away. Do not set things on the generator. It gets HOT. Locate it in a central location to allow even distribution of CO₂ to the growing area. Be sure to have circulation fans but don't blow directly into the generator such that the flames are disrupted.

Location of Propane Cylinder (not shown)

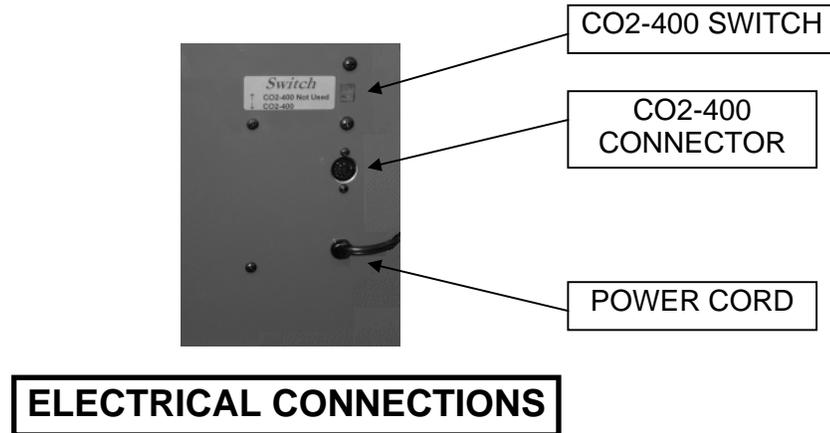
The cylinder should be mounted where it will not be subject to damage or excess heat or cold. Propane is heavier than air and any leaks will cause gas to collect at the lowest point, so be sure to provide good ventilation. Allow easy access to the shut off valve in case of emergency.

Gas Connection

Route the hose between the generator and cylinder. Be sure to protect it from being stepped on, cut or otherwise damaged. Connect the hose to the generator's gas inlet. Tighten with two wrenches - keep the generator fitting from turning and turn the hose fitting. Connect the gas regulator to the hose in a similar manner. Be sure the cylinder valve is closed and connect the regulator. The regulator uses the newer Type 1 fitting. If your cylinder has the older POL fitting, have your propane supplier change it.

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INSTALLATION (*continued*)



Electrical Connection

The Gas Pro is designed to be controlled by a timer or CO₂ controller. It is not designed for continuous operation. Plug the Gas Pro's power supply into the timer or controller's 120 VAC outlet. If the power supply blocks other outlets on the timer or controller, use a power strip or extension cord. Route the supply's cord such that it will not be stepped on or damaged. The cord connects to terminals on the supply that are 24 VAC. They are recessed and this will normally protect them from accidental contact but if this is an issue, protect them with electricians tape. **NEVER USE DUCT TAPE WITH ELECTRIC CIRCUITS** - it has metal in it and will cause a short circuit. The CO2-400 Switch should be UP if a CO2-400 is not used.

CO2-400 Controller

The optional CO2-400 controller plugs directly into the CO2-400 connector on the Gas Pro. It operates on 24 VAC from the Gas Pro - no separate power supply needed. It uses a 10 foot long cable, extension cables are available. If a CO2-400 is connected, the CO2-400 Switch is DOWN, towards the connector. When used, the Gas Pro power supply must be plugged into an outlet that is always powered. See CO2-400 instructions for further details.

Cooling Ducts

The Gas Pro allows the 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 CO₂) by a heat exchanger baffle. Use 4" flexible ducting. Use an inline fan to blow cool air into one side and run the other side outdoors to vent the hot air. It does not matter which duct is inlet or outlet. 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.

Carbon Monoxide (CO) Detector (not shown)

A carbon monoxide detector should be installed in any area where a gas appliance is being used. These are readily available at hardware or home improvement stores. Carbon monoxide is odorless but deadly.

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OPERATION

Principles of Operation

The Gas Pro uses electronic spark ignition. When power is applied (or the optional CO₂-400 controller requests CO₂), gas is supplied to the pilot burner and a high voltage spark is generated which lights the pilot. The Gas Pro senses when the pilot lights, and then turns off the spark and supplies gas to the main burners. The pilot then lights the main burners. The pilot stays lit and is monitored. 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 as described above. The pilot will try to light for about 90 seconds. If it cannot light in this time, it shuts off the gas and spark and retries in about 6 minutes. When power is removed, 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 CO₂, rise up and are forced out the upper slots by the heat exchanger baffle. If cool air is forced into the cooling duct, the baffle is cooled and heat is sent out the other duct.

Initial Startup

After the steps in the Installation section above have been done, a leak check should be done. The power supply should be unplugged. Slowly open the propane cylinder valve. Spray or brush the hose connections with soapy water and verify no bubbles (leaks) are seen. If you smell gas (propane has a wild onion smell added), shut off the gas, and allow it to vent out before continuing. Tighten connections if necessary using two wrenches. Next plug the power supply into 120 VAC to start the generator. You should hear the pilot valve open and the spark start after a few seconds. Because there is still air in the hose, it may take a minute or two to light the first time. If it is still sparking after 60 seconds, unplug the supply for a few seconds and plug back in. This will defeat the 90 second time-out for attempting to light the pilot. Once the pilot lights, you should hear the spark stop, the main valve open, and the main burners will light. Unplug the supply and plug it into the timer or controller and set them for desired operation.

Regular Operation

Normally, the timer or controller will turn on the Gas Pro and the pilot and main burners will light in a few seconds. CO₂ will be generated, replenish the growing area, and the Gas Pro is then shut off until the CO₂ is used up. The Gas Pro is then turned on and repeats the cycle. The Gas Pro is not designed for continuous operation.

Typical CO₂ Dispensing Cycle

The following test was done with a GP-12-LP in a 3200 cubic foot room using a CO₂ monitor/controller. The GP-06-LP puts out half as much CO₂ and should provide similar results in a room half the size. With the room starting at ambient CO₂, the Gas Pro operated for 11 minutes to bring the CO₂ above the 1400 PPM set point. It then shut off. After 17 minutes, the CO₂ level dropped enough and the Gas Pro was turned back on and ran for 4 minutes. Thereafter the Gas Pro came on about 3 times an hour, running approximately 4 minutes each time. CO₂ in the room rose and fell between 1200 and 1800 PPM, averaging about 1470 PPM. There are a number of variables in CO₂ generation and control, including room air circulation, fresh air ventilation cycles, room air leaks, plant CO₂ absorption rate, etc. Many published numbers have inaccuracies or are based on theoretical not practical studies. Comparison of published data should be done with caution.

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PROBLEM SOLVING

PROBLEM	SUGGESTIONS
There is a strange smell, like wild onions.	DANGER! There is a gas leak. Shut off the gas, vent the area and keep out until it dissipates. See OPERATION - Initial Startup section for checking for leaks at startup. Gas leaks are dangerous and must be corrected to prevent fire or explosion.
The power supply has 120 VAC but nothing happens.	Verify that the CO2-400 switch above the power cord is in the UP position. It should only be DOWN when using a CO2-400 controller.
Power is applied, the spark starts, and then stops and the generator doesn't come on.	Verify that the cylinder is not empty, the cylinder valve is open, and the hose is properly connected. If the cylinder has just been changed, the regulator or hose reconnected, or this is initial start up, see OPERATION - Initial Startup section.
There is discoloration at the top slots.	This is normal due to the flow of hot gases in this area.
The power supply had 120 VAC before the cylinder valve was turned on. Now there is barely any gas coming out of the regulator.	The Type 1 regulator fitting has excess flow rate detection to limit gas flow with an unconnected hose, etc. The gas should always be turned on before the power supply. This prevents the sudden burst of gas through the already open Gas Pro valve from being misinterpreted as a leak. Shut off the cylinder valve, shut off the power supply, wait ten minutes, and retry with the gas supplied first.
A CO2-400 is being used but its display is blank, even though the Gas Pro power supply has 120 VAC.	Verify that the CO2-400 switch above the power cord is in the DOWN position. It should only be UP when NOT using a CO2-400 controller.

SPECIFICATIONS

- Power supply (input) 120VAC, 60Hz, 0.5 Amp
- Power cord 18 AWG, 2 conductor, 10' length
- Internal operation 24 VAC
- Heat (nominal) GP-06-LP: 16,764 BTU / hr.
GP-12-LP: 33,528 BTU / hr.
- CO₂ (nominal) GP-06-LP: 20 cu. ft. / hr
GP-12-LP: 40 cu. ft. / hr
- Gas type Propane
- Regulator outlet pressure 14" W.C. nominal
- Pressure at Gas Pro inlet 12" to 14" W.C.
- Burner pressure 11" W.C.
- Gas regulator inlet fitting Type 1
- Gas hose 20' length, 3/8" ID, 3/8" flare fittings
- Dimensions 27" high (including ducts) x 21" wide x 8" deep
- Weight 40 LBs.