

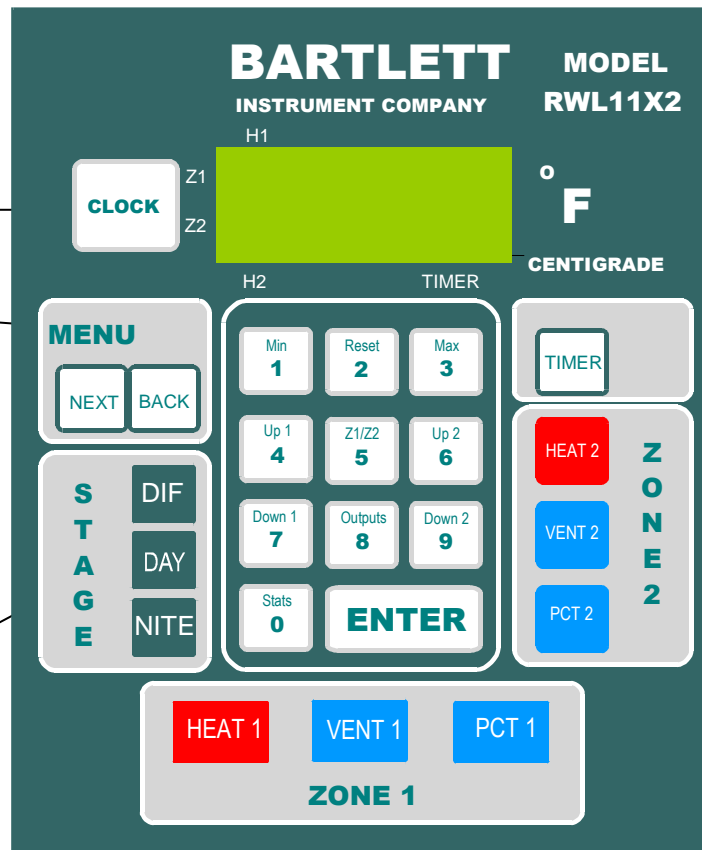
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Front Panel Description

MENU INCLUDES:

- rSet** – Reset changes all “ON” outputs to “AUTO”
- tHrS** – Proportional Output Threshold Time
- CHFC** – Select °F or °C
- Id** – Select ID# for **CIS (COMPUTER INTERFACE SYSTEM)**
- OtOA** – Set time to reset “ON” outputs back to “AUTO”
- dELA** – Delay sets time delay between the transition from heat to cool or from cool to heat
- dEFt** – Defaults resets DIF, DAY, and NITE back to default settings
- HYS** – Hysteresis settings for tightness of control
- ALAR** – Enter temperatures for High and Low alarm
- 1Or2** – Select 1 or 2-zone mode
- FAIL** – Selects if thermistor failure triggers heat cycling or outputs off.
- FULL** – Selects the full open time length for proportional outputs.
- Hu** – Set humidity set point for the house
- HuM** – Select to display current humidity in the house.
- RuNT** – View appliance run times

Set time on 24-hour clock



Timer for Mister operations and Timer operations

Set ZONE 2 steps to ON, OFF, or Auto and change step size and percents.

Set ZONE 1 steps to ON, OFF, or Auto and change step size and percents.

Set START TIME AND TARGET TEMPERATURE for each STAGE

NITE (CONT.)

DAY

NITE

DIF

Introductory Notes and Definitions

Notes

- The controller uses a 24-hour clock format.
- Programs are not stored until all information has been entered. If programming is started, and no key is pressed for 15 seconds the controller will go back to normal operation and any changes that had been made will be lost.

Definitions

First we need to define and understand some terms.

TERM	MANUAL DEFINITION AND DESCRIPTION
Output	OUTPUT is a relay that corresponds to HEAT 1, OPEN 1, & CLOSE 1 for ZONE 1; and HEAT 2, OPEN 2, & CLOSE 2 for ZONE 2.
Target Temperature	The base temperature set for each stage (DIF, DAY and NITE). Usually the temperature for the first HEAT to come on.
Step Size	The STEP SIZE is the amount of change required in temperature before the controller will transition to a new percentage.
Output Temperature	This is the TARGET TEMPERATURE with the STEP applied.
Vent Set Point	This is the TARGET TEMPERATURE + STEP
Hysteresis	This is the separation between output temperature and trip point. It is variable from 1° to 3°F
Trip Point	The temperature at which an output (relay) turns on or off.
Appliances	APPLIANCES are the heating and cooling connected to the controller.

Controller Operations

Overview

- The RWL11X2 has 2 temperature sensors so it can control 1 or 2 zones.
- It has 3 temperatures settings per day – DIF, DAY, and NITE.
- The RWL has 2 heat steps and 2 proportional outputs for roof vents and sidewalls.
- Includes a timer output for lights or misting.
- Alarm output for high temperature, low temperature, power failure, or hardware error.
- Two cooling strategies - “vent saver” or 5-position. (“vent saver” is the default; see cooling outputs for more information)

Options

Option H (1 HAF) – additional output for zone 1 for HAF fan control

The model RWL11X2H has the standard features listed above plus an additional output for 1 zone HAF fan control.

Option C (2 HAF or AUX) – additional outputs for 2 HAF fan or Auxiliary Outputs

The model RWL11X2C has the standard features listed above plus 2 additional auxiliary outputs for HAF fan control for zone 2 or for controlling louvers, fans, or other cooling equipment.

At power up, the display will read **RP H** or **R- H** for a few seconds to tell you the firmware version. You can also view the firmware version by pressing “**CLOCK**” then “**NEXT**”.

Stages – DIF, DAY, NITE

The RWL11X2 has three operating stages (DIF, DAY, and NITE).

- The DIF stage allows you to adjust the temperature a few hours before sunrise to help control crop height.
- The DAY stage allows you to take advantage of solar energy to increase the daytime temperature so you can maintain the correct average daily temperature to control crop maturity.
- The NITE stage allows you to lower the temperature at night to save on heating.

As shown in **Figure 1**, each stage has a programmable start time and target temperature. The time of day determines the current operating stage.

Target Temperature

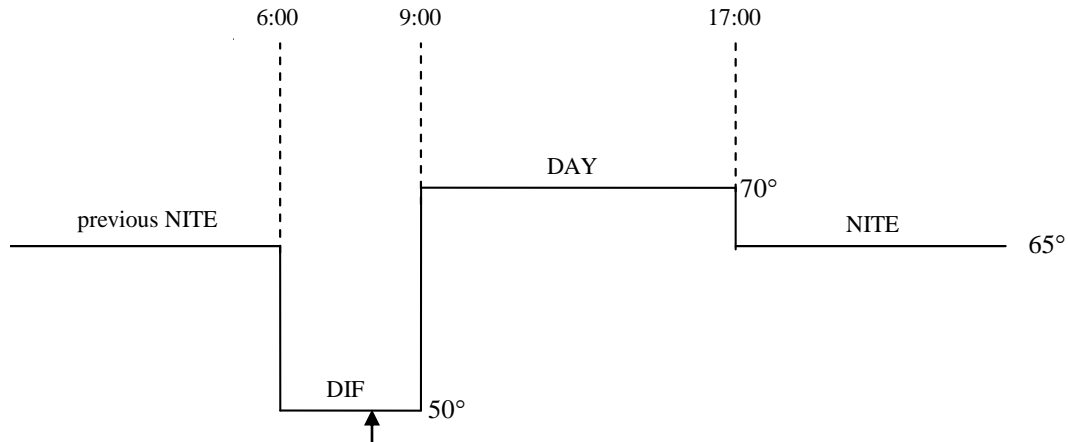


Figure 1

Figure 1 - shows we have programmed the DIF stage to start at 6:00am, the DAY stage at 9:00am and the NITE stage for 17:00 (5:00pm). We also have the target temperatures set as follows; for the DIF stage 50°F, the DAY stage at 70°F, and the NITE stage for 65°F. As indicated by the arrow, at 8:00am you are in the DIF stage and the target temperature is 50°F.

Cooling Outputs

A proportional or incremental output for cooling consists of an open and close signal. They are used to operate vents, rollup walls, or curtains. For example, the RWL has two proportional outputs each with independent settings so one can operate a roof vent and the other can operate a side vent. The RWL calculates the required amount the vent should be open as a percent of full open. It then pulses the open or close signal to move the vent.

The RWL controller has two methods for determining the percent open to maintain the correct temperature. They are the “vent saver” (a.k.a. full incremental or PID) and 5-position mode. With “vent saver” control, there is only one predefined position for the vent, -PCT1. When starting from the closed position, the RWL will wait for the temperature to rise to the VENT SET POINT (one **STEP** above the **TARGET TEMPERATURE**) and then open to PCT1. After that, the RWL will continue to open the vent until it is opened just the correct amount to maintain the desired temperature. The “vent saver” calculations are performed every minute. The current percent open will be modified according to three conditions - whether the temperature is rising or falling, if it is above or below the **VENT SET POINT**, and according to how long the temperature has been at its current reading. To prevent unnecessary movement, the controller will only move the vent when the accumulated change will result in at least seven seconds of motor run time.

In contrast to “vent saver” control, the 5-position vent control operates the vents, using five positions defined by the user. These are given as percentages of the fully-opened time for the vent. So, the RWL will wait for the greenhouse temperature to raise one **STEP** above the **TARGET TEMPERATURE**. After the greenhouse temperature has been at this reading for the threshold time, the vent will open to **PCT1**. If the greenhouse temperature continues to climb to **TARGET TEMPERATURE + (2 x STEP)**, the vent will open to **PCT2** after the threshold time has expired. It will continue in this manner until the temperature has risen to **TARGET TEMPERATURE + (5 x STEP)** before opening to the final percentage. More information about output temperature and heat transitions using the 5-position vent control can be found on page 14.

The controller’s default setting is the “vent saver” mode. However; you can easily toggle between the two with these few steps. Press the “**NEXT**” key and the screen will read **RSET**. Press “4”, “4”, “3”, and the screen will now read **RP** which indicates the controller is set to “vent saver” mode. Press the “0” key and the screen will now read **R** – which indicates the 5-position mode. If the controller is in the 5-position mode, press the “1” key and the screen will again read **RP**. When the desired setting is chosen, press the “**ENTER**” key.

Figure 2 shows the activation temperatures with respect to the target temperature for each output, when using the 5-position vent control.

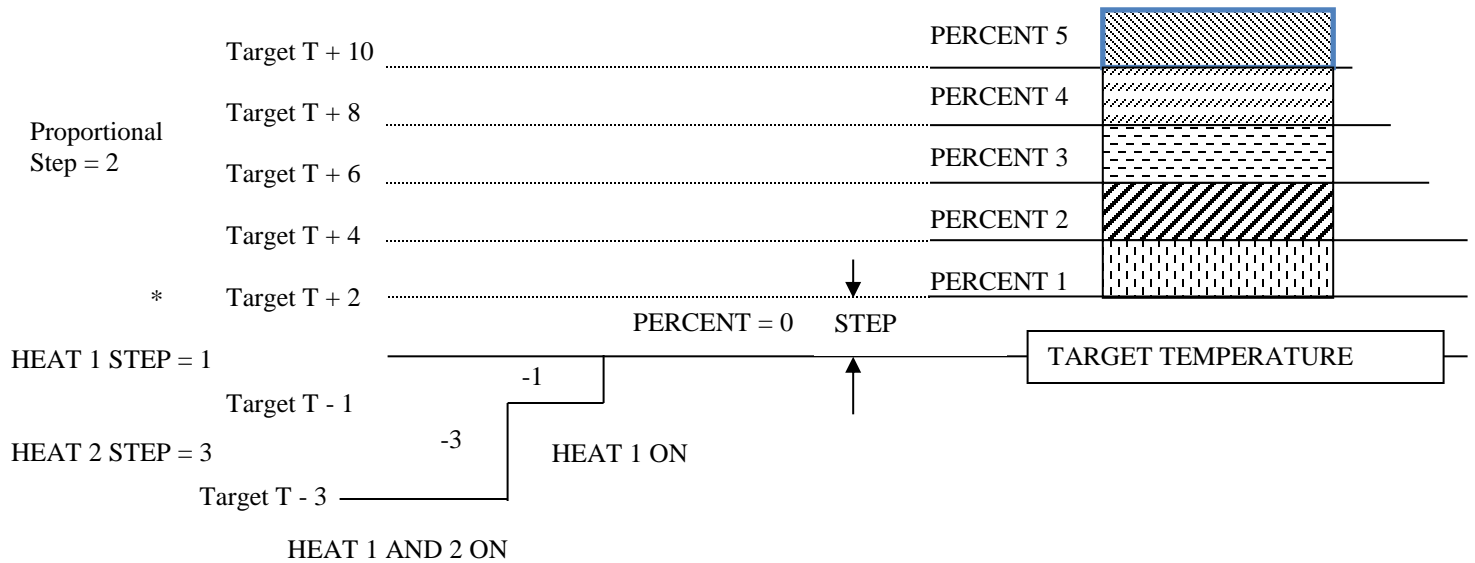


Figure 2

Figure 3 shows how the temperature changes might occur in the greenhouse, with the two different types of vent control.

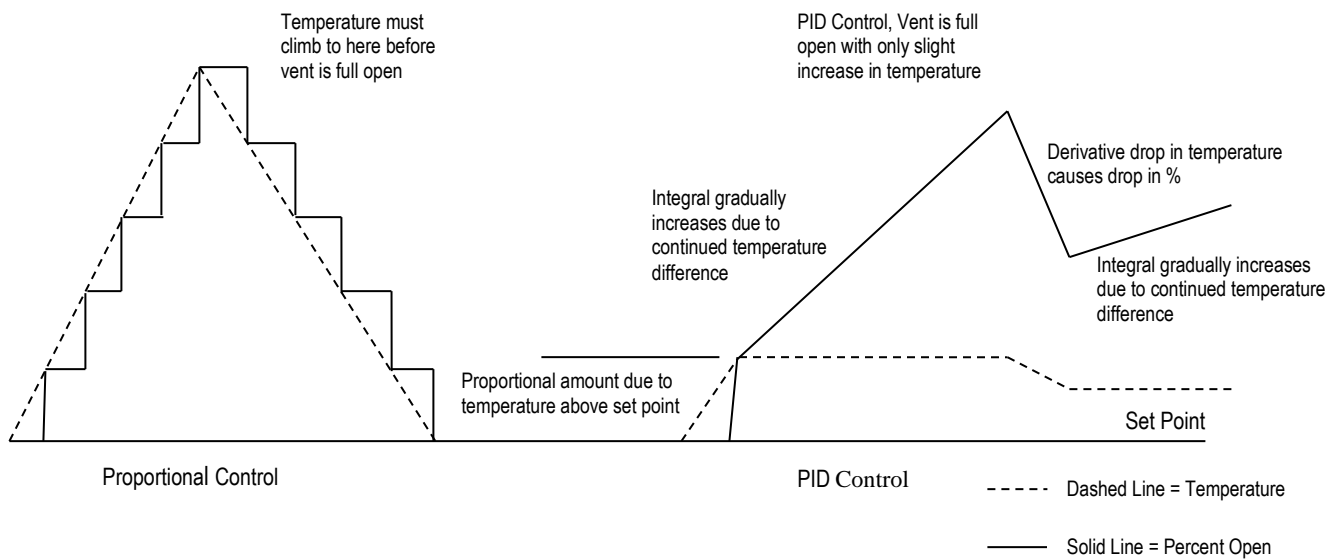


Figure 3

Output Temperature

Using the information in **Figure 1** and **Figure 2**, if the time is 8:00 AM the operating stage is DIF and the target temperature is 50°F. The output temperatures for each output are as follows:

	Target Temperature	Step	Output Temperature
STEP 5	50° F	+ 10 =	60
STEP 4	50° F	+ 8 =	58°
STEP 3	50° F	+ 6 =	56°
STEP 2	50° F	+ 4 =	54°
STEP 1	50° F	+ 2 =	52°
HEAT 1	50° F	- 1 =	49°
HEAT 2	50° F	- 3 =	47°

Table 1

Output ON/OFF Transitions For Heats

The trip point for an output is the temperature at which the output actually turns on or off. The ON and OFF points for an output should be separated slightly to prevent rapid cycling of appliances. This separation above and below the output temperature is called hysteresis (**Figure 4**). Larger hysteresis will give more efficient cycling of appliances but will also give a wider swing in temperature. The hysteresis can be set to values of 1, 2, or 3 through the menu options. For the proportional output, the hysteresis is fixed at a value of 1.

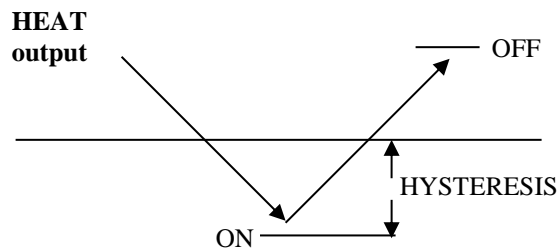


Figure 4

Using the output temperatures from **Table 1** and a hysteresis setting of 2, the trip points for each output will be as follows (all temperatures are in °F):

	Output Temperature	Hysteresis	ON	OFF
HEAT 1	49°	2	47	51
HEAT 2	47°	2	45	49

Table 2

Proportional outputs do not have hysteresis, but require the temperature to be above or below the next output temperature for a minimum amount of time before making the change. Once this time threshold has been exceeded, the output will move to the next step. Threshold is programmed through the menu options.

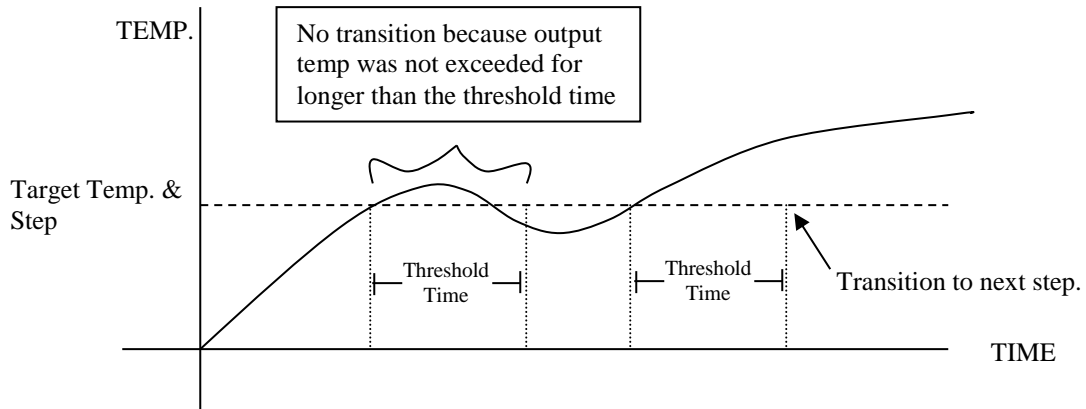


Figure 5

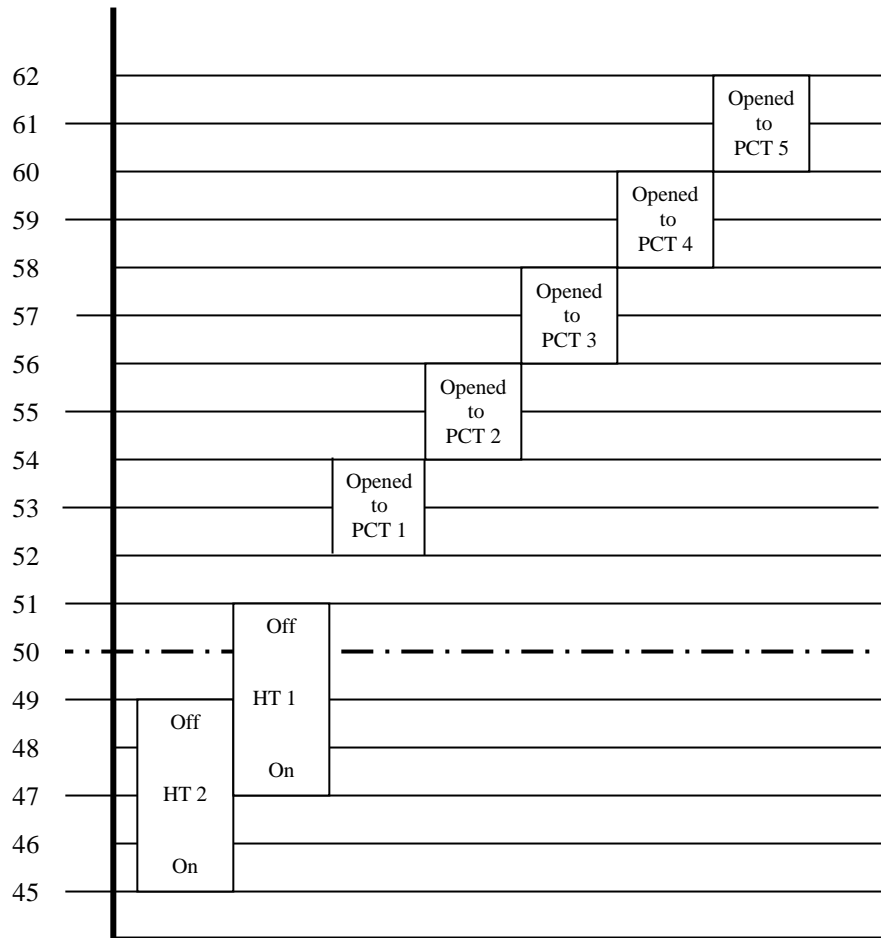


Figure 6: Proportional Output Operation - shows the information of Table 1 and Table 2 graphically.

Programming

The next pages will give you more detail on programming each step.

Notes

- The RWL11x2 utilizes a 24-hour clock.
- All information for a program sequence must be entered before the program is saved.
- Once data is entered it remains until modified, even after a power failure.
- The display flashes at a 1/2-second rate when in a programming mode.
- After 15 seconds without a key-press the RWL11x2 returns to normal operation without saving.
- Entering invalid data will cause a beep and display of the old information (DIF, DAY, NITE).

Programming strategy

Basic programming consists of the following steps (1 zone):

1. Pick DAY start time – usually from 0 to 1 hour after sunrise.
2. Pick DAY temperature – usually when you want to start heating.
3. Pick the NITE start time – usually an hour before sunset in the winter and up to an hour after in the summer.
4. Pick the NITE temperature – usually the same to a few degrees lower than day.
5. Pick the DIF start time – usually 1.5 to 1 hour before sunrise.
6. Pick the DIF temperature – for reduced stretch, 5-10 °F below NITE temperature, otherwise the same as night.
7. Determine Heat 1 offset – DAY temperature minus temperature to start heating.
8. Determine Heat 2 offset – same as Heat 1 offset for heats to run at the same time to a few degrees more.
9. Determine Vent 1 step size – Temperature to start cooling minus DAY temperature.
10. Determine Vent 2 step size – same as step 1 to a few degrees larger than step1.

With the “vent saver” mode, the most straight forward strategy is setting the DAY target temperature at the temperature where the heat should activate. The heat offset will then be 0. The step size for Vent 1 is the temperature to start cooling minus the DAY target temperature.

Stage - DIF, DAY, NITE

Programming of each stage (DIF, DAY, and NITE) will require a start time and a target temperature for each zone. If the **MISTER** option is enabled, you will have to also enter an "ON" time in seconds and a "CYCLE" time in minutes for each stage. See **TIMER** section for details.

Press the DIF, DAY, or NITE key to start programming stage information. The stage name and the currently programmed start time will be displayed alternately. Use the number keys to type in the start time for that stage. Remember the start time for DIF must be earlier than the start time for DAY and DAY must start before NITE. Press "**ENTER**" when the desired time is displayed. The controller will beep and flash the stage name and old start time if an invalid time was entered. All times are in 24hr clock format. Next, **°F 1** will be alternately displayed with the currently programmed target temperature for Zone 1. Use the number keys to change the target temperature and press "**ENTER**" to continue. If °F 2 alternates with a second target temperature, the RWL11X2 is set for 2 zones. Again, use the number keys to change the target temperature and press "**ENTER**" to continue.

Programming is complete if the MISTER is disabled. When programming is complete the display will flash the current stage and temperature.

If the MISTER is enabled, the display will alternately show 'ON t' and the current number of seconds the output will be on per cycle. Type in the desired "ON" time in seconds and press "ENTER" to continue. The display will show 'CYCL' and the cycle length in minutes. Type in the desired cycle time in minutes and press "ENTER". All information is stored and the current stage and temperature will flash at a one-second rate.

Programming Example

To program the following DIF setting, follow the steps in the example below.

STAGE	START TIME	°F1	°F2
DIF	5:00 AM	60	60

°F1 = Zone 1 Target Temp.

°F2 = Zone 2 Target Temp.

And we want the MISTER enabled with the following

On Time (seconds)	Cycle Time (minutes)
30	30

Since the default setting for the MISTER is off, in order to produce a program with the MISTER enabled we must first check that the TIMER option is set to MISTER. To perform this check, press the "TIMER" key until 'MIS' appears in the display and then press "ENTER".

Programming Example Instructions

STEP	KEY PRESS	DISPLAY	COMMENTS
1	DIF	diFF/XX.XX	'diFF' and start time will flash at 1/2 second interval
2	5,0,0	05.00	New start time of 5 AM
3	ENTER	°F 1/xx	'°F1' and current target temperature for Zone 1. Will flash at ½ second interval
4	6,0	_ _ 6 0	New Zone 1 target temperature for DIF.
5	ENTER	°F 2/xx	'°F2' and current target temperature for Zone 2. Will flash at ½ second interval
6	6,0	_ _ 6 0	New Zone 2 target temperature for DIF.
7	ENTER (while in MISTER mode)	Operating display On t/xx	If TIMER is off or in TIMER mode. All information for program is saved. 'On t' and current number of seconds MISTER will be on each cycle will flash at 1/2 second rate.

If in single zone mode, steps 5 and 6 are skipped.
With MISTER operation enabled the following is also required

8	3,0	_ _3 0	30-second mister on time each cycle.
9	ENTER	CYCL/xx	'CYCL' and current cycle length in minutes flash at a 1/2 second rate
10	3,0	_ _3 0	Cycle time of 30 minutes for MISTER in DIF stage.
11	ENTER	Operating display	All information saved.

Table 3

Programming Heat Outputs (HEAT 1, HEAT 2)

Each heat output has three different settings. These settings are Auto, On, and Off. In the “Auto” mode, the controller will regulate the temperature to correspond with the target temperature. This is accomplished in the manner described under **Controller Operations**. In the “On” mode, the output is turned on. Any appliance connected to this output is turned on regardless of the temperature. In the “Off” mode, the output is turned off. Any appliance connected to this output is also turned off. In either on or off mode the temperature is not regulated by this output.

To change the outputs setting (On, Off, or Auto), press the appropriate output key (Heat 1 or Heat 2). This will cause either 'Auto', 'On', or 'OFF' to appear in the display. Press the output key again until the desired setting is displayed. Then press "ENTER". For the Auto mode you will additionally be asked to enter the step size in degrees for this output. Refer to **Controller Operations** for more on step temperatures.

Programming Proportional Outputs: PID Vent Control (Default)

PID stands for Proportional, Integral, and Derivative, which is a mathematical way of determining how far to open a roof vent. This type of control for greenhouse vents has become the standard for all Bartlett RWL controllers, as shipped from the factory. With proportional control, the vent will open in stages as the temperature rises above the desired level. As **Figure 3** on page 7 shows, using just proportional control requires that the temperature gets significantly above your desired set point before the roof is completely open.

Integral control causes the vent to continue opening slowly if the temperature is above the desired setting. Therefore, the vent can reach the full open position without the temperature continuing to climb.

Adding derivative control allows the controller to respond to the rate of temperature change and direction of the change. For instance, the temperature could be above the set point but falling, indicating the vent should start closing instead of continuing to open.

Step 1: Setting Auto and step size

STEP – sets the tightness of control by determining how many degrees the temperature must rise above the target temperature before the vent opens to **PCT1**. 3 degrees is a typical setting for **STEP**. The data is not stored until the last enter, so do all programming steps.

STEP	KEY PRESSES	DISPLAY
1	“Vent 1”	Press the key until Auto is displayed
2	“ENTER”	Step is displayed
3	X	X shows the number of degrees step is set to.
4	“ENTER”	Goes back to the operating display

Table 4

Step 2: Setting PCT 1-5

Programming **PCT 1-5** establishes the initial opening percentage (pct1) and the maximum percent opening. 99% represents full open and the open output will stay on. The data is not stored until the last enter, so do all programming steps.

STEP	KEY PRESSES	DISPLAY
1	“Pct1”	PCT1
2	Type in the initial percent opening xx	Shows the initial percent opening. Typically 5 – 10%
3	“ENTER”	Stores PCT1 and shows next percentage
4	See note below	
5	“ENTER”	Stores PCT2 and shows next percentage
6	See note below	
7	“ENTER”	Stores PCT3 and shows next percentage
8	See note below	
9	“ENTER”	Stores PCT4 and shows next percentage
10	Type in the maximum % open the roof will be allow to open to, xx	In cool seasons, this is usually set between 40 and 60%. In warm seasons, this percentage is programmed to 99%
11	“ENTER”	Stores PCT5 and shows operating display

Table 5

Note - PCT2, PCT3, and PCT4 should be set the same as **PCT1**.

PCT1 – Sets the vent opening for the initial cooling step, the wind over range, and dehumidification cycle.
A typical setting for **PCT1** is 10%.

PCT5 – Sets the maximum “% open” allowed. In cold weather, **PCT5** can be used to limit how far the roof can open. In warm weather **PCT5** should be set to 99 to allow full opening. The vent will be allowed to go 7 percent past **PCT5** to prevent excess movement when vent is 100% open.

Step 3: Setting full open time of vent

Measure the amount of time (in seconds) to manually run the vent from fully closed to fully open. The data is not stored until the last enter, so do all programming steps.

STEP	KEY PRESSES	DISPLAY
1	“Back” until Full is displayed	Full
2	“ENTER”	Sec1
3	Type # of seconds for vent 1 to open	
4	“ENTER”	Sec2
5	Type # of seconds for vent 2 to open	
6	“ENTER”	Returns to operating display

Table 6

Offset and target temperature settings using PID control

For PID control, the target temperature for DIF, DAY and NITE usually is set to the temperature that the heat should start operating. Heat 1 and 2 offsets would then be set to 0. The **STEP** size should be set to the desired dead band between heating and cooling since it only affects the initial opening of the vent and not subsequent movement as it does in the standard proportional control. The menu item “**hyst**” (hysteresis) has a default value of 1 which is typical for PID control to prevent heating and cooling bands from overlapping. To synchronize the controller and appliance, set the curtain/vent to ‘Off’ and wait for the curtain or vent to close completely and then set the controller to the ‘Auto’ mode.

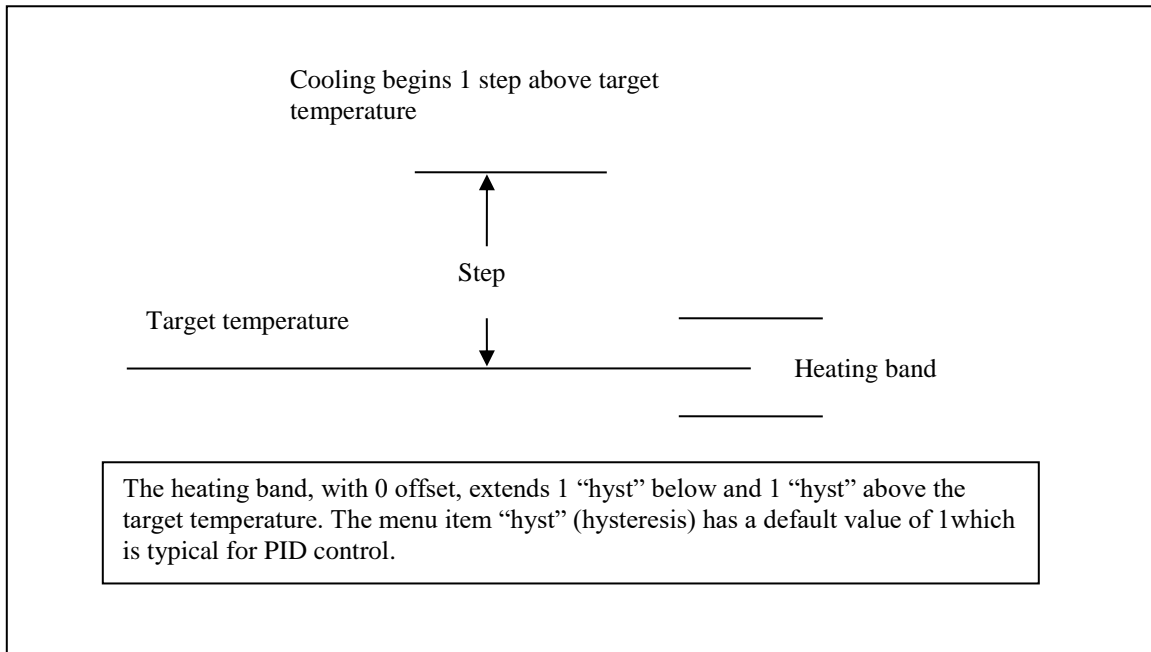


Figure 7

Programming Proportional Outputs: 5-Position Vent Control

5 Position Vent Control is the second option for controlling the RWL11X2’s vents. To switch from PID Vent Control to 5 Position Vent Control, see page 7 for more information. There are four steps in programming the proportional outputs: Entering the Full Open time, selecting Auto & Step Size, setting the percent open for each step, and setting the threshold time for each output.

The first step is entering the time in seconds that is required for the curtain or vent to transition from closed to full open. Press the menu “**BACK**” key until ‘Full’ is displayed, then press “**ENTER**”. “**SEC1**” will flash with the current full open time for the first proportional output (default setting is 200 maximum is 9999). Type the new time in seconds and press “**ENTER**”. The display will show “**SEC2**”. Type the new time for the second proportional output and press “**ENTER**”. The full open time is saved.

The second step in programming the proportional outputs is setting it to Auto and entering the step size. Press “**VENT 1**”. ‘Auto’, ‘On’, or ‘Off’ is displayed. Press the “**VENT 1**” key to toggle to the desired setting. Press “**ENTER**”. If ‘Auto’ was selected, “**step**”/xxxx will be displayed. Then, type in the new step size (0 –15). Press “**ENTER**”. Repeat for Vent 2. Vent 1 and Vent 2 can have different Step sizes.

The third step is to set the percent open for each of the 5 steps. Press “**PCT 1**”. ‘Pct1’/xx’ will be displayed. Type in the new percent 1 setting. Press “**ENTER**”. Continue this through all 5 percentages. Repeat for “**PERCENT 2**”.

The fourth step is programming the threshold time for each output. Press the menu “**NEXT**” key until **THRS** is displayed. Press “**ENTER**”. **THR1** will flash the current threshold time in minutes for output 1. Type

in the new time and press “ENTER”. **THR2** will flash with output 2’s threshold time. Type in the new threshold time for output 2 and press “ENTER”.

NOTE: Valid percentages are 0 – 99. 99% is full open. Percentages do **not** have to increase with increasing steps.

To synchronize the controller and appliance, set the curtain/vent to ‘Off’ and wait for the curtain or vent to close completely and then set the controller to the ‘Auto’ mode.

Programming Proportional Example

	STEP	KEY PRESS	DISPLAY	COMMENTS
Full Open Time Prgrm	1	“BACK”		Press “BACK” until ‘FULL’ is displayed
	2	“ENTER”	SEC1/xxx	Displays previous Full open time for the first proportional output
	3	# keys	xxx	Enter the Full open time for the first proportional output
	4	“ENTER”	SEC2/xxx	Goes to the entry for the second proportional output Full open time
	5	# keys	xxx	Enter the Full open time for the second proportional output
	6	“ENTER”	Operation Display	Stores the Full open times
Set to Auto and Step size	7	“Vent 1”	Vnt 1 or Auto/man/off	Keep pressing “VENT 1” until the display is Auto
	8	“ENTER”	Vnt1/xx	This is the step size
	9	# keys	xx	Enter the desired step size
	10	“ENTER”	Operation Display	Stores the entered step size
Enter % open for output one	11	“Pct 1”	PCT1/xx	This begins the sequence for programming the percentages for the first proportional output
	12	# keys	xx	This is the percent for the first step
	13	“ENTER”	PCT2/xx	This is the second percentage.
	14	# keys	xx	This is the percent for the second step
	15	“ENTER”	PCT3/xx	This is the third percentage
	16	# keys	xx	This is the percent for the third step
	17	“ENTER”	PCT4/xx	This is the fourth percentage.
	18	# keys	xx	This is the percent for the fourth step
	19	“ENTER”	PCT5/xx	This is the fifth and final percentage.
	20	# keys	xx	This is the percent for the fifth step
	21	“ENTER”	Operation Display	This stores the entered percents for the first proportional output
	22	“Pct 2”	PCT1/xx	This begins the sequence for programming the percentages for the second proportional output
	23	# keys	xx	This is the percent for the first step
	24	“ENTER”	PCT2/xx	This is the second percentage.
	25	# keys	xx	This is the percent for the second step
	26	“ENTER”	PCT3/xx	This is the third percentage

Enter % open for Output Two	27	# keys	xx	This is the percent for the third step
	28	“ENTER”	PCT4/xx	This is the fourth percentage.
	29	# keys	xx	This is the percent for the fourth step
	30	“ENTER”	PCT5/xx	This is the fifth and final percentage.
	31	# keys	xx	This is the percent for the fifth step
Enter threshold time for Output 1	32	“ENTER”	Operation Display	This stores the entered percents for the second proportional output
	33	“NEXT”	THRS	Press “NEXT” until THRS is displayed
	34	“ENTER”	THR1/xx	This is the current threshold time for output 1
Enter threshold time for Output 2	35	# keys	xx	This is the new threshold time for output 1
	36	“ENTER”	THR2/xx	This is the current threshold time for output 2
	37	# keys	xx	This is the new threshold time for output 2
	38	“ENTER”	Operation Display	

Table 7

Output Status

Once the stage information and outputs are programmed, you can check the output status by pressing the “8” key. When the “8” key is pressed, the current % open for output 1 is shown. Then the % open for output 2. Next, if HT1, HT2, or timer is ON, the bar will be displayed by the appropriate label.

Programming Clock

It is important to remember that the RWL11X2 uses a 24-hour clock. The middle decimal point in the time settings designates the hours and minutes division. See **Figure 8** for an example of the clock. For morning times the clock setting will be from 00.00 until 11.59 and the afternoon settings are from 12.00 until 23.59.

Press “**CLOCK**”, and the current time will appear. The middle decimal point will be illuminated indicating a time is being displayed. If the time is correct, press the clock button again or wait 15 seconds. The display will return to the normal operating mode. If the time is incorrect, use the number keys to type the new time and press “**ENTER**” to store it.

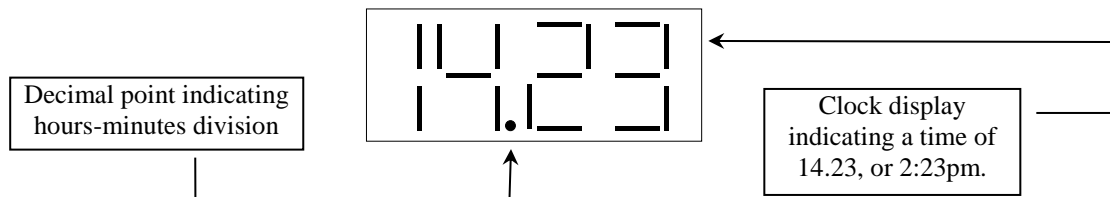


Figure 8

TIMER Option

The RWL11X2 has a TIMER output that is not used for temperature control but can be used to turn on lights at a certain time or to run mist type irrigation. The TIMER option has three modes of operation; TIMER, MISTER and OFF. In the Off position, the timer relay will not turn on. In TIMER mode the timer relay will turn on at a designated time of day and run for a set length. The MISTER mode causes the timer appliance to enter an on-off cycle. In this on-off cycle, the timer is on for a programmed number of seconds repeating after the set number of minutes has expired.

TIMER Mode

Timer mode is designated by ‘tMr’ in the display window when the TIMER option key is pressed. The following example describes programming the Timer to operate with the following information. A timer cycle may be manually started at any time by pressing “TIMER” and then when ‘tMr’ is in the display press “CLOCK”.

TIMER Example

To program a Timer cycle, to occur daily with the following settings, follow the programming example below.

START TIME	HOLD LENGTH	REPEAT
1:15	15 minutes	ON

TIMER Programming

KEY PRESS	DISPLAY	COMMENTS
TIMER	MIS or OFF or tMr	Press until ‘tMr’ is displayed.
ENTER	tMr/XX.XX	‘tMr’ and previous start time. Will flash at 1/2-second interval.
1,3,1,5	13.15	New start time of 1:15 PM.
ENTER	HOLd/00.00	New hold time in hours.minutes. Maximum hour setting is 23 and the maximum minute setting is 59.
1,5	00.15	Hold time of 15 minutes.
ENTER	REPt/OFF	Repeat timer cycle off or on. Toggle with TIMER key.
	REPt/On	‘rEPt’ off is performed once. ‘rEPt’ on is repeated daily
ENTER	Operating display	All information saved.

Table 8

MISTER Mode

‘MIS’ designates MISTER mode in the display window when the TIMER options key is pressed. MISTER programming occurs during Stage programming. To program a MISTER first select the MISTER option using the TIMER key until ‘MIS’ appears in the display window. Then follow the information provided under **Programming**.

TIMER/ALARM For Shade Curtain Control

The Timer and Alarm Outputs can be used to run a shade or energy curtain. The timer is used as the extend signal and the alarm is used as the retract signal. This can only be done if the Alarm output is NOT being used. The alarm will still be displayed and sent to CIS as normal. The Timer/Alarm feature coordinates the outputs to give a 10 second delay between extend and retract signals to allow the motor to come to a complete stop before changing directions. To program the TIMER/ALARM for curtain control follow these steps:

KEY PRESS	DISPLAY	COMMENTS
MENU	RSET	
4,4,6	T-A/NO	The Timer/Alarm for the shade curtain is off.
1	T-A/YES	The Timer/Alarm for the shade curtain is now on.
ENTER	Operating Display	Automatically reverts back to normal operating display.

Once you have activated the **TIMER/ALARM** for curtain control, you need to set the timer. The timer is set the same way as explained before.

HAF Control

The Horizontal Airflow Fans (HAF) can now be programmed for ON, OFF, or AUTO. Setting the HAF to ON or OFF will either turn them on or off indefinitely the user changes the setting. Setting HAF to AUTO will allow for a temperature limit to be set. When selecting AUTO, the user will enter a temperature limit. When the temperature in the greenhouse is above the HAF limit, the output turns off.

To access the HAF settings:

1. Press the **“BACK”** button until **HAF** is displayed.
2. Press the **“ENTER”** button and the current HAF setting will be displayed.
3. Use any number key to toggle between **ON**, **OFF**, and **AUTO**.
4. When the desired setting is displayed, press the **ENTER** button.
5. If **AUTO** is selected. HAF will alternate with the temperature limit.
6. Type in the desired temperature limit for the HAF and press **ENTER**. The controller will return to normal operation.

Dehumidification Vent Cycle

The vent cycle is a flexible dehumidification cycle. It consists of three programmable length stages – a first exhaust stage, a heating stage, and a second exhaust stage. One, two, or all three stages can be used. The display will show EXH1 during the first exhaust stage, PRHT during the heating stage, and EXH2 during the second exhaust stage. The vent cycle can be started by a programmed start time, or can be run manually, or by high humidity if the optional sensor is installed. The vent cycle can be stopped by pressing **BACK** until **dEHu** is displayed then **CLOCK**.

Access the dehumidification menu by pressing **BACK** until **“dEHu”** is displayed and press **ENTER**. Press **BACK** to cycle through the 5 menu options in the dehumidification menu – OFF, LMT, VENT, HuM, and SETU (set up).

LMT – sets the low and high temperature limits for aborting a vent cycle.

VENT – allows setting a time of day to start a vent cycle.

HuM – displays the current humidity level and is for programming a humidity set point.

SETU – is for which outputs will be active during a dehumidification cycle and length of stages.

OFF – the cycle will not run automatically but can be run manually.

Adjusting the low and high temperature limits (LMT) is the first step in programming a vent cycle.

Then selecting the active outputs (SETU) is the second step. The last step is picking the activation method – HUM, VENT, or OFF for manual operation.

LMT (temperature limits for VENT cycle)

The limit setting gives control over when the vent cycle can run. If the temperature is above the HI H or below the LO H setting the vent cycle will be aborted or will not start. The LO H can be set as low as 32 and HI H as high as 131.

SETU (setup configuration)

SETU is used to configure which appliances will be used during a vent cycle, the length of each vent stage and whether the heats will be used to maintain the temperature during an exhaust stage. The setup is necessary for all three types of activation. The following table diagrams the information to be programmed.

HAF	Auxiliary (AUX)	Vent 2 (VNT2)	Vent 1 (VNT1)	Heat 1	Heat 2	EXH1 exhaust	PrHt Heat	EXH2 exhaust	Heat During exhaust
On/off	On/off	On/off	On/off	On/off	On/off	0 – 30 minutes	0 – 30 minutes	0 – 30 minutes	On/off

To program the setup information:

1. Press the **“Back”** key until the display shows **“dEHu”**.
2. Press **“Enter”**, the display will read the last setting for the dehumidification cycle.
3. Press **“Back”** until **SETU** is displayed.
4. Press **“Enter”** and **HAF** will alternate with ON or OFF.
5. Use any number key to toggle between ON or OFF.
6. Press **“ENTER”** when the desired setting is displayed.
7. Repeat steps 4, 5, and 6 until **“ON or OFF”** has been entered for all outputs and **“Fan1”** is displayed.
8. **“Fan1”** will alternate with the number of minutes in the first exhaust stage.
9. Type in the desired number of minutes in this stage and press **“ENTER”**.
10. **“PrHt”** will alternate with the number of minutes in the heating stage.
11. Type in the desired number of minutes in this stage and press **“ENTER”**.
12. **“Fan2”** will alternate with the number of minutes in the second exhaust stage.
13. Type in the desired number of minutes in this stage and press **“ENTER”**.
14. **“HEAt”** will alternate with **“On or Off”**.
 - **“On”** indicates that the heaters will work to maintain the programmed temperature in an exhaust stage.
 - **“Off”** will keep the heats off during an exhaust stage but if the temperature drops below 55 F, the exhaust stage will be ended and the vent cycle will move to the next stage.
15. When the desired option is displayed, press **“ENTER”** to complete setup programming.

Using the Humidity Probe

When a humidity probe is used, you can program the maximum allowable humidity. Anytime the humidity exceeds the set point a vent cycle will be started. The controller compares the current humidity reading to the humidity set point on the half-hour to allow time between consecutive cycles. Also, when using the humidity probe, you can turn the dehumidification cycle ON or OFF during each of the stages (DIF, DAY, NITE).

To program the humidity set point:

1. Press **"BACK"** until **"dEHu"** is displayed.
 2. Press **"ENTER"**. **HuM** (Humidity) will alternate with the current humidity reading of the greenhouse. If **HuM** is not displayed, press **BACK** until **HuM** is displayed.
 3. Press **"ENTER"** the display will show **"Hu"** and the current humidity set point. It will flash at ½ second rate.
 4. Type in the new set point and press **"ENTER"**. **"DIF"** will flash with ON or OFF.
 5. Press a number key to change the ON/OFF setting.
 6. Press **"ENTER"** when the correct setting is selected. **"DAY"** will flash with ON or OFF.
 7. Press a number key to change the ON/OFF setting.
 8. Press **"ENTER"** when the correct setting is selected. **"NITE"** will flash with ON or OFF.
 9. Press a number key to change the ON/OFF setting.
- Press **"ENTER"** when the correct setting is selected and programming is complete.

Humidify Mode (requires humidity sensor)

The humidify mode combines the mist cycle and the humidity set point of the vent cycle to keep the humidity from getting too low. The mist output is enabled when the humidity is below the humidity set point. The mist cycle is disabled when the humidity is above the set point.

Programming steps for humidify mode –


1. Enable the mist mode using the timer key. (See timer/mister function section)
2. Set the on time and cycle time for DIF, DAY, and NITE.
3. Adjust the humidity set point and set DIF, DAY, and NITE to "On". (See menu item **dEHu** below)
4. Press the **"TIMER"** key to display TIMR and press **"ENTER"**.
5. The display will flash TIMR and the start time.
6. Press 7, 7, 7, 7, then **"ENTER"**.

The display will show **"t hu"** when humidifying otherwise it will show the temperature and stage.

Menu Options

This section will explain the menu options. The menu key allows access to the menu functions of the RWL11X2. The different menu functions of the controller are: **'rSet'**, **'tHrS'**, **'CHFC'**, **'Id'**, **'OtOA'**, **'dELA'**, **'dEFt'**, **'HYSt'**, **'ALAR'**, **'1Or2'**, **'FAIL'**, **'FULL'**, **'Hu'**, **'HuM'** and **'RuNT'**. Also included under the menu are the following status conditions of the controller: **'ALAR'**, **'FL 1'**, or **'FL 2'**. When the conditions for a status are indicated the status condition replaces the reset function of the controller. More will be explained on these conditions later in this section.

To navigate through the menu options, press “**NEXT**” to advance forward through the menu. Press “**BACK**” to navigate backwards through the menu options. When the desired option is displayed, press “**ENTER**”.

MENU OPTION	DISPLA Y	COMMENTS
Reset	rSEt	Returns all outputs to auto. The offsets return to the previously stored values. Under the special status conditions the reset option is replaced by the status indication message. To reset press “ ENTER ” when ‘ rSEt ’ is displayed. (** See Status Conditions after Menu table)
Proportional output Threshold time	tHrS	This is the amount of time the temperature must be above or below the target temperature or next step before the output will change. Valid times are 1-9 minutes. See page 14-16 for programming.
Fahrenheit to Celsius	CHFC	Allows change of the temperature scale (°F or °C). Appendix C contains information about any changes to the settings that occur under the Celsius setting. To indicate the controller is reading in the centigrade scale a decimal appears in the ones reading of the display.  <p style="text-align: center;">Figure 5</p> <p>To change temperature scale press “ENTER” when ‘CHFC’ is displayed. Press “MENU” to toggle between temperature scales. Press “ENTER” when the desired scale is displayed. Default = °F.</p>
Identification	Id	Controller Software Identity. Identification indicates the software identity of the controller for CIS (Computer Interface System). Default = 1
On to Auto	OtOA	Sets duration time in minutes for when all manually on outputs return to auto. For more comfortable working conditions or if an emergency situation develops, any output may be turned on manually. On to Auto will return any output that is set in the on position after a certain length of time has expired. Default = 15
Delay	dELA	Sets the delay duration time in minutes between transitions from cooling to heating. Default = 15
Defaults	dEFt	Returns the controller to default settings. Also will clear all statistics. For default settings see Appendix B .
Hysteresis	HYSSt	Sets the hysteresis value used for temperature regulation. 1, 2 or 3 are valid for the hysteresis. Default = 1
Alarm 1	ALA1	Sets temperatures for high and low alarm values. The alarm is meant for use in conjunction with a SensaPhone, auto dialer, or similar piece of equipment. ALARM could also be utilized to set off a buzzer when the conditions are met. Default low = 32, high = 131
Alarm 2 (Only in 2 Zone Mode)	ALA2	Sets temperatures for high and low alarm values in zone 2. Like Alarm 1, it is meant to be used in conjunction with a SensaPhone, auto dialer, or similar piece of equipment. Default low = 32, high = 131. The controller must be set to 2 zones for use of Alarm 2.
1 or 2 zones	1Or2	Sets the number of zones being monitored. Under one zone operation both thermistor connections are averaged to determine the temperature. Default = 2

Thermistor Fail Mode	FAIL	Sets the operation if thermistor fail is detected. The off condition causes all outputs to terminate during a fail condition for the failed zone. The heat condition causes the controller to enter 50 percent on 50 percent off heating duty cycle. The 50/50 heating duty cycle is designed for use during colder weather or in colder climates to help prevent loss of greenhouse crops. Default = heat
Full Proportional output opening time	FULL	Sets the time to fully open both proportional outputs. This value is in seconds and has a valid range of 0 through 9999. Default = 0.
Humidity Set Point	Hu	Sets the humidity set point for the house.
Current Humidity	HuM	Selecting this option, will display the current humidity in the house.
Appliance Run Time	RuNT	This will display the number of hours of run time for the heat outputs: (Heat 1 and Heat 2) since the last reset. Options to view or reset are given when this is selected.
Horizontal Airflow Fans	HAF	Turn HAF fans ON, OFF, or to AUTO. Use any number key to toggle between the options. Press ENTER to select desired setting. When selecting AUTO, enter temperature limit. When the temperature is above the HAF limit, the output turns off.
Dehumidification Cycle	dEHu	Used to program a dehumidification vent cycle or use Humidify Mode. See below for various programming.

Table 9

****Status Conditions**

Under normal operation when the menu key is pressed 'rSet' appears in the display. However, when certain status conditions are present this display changes for notification of this status. The status condition displays are 'HI 1', 'HI 2', 'Lo 1', 'Lo 2', 'FL 1', and 'FL 2'.

'HI' and 'Lo' indicate alarm conditions. 'HI 1'(Zone 1) and 'HI 2'(Zone 2) indicate the temperature has gone above the high temperature setting in their respective zone. 'Lo 1'(Zone 1) and 'Lo 2'(Zone 2) indicates the temperature has gone below the low temperature setting in their respective zone. 'FL 1' and 'FL 2' indicate thermistor fail conditions. 'FL 1' indicates a fail on thermistor one and 'FL 2' indicates a fail on thermistor two.

An alarm or error condition will latch the alarm relay. Pressing "**NEXT**" will display the cause of the alarm. Once the cause has been remedied, press "**NEXT**", then "**ENTER**" to clear the display and reset the alarm relay.

Controller Status

Operating Display

The main operating display will tell you the current stage and temperature, one or two zones operation, the temperature scale (°F/°C), and if the target temperature has been overridden. During normal operation, the current stage (DIF, DAY, or NITE) and the current temperature will be alternately shown at 1-second rate. Around the outside edge of the display are the output identifiers.

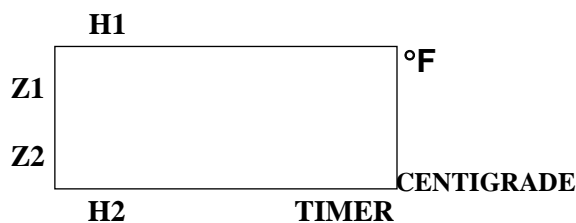


Figure 9
Controller Display Output Identifiers

The following table explains what each describes.

Output Identifier	Explanation
Z1	Bar to the right of Z1 identifies Zone 1 is being viewed.
Z2	Bar to the right of Z2 identifies Zone 2 is being viewed.
H1	Bar below H1 identifies Heat 1 is on.
H2	Bar above H2 identifies Heat 2 is on.
TIMER	Bar above TIMER identifies Timer is on.
°F	Default temperature is Fahrenheit. Reminder to user for temperature readings.
CENTIGRADE	Decimal in lower right corner identifies in Centigrade temperatures.

Table 10

If there is no bar to the right of Z1 or Z2 then the controller is set for single-zone use. Press the 5 key to toggle the zone being displayed when in two zone mode.

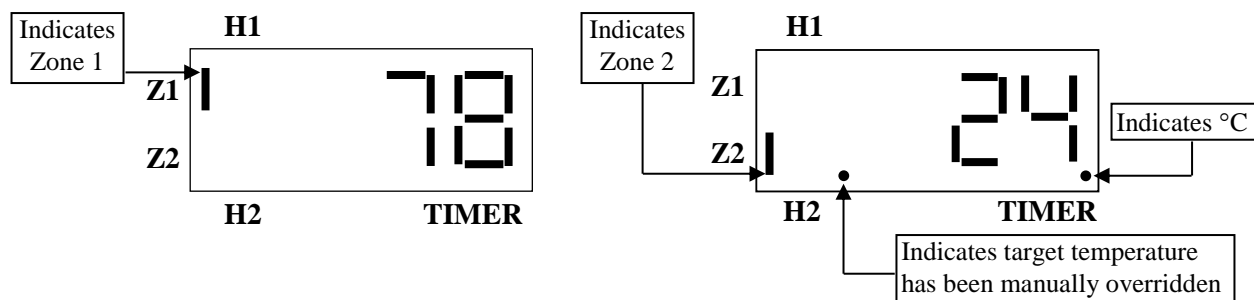


Figure 10

Two decimal points are used to give status information also. °C operation is indicated if the Decimal point to the right of the ones digit is illuminated (See **Menu Options** for setting). Override of the target temperature is indicated if the decimal point to the right of the 1000s digit is illuminated. (See **Appendix A** for this function)

Output Conditions (Hot Key 8)

Many times, especially for troubleshooting, you will want to know which outputs the RWL11X2 has on. Pressing the “8” key changes from the normal operating display to the output status display. For the RWL11X2 two numbers will be displayed followed by the current status bar for the heats and the timer. The first number is the percentage for VENT 1 and the second number is the percentage for VENT 2. Each will be displayed for 1 second. See **Figure 11** below for an example of the status bars.

The current open percentages will precede the status bars

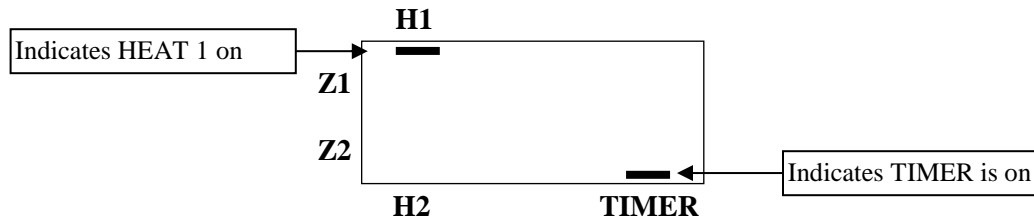


Figure 11

Target Temperature Viewing and Override

The hot keys for overriding the target temperature can be used to view the current setting. The target temperature for Zone 1 can be viewed from the main operating display by pressing the "4" or "7" key once and for Zone 2 by pressing "6" or "9" key once. To leave the temperature unchanged, simply wait 15 seconds to return to the main operation display or press "ENTER". Continue pressing the up (4 or 6) or down (7 or 9) keys for that zone to temporarily override the current target temperature. The next stage transition will reset the target temperature to the programmed value.

Error Status Displays

Various error conditions will open the contacts of the alarm relay. The error signal will persist until manually cleared, even if the fault corrects itself. Press "NEXT" to see the fault (CLOC, FL 1, FL 2, Hi, Lo) then press "ENTER" to clear the error. If the fault has not been corrected it will latch again and must be cleared again after correcting the offending condition.

Failed Thermistor

A vertical zone indicator on the left side of the display with the letters 'FL' indicates the thermistor for that zone is faulty or disconnected. A controller set for single zone operation will continue to control if one thermistor fails. If both thermistors in single zone, or one thermistor in two-zone mode fail, the controller will either shut all outputs off or go into a heat cycle of 15 minutes on and 15 minutes off as specified under Menu Options "FAIL".

ALARM Condition (High, Low Temperature)

'ALAr' will flash alternately with the current temperature if the high or low alarm conditions were exceeded. Use the Min and Max hot keys to see the temperature extremes. The ALARM relay will open indicating an alarm condition. Press "NEXT" and "ENTER" to reset the alarm status.

Memory Failure

'ErrE' will be displayed alternately with the temperature if the backup memory has had an error. The controller restores the factory default table and continues to function. The controller can be programmed, but will restore defaults if power is lost and then restored. If the fault continues the controller should be returned to the factory for repair.

Clock Failure

If the real-time clock fails, the stage will remain in DAY and 'CLOC' will be displayed. When "MENU" is pressed, 'CLOC' will be displayed. Press "ENTER" to clear the error. The clock failure can be caused by excessive moisture in the case, faulty clock circuitry or a discharged battery. If this condition persists factory service will most likely be required.

Faulty Keypad

‘StUC’ will be displayed if the keypad has a stuck key. Factory service will most likely be required.

Statistics

The RWL11X2 was designed to be a growing tool as well as a temperature control device. The RWL11X2 not only has a DIF feature to help control plant height through temperature control but also collects and stores averages for 7 days. Each day it stores the average temperature for each operating stage (DIF, DAY, and NITE) and the average for the 24 hours from the start of DIF until the end of NITE.

Note: When in the two-zone mode, set the zone indicator with the "5" key to the zone of interest before viewing averages or minimum and maximum temperatures.

The hot key "0" (stats) is used to view the averages. Press "0" once and **dAY 1** will be displayed. 'dAY 1' is the current 24-hour period, 'dAY 2' is yesterday, 'dAY 3' the day before that, through 'dAY 7'. Continue to press "0" until the day to be reviewed is displayed and press **"ENTER"**. The average temperature for that day's DIF period will be displayed. Continue to press **"ENTER"** to see the average temperature for DAY, NITE, and 24-hour periods.

Besides averages, the RWL11X2 tracks minimum and maximum temperatures. You can see the minimum and maximum temperature since the last hot key reset ("2") by pressing "1" or "3". Press the "2" key to reset the stored minimum and maximum.

The RWL11X2 also tracks the run time of Heat 1 and Heat 2. The RWL11X2 will store the information until it is reset and will display the number of days since the last reset. To view run times, press **MENU** until **'RuNT'** appears on the screen. Press **'ENTER'** and **'RuNT/View'** will alternate. Press **'ENTER'** to view the run times. To reset the run times, press **'1'** and **'RuNT/CLR'** will alternate. Press **'ENTER'** to reset the run times.

Overrides

Not only is the RWL11X2 easily programmed for automatic operation but it can also give the grower temporary overrides of the target temperature, manual start of the **TIMER** option and on/off control of each output.

Target Temperature Override

The target temperature can be temporarily moved up (4, 6) or down (7, 9) with hot keys without altering the program. This is for times when you want to change the growing temperature because it is too uncomfortable to work in but want to revert back to the program after you have completed your task.

Use the appropriate hot key ("4" or "7" for Zone 1, "6" or "9" for Zone 2) to move the target temperature up or down. The first time you press one of these keys you will see the current target temperature. Continue to press **"UP"** (4 or 6) or **"DOWN"** (7 or 9) until the desired temperature is displayed and then press **"ENTER"**. The 1000's decimal point will be illuminated indicating an override.

Remember if you were in a cooling situation and the new target temperature moves you into a heating situation the delay between HEAT to COOL or COOL to HEAT must time out before the output will activate. Delay is a menu option and can be varied from 1 to 30 minutes.

TIMER Manual Start

Pressing **"TIMER"** and then **"CLOCK"** can manually start the **TIMER** cycle. Repeating the key press sequence will end the manual start. **TIMER** can be manually started even if set to off. This allows you to program a cycle, set it to off and run it only on a manual cycle.

Outputs Manual Settings

Each Heat or Proportional output can be set manually to on or off. Manual settings will override the safety checks and you may have instances where the Heats and Proportionals run at the same time. The menu function ‘**rSet**’ will set all outputs to Auto. The menu function On-to-Auto will set any output, from ‘ON’ back to ‘Auto’ after the programmed time. On-to-Auto does not affect an output set to off.

To manually set a heat output press one of the “**HEAT**” keys until “**on**” or “**off**” is displayed. Press “**ENTER**” to accept the override. “On” will turn the output on without regard to temperature. An “On” setting will return to Auto after the “On-to-Auto” timer has elapsed.

The proportional outputs can be manually set to a desired percent, or to off. To close and disable the output, press “**Vent 1**” or “**Vent 2**” until off is displayed. Press “**ENTER**” to accept.

To manually set the output to a given percent, press “**Vent 1**” or “**Vent 2**” until “**man**” is displayed. Press “**ENTER**” and the display will flash between “**Pct**” and the current setting. Use the number keys to adjust the percentage and press “**ENTER**”. The “On-to-Auto” timer will set a manually set percentage back to Auto after the timer has elapsed.

An “Off” setting will leave the output off regardless of the temperature. The “On-to-Auto” timer does not affect an output set to “off”.

The RWL11X2 has a special feature in its menu options called “On-to-Auto”. This is used in conjunction with manually setting an output to “On” to ensure the output is not left on indefinitely. The “On-to-Auto” time can be set from 1 minute to 23 hours and 59 minutes. Setting the “On-to-Auto” time to 0 disables the function and the output will remain in the ON mode. The “On” mode or manual open setting will be maintained until changed by the operator.

Auxiliary Outputs (C and H Version Only)

Model RWL11X2-HAF (H Version) has an additional output for zone 1 that will control HAF fans. Model RWL11X2-2HAF (or AUX)(C Version) has 2 auxiliary outputs (1 for each zone) for controlling louvers, fans, or other equipment. The HAF outputs generally control circulation fans. The RWL runs the HAF output when the temperature is below LMT setting. Alternately, the HAF output could control a heater that is not affected by the DIF, DAY, or NITE settings. Connection for the HAF fan output is at terminal 23. See **Figure 4** in the Installation Manual for location.

The AUX output generally runs gable louvers and/or fan for cooling and dehumidification. The AUX output is active when the vent opening is equal or greater than the PCT1 setting. Thru relays, you can creatively couple the HAF output with the AUX output to limit the temperature range for the gable fan/louver operation. Connections for two zone mode are at terminals 24 and 26. See **Figure 4** in the Installation Manual for location.

In 2-zone mode, thru the dehumidification set up, one zone can be configured to run normally while the other zone runs the dehumidification cycle. Only set to “on” outputs for the zone to run the dehumidification cycle. For instance, setting HAF, AUX, and VNT2 to “on” will allow zone 1 to operate normally while zone 2 is in a dehumidification cycle. The RWL defaults to zone 2 “operate normally” while zone 1 dehumidifies when just HAF and AUX are selected.

Typical configuration setting –

1. One zone, one HAF. Gives two auxiliary outputs so louvers and fans can be controlled by separate outputs.
2. One zone, two HAF’s. Use this configuration if you want to use AUX (thru relays) to disable circulation fans that oppose the air flow of the exhaust fan.
3. Two zone, one HAF. Use this configuration when you have additional cooling appliances in each house.
4. Two zone, two HAF’s. Use when it is critical to control HAF fans in each zone.

The RWL defaults to 1 HAF. Programming to set RWL to the 2-HAF mode is as follows –

STEP	KEY PRESSES	DISPLAY
1	Press “NEXT”	<i>RSET</i>
2	Press 4,4,8	On or Off
3	Press the 1 key to toggle between on and off	On indicates the “two HAF fan” mode is active
4	Press “ENTER”	Stores the new setting and returns to normal operation.

Table 11

Appendix A: Hot Keys

The number keys function as hot keys in the normal operating mode to give instant access to special functions.

KEYPAD NUMBER	HOT KEY	COMMENTS
1	Min	Displays the Lowest temperature since the last reset of Min and Max. To clear the display, press “ENTER” or wait 15 seconds.
2	Reset	Resets the Minimum and Maximum temperatures.
3	Max	Displays the Highest temperature since the last reset of Min and Max. To clear the display, press “ENTER” or wait 15 seconds.
4	Up 1	Temporarily increases the Zone 1 target temperature. This increase will be canceled at the next stage transition. A decimal will appear in the display to indicate a temporary change. See Figure A.1 for an example.
5	Z1/Z2	Toggles between which zone temperature is displayed. The zone indicator will change to indicate this. (See Operating Display on page 22)
6	Up 2	Temporarily increases the Zone 2 target temperature. This increase will be cancelled at the next stage transition. A decimal will appear in the display to indicate a temporary change. See Figure A.1 for an example.
7	Down 1	Temporarily decreases the Zone 1 target temperature. This decrease will be cancelled at the next stage transition. A decimal will appear in the display to indicate a temporary change. See Figure A.1 for an example.
8	Outputs	Changes the display to the output indication. Figure A.2 is an example read-out of the display as output indication. (See Outputs on page 16)
9	Down 2	Temporarily decreases the Zone 2 target temperature. This decrease will be canceled at the next stage transition. A decimal will appear in the display to indicate a temporary change. See Figure A.1 for an example.
0	Stats	Displays the average temperatures for the selected day. The averages maintained are for DIF, DAY, NITE, and 24-hour period. (See Statistics on page 25)

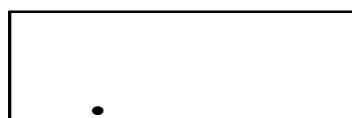


Figure A. 1

Decimal indicator in the 1000s location shows a target temperature has been modified using the hot keys.

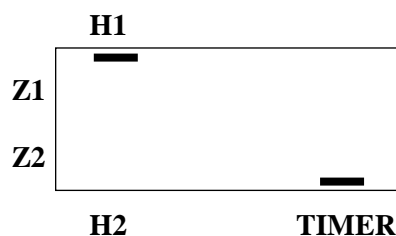


Figure A. 2

Figure A.2 indicates that in Zone 1, Heat 1 is active and the Timer is active.

Appendix B: Default Settings

See the following charts for default settings of the RWL11X2.

STAGE SETTINGS			
STAGE	START TIME	°F1	°F2
DIF	6:00	65	65
DAY	8:00	65	65
NITE	17:00	65	65

MENU SETTINGS	
MENU FUNCTION	SETTING
CHFC	°F
Id	01
OtOA	10
DELA	15
HYS _t	1
ALAr	Lo – 32 °F HI – 131 °F
lOr2	1
FAIL	HEAT
FULL	SEC1 – 200 SEC2 – 200

OPTIONS KEY	DEFAULT SETTING
TIMER	TMr

TIMER DEFAULTS	
OPTION	SETTING
START TIME	12.00
HOLd	00.00
rEPt	OFF

OUTPUT SETTINGS		
OUTPUT	MODE	OFFSET or STEP
HEAT 1 and HEAT 2	AU _t O	0
VENT 1	AU _t O	2
VENT 2	AU _t O	2
TIMER	tMr	N/A

Appendix C: Celsius Settings Conversions

When operating in Celsius mode the controller settings are different than in the Fahrenheit. The following table will illustrate the differences between the temperature settings. Remember that the default setting for the controller is Fahrenheit.

SETTING	CONTROLLER DEFAULT	COMMENTS
DIF target temperature	18	Maximum setting of 55. Minimum setting of 1.
DAY target temperature	18	Maximum setting of 55. Minimum setting of 1.
NITE target temperature	18	Maximum setting of 55. Minimum setting of 1.
HYS setting	2	Only values of 1, 2, or 3 accepted.
ALAr setting		Values of 1 through 55 accepted.
Lo	0	
HI	55	

Converting the Fahrenheit settings to Celsius temperatures generates the values in this table. Although the default setting for ALAr Lo is 0, only values of 1 or higher are acceptable for entry. This is due to the internal conversion that the controller performs.

Appendix D: Humidity Sensor Option

The RWL11X2 requires AHUMSENZ humidity sensor to run automatic dehumidification cycle. See page 6 of the RWL11X2 Installation Manual for installation guide.

Notes

- Proper calibration provides a ± 2 percent accuracy on reading humidity levels.
- After 15 seconds without a key press, the RWL11X2 will return to normal operation without saving the calibration data.
- Once entered, the calibration data remains until changed.
- Different humidity probes may have different calibration codes.
- Altering the calibration code value could invalidate readings. See below.

CALIBRATION CODE

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The numbers above are the calibration code. This is the value entered when the calibration code is requested below. The calibration code is also located on the label inside the humidity sensor casing.

STEP	KEY PRESS	DISPLAY	COMMENTS
1	"NEXT"	rSEt	If rSEt does not appear, press "NEXT" until rSEt appears in the display
2	4, 4, 5	XXXX	The display should read four numbers. These values are most likely all zero for a new controller
3	Number Keys	CALIBRATION CODE	Press the number keys to enter the above calibration code
4	"ENTER"	Operating Display	Calibration data for humidity probe entered and stored
5	N/A	Operating Display	Attach humidity probe as described under installation

In order to fine-tune the humidity probe, the above steps may be utilized while changing the last two digits of the calibration code. In general, changing the value by +5 will cause a 2% drop in humidity readings and a -5 change will cause a 2% rise in humidity readings.

For Example, if the calibration code is 6550 and a 4% drop in humidity readings is desired, then reentering the calibration data with a calibration code of 6560 will approximate this.

If modified, the humidity should be closely monitored to ensure proper humidity readings

Changing the first two digits of the calibration code will cause erroneous readings by the probe and will invalidate all humidity readings.

Operation

The dehumidification cycle will burp (open the vent to percent 1) a greenhouse to expel hot, humid air when the humidity reading (HUM in menu) is greater than the humidity set point (Hu in menu). The length of the burping is set with the “on to auto” timer in the menu. Once the cycle has run, the controller will not run another cycle until the time passes the top of the hour or the bottom of the hour. If the humidity is still high after the time has passed the hour or half hour, then the cycle will run again.

For instance, if the set point is 70% (Hu), and the reading is 75% and the time is 12:01 and on to auto timer is set to 10 minutes – Vent 1 will open for 10 minutes and then go back to normal operation. The controller will not compare the humidity reading to the set point again until after 12:30.

In 2-zone operation, both vents will burp for the ‘On to Auto’ time.

Both proportional outputs will burp if the controller is set to 2 roof vents with the 4, 4, 9 code. (See **Appendix E** on the next page)

Appendix E: Wind/Rain Roof Vent Setting

Wind/rain alarm input (o-r display)

If the vent is open past **PCT1** setting, a contact closure across the wind alarm inputs will cause the vent to close to the **PCT1** setting. In this condition the display will alternate between the current temperature and o-r. In the 2 zone mode, both proportional output will respond to the wind/rain input. In the single zone mode only proportional output 1 will respond to the wind/rain alarm. The setting described below will cause both outputs to respond to the wind/rain alarm input in the single zone mode.

“Two roof vents” setting

When the RWL11X2 is set to single zone mode and both proportional outputs are controlling separate roof vents the controller must be set to the “two roof vents” mode so both vents will respond to a contact closure across the wind/rain alarm input. If the “two roof vents” mode is not set for a single zone controller, the RWL11X2 will assume that proportional output 1 controls a roof vent and proportional output 2 controls an end vent.

The table below shows the key steps to enable the “two roof vents” mode.

STEP	KEY PRESSES	DISPLAY
1	Press “NEXT”	<i>RSET</i>
2	Press 4,4,9	On or Off
3	Press the 1 key to toggle between on and off	On indicates the “two roof vents” mode is active
4	Press “ENTER”	Stores the new setting and returns to normal operation.

Energy curtain option for Vent 2

The “**ENRG**” option for Vent 2 sets the percent output to 99% (fully extended) during the NITE stage and sets the percent output to 0% (fully retracted) during DIF and DAY stages.

Setting the controller to 2 zones and placing the #2 thermistor above the curtain, allows the Heat 2 to be used to hold off retracting the curtain until the air above the curtain has been warmed by the sun.

To select “**ENRG**”, press the “**Vent 2**” key until “**ENRG**” is displayed and then press “**ENTER**”.