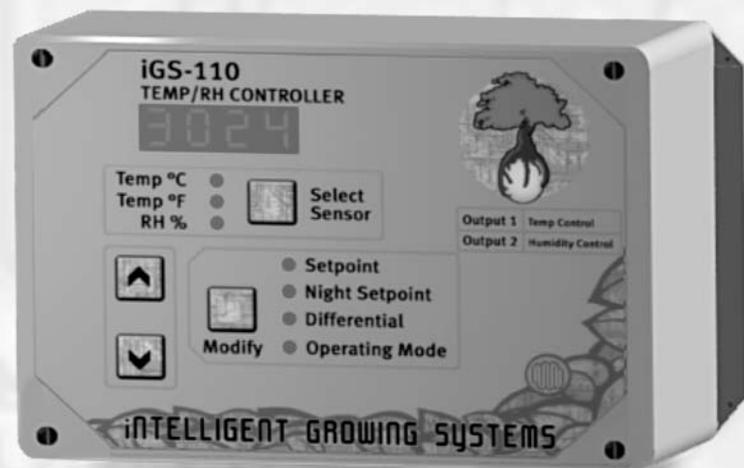


iNTELLIGENT GROWING SYSTEMS™

iGS-110



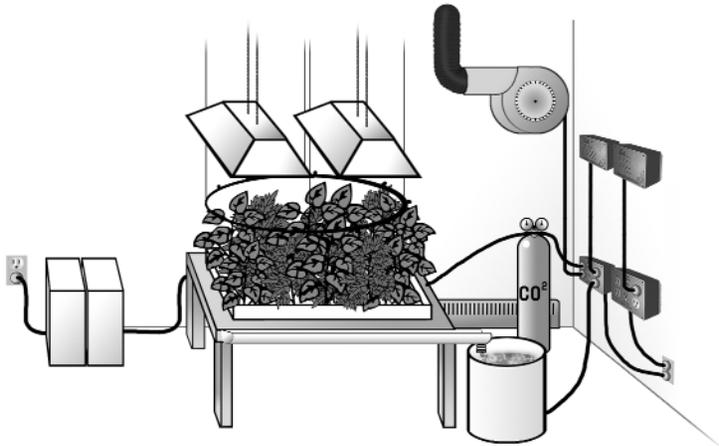
PLUG 'n' GROW

USER
MANUAL

www.igrowing.ca

Manufactured in Canada by : Nova Biomatique Inc. T: [418] 856-6274 F: [418] 856-6239
info@novabiomatique.com

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Welcome to the world of smart climate control. We are pleased you have chosen the **intelligent Growing Systems** iGS-110 product to benefit from the added yield and quality climate controlled environments can give you! Apart from its reliability and precision, you will benefit from incorporated smart features that will work with you to optimize your climate control.

The first part of this manual aims at giving you a quick start and a global overview of all basic functions and configuration options. The second part will give you a more detailed explanation on the control loops, configuration options and smart features that the iGS-110 works with.

We are always interested in any comments or suggestions you might have. Feel free to let us know at the following e-mail: info@novabiotmatique.com.

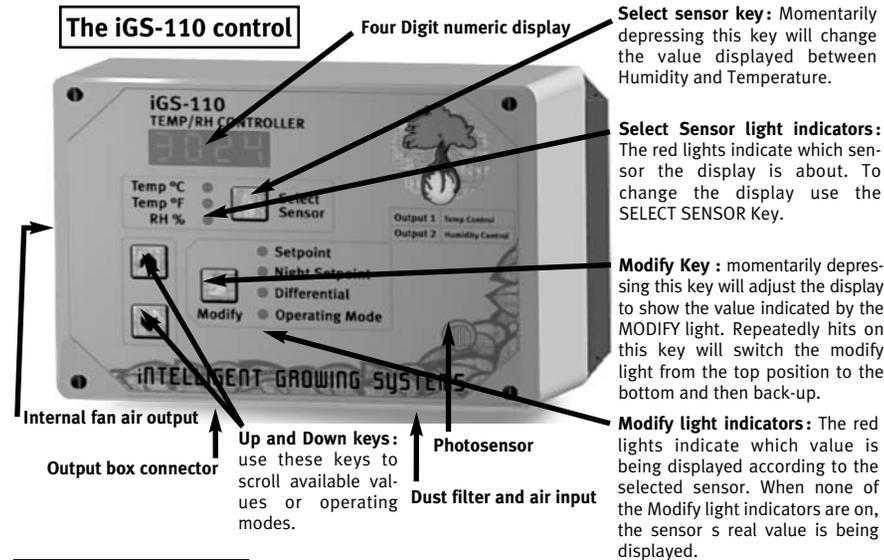
THE EQUIPMENT(S) PLUGGED TO THE IGS-25 OUTLETS AND CONTROLLED BY THE IGS-110 MUST HAVE THEIR OWN OVERHEATING PROTECTION BREAKER OR APPROPRIATE DEVICE

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PART-1 SETTING UP THE CONTROLLER

Contents and description of the iGS-110 Temp/RH controller

The iGS-110 Temp/RH smart controller is composed of the following items:



iGS-25 Output box



The iGS-Ad1 AC adapter powers the controller's electronics. It must be plugged into the connector on the iGS-25's left side.

- Output #1: Temperature control.** will turn on automatically according to operating mode 1-xx.
- Output #2: Humidity control.** will turn on automatically according to operating mode 2-xx.

6 feet cable to connect with the iGS-110 Temp/RH Controller

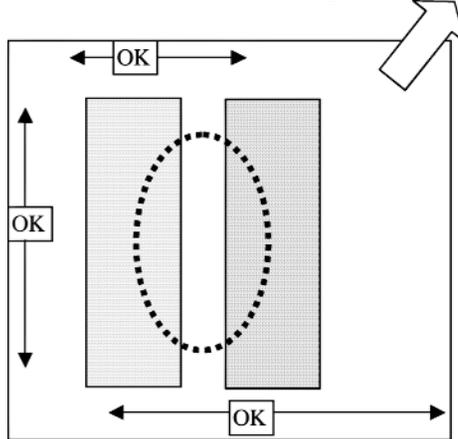
The product is completed by this user manual and a complimentary **intelligent Growing Systems** user sticker.

Tips on proper installation

The iGS-110 temperature/humidity control box should be placed as close as possible to the plant canopy where light can be sensed by the photosensor. Taking care not to expose the controller too close to the air evacuation points, heating/cooling and humidity management equipment. The control box is equipped with an internal fan that speeds up sampling the air. Do not expose these vent holes to potential sources of moisture or dirt. A lint filter is held by Velcro pieces under the controller. The filter should never be removed indefinitely.

Take care in not exposing the photosensor to insufficient light during the day and light during the desired night cycle.

When fixing the control (iGS-110) and output (iGS-25) box, take care in not over-tightening the screws in the flap holes. The enclosure is made out of solid ABS plastic but a strong compression impact with a big screw can crack the enclosure.



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

the wall upon which the control and output boxes will be fixed is flat. Take care in not bending the enclosures.

The iGS-25 output Box can be fixed anywhere around the control box without kinking or binding the 6 feet connection cable.

Once both enclosures are properly installed, plug the 120 Volts power cords into a 15 A 120 Volts electrical outlet. Then connect the cable supplied with the controller into the RJ-45 jack situated under each enclosure (control and output box). The controller will turn-on and warm-up.

Disconnecting the cable from either side will interrupt the controller's operation. Once reconnected the controller will reboot. All operating modes and values entered before the interruption will be retrieved automatically from memory.

Also refer to the safety notice on page 12.

THE EQUIPMENT(S) PLUGGED TO THE IGS-25 OUTLETS AND CONTROLLED BY THE IGS-015 MUST HAVE THEIR OWN OVERHEATING PROTECTION BREAKER OR APPROPRIATE DEVICE

Controller outputs

It is now important to configure the controller's two(2) independent outputs according to the grower's objectives. Output 1 (temperature control) can perform heating or cooling during the day, the night or day and night. Output 2 (humidity control) can humidify or dehumidify also during the day, the night or day and night. Both outputs also offer timer associated functions.

Output 1 : Temperature output control configuration.

The output labeled as number 1 performs the functions associated with the temperature control. Usually, if output 1 is configured to heat your grow room, you will plug a heater into the outlet 1. On the other hand, if output 1 is configured to cool your room, you will plug a cooling unit into it.

The temperature output can also be configured to be independent or dependent of the humidity output. When independent, output 1 will control the heater-cooler without considering the actual humidity output status. When dependent, the temperature output will control the heater-cooler only when the humidity output is OFF; when an additional delay is selected (see the table below), the temperature output will be able to turn ON only 5 or 10 minutes after the humidity output just turned OFF.

Type of control	Output 1 (Temp) is independent of RH control		Output 1 (Temp) turns OFF while RH output is ON		
	Additional OFF delay →		0 min.	5 min.	10 min.
Heating	Day only	1-04	1-01	1-02	1-03
	Night only	1-14	1-11	1-12	1-13
	Day and night	1-24	1-21	1-22	1-23
Cooling	Day only	1-34	1-31	1-32	1-33
	Night only	1-44	1-41	1-42	1-43
	Day and night	1-54*	1-51	1-52	1-53

* Factory default

Operating mode 1- ____

Output 2 : Humidity output control configuration.

The output labeled as number 2 performs control over the humidity management equipment that can be used when controlling relative humidity levels in your grow room.

As for the temperature output, the humidity output can also be configured to be independent or dependent of the temperature output. When independent, output 2 will control the humidity management equipment without considering the actual heater-cooler status. When dependent, the humidity sensor will control its output only when the temperature output is OFF; once again, when an additional delay is selected (see the table below), the humidity output will be able to turn ON only 5 or 10 minutes after the temperature output just turned OFF.

Type of control	Output 2 (RH) is independent of Temp control		Output 2 (RH) turns OFF while Temp output is ON		
	Additional OFF delay →		0 min.	5 min.	10 min.
Humidify	Day only	2-04	2-01	2-02	2-03
	Night only	2-14	2-11	2-12	2-13
	Day and night	2-24	2-21	2-22	2-23
Dehumidify	Day only	2-34	2-31	2-32	2-33
	Night only	2-44	2-41	2-42	2-43
	Day and night	2-54*	2-51	2-52	2-53

* Factory default

Operating mode 2- ____

Output 1 : mixed control

Output 1 can also perform a mixed type of control that can be used to cool and dehumidify your grow room. For more details, refer to section Combined Temperature and Humidity Control Sequence on page 9.

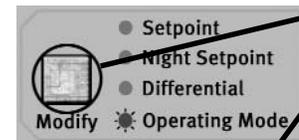
Type of control	Output 1 independent of Output 2	
Cooling and Dehumidifying	Day only	1-61
	Night only	1-62
	Day and Night	1-63

Operating mode 1- ____

Setting operating modes for output 1 and 2

Once you have chosen the operating mode associated with the role you want each output to perform you have to enter it into the controller.

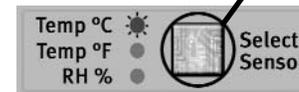
Temperature control operating mode :



1- Depress repeatedly if necessary the MODIFY key until operating mode light turns ON.

2- Depress repeatedly if necessary the SELECT SENSOR key until the Temp °C or Temp °F indicator light turns ON. The display will show the configuration value 1-04.

3- To change the value of the temperature operating mode, simply use the UP and DOWN keys until the desired code is displayed.



Temperature control operating mode :

1- Depress repeatedly if necessary the MODIFY key until operating mode light turns ON.

2- Depress repeatedly if necessary SELECT SENSOR key until the %RH indicator light turns on.

3- The display will show the configuration value 2-04.

4- To change the value of the temperature control configuration code, simply use the UP and DOWN keys until the desired code is displayed.



Selecting the temperature units

The iGS-110 is able to display the current temperature, setpoint and logged data values either in Celsius (°C) or Fahrenheit (°F). The user selected units will be maintained even if the controller is turned OFF and ON again, as well as all other user settings.

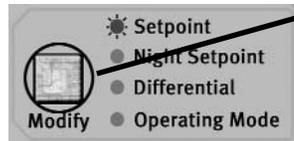
The procedure below will allow the user to select his preferred temperature units (default is °C). Once selected, the actual temperature will still be displayed either in °C or °F at all times, as selected by the SELECT SENSOR key; however, all MODIFY functions will be available only when the user preferred unit light (Temp °C or Temp °F) is ON, as chosen by the SELECT SENSOR key. To change the temperature units:

To set the iGS-110 to Celsius, depress the SELECT SENSOR key until the TEMP °C light is ON, and make sure that all MODIFY lights are OFF. Then keep the MODIFY key depressed for 3 seconds until you see [CELS] on the display. You can then release the key and the iGS-110 will resume operation displaying all temperature values in Celsius.

To set the iGS-110 to Fahrenheit, depress the SELECT SENSOR key until the TEMP °F light is ON, and make sure that all MODIFY lights are OFF. Then keep the MODIFY key depressed for 3 seconds until you see [FAHR] on the display. You can then release the key and the iGS-110 will resume operation displaying all temperature values in Fahrenheit.

Adjusting day and night setpoint values

To set your target Temp and RH levels for the daytime:

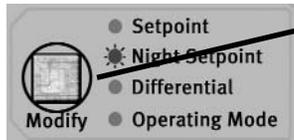


1- Depress repeatedly if necessary the MODIFY key until the SETPOINT light comes on. The SETPOINT value will be displayed according to which sensor is selected (use the SENSOR SELECT key).

2- To change that value, simply use the UP and DOWN keys.

Holding the UP or DOWN button for more than 4 seconds will increase the speed at which the value will be modified.

To set your target Temp and RH levels for the night:



1- Depress repeatedly if necessary the MODIFY key until the NIGHT SETPOINT light indicator turns on. The night setpoint value will be displayed according to which sensor is selected (use the SENSOR SELECT key).

2- Use the UP and DOWN keys to change the current NIGHT SETPOINT value.

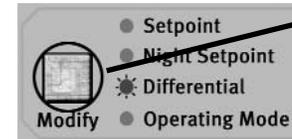
Setpoints adjustments for temperature control is adjusted through 0.5 °C/1.0 °F increments. Going over 50 °C/ 122 °F will rollover the display to - 20 °C/-4 °F.

Display functions

The controller will flash the temperature (output 1) or relative humidity (output 2) readings on the display when their respective output is activated.

Displaying the Dynamic Differential

The Dynamic Differential is the window of operation that the controller will have chosen to optimize setpoint fidelity without provoking annoying repetitive switching or setpoint over and undershoots. The value takes approximately a full day of normal operation of your grow room to stabilize. The smaller your Dynamic Differential is, the better the overall grow room equipment is tuned. The Dynamic Differential will vary automatically to change upon room sizes, heater-cooler power and location, ventilation apparatus, control sequence and room insulation.



1- In order to display the current Dynamic Differential for each controlled output (Temperature and Relative humidity), depress repeatedly if necessary the MODIFY key until the Differential light turns ON.

The controller will display the Temp Differential if any Temp sensor is selected and the Relative humidity differential if the Humidity sensor is chosen (use SENSOR SELECT key).

When you chose the controller to control RH or Temp 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.

PART-2 MORE ON THE iGS-110

Temperature Control sequence

When the controller is configured heat your grow room, it will activate both slots of output 1 (Temp control) when the sensor detects levels under the user defined levels minus the Dynamic Differential. The Dynamic Differential is subtracted to the setpoint to determine at what level the heating equipment has to stop to attain the actual valid setpoint without over or undershooting (warm air might move slowly in your grow room).

When on the other hand the controller is configured to cool down your grow room, it will activate both slots of output 1 (Temp control) when the sensor detects levels over the user defined setpoint plus the Dynamic Differential. The Dynamic Differential is added to the actual valid setpoint to determine when to stop the cooling equipment without under or overshooting.

Humidity control sequence

The humidity control loop uses the same algorithm has the Temp control loop. If configured to dehumidify, the controller will activate output 2 whenever the relative temperature rises over the user setpoint plus the Dynamic differential value. If configured to humidify, the controller will activate output 2 whenever the relative temperature falls below the user setpoint minus the Temp Dynamic Differential.

Keep in mind that if a special timer delay or priority mode was selected (see output 1 and 2 operating modes) the outputs will respond according to the operating mode (extra OFF timer delay, Temp or RH output priority).

Mixed Temperature and Humidity Control Sequence

Cooling and dehumidifying is often performed simultaneously by the same venting equipment. You can select this combined mode by setting one of the following Control Mode numbers for Output 1:

- 1-61 Day Cooling and Dehumidifying
- 1-62 Night Cooling and Dehumidifying
- 1-63 24 H Cooling and Dehumidifying

When any Cooling and Dehumidifying mode is used, the Output 1 will activate the equipment as soon as the temperature is above the temperature setpoint **OR** the humidity is above the humidity setpoint. However, the Output 1 will not be deactivated until both conditions have been reached, that is, until the temperature and the humidity are below their respective setpoint.

When using any of these 3 modes, take note that the Output 2 will then be forced to operate **independently** of the Output 1, thus forcing its Control Mode number to either 2-04, 2-14, 2-24, 2-34, 2-44 or 2-54. For instance, if Output 2 Control Mode number prior to change was 2-22, then the forced mode will be 2-24; or if it was 2-41, it will be forced to 2-44: in short only the last digit will be forced to 4. Refer to pages 13 and 14 of the User manual to see the complete list of the available Control Mode numbers.

Also take note that the humidity setpoint will be the same for Output 1 and Output 2. For instance, if you want to perform a 2-stage 24-hour Dehumidifying setup, you must connect one fan in each output and set your Output 1 to mode 1-63 (Cooling and Dehumidifying 24 H) and Output 2 to mode 2-54 (Dehumidifying 24 H). Then, only Output 1 fan will be on when it's too hot, and both fans will be on when it's too humid.

In a second example, you may need to connect a fan in Output 1 and a humidifier in Output 2. By selecting the operating modes 1-63 (Cooling and Dehumidifying 24 H) and 2-24 (Humidifying 24 H), the iGS-110 will activate the fan when it's too hot or too humid. However, if you reach a condition where it's too hot and too dry, the Output 1 fan will take care to cool the room, while Output 2 will take care to humidify it.

Dynamic Differential

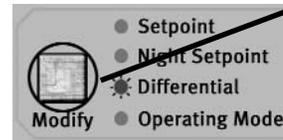
The iGS-110 controller performs its duties according to a special dynamic differential adjustment algorithm.

The controller will automatically adjust the operational differential when the Temp levels overshoot or undershoot the desired setpoint level (or night setpoint during the night). This dynamic algorithm adjusts the working parameters of the controller to the reality found in your grow room. It can vary between 1 C and 10 C/2 F and 18 F (actually the maximum Dynamic Differential will be the biggest value between 20% of the setpoint or 10 C/18 F). The controller will always aim at not climbing higher than the used setpoint added with a 1 C/2 F. In the case of cooling, the 1 C/2 F will be subtracted to the setpoint. When controlling temperature levels, the controller will apply the same algorithm. In this case, the Dynamic Differential will vary between 3 and 20% over the entire Relative Humidity range (0-100%).

If the controller is set to heat the room at 20 C, the Dynamic Differential will modify itself until the control sequence never overshoots 21 C when heating and undershoots 19 C when cooling.

Controller hints

The controller can display hints that help the grower in assessing the efficiency of his climate control set-up.



- 1- To view the Hint codes depress, repeatedly if necessary, the MODIFY key until the DIFFERENTIAL light turns ON.
- 2- Choose which sensor hint codes you desire by depressing the SENSOR SELECT key (Temp or RH).
- 3- Use the UP and DOWN keys to toggles between hint codes.

Note: The hint codes will only be available after 4 full control cycles, (watch for the blinking rightmost dot on the display).

Write them down and check in the next table. More information to properly analyze performance is available on the following web site www.igrowing.ca (October 2002).

Hint #	Description of TEMP hint codes
H-01	TEMP output is ON from 0 to 19% of the time
H-02	TEMP output is ON from 20 to 39% of the time
H-03	TEMP output is ON from 40 to 59% of the time
H-04	TEMP output is ON from 60 to 79% of the time
H-05	TEMP output is ON from 80 to 100% of the time
H-06	Current ON-time for TEMP output is at least 4 times the average ON-time
H-11	Total differential is between 2.0 C and 2.9 C (3.8 F and 5.2 F)
H-12	Total differential is between 3.0 C and 4.4 C (5.6 F and 7.9 F)
H-13	Total differential is between 4.5 C and 5.9 C (8.0 F and 10.6 F)
H-14	Total differential is between 6.0 C and 7.4 C (10.7 F and 13.3 F)
H-15	Total differential is between 7.5 C and 8.9 C (13.4 F and 16.0 F)
H-16	Total differential is 9 C and up (16.1 F and up)

Note: The total differential equals the Dynamic Differential plus 1 C/2 F.

Hint #	Description of RH hint codes
H-21	RH output is ON from 0 to 19% of the time
H-22	RH output is ON from 20 to 39% of the time
H-23	RH output is ON from 40 to 59% of the time
H-24	RH output is ON from 60 to 79% of the time
H-25	RH output is ON from 80 to 100% of the time
H-26	Current ON-time for RH output is at least 4 times the average ON-time
H-31	Total differential is 5% or better
H-32	Total differential is between 6% and 8%
H-33	Total differential is between 9% and 11%
H-34	Total differential is between 12% and 14%
H-35	Total differential is between 15% and 17%
H-36	Total differential is 18% and up

Note: The total differential equals the Dynamic Differential plus 1%.

Error Messages

As the controller performs its operating functions it will continuously check itself for system faults. When a fault is detected the controller will flash an error code at least once every 32 seconds. The following table describes the error codes :

Error #	Name	Conditions to SET	Conditions to RESET
4	Climate Sensor malfunction	Climate sensor is out of order	Climate sensor resumed operation

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 will improve 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 (iGS-110) and the output box (iGS-50). 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.

The maximum current allowed for all the devices connected to all 120 V outlets should never exceed a total of 12A.

iGS-110 Specifications

Input	:	15 VDC 400mA
Internal Fan	:	3-5 cfm (with lint filter)
Temperature range	:	-20 C to 50 C/-4 F to 122 F
Temperature precision	:	-1 C/-2 F
Temperature calibration	:	factory calibrated, 5 year
RH range	:	0-100%
RH precision	:	-3.5%
RH calibration	:	factory calibrated, 3-5 years
Front Panel	:	Splashproof keyboard membrane
Operating temperature	:	0-60 C, 0-95% (non-condensing)

iGS-50 Specifications

Input	:	120V 60 Hz 15 A
Output Voltage	:	120V 60 Hz
Output Maximum Current :		

Load Type	Current Rating
General purpose (inductive)	15 A total for both duplex receptacles
Resistive	15 A total for both duplex receptacles
Motor	1/2 HP total for both duplex receptacles

Safety Notice

IMPORTANT SAFETY INSTRUCTIONS



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

Output Box Safe Installation

The iGS-50 Output Box must be mounted on a vertical wall using 4 wood screws provided with the unit. We recommend that the Output Box be located at no more than 5 feet from a standard 125 V 15A electrical receptacle due to the length of the attached power cord.

Control Box Safe Installation

The iGS Control Box (iGS-1X0 and iGS-2X0 Series) must also be mounted on a vertical wall using 4 wood screws provided with the unit. We recommend that the Control Box be located at the eye level at no more than 6 feet from the Output Box due to the length of the included interconnection cable. We also recommend to disconnect the cable between both boxes before servicing.

Product warranty

Nova Biomatique inc. warrants their **intelligent Growing Systems** controllers and accessories to be free of defects in material and workmanship for a period of 3 years from the date of 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 part 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 offices. 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 responsibility except in the case of a repair covered by the warranty where Nova Biomatique inc. will assume the return shipping fees 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

Nova Biomatique
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Quebec, Canada, G0R 1Z0
info@novabiotatique.com

iGS-110 Operating Modes

Temperature Control Modes Control mode number is 1- TT

	TT	
Day Heatstat	01	Turn TEMP output OFF while RH is ON
	02	Turn TEMP output OFF while RH is ON + 5 min.
	03	Turn TEMP output OFF while RH is ON + 10 min.
	04	TEMP output is fully independent of RH control
Night Heatstat	11	Turn TEMP output OFF while RH is ON
	12	Turn TEMP output OFF while RH is ON + 5 min.
	13	Turn TEMP output OFF while RH is ON + 10 min.
	14	TEMP output is fully independent of RH control
24 H Heatstat	21	Turn TEMP output OFF while RH is ON
	22	Turn TEMP output OFF while RH is ON + 5 min.
	23	Turn TEMP output OFF while RH is ON + 10 min.
	24	TEMP output is fully independent of RH control
Day Coolstat	31	Turn TEMP output OFF while RH is ON
	32	Turn TEMP output OFF while RH is ON + 5 min.
	33	Turn TEMP output OFF while RH is ON + 10 min.
	34	TEMP output is fully independent of RH control
Night Coolstat	41	Turn TEMP output OFF while RH is ON
	42	Turn TEMP output OFF while RH is ON + 5 min.
	43	Turn TEMP output OFF while RH is ON + 10 min.
	44	TEMP output is fully independent of RH control
24H Coolstat	51	Turn TEMP output OFF while RH is ON
	52	Turn TEMP output OFF while RH is ON + 5 min.
	53	Turn TEMP output OFF while RH is ON + 10 min.
	54	TEMP output is fully independent of RH control
Coolstat and Dehumidifier	61	Day
	62	Night
	63	Day and night

Relative Humidity Control Modes Control mode number is 2- HH

	HH		
Day Humidifier	01	Turn RH output OFF while TEMP is ON	
	02	Turn RH output OFF while TEMP is ON + 5 min.	
	03	Turn RH output OFF while TEMP is ON + 10 min.	
	04	RH output is fully independent of TEMP control	
Night Humidifier	11	Turn RH output OFF while TEMP is ON	
	12	Turn RH output OFF while TEMP is ON + 5 min.	
	13	Turn RH output OFF while TEMP is ON + 10 min.	
	14	RH output is fully independent of TEMP control	
24H Humidifier	21	Turn RH output OFF while TEMP is ON	
	22	Turn RH output OFF while TEMP is ON + 5 min.	
	23	Turn RH output OFF while TEMP is ON + 10 min.	
24	24	RH output is fully independent of TEMP control	
	Day Dehumidifier	31	Turn RH output OFF while TEMP is ON
		32	Turn RH output OFF while TEMP is ON + 5 min.
33		Turn RH output OFF while TEMP is ON + 10 min.	
24	34	RH output is fully independent of TEMP control	
	Night Dehumidifier	41	Turn RH output OFF while TEMP is ON
		42	Turn RH output OFF while TEMP is ON + 5 min.
43		Turn RH output OFF while TEMP is ON + 10 min.	
44		RH output is fully independent of TEMP control	
24H Dehumidifier	51	Turn RH output OFF while TEMP is ON	
	52	Turn RH output OFF while TEMP is ON + 5 min.	
	53	Turn RH output OFF while TEMP is ON + 10 min.	
	54	RH output is fully independent of TEMP control	

Notes:

1- When Temp Control Mode is 1-x4 (eg. 1-04 or 1-14 or 1-54) and RH Control Mode is 2-x4 (eg. 2-24 or 2-44), then both outputs can be activated simultaneously and independently.

2- When Temp Control Mode is 1-x4 and RH Control Mode is different from 2-x4, then Temp output is given the highest priority and will turn the RH output OFF whenever Temp control is required.

3- When RH Control Mode is 2-x4 and Temp Control Mode is different from 1-x4, then RH output is given the highest priority and will turn the Temp output OFF whenever RH control is required.

4- When both Control Modes are different from 1-x4 or 2-x4, then both outputs are given the same low priority, meaning that only one output can be activated at a time on a first need/first served basis.



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