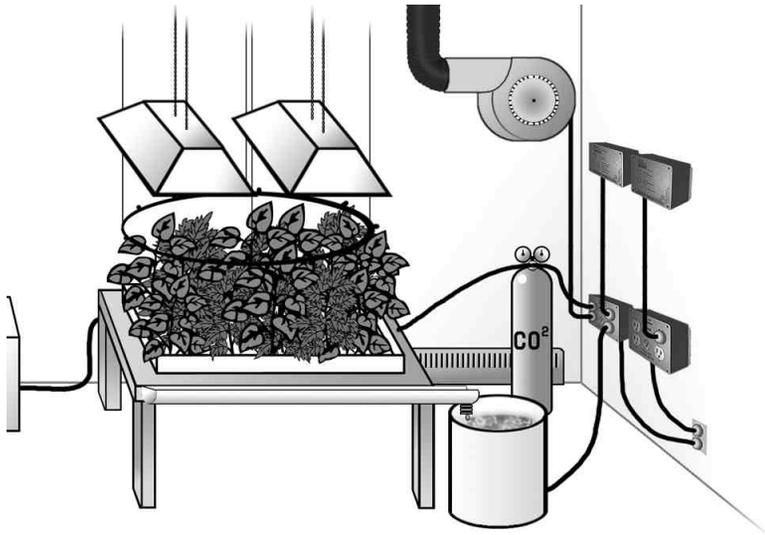


iGS-100



PLUG 'n' GROW

USER
MANUAL



world of smart CO₂ control. We are pleased you have chosen growing Systems iGS-100 product to benefit from the added by CO₂ controlled environments can give you ! Apart from its precision, you will benefit from incorporated smart features which allow you to optimize your CO₂ and climate control.

This manual aims at giving you a quick start and a global overview of the basic functions and configuration options. The second part will provide a detailed explanation on the control loops, configuration and advanced features that the iGS-100 works with.

If you are interested in any comments or suggestions you might have, please contact us, we will be happy to know at the following e-mail : info@novabiotmatique.com .

Contents and description of the iGS-100 CO₂ controller

Tips on proper installation _____

Controller Outputs _____

Output 1 : CO₂ control _____

Output 2 : Auxiliary control _____

Setting operating modes for output 1 and 2 _____

Adjusting Day and Night Setpoint values _____

Display functions _____

Displaying the Dynamic Differential _____

Part-2 More on the iGS-100 CO₂ controller

CO₂ control sequence _____

Dynamic Differential _____

Controller Hints _____

Error Messages _____

CO₂ Sensor calibration _____

Maintenance and warnings _____

iGS-100 Specifications _____

iGS-50 Specifications _____

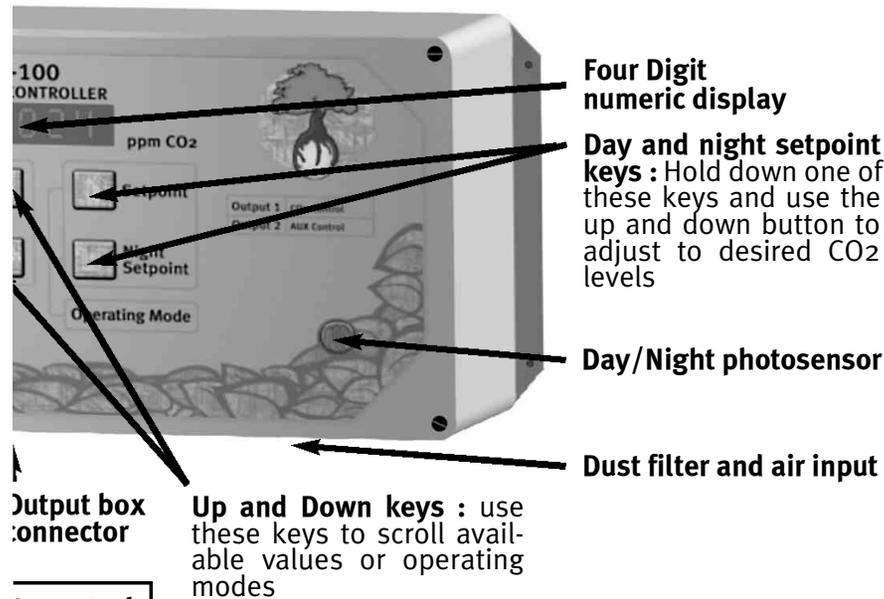
Product warranty _____

Product repairs _____

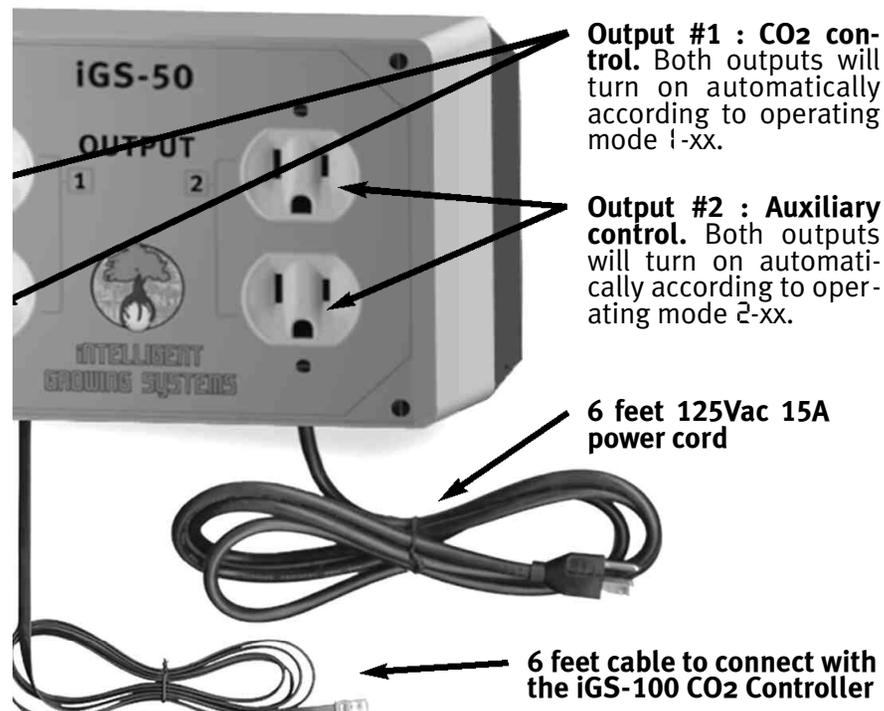
iGS-100 Operating Modes _____

2 smart controller is composed of the following items :

IGS-100 control



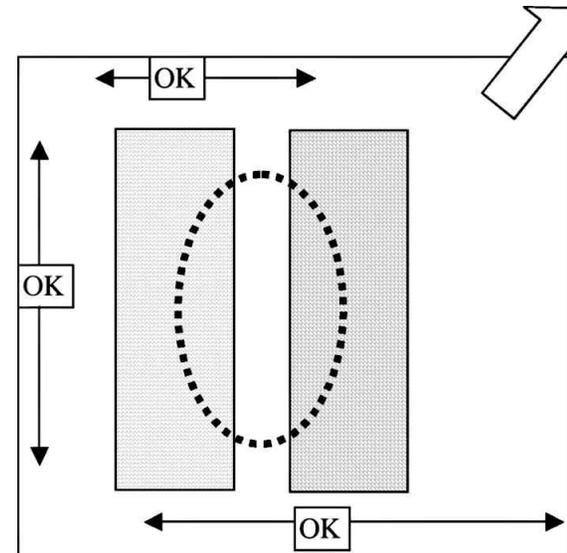
IGS-50 control



uation points or heating/cooling equipment. The control box i an internal fan that speeds up sampling the air. Do not to ex holes to potential sources of moisture or dirt. A lint filter is pieces under the controller. The filter should never be remove

Take care in not exposing the sensor to insufficient light dur light during the desired night cycle.

When fixing the control box take care in not over-tightening tl flap holes. The enclosure is made out of solid ABS plastic bu pression impact with a big screw can crack the enclosure. Ma



wall upon which i output boxes will Take care in not be sures.

Usually the CO2 s in the middle or c whereas the contro right outside of yo

The iGS-50 control anywhere around the out kinking or bindir rection cable.

Once both enclosu installed, plug the cords into a 15 A 1 cal outlet. Then co supplied with the the RJ-45 jack situat enclosure. The con on and warm-up.

Disconnecting th either side will int troller's operatio nected the contro and warm-up the seconds). All opera values entered be ruption will be retr cally from memory.

-  Plant canopy, grow zone
-  Air extraction, exhaust
-  CO2 supply line or zone
-  Favorable control box position

Now that we have done the "Plugging", let's get into the "Gr

ly during the day, the night or day and night. Output 2
 2) benefits from the same choice as for output 1 and offers
 3) functions.

Output 1 : CO2 output control configuration

Output 1, labeled as number “1” performs the functions associated with the
 1) usually if output 1 is configured to reduce CO2 in the air you will
 2) have fan into it. On the other hand if output 1 is configured to
 3) have air you will plug a CO2 generator of some sort in output 1.

Output 1 control loop will:	Code
1) (rich) CO2 during the day only	1-01*
2) (rich) CO2 during the night only	1-02
3) (rich) CO2 day and night	1-03
4) (vent) CO2 during the day only	1-04
5) (vent) CO2 during the night only	1-05
6) (vent) CO2 Day and night	1-06

Default

Operating mode 1-____

2 : Auxiliary output control configuration

Output 2, labeled as number “2” performs control over the auxiliary equip-
 1) ment used when controlling CO2 levels.

Output 2 can be configured to be ON or OFF during the day, the
 1) night (row choices in the table). In any of the latter choices,
 2) output will toggle state when the CO2 output turns ON. The aux-
 3) output returns to normal when the CO2 output turns OFF except if you
 4) have configured an additional delay (5, 10, 15 or 20 minutes, column choices in table)
 5) which the auxiliary output will return to normal (except if another
 6) sequence is in progress).

The auxiliary output to be ON except when the CO2 output is
 1) in OFF sequence. The following table will give you your operating mode.

Output 2 is ON	Additional delay to keep auxiliary output OFF during CO2 sequence				
	0 min.	5 min.	10 min.	15 min.	20 min.
1) (rich) CO2 during the day only	2-01*	2-02	2-03	2-04	2-05

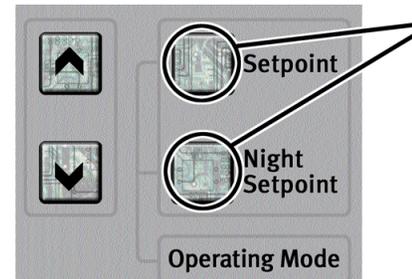
Auxiliary output is OFF during the :	0 min.	5 min.	10 min.	15 min.
Day	2-31	2-32	2-33	2-34
Night	2-41	2-42	2-43	2-44
Day and night	2-51	2-52	2-53	2-54

Note : If the auxiliary output is configured to be OFF during the day
 1) and output is ON, the auxiliary output will always be ON during the night
 2) and OFF during the night except when CO2 output is ON will also force th
 3) to be ON during the daytime.

Operating mode

Setting operating modes for output 1 and 2

Once you have chosen the operating mode associated with th
 1) each output to perform you have to enter it into the controller.



1- Press and hold the SETPOINT
 1) SETPOINT button simultaneously
 2) will show the operating mode
 3) or 3-xx.

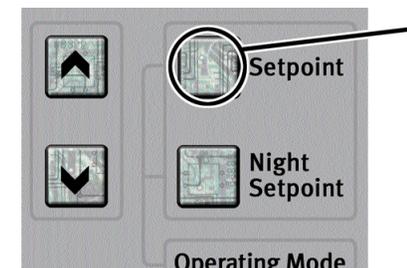
2- Let go of both keys and
 1) simultaneously to toggle bet
 2) mode value (1-xx, 2-xx or 3-xx).

3- To change the value of the
 1) operating mode simply use the UP
 2) and DOWN buttons until the
 3) displayed while maintaining pressure on the both SETPOINT

Once the SETPOINT and NIGHT SETPOINT buttons are relea
 1) returns to showing the actual CO2 reading and the controller
 2) configured behavior within 4 seconds.

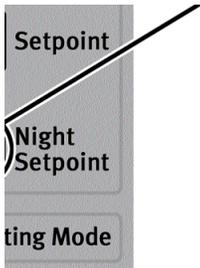
Adjusting day and night setpoint values

Now you can set your target CO2 levels for the daytime and n



1- Press and hold the SETPOINT
 1) the display will show you the
 2) point value.

2- To change that value sim
 1) and DOWN buttons while pr
 2) on SETPOINT button. Hold
 3) DOWN button for more than
 4) increase the speed at which t



1- Holding down the NIGHT SETPOINT and using the UP and DOWN keys will adjust the night setpoint.

When the controller is configured to control CO₂ levels day and night the controller will use the setpoint value during the day and the NIGHT setpoint value during the night even when in day and night modes.

Conditions

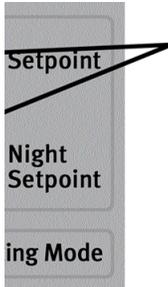
The controller will flash the CO₂ levels displayed when CO₂ venting or enrichment is taking place.

A dot is situated at the bottom right of the rightmost digit is visible, which indicates that the actual CO₂ reading is being displayed.

When the enrichment function is activated (see page 9) the same dot (rightmost digit) will be visible when hint codes are available.

The Dynamic Differential

The Dynamic Differential is the window of operation that the controller will use to optimize setpoint fidelity without provoking annoying repetitive overshoots or undershoots. The value takes approximately 10 minutes of normal operation of your grow room to stabilize. The smaller the Dynamic Differential is, the better the overall grow room equipment. The Dynamic Differential will vary automatically to changes in CO₂ enrichment flow rate, ventilation apparatus, control strategy, and rate of consumption of CO₂ by the garden.



1- In order to display the current Dynamic Differential value, press the UP and DOWN buttons simultaneously.

2- Let go of both keys to switch back to normal display

When the controller is configured to add CO₂ in your grow room, it will activate both slots of output 1 (CO₂ control) when the sensor detects the user defined levels minus the Dynamic Differential. The Dynamic Differential is subtracted to the setpoint to determine at what point the venting process has to stop to attain the actual valid setpoint without undershooting (CO₂ gas moves slowly in your grow room).

When on the other hand the controller is configured to vent the grow room, it will activate both slots of output 1 (CO₂ control) when the sensor detects levels over the user defined setpoint plus the Dynamic Differential. The Dynamic Differential is added to the actual setpoint to determine when to stop the venting process without overshooting.

Dynamic Differential

The iGS-100 CO₂ controller performs its duties according to a dynamic differential adjustment algorithm. The controller will automatically adjust the operational differential when the CO₂ levels overshoot or undershoot the desired setpoint level (or night setpoint during the night). This algorithm adjusts the working parameters of the controller to the conditions in your grow room (CO₂ flowrate, location of venting and CO₂ point, room volume, ...). It can vary between 50 and 1000 ppm. The maximum Dynamic Differential will be the biggest value between the setpoint and 500 ppm. The controller will always aim at not climbing above the used setpoint added with a 50 ppm. In the case of venting, the Dynamic Differential will be subtracted to the setpoint.

If the controller is set to enrich to a level of 2000 ppm, the Dynamic Differential will modify itself until the control sequence reaches 2050 ppm when enriching and 1950 ppm when venting.

On the display simply press on the SETPOINT and the NIGHT SETPOINT simultaneously until the code 3-00 on the display. Without releasing keys press one time on the UP or the DOWN arrow to change the code. The Hint algorithm will start analysing your performance.

Codes (which will only be available after 4 full injection or venting for the blinking rightmost dot on the display) use the UP and DOWN arrow to scroll through available codes. Write them down and check in the manual for more information to properly analyze performance is available on our website www.igrowing.ca (October 2002).

Description of hint code

output is ON from 0 to 19% of the time
output is ON from 20 to 39% of the time
output is ON from 40 to 59% of the time
output is ON from 60 to 79% of the time
output is ON from 80 to 100% of the time
average ON-time for CO ₂ output is four times the average time ON
CO ₂ differential is between 100 and 199 ppm
CO ₂ differential is between 200 and 299 ppm
CO ₂ differential is between 300 and 399 ppm
CO ₂ differential is between 400 and 499 ppm
CO ₂ differential is between 500 and 599 ppm
CO ₂ differential is 600 ppm and up

Diagnoses

To perform its operating functions it will continuously check itself for faults. When a fault is detected the controller will flash an error code every 32 seconds. The following table describes the error codes:

	Conditions to SET	Conditions to RESET
Sensor Overflow	CO ₂ level above 5000 ppm	CO ₂ level below 5000 ppm
Sensor requires new	1 year elapsed since last	User calibration must be

sensor. Whenever the grower has access to a portable calibration (CO₂-Ref), he or she should use it to perform a calibration or

The internal CO₂ sensor can be recalibrated the following way:

- 1- Depress the UP key followed by DOWN key, 5 times within 5 seconds.
- 2- Display shows [CAL] and [CO₂] alternatively: press SETPOINT then NIGHT SETPOINT to abort calibration.
- 3- Display shows current CO₂ level and [CAL]: press UP or DOWN to set this value with the real value (CO₂-Ref), then press SETPOINT then NIGHT SETPOINT to abort calibration.
- 4- If SETPOINT was depressed, display shows [CAL RUN] to indicate calibration is underway. It may take up to 8 minutes before the sensor is ready.
- 5- When calibration is complete, display shows [CAL DONE]. Press any key to exit and resume normal operation. The timer associated to ERR1 is reset to 1 year and ERR2 display is cleared.

Maintenance and warnings

The controller needs a change or clean of the lint air filter situated at the bottom of the controller enclosure. Keeping the filter free of debris is essential for the controller's work and prolong the products lifetime.

Keep the photo-sensor clear of debris or dirt.

Take care in not directing a water jet towards the control box (input/output box (iGS-50)). These enclosures can withstand light rain but should not be drenched with water to protect the internal sensor and prevent possible electrical hazards.

The maximum current allowed for all the devices connected to the controller should never exceed a total of 12A.

iGS-100 Specifications

Input	:	15 VDC 400mA
Internal Fan	:	3-5 cfm (with lint filter)
CO ₂ sensor range	:	0-5000 ppm
CO ₂ sensor precision	:	±75 ppm
CO ₂ sensor calibration	:	factory calibrated,

2 max load : 12 A
 1 and 2 max load : 12 A
 ng temperature : 0-60° C, 0-95% (non-condensing)
 smart controller is CSA SPE1000 compliant and has been cer-
 / ITS (Intertek Testing Services).

Warranty

we inc. warrants their “*intelligent Growing System*” controllers to be free of defects in material and workmanship for a period of 5 years from the date of original purchase (proof of purchase needed). This warranty applies only to the original purchaser of the product. The warranty covers the repair or replacement, at Nova Biomatique’s discretion, of the controller or accessories which are covered by the warranty. This warranty does not cover the following : defects resulting from shipping (insurance is recommended), misuse, negligence or improper use.

Repairs

we inc. will repair the “*intelligent Growing Systems*” controllers if they are returned to our offices. For repairs not covered by the warranty, you will be contacted and informed on the cost and delays and you will need a verbal approval. Only when the customer agrees to the repair, we will repair the controller. Shipping fees are the customer’s responsibility except in the case of a repair covered by the warranty. Nova Biomatique inc. will assume the return shipping fees only.

For repairs or upgrades, you must call for a product return number. Please ensure that we have all the information necessary to properly repair the controller and to send it back to you.

1-888-577-6274

Nova Biomatique

1000 Industrielle, La Pocatière,

Québec, G0R 1Z0

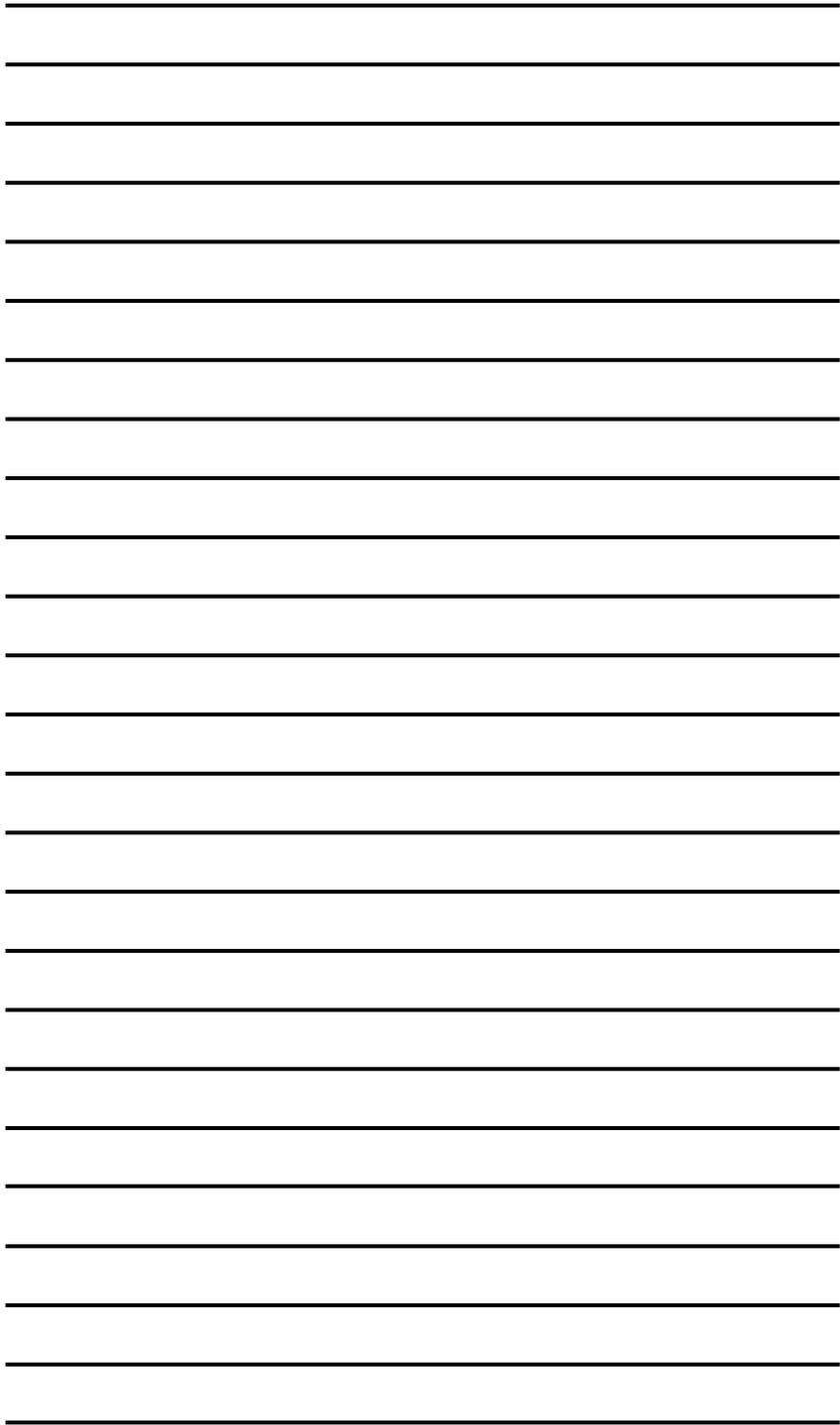
www.novabio.com

		Output 1		Output 2	
1-xx		2-xx			
01	Day enrichment	0	ON day	1	OFF during
02	Night enrichment		(always OFF during night)	2	OFF during
03	24Hrs enrichment			3	OFF during
04	Day venting			4	OFF during
05	Night Venting			5	OFF during
06	24Hrs venting	1	ON night	1	OFF during
			(always OFF during day)	2	OFF during
				3	OFF during
				4	OFF during
				5	OFF during
		2	ON 24Hrs	1	OFF during
				2	OFF during
				3	OFF during
				4	OFF during
				5	OFF during
		3	OFF day	1	ON during
			(always ON during night)	2	ON during
				3	ON during
				4	ON during
				5	ON during
		4	OFF night	1	ON during
			(always ON during day)	2	ON during
				3	ON during
				4	ON during
				5	ON during
		5	OFF 24Hrs	1	ON during
				2	ON during
				3	ON during
				4	ON during
				5	ON during

Note:

1- Compose the operating mode 1-xx with the number in the

2- Compose the operating mode 2-xx with the number in the





Printed in Canada © &™ Nova Biomatique Inc.