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iGS-220 CO2, RH and Temperature Controller  
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## 1- Basic Description of the Controller

All Plug’N’Grow Climate Controllers are made up of two boxes : the Control Box and the Power Box. They are connected together with the included network-type cable.

The **Control Box** (the iGS-220) contains the SENSORS, the DISPLAY, the KEYPAD, the LIGHT INDICATORS and the ALARM DRY CONTACT CONNECTOR. This box should be positioned on a wall at the plant level, not too close from the lighting equipment.

The **Power Box** (the iGS-50) contains the POWER SUPPLY, the switching RELAYS and the 120 volts POWER OUTLETS. This unit can be used with any other Plug’N’Grow Controllers of the 100 and 200 Series. It should be positioned within 6 feet from a 120VAC power outlet where you connect it.

**Also read the Safety Notice on page 36.**

## 2- Setting up the controller

Connecting the equipment on the Power Box (iGS-50)

**OUTPUT 1** : when used with the iGS-220, OUTPUT 1 is always dedicated to **CO2 generating or venting equipment**. Connect your CO2 Injector/Burner or your venting fan.

**OUTPUT 2** : with the iGS-220, OUTPUT 2 is always dedicated to **Temperature Control or Relative Humidity (RH) Control or Mixed Control (Cooling and Dehumidifying) equipment**. Connect either your heater, your cooling fan, your dehumidifier, your air conditioning unit, etc.



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## Overview of the Control Box LIGHT INDICATORS, KEYPAD and DISPLAY

The **LIGHT INDICATORS** are formed of two groups :

The three “**Select Sensor**” lights are :

- [ppm CO<sub>2</sub>]
- [%RH]
- [Temp °C/°F]

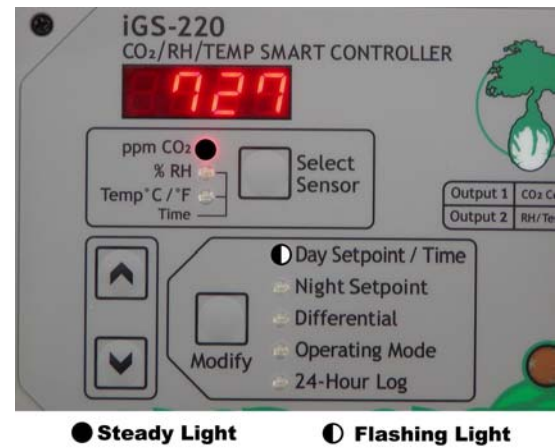
and the five “**Modify**” lights are :

- [Day Setpoint/Time]
- [Night Setpoint]
- [Differential]
- [Operating Mode]
- [24-H Log]

The **KEYPAD** is made up of 4 keys :

- **SELECT SENSOR** : press repeatedly to choose among the three “Select Sensor” lights above, or Time reading;
- **MODIFY** : press repeatedly to choose among the five “Modify” lights above.
- **UP and DOWN ARROWS** : press to change the value or setting of the information on screen, enabled only in some menus or modes.

The **DISPLAY** : the room climate conditions, time and controller settings can be viewed on the 4-digit display. Letters may also appear on the display in some menus.



Note : these Steady and Flashing lights symbols will be used throughout the manual.

**NOTE** : in the text, the **KEYS** will be indicated in upper case, and the [light indicators] within square brackets.

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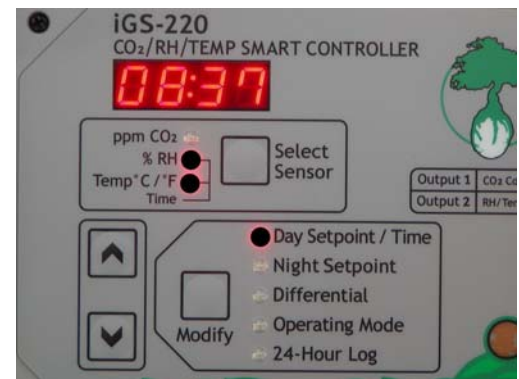
### Setting the TIME

#### **Do you really need to set the time ?**

**YES** if you want the 24-Hour Logger to keep track of the actual MIN, MAX and AVERAGE values of CO<sub>2</sub>, RH or TEMP in the past 24 hours and then store the information in the right hour frame.

1. Press the **SELECT SENSOR** key until [%RH] and [Temp °C/°F] lights turn on.
2. Press the **MODIFY** key until the [Day Setpoint / Time] turns on.
3. Press the **UP ARROW** key to modify the **HOUR**; if you keep it pressed for more than 1 sec., the value will increase automatically.
4. Press the **DOWN ARROW** key to modify the **MINUTES**; if you keep it pressed for more than 1 sec., the value will decrease automatically.
5. To exit, press the **MODIFY** key until all [Modify] lights turn off.

Notice : this controller does not provide for daylight time savings. The time should be corrected in April and October by the user.



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Setting the OUTPUT 1 operating mode for CO2 enrichment or venting

1. Press the SELECT SENSOR key until the [ppm CO2] light turns on.
2. Press the MODIFY key until the [Operating Mode] light turns on.
3. From **Table 1** below, choose the **Code** of your desired Operating Mode.
4. Press the ARROW keys (up or down) to enter the selected **Code**.
5. To exit, press the MODIFY key until all [Modify] lights turn off.

CO2 Operating Mode (for Output 1)	Code
Add (enrich) during the day only	<b>1-01 *</b>
Add (enrich) during the night only	<b>1-02</b>
Add (enrich) during day and night	<b>1-03</b>
Reduce (vent) during the day only	<b>1-04</b>
Reduce (vent) during the night only	<b>1-05</b>
Reduce (vent) during day and night	<b>1-06</b>

\* Factory Default

**Table 1**



Example : 1-01, adding CO2 during the day

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Setting the OUTPUT 2 operating mode for RELATIVE HUMIDITY control :

Note : OUTPUT 2 can also be set for temperature control. See page 8.

To Humidify :

1. Press the SELECT SENSOR key until the [%RH] light turns on.
2. Press the MODIFY key until the [Operating Mode] light turns on.
3. From **Table 2** on next page, choose the **Code** of your desired Operating Mode.
4. Press the ARROW keys (up or down) to enter the selected **Code**.
5. To exit, press the MODIFY key until all [Modify] lights turn off.

To Dehumidify :

1. Press the SELECT SENSOR key until the [%RH] light turns on.
2. Press the MODIFY key until the [Operating Mode] light turns on.
3. From **Table 3** on next page, choose the **Code** of your desired Operating Mode.
4. Press the ARROW keys (up or down) to enter the selected **Code**.
5. To exit, press the MODIFY key until all [Modify] lights turn off.



Example : 2-21, humidify day and night  
only when CO2 (Output 1) is OFF

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	Humidifier is STOPPED when CO2 is injected or vented			Humidifier is FULLY INDEPENDANT of CO2 injection or venting	CO2 injection or venting is STOPPED when humidifier is activated.
	OFF delay : none	OFF delay : 5 minutes	OFF delay : 10 minutes	OFF delay : none	OFF delay : none
Humidify day only	<b>2-01</b>	<b>2-02</b>	<b>2-03</b>	<b>2-04</b>	<b>2-05</b>
Humidify night only	<b>2-11</b>	<b>2-12</b>	<b>2-13</b>	<b>2-14</b>	<b>2-15</b>
Humidify day and night	<b>2-21</b>	<b>2-22</b>	<b>2-23</b>	<b>2-24</b>	<b>2-25</b>

\* Factory Default : see page 10.

**Table 2**

Note : **OFF delay** will keep your Output 2 OFF, once the CO2 process is over, for 5 or 10 more minutes. If the Emergency Mode (see page 14) is properly set up, the OFF delay will be interrupted when emergency condition appears.

	Dehumidifier or fan is STOPPED when CO2 is injected or vented			Dehumidifier or fan is FULLY INDEPENDANT of CO2 injection or venting	CO2 injection or venting is STOPPED when dehumidifier or fan is activated.
	OFF delay none	OFF delay 5 minutes	OFF delay 10 minutes	OFF delay none	OFF delay none
Dehumidify day only	<b>2-31</b>	<b>2-32</b>	<b>2-33</b>	<b>2-34</b>	<b>2-35</b>
Dehumidify night only	<b>2-41</b>	<b>2-42</b>	<b>2-43</b>	<b>2-44</b>	<b>2-45</b>
Dehumidify day and night	<b>2-51</b>	<b>2-52</b>	<b>2-53</b>	<b>2-54</b>	<b>2-55</b>

\* Factory Default : see page 10.

**Table 3**

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Setting the OUTPUT 2 operating mode for TEMPERATURE control :

Note : OUTPUT 2 can also be set for cooling and dehumidifying control. See page 10.

To Heat :

1. Press the SELECT SENSOR key until the [Temp °C/°F] light turns on.
2. Press the MODIFY key until the [Operating Mode] light turns on.
3. From **Table 4** on next page, choose the **Code** of your desired Operating Mode.
4. Press the ARROW keys (up or down) to enter the selected **Code**.
5. To exit, press the MODIFY key until all [Modify] lights turn off.

To Cool :

1. Press the SELECT SENSOR key until the [Temp °C/°F] light turns on.
2. Press the MODIFY key until the [Operating Mode] light turns on.
3. From **Table 5** on next page, choose the **Code** of your desired Operating Mode.
4. Press the ARROW keys (up or down) to enter the selected **Code**.
5. To exit, press the MODIFY key until all [Modify] lights turn off.



Example : 3-04, humidify day and night  
INDEPENDENTLY from CO2 output.

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	Heater is STOPPED when CO2 is injected or vented			Heater is FULLY INDEPENDANT of CO2 injection or venting	CO2 injection or venting is STOPPED when heater is activated.
	OFF delay none	OFF delay 5 minutes	OFF delay 10 minutes	OFF delay none	OFF delay none
Heating day only	<b>3-01</b>	<b>3-02</b>	<b>3-03</b>	<b>3-04</b>	<b>3-05</b>
Heating night only	<b>3-11</b>	<b>3-12</b>	<b>3-13</b>	<b>3-14</b>	<b>3-15</b>
Heating day and night	<b>3-21</b>	<b>3-22</b>	<b>3-23</b>	<b>3-24</b>	<b>3-25</b>

\* Factory Default : see page 10.

**Table 4**

	Cooler or fan is STOPPED when CO2 is injected or vented			Cooler or fan is FULLY INDEPENDANT of CO2 injection or venting	CO2 injection or venting is STOPPED when cooler or fan is activated.
	OFF delay none	OFF delay 5 minutes	OFF delay 10 minutes	OFF delay none	OFF delay none
Cooling day only	<b>3-31</b>	<b>3-32</b>	<b>3-33</b>	<b>3-34</b>	<b>3-35</b>
Cooling night only	<b>3-41</b>	<b>3-42</b>	<b>3-43</b>	<b>3-44</b>	<b>3-45</b>
Cooling day and night	<b>3-51</b>	<b>3-52</b>	<b>3-53</b>	<b>3-54</b>	<b>3-55</b>

\* Factory Default : see page 10.

**Table 5**

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Setting the OUTPUT 2 operating mode for COOLING AND DEHUMIDIFYING control :

Note : OUTPUT 2 can also be set for independent temperature or humidity control. See pages 6 and 8.

To Cool and Dehumidifying with the same equipment (generally a fan) :

1. Press the SELECT SENSOR key until the [Temp °C/°F] light turns on.
2. Press the MODIFY key until the [Operating Mode] light turns on.
3. From **Table 6** below, choose the **Code** of your desired Operating Mode.
4. Press the ARROW keys (up or down) to enter the selected **Code**.
5. To exit, press the MODIFY key until all [Modify] lights turn off.

How to avoid excessive cooling while dehumidifying ?

The LOW TEMPERATURE LIMIT used for alarm purpose (see page 16) is also used to define a cooling limit, that is, the output 2 will be turned off whenever the temperature drops below this value. Make sure to set the LOW TEMPERATURE LIMIT for limiting the cooling effect according to this formula :

$$\text{COOLING LIMIT} = \text{LOW TEMPERATURE LIMIT} + 5^{\circ}\text{C (or} + 9^{\circ}\text{F)}$$



Example :4-31.cooling during the day only  
and when CO2 (Output 1) is OFF

	Fan is STOPPED when CO2 is injected or vented			Fan is FULLY INDEPENDANT of CO2 injection or venting	CO2 injection or venting is STOPPED when cooler or fan is activated.
	OFF delay none	OFF delay 5 minutes	OFF delay 10 minutes	OFF delay none	OFF delay none
Cooling & dehum. day only	<b>4-31</b>	<b>4-32</b>	<b>4-33</b>	<b>4-34</b>	<b>4-35</b>
Cooling & dehum. night only	<b>4-41</b>	<b>4-42</b>	<b>4-43</b>	<b>4-44</b>	<b>4-45</b>
Cooling & dehum. day and night	<b>4-51*</b>	<b>4-52</b>	<b>4-53</b>	<b>4-54</b>	<b>4-55</b>

\* Factory Default

**Table 6**

### Setting the CO2 Day and Night Setpoints

1. Press the SELECT SENSOR key until the [ppm CO2] light turns on.
2. Press the MODIFY key until the [Day Setpoint / Time] or [Night Setpoint] light turns on.
3. Press the ARROW keys (up or down) to modify the current value; if you keep it pressed for more than 1 sec., the value will vary automatically.
4. To exit, press the MODIFY key until all [Modify] lights turn off.



### Setting the RELATIVE HUMIDITY Day and Night Setpoints

Note : this setpoint will apply whenever you are humidifying or dehumidifying, as defined by the output 2 operating mode.

1. Press the SELECT SENSOR key until the [%RH] light turns on.
2. Press the MODIFY key until the [Day Setpoint / Time] or [Night Setpoint] light turns on.
3. Press the ARROW keys (up or down) to modify the current value; if you keep it pressed for more than 1 sec., the value will vary automatically.
4. To exit, press the MODIFY key until all [Modify] lights turn off.



### Setting the TEMPERATURE Day and Night Setpoints

Note : this setpoint will apply whenever you're are cooling or heating, as defined by the output 2 operating mode.

1. Press the SELECT SENSOR key until the [Temp °C/°F] light turns on.
2. Press the MODIFY key until the [Day Setpoint / Time] or [Night Setpoint] light turns on.
3. Press the ARROW keys (up or down) to modify the current value; if you keep it pressed for more than 1 sec., the value will vary automatically.
4. To exit, press the MODIFY key until all [Modify] lights turn off.



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## 3- Using the controller (basic features)

### Viewing the room ppm CO2, relative humidity, temperature and current time.

1. Make sure that all [Modify] lights are off. If not, press MODIFY repeatedly until they all turn off.
2. Press the SELECT SENSOR key to view the room conditions or time in the following order
  - [ppm CO2] light ON to view the **ambient CO2 level (ppm CO2)**
  - [%RH] light ON to view the **ambient relative humidity level**
  - [Temp °C/°F] light ON to view the **ambient temperature level**
  - Both [Temp °C/°F] and [%RH] lights ON to view the **current time**

### Knowing whether OUTPUT 1 or OUTPUT 2 is activated

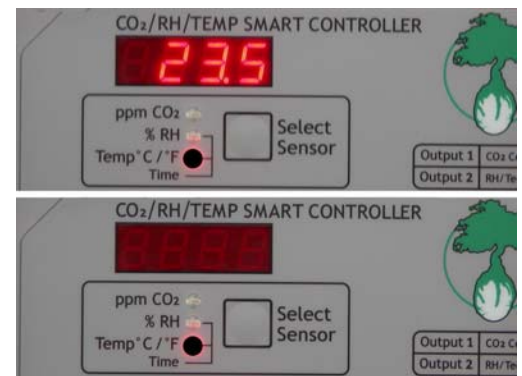
#### **While viewing the actual CO2 level (ppm CO2)**

- CO2 Output 1 is **ACTIVATED** if the display blinks (½ sec. ON, ½ sec. OFF)
- CO2 Output 1 is **NOT ACTIVATED** if the display is steady (does not blink)

#### **While viewing the actual humidity level or temperature**

- RH-TEMP Output 2 is **ACTIVATED** if the display blinks (½ sec. ON, ½ sec. OFF)
- RH-TEMP Output 2 is **NOT ACTIVATED** if the display is steady (does not blink)

Example of Output 2 flashing while displaying ambient temperature



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14	4) <b>Changing the temperature units</b> : Celsius or Fahrenheit
	5) <b>Enabling or disabling Alarms</b>
	o What does ALARM mean ?
15	o You DO NOT want to use the iGS-220 alarms
16	o You DO want to use the iGS-220 alarms
17	o The Alarm Dry Contact Connector
18	6) <b>Advice, Error and Alarm Messages</b>
19	o Advise messages (Adv) : do not panic ! just for your information...
20	o Error messages (Err) : an automatically detected problem requires your attention...
21	o Alarm messages (ALr) : a user defined alarm condition has been detected...
22	7) <b>24-Hour Log</b>
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	o Activating the data logger
23	o Reading the recorded values

See also

1	Part 1 : GETTING STARTED
24	Part 3 : ADVANCED FEATURES
38	Part 4 : CUSTOMER SERVICE

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#### 4- Changing the temperature units : Celsius or Fahrenheit ?

**Note** : the default units, as shipped from the manufacturer, are the Celsius (°C). Working in °C or in °F will not change any control features, since only the display functions are affected. In other words, the precision of the temperature control is not dependent of the selected units.

1. Make sure that all [Modify] lights are off. If not, press MODIFY repeatedly until they all turn off.
2. Press the SELECT SENSOR key until [Temp °C/°F] light turns on.
3. Press and hold down the MODIFY key until CELS or FAHr shows up on the display; it takes about 3 seconds.
4. As soon as you release the key, the new units are enabled.
5. To toggle between Celsius and Fahrenheit, return to step 3.



#### 5- Enabling and disabling Alarms

What does ALARM mean ?

The iGS-220 supports **two kinds of alarms** : the USER ALARM and the AUTOMATIC EMERGENCY MODE.

1) The USER ALARM : the user can set HIGH and LOW limits on temperature and relative humidity levels to be met in the growing room. Whenever the conditions go above the HIGH limits or below the LOW limits, an alarm will be triggered and the dry contact alarm output will be activated. See page 17. **It is up to the user to enable or disable this feature.**

2) The AUTOMATIC EMERGENCY MODE : our experience tells us that in some set-ups, priority will be given to CO2 enrichment over temperature or humidity control. As an example, in the case of an empty CO2 bottle, the controller will keep the Output 2 OFF, preventing the heating or cooling or humidifying equipment to operate, due to the high priority defective CO2 equipment. In such a case, the Automatic **Emergency Mode will suspend CO2 high priority temporarily** and allow the heater or cooler or humidifier (on Output 2) to operate **INDEPENDENTLY** of the CO2 equipment. **This automatic feature is always enabled when the USER ALARM is enabled.**

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You DO NOT want to use the iGS-220 Alarms

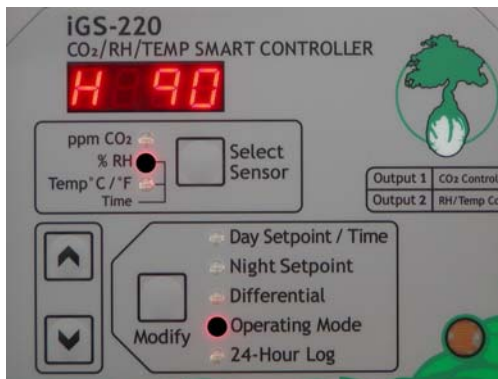
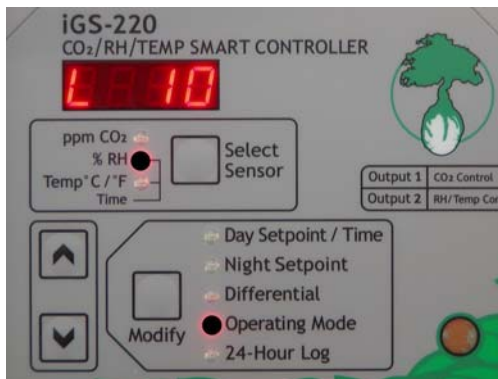
First, DISABLE the Relative Humidity Alarm Limits :

1. Press the SELECT SENSOR key until [% RH] light turns on.
2. Press the MODIFY key until [Operating Mode] light turns on.
3. Press the MODIFY key one more time to see the LOW limit (leftmost digit is L)
4. Use the ARROW keys to adjust the value much below the lowest expected temperature in your room.
5. Press the MODIFY key one more time to see the HIGH limit (leftmost digit is H)
6. Use the ARROW keys to adjust the value much above the highest expected temperature in your room.
7. To exit, press the MODIFY key until all [Modify] lights turn off.

And finally DISABLE the Temperature Alarm Limits :

1. Press the SELECT SENSOR key until [Temp °C/°F] light turns on.
2. Repeat steps 2 to step 7 as above for temperature.

BE AWARE that the AUTOMATIC EMERGENCY MODE will also be DISABLED.  
Make sure to read more about this topic on page 14.



Example for Low and High alarm limits for RH

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You DO want to use the iGS-220 Alarms

In order to ENABLE this controller safety feature, you may need to modify the default alarm limits as follows :

First, ENABLE the Relative Humidity Alarm Limits :

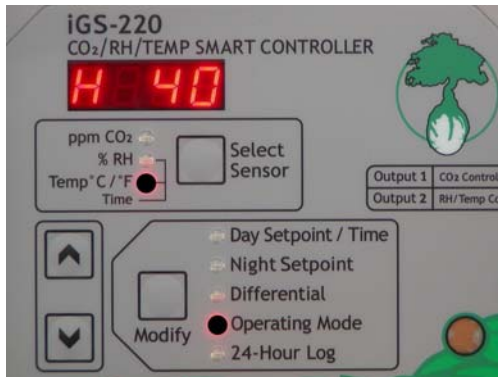
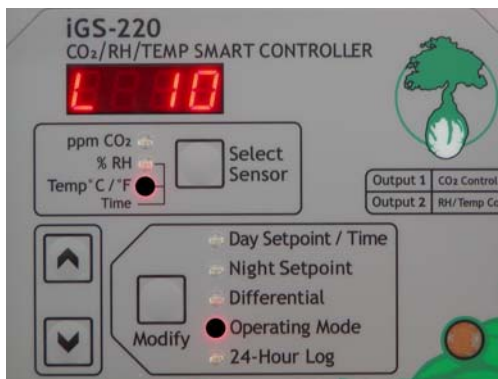
1. Press the SELECT SENSOR key until [% RH] light turns on.
2. Press the MODIFY key until [Operating Mode] light turns on.
3. Press the MODIFY key one more time to see the LOW limit (leftmost digit is L)
4. Use the ARROW keys to set the desired alarm LOW LIMIT
5. Press the MODIFY key one more time to see the HIGH limit (leftmost digit is H)
6. Use the ARROW keys to set the desired alarm HIGH LEVEL
7. To exit, press the MODIFY key until all [Modify] lights turn off.

And finally ENABLE the Temperature Alarm Limits :

1. Press the SELECT SENSOR key until [Temp °C/°F] light turns on.
2. Repeat steps 2 to step 7 as above for temperature.

BE AWARE that the AUTOMATIC EMERGENCY MODE will also be ENABLED. It does mean that whenever any relative humidity levels or temperature get as close as 5% or 5°C or 9°F of any alarm limits, the relative humidity or temperature equipment will start operating INDEPENDENTLY of the CO2 generating or venting equipment. If the user had already selected an operating mode with equal priorities on both outputs, or with a priority set for output 2, the Emergency Mode will never be activated.

Example for Low and High alarm limits for Temp °C / °F



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## The Alarm Dry Contact Connector

### Step 1 : Do you need it ?

YES, if you have an automatic dialing equipment to reach you by phone, or if you have any kind of alarm system you want to interface with your controller.

NO, you do not own such equipment and you prefer your controller to operate stand alone, with no other equipment connected to it...

### Step 2 : Select your contact configuration (if needed) :

**Contact A** (connection made between terminals COM and A) is FAIL SAFE and will CLOSE whenever any of these 3 conditions occurs :

- a power outage, a power supply failure or a catastrophic hardware failure
- a sensor or memory failure
- any Temp or RH high or low limit has been reached

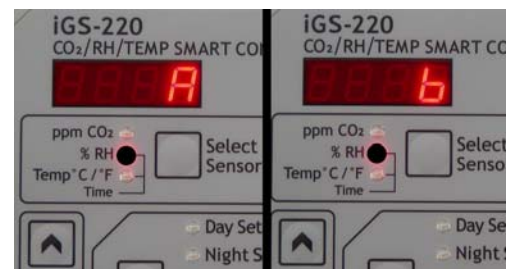
**Contact B** (connection made between terminals COM and B) is STANDARD and will CLOSE only when any of these 2 conditions occurs :

- a sensor or memory failure
- any Temp or RH high or low limit has been reached

Be aware that if the relay itself or its internal driving circuit is damaged, the alarm may not be activated although an alarm condition is present. This is not a fail-safe configuration.

### Step 3 : Finally, the system needs to know which contact you are using (if needed) :

1. Press the SELECT SENSOR key until [Temp °C/°F] or [%RH] light turns on.
2. Press the MODIFY key until [Operating Mode] light turns on.
3. Press the MODIFY key one more time to see the LOW limit (display leftmost digit is L)
4. Press and hold down the MODIFY key until [Operating Mode] light flashes
5. Release MODIFY and use the ARROW keys to select A (upper case) or B (lower case)
6. To exit, press the MODIFY key until all [Modify] lights turn off.



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## 6- Advice, Error and Alarm Messages

The iGS-220 is able to display three types of message to the user.

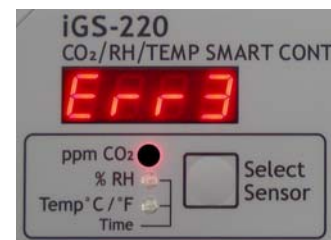
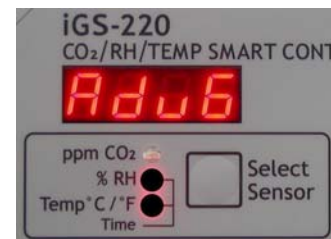
**The ADVICE messages DO NOT require immediate attention or action to be taken.** They simply inform the user that a special condition has been met, that may require some non urgent user validation, although the module KEEPS CONTROLLING the equipment.

**The ERROR messages DO require immediate attention.** They show up when a hardware failure has been detected. It is recommended to connect an automatic dialer or any other alarm system to the Alarm Dry Contact Connector (see page 17). While displaying Error Messages, the module STOPS CONTROLLING the equipment, turning the iGS-50 OUTPUTS OFF.

**The ALARM messages ONLY INDICATE USER ALARM conditions.** The Alarm Dry Contact Connector can also be used (see page 17), as for Error messages. The module KEEPS CONTROLLING the equipment.

See MESSAGE DESCRIPTIONS and INSTRUCTIONS  
in tables 7, 8 and 9  
on pages 19, 20, 21.

Examples for Advice #6, Error #3 and Alarm #1



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Do you need assistance ?

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iGS-220 CO2, RH and Temperature Controller  
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The ADVICE MESSAGES

ADv #	Cause	System Action	User Action
1	CO2 sensor overflow : CO2 level is above 5000 ppm.	As soon as CO2 level returns below 5000 ppm, message is cleared.	Ventilate if actually too much CO2 in your room. If message still there, call Plug' n' Grow Hotline.
2	The CO2 sensor calibration is now recommended, since 1 year timer has now elapsed.	As soon as CO2 sensor is recalibrated, message is cleared. Timer is reset to 1 year.	You'll need to recalibrate your CO2 sensor. Refer to page 30.
3	Automatic system recovery has completed successfully.	Message is cleared as soon as you enter the edit mode, that is, when you press the MODIFY key at least once.	Double check your setpoints and operating modes, to make sure that the recovered data are the most recent settings. If not call Plug' n' Grow Hotline.
4,5	NOT USED		
6	The system has restarted after a short power outage of less than 2 hours.	At power on, <b>time</b> is always displayed.  Message is cleared as soon as MODIFY or SELECT SENSOR key is pressed at least once.	Nothing special, just make sure the time is still good.
7	The system has restarted after a power outage lasting between 2 and 36 hours	Also, 24-h log data have been partially erased, for the duration of the power outage.	
8	The system has restarted after a long power outage of more than 36 hours.	At power on, <b>time</b> is always displayed. For long power outage, <b>time likely needs to be set</b> . Message is cleared as soon as the time on screen has been set.  Also, 24-h log data have been fully erased.	You need to enter the current time since it has been lost due to the long power outage which has drawn all current from the rechargeable backup batteries.  Note : these batteries are recharged in just seconds after power has returned.

**Table 7**

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The ERROR MESSAGES

Err #	Cause	System Action	User Action
1, 2	Not Used		
3	CO2 sensor is not working.	The CO2 equipment connected to OUTPUT 1 is STOPPED and the ALARM DRY CONTACT is closed.	Disconnect and restart your module. If the problem persists, call Plug' n' Grow Hotline at 1-888-577-6274
4	Temp/RH sensor is not working.	The fan or heater or humidifier connected to OUTPUT 2 is STOPPED and the ALARM DRY CONTACT is closed.	Disconnect and restart your module. If the problem persists, call Plug' n' Grow Hotline at 1-888-577-6274
5	Not Used		
6	Automatic system recovery has failed.	Both OUTPUTS are STOPPED and the ALARM DRY CONTACT is closed.	Disconnect and restart your module. If the problem persists, call Plug' n' Grow Hotline at 1-888-577-6274
7, 8	Not Used		

**Table 8**

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The ALARM MESSAGES

ALr #	Cause	System Action	User Action
1	Relative Humidity in the room is currently BELOW the LOW limit	The ALARM DRY CONTACT is activated (closed).	<p><b>FIRST</b>, confirm the state of ambient relative humidity and temperature and determine which if any is causing the alarm</p> <p><b>SECOND</b>, if no problems are evident, readjust your limits to prevent triggering :</p> <p>SEE PAGE 15 to disable the alarms. SEE PAGE 16 to set the limits correctly. SEE PAGE 14 for Emergency Mode</p> <p><b>THIRD</b>, if the problem persists, call Plug'n'Grow Hotline at 1-888-577-6274</p>
2	Relative Humidity in the room is currently ABOVE the HIGH limit		
3	Temperature in the room is currently BELOW the LOW limit		
4	Temperature in the room is currently ABOVE the HIGH limit		
5	The Emergency Mode is currently activated. See page 14.	The ALARM DRY CONTACT is activated (closed). The CO2 high priority mode is temporarily suspended. Operating Mode on Output 2 is automatically modified to be independent of CO2 process, that is, the Operating Mode code last digit will be forced to "4" (meaning "independent"). When viewing the Operating Mode, the rightmost dot point is also flashing while the Emergency Mode is activated.	
6	While dehumidifying, the Cooling Limit has been reached. See page 10.	The ALARM DRY CONTACT is activated (closed). While in Dehumidifying only, or Cooling and Dehumidifying Modes, the Output 2 is turned OFF, until the temperature warms up above the cooling limit.	
7,8	NOT USED		

**Table 9**

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iGS-220 CO2, RH and Temperature Controller  
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## 7- 24-Hour Log

Do you need to use the 24-hour log ?

YES, if you suspect that an equipment is not working well and that you need to see the actual climate conditions in the past 24 hours, or you are simply interested in knowing how these conditions evolved in your room to detect abnormal situations or to learn more about plant behavior during the night...

Activating the 24-hour log

The data logger is always active. You do not really need to enable or disable it, it operates continuously, constantly replacing the "old" values by "new" values. At any time during the day, you can see the MINIMUM, MAXIMUM and AVERAGE values for EACH HOUR of the 24 past hours. It does mean that each climate condition (CO2 ppm, % RH or Temp in °C or °F) will have 72 values recorded (3 values per hour x 24 hours) for your information.

**To make sure the right information is stored in the right time frame, you need to set the time as described on page 4.** If you do not set the time and let it go as it is, the 24-hour log will still memorize the actual values but the time references stored in your 24-hour log will not match with the actual time. In other words, the information will be there, but it will be quite confusing trying to figure out the actual time a specific condition happened.

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Reading the recorded values

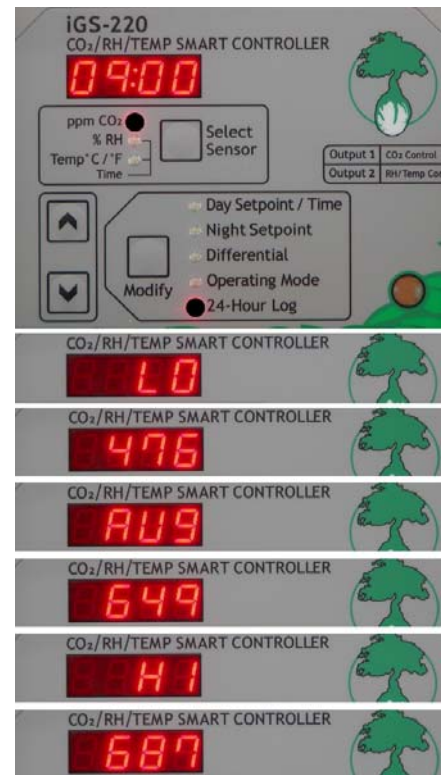
Viewing the recorded values is very simple : you just need to select the specific hour (in the past 24 hours) you need to know more about and then the system will **scroll automatically on screen** the MIN, AVERAGE (AVG) and MAX values. To see the next or previous hour information, you just need to press a key, and the system will start scrolling the new values associated with this new hour frame.

**As an example**, let's say it is 10:15 AM on Sept. 15<sup>th</sup>. Be aware that the “newest” information you can observe was stored at 10:00 the same day, for conditions prevailing between 9:00 AM and 10:00 AM. On the other hand, the “oldest” information can be observed in the 11:00 AM hour frame, and it represents the conditions prevailing between 10:00 AM and 11:00 AM on Sept 14<sup>th</sup>. What will happen at 11:00 on Sept 15<sup>th</sup> ? Very simple : the data stored on Sept. 14<sup>th</sup> at 11:00 AM (the “oldest” information described above) will be replaced by those conditions that just prevailed in the past hour, between 10:00 AM and 11:00 AM today Sept. 15<sup>th</sup>. In other words, old data are continuously replaced by new values, hour after hour.

**To view the CO2 ppm recorded values, as shown, do as follows :**

1. Press the SELECT SENSOR key until [CO2 ppm] light turns on.
2. Press the MODIFY key until [24-Hour Log] light turns on.
3. The system will start scrolling automatically the MIN, AVG and MAX values for the most recent hour.
4. Press the DOWN ARROW to step back in time or the UP ARROW to return to the most recent information.
5. To exit, press the MODIFY key until all [Modify] lights turn off.

**To view RH or Temp** recorded values, return to step 1 above and select either the [% RH] light or the [Temp °C/°F] light.



Example of 24-Log sequence viewing for CO2

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iGS-220 CO2, RH and Temperature Controller  
Revision 1.0

Page **Part 3 : ADVANCED FEATURES**

**iGS-220 User Guide**

25	8) <b>Fine tuning the control</b>
	o Setpoint and differential : what does it mean ?
26	o Working with automatic self-adaptive differential : recommended for CO2 control.
27	o Working with a fixed differential : recommended for RH and temperature control.
28	o Setting the differential offset : above, below or centered on the setpoint
29	9) <b>CO2 Reading Correction due to Altitude</b>
30	10) <b>Sensor Calibration</b>
	o Do you need to calibrate your CO2 sensors ?
31	o Do you need to calibrate your relative humidity or temperature sensors ?
32	11) <b>Hints</b>
	o Why does the system provide hints ?
33	o Available hints for CO2 control, and their meaning
34	o Available hints for RH and temperature control, and their meaning
35	o How can you see the available hints ?
36	12) <b>Maintenance and Safety Notice</b>
37	13) <b>Electrical specifications</b>
	o iGS-220 Control Box
	o iGS-50 Power Box

See also

1	<b>Part 1 : GETTING STARTED</b>
13	<b>Part 2 : USEFUL FEATURES</b>
38	<b>Part 4 : CUSTOMER SERVICE</b>

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## 8- Fine tuning the control

### Setpoint and differential : what does it mean ?

The SETPOINT is the target condition you want to reach and maintain in your grow room. Unfortunately, reaching and maintaining a setpoint is not always an easy task ! In climate control, what you want and what you get is sometimes different.

The DIFFERENTIAL represents the actual variations of the room condition around the setpoint. The differential value may be of two types :

- a user-defined fixed differential, or
- a system-controlled automatic differential.

It is up to you to select one type of differential or the other. However, **we do recommend** :

- to use the fixed differential type for the RH or temperature control, and
- to use the automatic differential for the CO2 control.

**These settings are also the manufacturer default values.**

In both cases, the differential range is always defined through minimum and maximum limits. For ease of display we rather call them the low and high limits of the differential range, the low limit being displayed with a leading “L” and the high limit with an “H”. For instance, a **low limit** of 75 ppm will be displayed as **L 75** and a **high limit** of 700 ppm as **H700**.

NOTE : the low and high limits defined for alarm purpose are fully independent of these differential low and high limits, although we use the same symbols (L and H).

More information about the automatic differential is found on page 26.

More information about the fixed differential is found on page 27.

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iGS-220 CO2, RH and Temperature Controller  
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### Working with an automatic self-adaptive differential : recommended for CO2 control

**The iGS-220 can do better than any electromechanical controller.** If you need to get climate conditions as stable as possible in your room (generating a minimum overshoot above or undershoot below the setpoint), you should let the controller adapt its differential to the natural conditions of the room. As a “room-dependant” device, your iGS-220 will set its differential to the smallest possible value, in order to get the smallest undershoots and overshoots.

**This setting is the differential default setting** for CO2 control. Our self-adaptive differential control method is one of the best on the market today. Should you need to return to this default setting, after changing it, follow the instructions below.

In order to set the self-adaptive differential for CO2 control, you must define the low and high limits, between which the differential will vary automatically until finding the optimized value. The recommended differential range has a **low limit** of 50 ppm (on screen **L 50**) and a **high limit** of 500 ppm (on screen **H500**) :

1. Press the SELECT SENSOR key until [CO2 ppm] light turns on.
2. Press the MODIFY key until [night setpoint] light turns on.
3. Press MODIFY key one more time and maintain it pressed until the [differential] light starts flashing : it takes about 3 seconds.
4. Press the ARROW keys to change the **low limit** (leftmost digit is L).
5. Press MODIFY to see the **high limit** (leftmost digit is H) and the ARROW keys to change it.
6. To exit, press the MODIFY key until all [Modify] lights turn off.

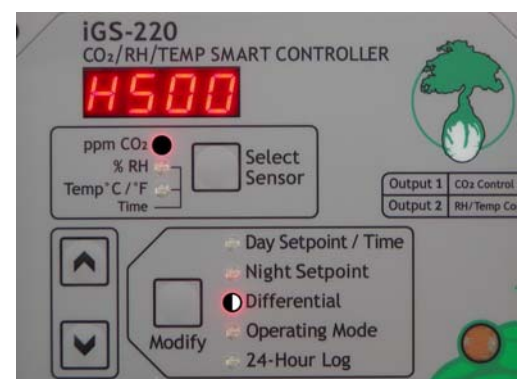
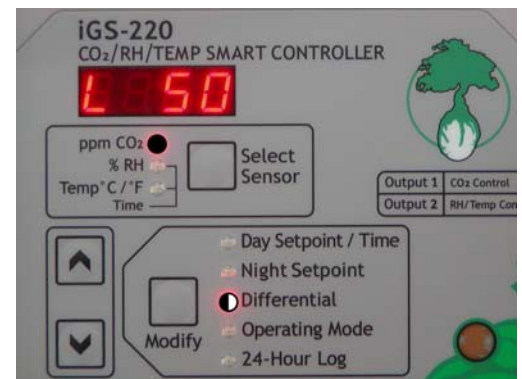
From now on, the controller will vary the differential between these two limits until it reaches the optimized value which causes the smallest overshoot and undershoot with respect to the setpoint.

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iGS-220 CO2, RH and Temperature Controller  
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### Working with a fixed differential : recommended for RH or temperature control

In some types of culture, it may be desirable or even necessary to force your climate conditions to vary between some minimum and maximum values, even though your natural room characteristics would allow you to maintain a more stable value. In this case, you need to operate with a **fixed differential**, which also means that the variation observed in the room are likely to be “**system-dependant**”, not “**room-dependant**”.

To define a fixed differential, you must set the **low and high limits** of the differential range to **equal values**. For instance, if you need to operate with a fixed 10°C differential, you will set both the low and high values to 10.

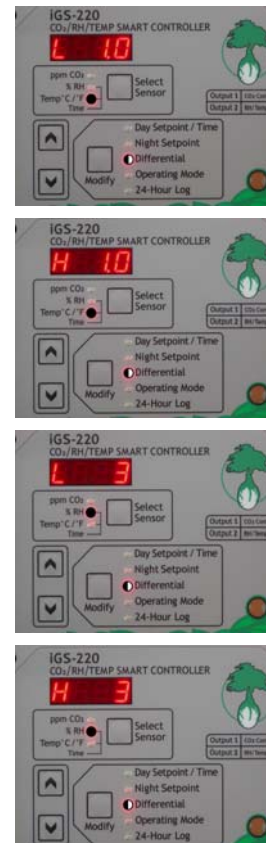
For **temperature control**, the recommended differential range is a **low value** of 1.0°C and also a **high value** of 1.0°C (on screen **L 1.0** and **H 1.0** ).

For **humidity control**, the recommended differential range is a **low value** of 3% and also a **high value** of 3% (on screen **L 3** and **H 3** ).

**Note : a small differential generally means that the equipment will be turned ON and OFF more often; evidently, a larger differential would reduce the number of ON-OFF cycles during the same period of time.**

1. Press the SELECT SENSOR key until [Temp °C/°F] or [%RH] light turns on.
2. Press the MODIFY key until [night setpoint] light turns on.
3. Press MODIFY key one more time and maintain it pressed until the [differential] light starts flashing : it takes about 3 seconds.
4. Press the ARROW keys to change the **low value** (leftmost digit is L).
5. Press MODIFY to see the **high value** (leftmost digit is H) and the ARROW keys to change it.
6. To exit, press the MODIFY key until all [Modify] lights turn off.

For **CO2 control**, fixed differential is not recommended. If you need so, you can do it though. Just repeat the procedure above using the [CO2] light in step 1.



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### Setting the differential offset : above, below or centered on the setpoint.

All electromechanical controllers work with a differential centered on the setpoint. The iGS-220 offers further flexibility providing the capability to set the differential below or above the setpoint. The goal is to improve the performance of the controller in reducing the overshoots and undershoots above or below the setpoint, in order to save money on CO2 gas, or heating/cooling energy costs, etc.

**In most cases you will not need to change the default settings which are :**

- Differential below the setpoint when injecting CO2;
- Differential above the setpoint when venting CO2;
- Differential centered on setpoint when cooling or heating or humidifying or dehumidifying.

**Should you need to change these default settings, we suggest you first talk with one of our representatives at 1-888-577-6274.**

If you need to modify the current differential offset setting, do as follows :

1. Press the SELECT SENSOR key until [ppm CO2] or [Temp °C/°F] or [%RH] light turns on, depending on which output you want to make the modification.
2. Press the MODIFY key until [Day Setpoint / Time] light turns on.
3. Press MODIFY key one more time and maintain it pressed until the [Night Setpoint] light starts flashing : it takes about 3 seconds. Then let go MODIFY key.
4. Press the ARROW keys to select among A (above), B (below) or C (centered).
5. To exit, press the MODIFY key until all [Modify] lights turn off.



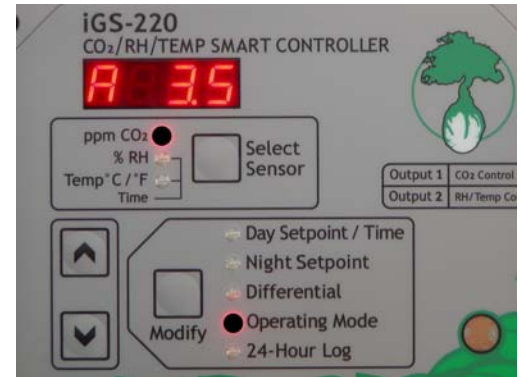
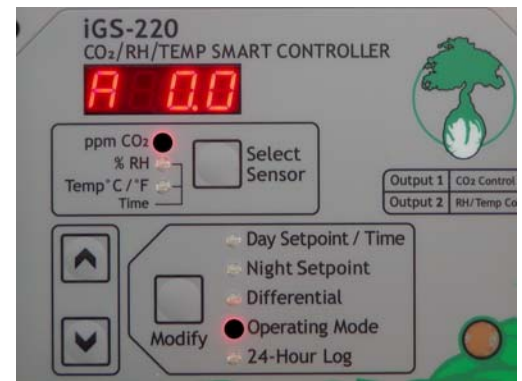
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## 9- CO2 Reading Correction due to Altitude

The measurement of CO2 concentration is slightly influenced by the elevation (or altitude) of your growing room with respect to the sea level. The actual concentration tends to decrease by approximately 3% per 1000-ft increase in altitude, which should not alter significantly the growing of your plants. However, if you want your module to take into account the actual influence of the elevation, please follow this procedure :

1. Press the SELECT SENSOR key until [ppm CO2] light turns on.
2. Press the MODIFY key until [Operating Mode] light turns on.
3. Press MODIFY key one more time; the leftmost digit on screen will be the letter A (for Altitude), followed by the number of thousands feet of altitude currently being considered by the CO2 sensor. For instance, **A0.0** means "0 thousand feet" (or sea level), or **A3.5** means 3 500 feet.
4. Press the ARROW keys to increase or decrease the altitude in step of 500 feet, to a maximum elevation of 9 500 feet (displayed as **A9.5**).
5. To exit, press the MODIFY key until all [Modify] lights turn off.



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## 10- Sensor Calibration

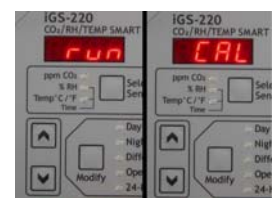
The iGS-220 integrates three climate sensors : a CO2 sensor (or sniffer), a temperature sensor as well as a relative humidity sensor. Each one can be recalibrated separately, with no influence on the two other sensors.

### Do you need to calibrate your CO2 sensor ?

The CO2 sensor is normally calibrated for a defined period of time from 1 to 5 years, depending on the precision you require. **We do recommend recalibrating your CO2 sensor once a year.** In fact, the iGS-220 contains a built-in timer that will elapse after one year, to recall you that time has come to recalibrate. **See Advice # 2 on page 19.**

At all times, you can also verify your CO2 sensor as follows : fresh air is known to contain about 350 to 450 ppm of CO2. Before you start the calibration procedure, we do recommend that you go outside with your module, or at least get as close as possible of any well ventilated window, in order to check whether recalibration is needed or not. **If the CO2 reading is around 400 ppm, you do not need to recalibrate.** However, if your reading is over 600 ppm, we do recommend to follow this step by step procedure.

1. Press the SELECT SENSOR key until [ppm CO2] light turns on.
2. Depress the UP arrow followed by the DOWN arrow, 5 times within a 5-second period. Display will show **CAL** and **CO2** alternately.
3. Press SELECT SENSOR to continue to step 4 or MODIFY to abort calibration.
4. Display will show the ambient CO2 ppm : press UP or DOWN arrows to reach 400 ppm, given your controller is still in a fresh air condition. Press SELECT SENSOR to continue to step 5 or MODIFY to abort calibration.
5. Display will show **CAL** and **Run** alternately to indicate calibration is underway. It may take up to 8 minutes before the sensor resumes operation.
6. When calibration is complete (it may take up to 8 minutes), display shows **CAL** and **Done** alternately. Press any key to exit and restart the module. The Advice Message #2 will be cleared : see page 19 for more details.



More pictures on page 31...

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Do you need to calibrate your relative humidity or temperature sensors ?

The Relative Humidity and Temperature sensors are **factory calibrated**. They should keep their precision throughout their specified lifetime. **We do recommend not recalibrating** these sensors, although they will not be damaged nor deteriorated if you do so. Typically, recalibration of these sensors is only required if you need two sensors on different systems to match. Recalibrating these sensors simply means **adding or subtracting an offset** between the raw value provided by the sensor and the value on screen. This offset will be stored into the battery backed-up system memory until next calibration.



In order to recalibrate any of these sensors, **you will need to get a precision thermostat or humidistat that will become your reference during the calibration process.**

1. Press the SELECT SENSOR key until [% RH] or [Temp. °C/°F] light turns on, in order to select the sensor to calibrate.
2. Depress the UP arrow followed by the DOWN arrow, 5 times within a 5-second period. Display shows either **CAL** and **rH** alternately for humidity sensor, or **CAL** and **Fahr** or **Cels** for temperature sensor.
3. Press SELECT SENSOR to continue to step 4 or MODIFY to abort calibration.
4. Display shows ambient relative humidity or temperature : press UP or DOWN arrows to set the value on screen to the same value read on your reference thermostat or humidistat. Press SELECT SENSOR to continue to step 5 or MODIFY to abort calibration.
5. Display shows **CAL** and **Done** alternately to indicate calibration is complete. Press any key to exit and restart the module.

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## 11- Hints

Why does the system provide hints ?

The iGS-220 already integrates some microprocessor and digital memory technologies. It becomes then very easy and convenient to add such a feature in order to help the grower in assessing the efficiency of his climate control set-up. No electromechanical controller can support this kind of feature, but electronic devices like the iGS-220 can, so take advantage of it !

The hints provide two types of useful information :

- the duty cycle of your equipment, given as a percentage of use
- the stability of the climate conditions in your room

Based on this information, you should be able to work out some solutions to improve the yield of your garden or to reduce the cost associated with climate control. For instance, you may detect :

1. an equipment whose power or capacity is too high or too low for your garden size
2. an equipment whose location is not optimized with respect to climate control
3. an operating mode which is not optimized in regards to your room dynamic and equipment.

Tables 10 and 11 on pages 33 and 34 describe hints associated with each one of the two outputs : a first set of hints for CO2 control on output 1, and second set of hints for relative humidity or temperature control on output 2.

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iGS-220 CO2, RH and Temperature Controller  
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Available hints for CO2 control and their meaning

HINT Code	Description
H-01	CO2 equipment connected to output 1 is ON from 0% to 19% of the time : your burner is efficient or the chosen operating mode is interrupting the CO2 injection : verify 24-Hour log to view the actual CO2 levels in your room in the past 24 hours.
H-02	CO2 equipment connected to output 1 is ON from 20% to 39% of the time
H-03	CO2 equipment connected to output 1 is ON from 40% to 59% of the time
H-04	CO2 equipment connected to output 1 is ON from 60% to 79% of the time
H-05	CO2 equipment connected to output 1 is ON from 80% to 100% of the time : your burner or injector may be too small for your room size. Or some CO2 is being exhausted by the venting fan or other equipment, thus needing to inject quite often or continuously.
H-06	CO2 equipment connected to output 1 has been ON for an abnormally long period of time : <b>check for propane in burner or CO2 gas in injector bottle or defective fan if venting CO2.</b>
H-11	The differential has been set manually to a larger value than what could be reached automatically : the controller could provide a more stable climate, unless you want to maintain this forced differential for any specific purpose ! To improve performance, you should reduce the low limit of the differential range, see instructions on page 27.
H-12	The differential has been set for an optimized control : the controller couldn't do a better job !
H-13	The differential has been set manually to a smaller value than the optimum value : the controller could reduce the overshoots or undershoots around the setpoint if the differential could grow a little more. You should increase the high limit of the differential range, see instructions on page 27.

Table 10

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iGS-220 CO2, RH and Temperature Controller  
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Available hints for RH and temperature control, and their meaning

HINT Code	Description
H-21	RH/Temp equipment (*) connected to output 2 is ON from 0% to 19% of the time : your equipment (*) is very efficient in the control of Relative Humidity (RH) or temperature. Or the chosen operating mode is interrupting Output 2 quite often or continuously : verify 24-Hour log to view the actual RH or temperature levels in your room in the past 24 hours.
H-22	RH/Temp equipment (*) connected to output 2 is ON from 20% to 39% of the time
H-23	RH/Temp equipment (*) connected to output 2 is ON from 40% to 59% of the time
H-24	RH/Temp equipment (*) connected to output 2 is ON from 60% to 79% of the time
H-25	RH/Temp equipment (*) connected to output 2 is ON from 80% to 100% of the time : your equipment (*) may be too small for your room size, or defective, or simply not able to perform to desired setpoint level because of exterior climate or user setting error.
H-26	RH/Temp equipment (*) connected to output 1 has been ON for an abnormally long period of time : <b>check for damaged or defective equipment (*) : heater breaker has tripped, or fan is blocked, or humidifier needs water, or air conditioning needs tuning...</b>
H-31	The differential has been set manually to a larger value than what could be reached automatically : the controller could provide a more stable climate, unless you want to maintain this forced differential for any growing purpose ! To improve performance, you should reduce the low limit of the differential range, see instructions on page 27.
H-32	The differential has been set for an optimized control : the controller couldn't do a better job !
H-33	The differential has been set manually to a smaller value than the optimum value : the controller could reduce the overshoots or undershoots around the setpoint if the differential could grow a little more. You should increase the high limit of the differential range, see instructions on page 27.

Table 11

(\* can be any cooling or heating or humidifying or dehumidifying units.)

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iGS-220 CO2, RH and Temperature Controller  
Revision 1.0

### How can you see the available hints ?

The CO<sub>2</sub>, RH or temperature hints are available only when the controller has been controlling for a minimum period of time. **In fact, the controller has to go through four complete ON-OFF cycles on each output before providing the relevant hints to the user.** The displayed hints are then based on the average behavior of these four control cycles.

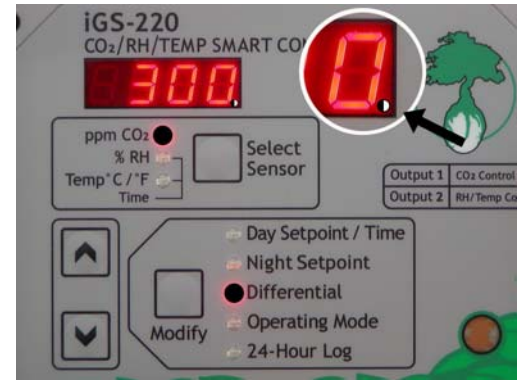
In order to display CO<sub>2</sub> hints (associated with the equipment connected to output 1), follow this step-by-step procedure :

1. Press the SELECT SENSOR key until [ppm CO<sub>2</sub>] light turns on.
2. Press the MODIFY key until [Differential] light turns on. If four ON-OFF cycles have already occurred, the rightmost dot point (RMDP, located at the right bottom corner of the display) will be flashing. If not flashing, no hints are available yet.
3. If RDMP is flashing, press any of the ARROW keys to scroll through the available hint list : the list can be of any length from zero up to six hints displayed in sequence one at a time.

In order to display RH/temp hints (associated with the equipment connected to output 2), follow this step-by-step procedure :

1. Press the SELECT SENSOR key until [% RH] or [Temp. °C/°F] light turns on.
2. same as step 2 above.
3. same as step 3 above.

Take note that hints H-31 to H-33 (see table 11 on page 34) are NOT available when output 2 is configured for cooling and dehumidifying (that is, output 2 operating mode varies from 4-31 to 4-55, as described on page 10).



Do you need assistance ?  
Give us a call at 1-888-577-6274

iGS-220 CO<sub>2</sub>, RH and Temperature Controller  
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## 12- Maintenance and Safety Notice

**Air filter** : we recommend to change the lint air filter located at the bottom right of the iGS-220 enclosure. Keeping this filter free of dust, dirt or debris will improve the controller's work and prolong the product lifetime.

**Day/night sensor** : also keep the photosensor clear of dust, dirt or debris. It is located at the bottom right of the front panel.

**Water splash** : take care in not directing a water jet towards the iGS-220 control box and the iGS-50 output box. These enclosures can withstand light splashing but should not be drenched with water to protect the internal sensor and circuitry and prevent possible electrical hazards.

**Electrical load** : the maximum current allowed for all the devices connected to all 120V outputs should not exceed a **total of 12 Amp.**

### SAFETY NOTICE

**DANGER** : TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, CAREFULLY FOLLOW THESE INSTRUCTIONS.

**1- Output Box Safe Installation** : the iGS-50 must be mounted on a vertical wall using the 4 wood screws provided with the unit. We recommend that the iGS-50 be located at no more than 5 feet from a standard 120V-15A electrical receptacle due to the length of the attached power cord.

**2- Control Box Safe Installation** : the iGS-220 must also be mounted on a vertical wall using 4 wood screws, also provided with the unit. We recommend locating it at the plant level; to obtain a larger distance between the control and output boxes, acquire a standard network cable of no more than 50 feet. We also recommend disconnecting this cable before servicing any module.

**This product complies with CSA 22.2-14 and UL 508A Standards for Canada and United States of America.**



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# 13- Electrical Specifications

## iGS-220 Control Box

Input power	15 Vdc @ 400 mA
Internal fan	Magnetic levitation sleeve bearing, 7 cfm
CO2 sensor range	0-5000 ppm
CO2 sensor precision	+/- 75 ppm
CO2 sensor calibration	Factory calibrated; Also user calibrated once a year, see on page XX
Temperature sensor range	-20°C to +50°C or -4°F to +122°F. To change units, see page XX.
Temperature sensor precision	+/- 1°C or +/- 2°F
Temperature sensor calibration	Factory calibrated, 5 years minimum. See page xx.
RH sensor range	0-100 %
RH sensor precision	+/- 3.5 %
RH sensor calibration	Factory calibrated, 3 years minimum. See page xx.
Front panel	Splash proof keyboard membrane
Alarm dry contact	n.o or n.c., fail safe or standard, 0.6A @ 120Vac or 110Vdc, 2A @ 30Vdc
Operating temperature	0-60°C , 0-95 % non-condensing relative humidity

## iGS-50 Power Box

Input	120V – 60Hz – 15A	
Output voltage	120V – 60Hz	
Output maximum current	<b>Load type</b>	<b>Rating</b>
	General purpose (inductive)	15A total for both duplex receptacles
	Resistive	15A total for both duplex receptacles
	Motor	½ HP total for both duplex receptacles

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## Part 4 : CUSTOMER SERVICE

## iGS-220 User Guide

Page

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	○ Product repair

See also

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13	Part 2 : USEFUL FEATURES
24	Part 3 : ADVANCED FEATURES

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## Product warranty

Nova Biomatique Inc. warrants its **intelligent Growing Systems** controllers and accessories to be free of defects in material and workmanship for a period of one year from the date of the original purchase (proof of purchase needed). The warranty applies only to the original purchaser of the product. The warranty is limited to the repair or replacement, at Nova Biomatique's discretion, of any defective parts of the controller or accessories which are covered by the warranty. The warranty does not cover the following : defects resulting from installation, shipping (insurance is recommended), misuse, negligence or tampering, or improper use.

## Product repairs

Nova Biomatique Inc. will repair the **intelligent Growing Systems** controllers within 10 days of reception at our office. For repairs not covered by the warranty, the customer will be contacted and informed on the cost and delays and will be asked for a verbal approval. Only when the customer agrees to the repairs in question will the controller be repaired. Shipping fees are the customer's responsibility except in the case of a repair covered by the warranty where Nova Biomatique Inc. will assume the return shipping fee only.

To send for repairs or upgrades, you must call for a product return number. This call will insure that we have all the information necessary to properly diagnose your controller and to send it back to you.

Toll free line : 1-888-577-6274  
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