Instruction Manual

HD100 Dual Output Programmable Humidity Controller

Version 1.2 (Feb, 2015)

1. Overview

This controller contains one humidity sensor and two independent outputs. One output is for humidifier and the other is for dehumidifier. The humidity control can be programmed to vary with different time step setting. Up to 8 humidity-time steps covering 33 days can be programmed. It can be used for tobacco dehydration, sausage curing, etc. By using both humidifying and dehumidifying, the humidity ratio can be controlled at a specific value regardless of whether it is in dry or wet environments.

This controller is a plug-n-play device. No extra wiring is needed for the humidifier or dehumidifier. Both humidifying and dehumidifying control modes contain simple on/off operation; they are similar to a mechanical humidistat but with much higher precision due to adjustable hysteresis band, precise sensor and digital read out.

Different operation humidity ranges of the two outputs can be set separately. Once the dehumidifying range is set, the controller program will automatically limit the humidifying range to prevent both outputs from being turned on at the same time.

This plug-n-play humidity controller is designed for high relative humidity (>85%) and condensing environments, where a slight drop in temperature may cause condensation and could damage other humidity sensors. This controller equipped with one of the most robust humidity sensors on the market. It can be fully recovered even immersed in water.

2. Specification

Table 1. Specification

Humidity Control Range	0~99.9%RH
Humidity Resolution	0.1%RH
Humidity Accuracy	4%RH
Sensor Working Temperature	-40~197°F (-40~90°C)
Humidity Control Mode	On/Off Control. Humidifying or Dehumidifying
Humidity Control Output	15A, 120V or 240V AC *
Timer Range	8 Steps with 0.1 to 99.9 hours for each step
Timer Resolution	0.1 Hours (6 Minutes)
Max Programmable Time	799.2 hours or 33.3 days (8 Steps Total)
Audio Alarm	High and Low Limit
Controller Operating Environment Temperature	0~50 °C
Dimension	91x140x46mm
Input Power	85 ~242VAC, 50Hz/60Hz
Sensor Cable Length	6 ft (2m)
Power Cable Length	3 ft (1m)
Warranty	One (1) Year

* Please note: Although both humidity and dehumidity output can handle up to 15A; the total power of the two channels is limited to 1500 Watts due to the restriction of input power cord.

3. Front Panel

Figure 1. Front Panel.

4. Parameter Setup

When the controller is powered on, it will display both the measured value and set value. The controller will start controlling humidity according to the saved setting. If the controller shows "Err", it indicates a sensor error -- either the sensor is not connected or the sensor is faulty. Please see Table 2 for a list of parameters and see Figure 2 for the flow chart of how to set the parameters. **Note:** Parameter remains unchanged unless you press set key to confirm it.

Table 2. Parameters Description.

Code		Description	Setting Range	Initial	Note
AH	AH	High Limit Alarm	0~99.9	20.0	1
AL	AL	Low Limit Alarm	0~99.9	20.0	1
HY	HY	Humidity Control Hysteresis Band	0~99.9	1.0	2
HYd	HYd	Dehumidifier Hysteresis Band	0~99.9	5.0	3
HYH	HYH	Humidifier Hysteresis Band	0~99.9	5.0	4
oFS	oFS	Humidity Offset	-9.9~9.9	0	5
AS	AS	Anti-short Cycle Delay (only for dehumidifying)	M 0~ M99 (0~99 mins)	M 6	6
PrG	PrG	Program Modes	on, off	ON	7
A-M	A-n	Power Outage/Startup Modes	S,M,C	S	8
SFA	SFA	Sensor Failure Operation	0-0, 0-1, 1-0	0-0	9

Note 1. AH, High limit alarm; AL, Low limit alarm:

When humidity is above AH or below AL setting, the built-in buzzer will turn on. User can mute the alarm by momentarily pressing the DOWN key (▼). The alarm will remain inactive until the process value moves out of the alarm zone. Both alarms are deviation alarms, i.e., if AH = 20%, AL = 30%, and the Set Humidity (H) is 50% RH, the alarm will be activated if the humidity is above 70% or below 20%. The alarm function is suppressed at powering up or when the program is jumped from one step to another step. It will be activated automatically once the measured humidity enters the none-alarm zone (between H - AL and H + AH).

Note 2. Hy, Humidity Control Hysteresis Band, or Humidity Control Dead Band:

This parameter set up a dead band (between H - Hy and H + Hy) within which either the humidifier or dehumidifier will not work. The minimum value for Hy is 0.5. The Hy value should not be too small if the system has sluggish response. Otherwise, it may result in the humidifier and the dehumidifier working against each other, wasting energy and causing oscillation.

Note 3. Hyd, Dehumidifier Hysteresis Band:

This is the differential band between turn on and turn off the dehumidifier. It is set to the higher side of the dehumidifier set point (H + Hy). The dehumidifier will turn on when humidity is above H + HY + Hyd, and turn off when humidity is below H + Hy. For compressor based dehumidifier, the Hyd value should not be set too small to prevent frequent cycling.

Note 4. HyH, Humidifier Hysteresis Band:

This is the differential band between turn on and turn off the humidifier. It is set to the lower side of the humidifier set point (H - Hy). The humidifier will turn on when humidity is below H - HY - HyH, and turn off when humidity is above H - Hy.

For example, if Set Humidity H = 50%, Hy = 5%, Hyd = 3%, HyH = 2%, then the humidifier will turn on when process humidity is lower than 43% (H - Hy - HyH) and turn off when process humidity rise above 45% (H - Hy). The dehumidifier will turn on when process humidity is above 58% (H + Hy + Hyd) and turn off when process humidity drop below 55% (H - Hy).

Note 5. OFS, Humidity Offset:

OFS (Humidity Offset:) is used to compensate the error produced by the sensor or input signal itself. For example, if the unit displays 37% when the actual humidity is 32%. Set parameter OFS = - 5 will make the controller display 32%.The displayed process humidity = actual measured humidity + OFS.

Note 6. AS, Anti-short Cycle Delay:

The Anti-short is the delay time to turn on the dehumidifier. If the dehumidifier is compressor based, compressor should not be turned on immediately when it is at high pressure (just after turned off). Otherwise, it may shorten the life of compressor. The Anti-Short cycle delay function can be used to prevent the rapid cycling of the compressor. It establishes the minimum time that the compressor remains off (after reaching cutout) before turns on again. The delay overrides any controller demand and does not allow the compressor to turn on until the set time-delay value has elapsed. It gives time to release the refrigerant pressure through evaporator. It typically set to 4- 6 (minutes). The unit is in minutes. This setting is only valid for dehumidifying control.

Note 7. Prg, Program Mode:

When Prg is set to “ON”, user can program up to 8 steps (Section 5). When set it to “OFF”, this function is disabled. User can only set “H-1” value (without timer t-1) when disabled.

Note 8. A-M, Power Outage/Startup Mode:

This parameter determines what the controller should do in an event of power interrupt or outage. It also decides how the controller starts the program while powered up. A-M can be set to three modes: C, S and M.

Mode C. After being powered on, the controller will continue the program from the where it was powered off. For example, if step 3 is set for 40% and 5 hours, the power was interrupted at 2.1 hours. Then, when the controller power up, the controller will continue to control at 40% for 2.9 hr.

Mode S. The controller will run the program from step 1 every time the controller is powered up. This is suitable for situations where the power never fails, or when the program mode “PrG” is set to “off”.

Mode M. The program will be held at the step at which the controller was powered off. The controller will hold the humidity at the set value. The controller lower display will flash "hold" and process humidity alternatively. This mode is suitable for situations where the operator’s attention is needed after power interruption occurs.

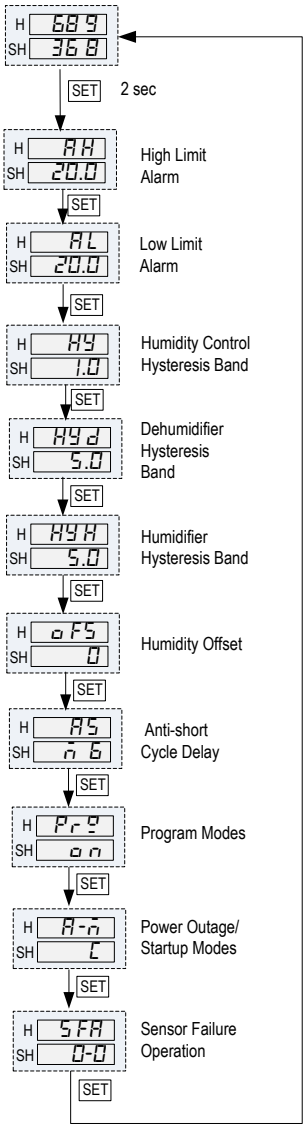

Figure 3. Flow chart of setting up parameters.

Note 9. The SFA defines how the output would be if the sensor fails. It can be set to 0-0, 0-1 or 1-0. Please refer to table 2 for details. For example, in some applications, you may want the dehumidifier to be working and the humidifier to be off when sensor fails. Hence you need to set SFA to “1-0”.

Table 2. Output of the controller when sensor fails.

SFA	Controller output when sensor fails
0-0	dehumidifier off, humidifier off
1-0	dehumidifier on, humidifier off
0-1	dehumidifier off, humidifier on

5. Program Setup

A total of 8 control steps can be programmed to this controller. Each step contains the set value for humidity (H-X) and the preset time (t-X), where "X" is the step number (e.g. Step 4 humidity is represented by H-4 and step 4 preset ending time is represented by t-4). The preset time determines when the controller finishes the current step and starts the next step. The unit of time is in hours with 0.1 hour (6 minutes) resolution.

The preset time is defined as the duration period between the current step and the next step. Please make sure the time is long enough for the device to reach the set humidity. If the setting time is too short, the humidity may not reach the set value before the program jumps to the next step.

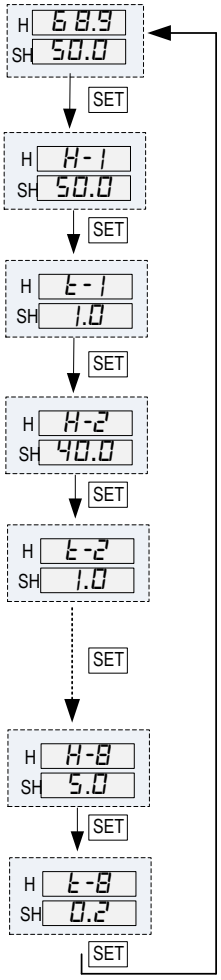

Figure 4. Flow chart of setting up control program.

To program the humidity profile, briefly press SET key once. The display will show "H-1" at the top window and the humidity set value at the bottom window for step 1. Use ▲ or ▼ key to adjust the humidity to the desired value. Then press SET key again to save the change and go to the next parameter. Then the upper display will show "t-1" and the preset time on the lower window. Use ▲ or ▼ key to adjust the value, then press SET key to confirm the change and go to the next parameter. Then repeat this process for the rest of the program steps. After you program enough steps for your application, you can set the time for rest of the steps to zero.

Note: The humidity set value will not be saved unless SET is pressed (confirmed). If no adjustment is needed for any followed steps, you can skip them by holding the SET key until the controller goes back to the normal operating mode. The controller will also return to the normal operating mode if it is left alone for 10 seconds.

6. Mode Selection

The operating procedures are divided into 5 different modes: M0, M1, M2, M3 and M4. Following are their definitions:

M0: Running mode, where the top display shows the measured value and lower display shows the setting value at the current step.

M1: Programming mode, where the humidity and time are to be programmed.

M2: Setting mode, where the controlling parameters are displayed and to be set.

M3: Holding mode. Controller controls the humidity by the current setting but timer is not running. The lower display flashes between the set humidity and Hol. When Run Key is pressed, it will continue from the current step.

M4: Stopping mode, where the device still controls the humidity by the current setting but timer is not running. The lower display flashes between the setting value and StP. When Run Key is pressed, it will start from the first step.

Under each mode, each key can accomplish two functions. One is by a short press. The other is by a press and hold for 3-5 seconds. The two functions of each key are different in different mode. Please check Table 3.

7. Quick Operation Guide

- To enter the running mode: power on the controller and leave it alone for at least 5 seconds. You will see two numbers being steadily displayed.
- To start/resume the control process: in normal running mode (M0), press ▲ key for 2 seconds to start/resume the program. You will see "run" flash once in bottom display, and then it will show the preset humidity.
- To hold the process: in running mode (M0), press ▼ key for 2 seconds to hold processing (M3) (It can be resumed later). You will see set humidity and "hold" flashing alternatively.
- To stop the program: in hold mode (M3), press ▼ key for 5 seconds to stop processing (M4) (It cannot be resumed later, it can be restarted from the beginning later). You will see set humidity and "stop" flashing alternatively.
- To program steps: in running mode (M0), press "set" key once
- To enter parameter setting mode: in running mode (M0), press "SET" key for 2 seconds.
- To mute the alarm (not step completion alarm): press ▼ key once.
- To check the current step, how much time has run for the step: In running mode (M0), press ▲ once. The top display is P-X is the current running step. The bottom display is the time running in this step.

- To check the total time (toL) since last power up (power interruption): In running mode (M0), press ▲ twice.
- To start from a specific step (or jump to a specific step): When program is on hold or stopped, short press SET key once to enter programming mode, then press SET key repeatedly to choose the step you want to jump to. Press & hold SET key for 4s, then the program will jump to this step and run. The bottom display flashes "JMP" to confirm that jump is accomplished.

Table 3. List of operations under different modes.

Running Mode (M0)		
▲	Short press	Shows current step and its running
	Double press	Shows the total time (toL) since last power up(power interruption)
▼	Short press	Mute alarm
	Press and hold for 2s	Program on holding mode (M3)
SET	Short press	Program the humidity-time profile (M1)
	Press and hold for 2s	Setting mode (M2)
Programming mode (M1)		
▲	short press	Increase Set Humidity (H)
▼	short press	Decrease Set Humidity (H)
SET	short press	Confirm the setting change, jump to next setting
	Press and hold	Back to running mode(M0)
Setting mode (M2)		
▲	short press	Increase Set Humidity (H)
▼	short press	Decrease Set Humidity (H)
SET	short press	Confirm the setting change, jump to next setting
	Press and hold	Back to running mode(M0)
Holding mode (M3)		
▲	Short press	Shows the total time (toL) since last power up(power interruption)
	Press and hold for 2s	Resume the program (M0)
▼	Press and hold for 5s	Stop the program (M4)
SET	Short press	To change profile: Press SET key repeatedly to go to target step, then use ▲ or ▼ key to change setting value. To jump to a specific step: Press SET key repeatedly to set to target step, then press & hold SET key for 4s to jump & start at that step.
	Press and hold for 2s	Setting mode (M2)
Stopping mode (M4)		
▲	Short press	Shows the total time (toL) since last power up(power interruption)
	Press and hold for 2s	Resume the program (M0)
SET	Short press	To change profile: Press SET key repeatedly to go to target step, then use ▲ or ▼ key to change setting value. To jump to a specific step: Press SET key repeatedly to set to target step, then press & hold SET key for 4s to jump & start at that step.
	Press and hold for 2s	Setting mode (M2)

8. Connect the Sensor to the Controller

The connector of sensor contains a slot for fitting pin connection. It also has a spring lock to prevent disconnections from accidental pulling on the cable. To install the to the unit, please align the slot of the female connector on the sensor to the red mark of the male connector on the unit, then hold the tail and push the female connector forward. To remove the connector, please pull the spring loaded collar of the female connector. Please see the Figure 5 and Figure 6 below for details.

Figure 5. Install the Sensor.

Figure 6. Remove the Sensor.

Auber Instruments
5755 North Point Parkway, Suite 99
Alpharetta, GA 30022, USA
www.auberins.com
E-mail: info@auberins.com Tel: 770-569-8420