

System 350™

W351P Electronic Proportional Plus Integral Humidity Control

The W351P control is an electronic, proportional plus integral humidity control with analog 0-10 VDC and 0-20 mA outputs. The W351P control has three user-selectable integration constants, a wide setpoint range of 10-90% RH, and an adjustable throttling range of 2-20% RH.

The W351P control is designed to work with an HE-67S3-0N0BT Room Sensor Humidity Transmitter or HE-67S3-0N00P Duct Sensor Humidity Transmitter.

Like all System 350 products, the W351P control housing is a NEMA 1, high-impact plastic enclosure. The modular design provides easy, plug-together connections for quick installation and future expandability.



Figure 1: W351P Electronic Proportional Plus Integral Humidity Control

Features and Benefits

☐ Modular Design	Provides the flexibility to add up to four S351 Stage Modules, a D351 Humidity Display Module, and a Y350R Power Module
☐ Plug-together Connectors and 35 mm DIN Rail Mounting	Eliminates wiring between modules and reduces installation costs
☐ Adjustable Setpoint Range of 10-90% RH	Reduces inventory by covering the humidity range required to support most humidity applications
☐ Adjustable Minimum Output Signal	Allows the user to adjust the minimum output between 0-60% of the output signal voltage; can also be used to set minimum valve position
☐ Adjustable Throttling Range of 2-20% RH	Enables user to match the amount of control (maximum to minimum) to application requirements
☐ Humidification or Dehumidification Modes of Operation	Works in a variety of humidification or dehumidification applications
☐ Three Selectable Integration Constants	Allows user to adjust system recovery rate to setpoint humidity at Slow, Medium, or Fast to meet application requirements
☐ Interchangeable Humidity Transmitters	Increases versatility and serviceability

Application Requirements

IMPORTANT: All System 350 controls are intended to control equipment under normal equipment operating conditions. Where failure or malfunction of System 350 controls could lead to an abnormal operating condition that could cause personal injury or damage to the equipment or other property, other devices (limit or safety controls) or systems (alarm or supervisory) intended to warn of, or protect against, failure or malfunction of the System 350 controls must be incorporated into and maintained as part of the control system.

The W351P Humidity Control can operate as a standalone device or in conjunction with add-on modules. With the addition of S351 Stage Modules, the humidity system can control a variety of single or multiple-stage humidity applications.

A typical application for the W351P control is modulating steam valves for humidification.

A typical System 350 humidity control scheme includes the following:

- W351P Humidity Control
- Y350R Power Module (or 24 VAC transformer)
- up to four S351 On/Off Stage Modules
- D351 Digital Humidity Display Module
- HE-67S3-0N0BT Wall Mount or HE-67S3-0N00P Duct Mount Humidity Transmitter

Operation

The W351P control operates on 24 VAC/VDC and provides two simultaneous analog outputs: 0 to 10 VDC and 0 to 20 mA.

A ten-segment front panel Light-Emitting Diode (LED) indicates percentage of output. Features include:

- adjustable setpoint
- adjustable minimum output
- adjustable throttling range (proportional band)

- selectable integration constant
- selectable humidification/dehumidification mode of operation

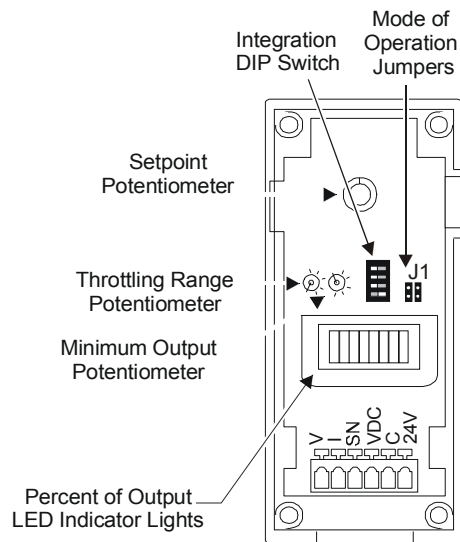


Figure 2: Interior View Showing W351P Control Features

Proportional-only Controls

Proportional-only controls work by continuously adjusting the magnitude of the control's output signal in proportion to the difference (input-error) between the control's setpoint value and the actual value sensed in the controlled system. As the load on a system increases, the input-error to the control increases. The control reacts by increasing the magnitude of the output signal, driving the controlled device to respond to the increased load. (See Figure 3.)

Proportional-only controls are easy to set up and adjust, and they provide good stability and rapid response to changing load conditions.

Proportional-only controls cannot maintain a system process at the exact control setpoint. A proportional offset (or droop) is always present when there is a steady load on the controlled system. (See Figure 3.)

The result is that a proportional-only control maintains a system process at a control-point (setpoint plus the proportional offset) instead of the desired setpoint. The greater the load on the system, the greater the proportional offset, and the further the control-point is from the system setpoint.

A proportional-only control cannot adjust the output signal to drive a system process from the control-point to the desired setpoint. (See Figure 3.)

Systems with proportional-only controls and large loads or highly variable load conditions may operate at control-points that vary significantly from the desired setpoint.

Proportional Plus Integral Controls

The W351P Electronic Proportional Plus Integral Humidity Control incorporates integral (or reset) control action along with the proportional-only control action. The addition of the integral (or reset) design effectively eliminates proportional offset. The control can adjust the output signal to match a steady load on the system, and drive the system process toward setpoint.

On a properly-sized system with steady load conditions, a proportional plus integral control can maintain the system process very close to the setpoint. (See Figure 3.)

The speed at which the proportional plus integral control drives the system process to setpoint (recovery rate) is determined by the system's capacity, the size of the load, and the integration constant set on the control.

The integration constant establishes the rate at which the control re-adjusts to the load as it drives the process towards setpoint. The faster the integration constant, the faster the control re-adjusts the magnitude of the output signal, and the faster the recovery rate of a properly sized and set-up system.

On traditional proportional plus integral controls, the rate of re-adjustment can become too large if the process load exceeds the capacity of the equipment. When the controlled equipment is at full capacity and the setpoint still cannot be reached, traditional proportional plus integral controls continue to adjust the magnitude of the output signal. The result is called *integral windup*.

The W351P proportional plus integral controls avoid integral windup with a patented circuit that puts a dynamic ceiling on the integrator. This allows the process to recover from an out-of-range condition without experiencing a long overshoot period.

Proportional plus integral controls might not be suitable for all applications. Improperly applied proportional plus integral controls may be unstable and overshoot the setpoint.

Also, proportional plus integral controls require two separate adjustments that are dependent on each other. The system must be properly sized to handle the maximum process load, and close observation is necessary when the proportional plus integral controls are initially set up and checked out. On proper applications, proportional plus integral controls provide superior accuracy and continuous setpoint control.

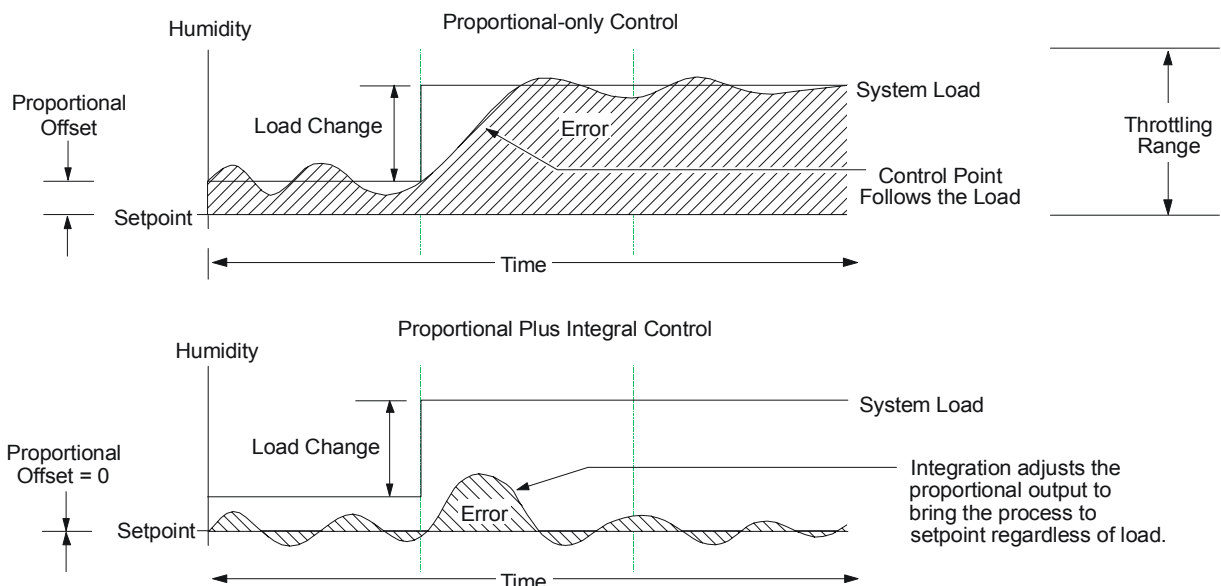


Figure 3: Operation of Proportional-only vs. Proportional Plus Integral Control

Minimum Output Adjustment

The minimum output adjustment sets the minimum signal output (in VDC or mA) that the W351P control provides to the controlled device. The minimum output can be set between 0 to 60% of the output range (up to 6 VDC or up to 12 mA).

Example: For a controlled device that responds to a 4 to 20 mA output signal, the minimum output must be 4 mA or 20% of the output range. (See Figure 4.)

Adjust the MIN OUTPUT potentiometer, located on the lower circuit board to the right of the throttling range potentiometer. One LED segment will light on the front of the control for each 10% increase in range. The first segment lights at 10%, the second segment at 20% and so on, until the sixth segment lights at 60%.

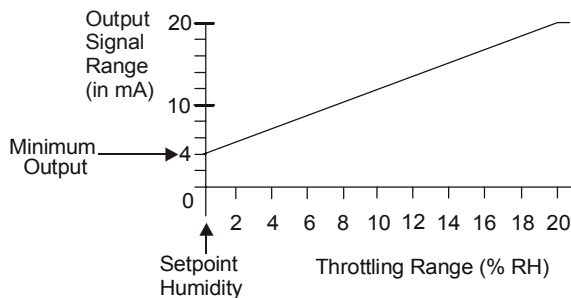


Figure 4: Minimum Output Set to 20% (4 mA) and Throttling Range Set to 20% RH

Throttling Range (Proportional Band)

On proportional-only controls, the throttling range or proportional band setting establishes how far the system humidity must deviate from the W351P control setpoint to generate a 100% output signal from the control.

For example, on a proportional-only control with a throttling range of 10% Relative Humidity (RH), the output signal (VDC or mA) is 0% when the system humidity equals the setpoint humidity. The output signal increases to 100% (10 VDC or 20 mA) when the system humidity rises 10% RH above the setpoint in Dehumidification mode or drops 10% RH below the setpoint in Humidification mode.

When setting up the controls for proportional plus integral operation, start with the integration constant Off (in the proportional only mode), and set the throttling range (or proportional band) to a wide setting (60% or more of the total throttling range) to assure a stable control loop. Then set the integration constant as slow as possible. (Refer to *Integration Constant*.)

Adjust the throttling range by turning the THROT RANGE potentiometer located on the center of the circuit board under the control cover.

The throttling range is adjustable from 2-20% RH. (See Figure 4.) Make adjustments using the potentiometer marked THROT RANGE located on the lower circuit board to the left of the MIN OUTPUT potentiometer. (See Figure 2.)

Integration Constant

Depending on the application, the W351P humidity control operates as a proportional-only control or a proportional plus integral control. Refer to sections *Proportional-only Controls* and *Proportional Plus Integral Controls*.

The W351P control has three available integration constants, which allow setup for optimum recovery rate for an application. Use the Integration DIP switch block (see Figure 5) and the guidelines below to set the control for proportional-only or to set the integration constant for proportional plus integral control.

- **Off: Switch 1 to On position, all others Off** provides proportional-only operation. In open loop (without feedback) applications, select Off for proportional-only operation. (See Figure 5.)
- **Slow (C3): Switch 2 to On position, all others Off** is the slowest integration constant and is suitable for most proportional plus integral applications. Slow is the recommended initial setting.
- **Medium (C2): Switch 3 to On position, all others Off** provides a faster integration constant. If the rate of system recovery to setpoint is sluggish with the control set to Slow and the system has enough capacity to drive the process to setpoint at a faster rate, the Medium setting may be used.
- **Fast (C1): Switch 4 in On position, all others Off** is the fastest integration constant. Fast should be used only in instances where the rate of change at the transmitter is extremely rapid and system capacity is sufficient to compensate for rapid load changes.

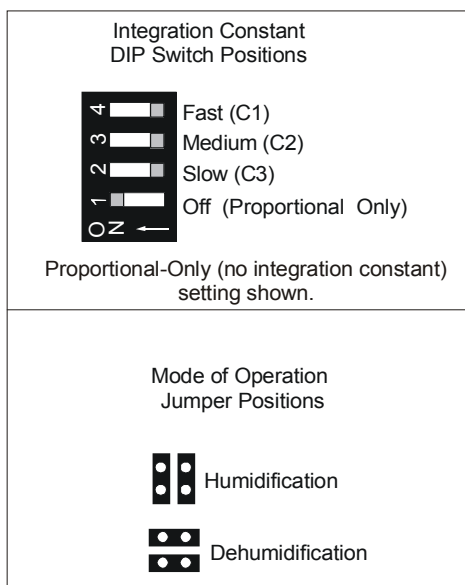


Figure 5: Integration Constant and Mode of Operation Settings

Mode of Operation

When Dehumidification Mode is selected, the analog output signal magnitude increases as the humidity rises.

When Humidification Mode is selected, the analog output signal increases as the humidity drops. (See Figure 6.) The control is factory set for humidification.

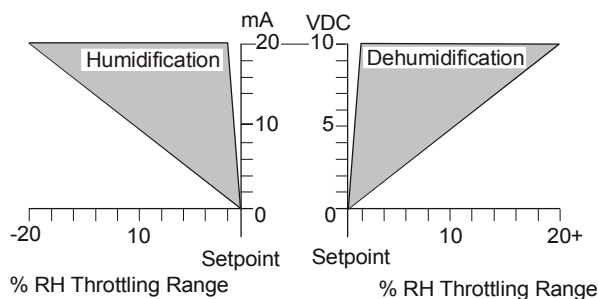


Figure 6: Humidification or Dehumidification Proportional Bands Shown in Proportional-Only Mode (Shaded area shows throttling range possibilities from minimum to maximum.)

Dimensions

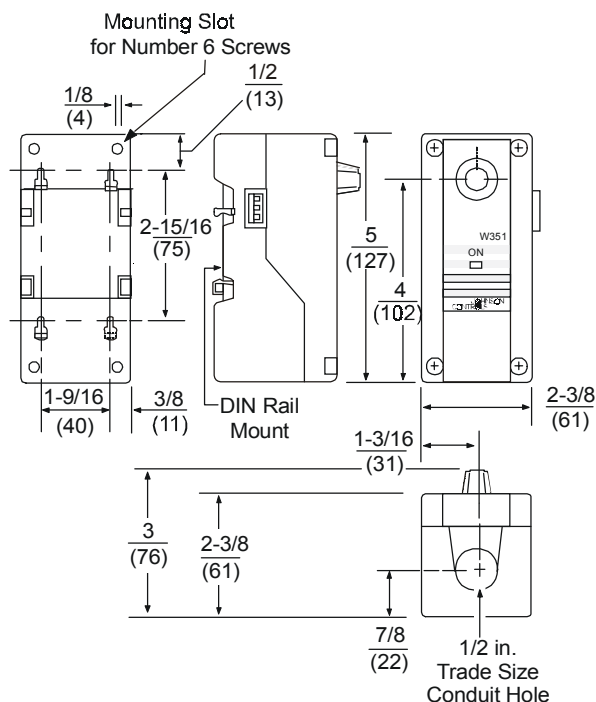


Figure 7: W351P Control Dimensions, in./mm

Mounting

The W351P control housing is a compact NEMA 1 plastic enclosure designed for standard 35-mm DIN rail mounting. Four key-slot mounting holes on the back of the control case are provided for surface mounting.

The W351P control is not position sensitive but should be mounted for convenient wiring and adjustment.

Note: When mounting the W351P control (or any System 350 module) to rigid conduit, attach the hub to the conduit before securing the hub to the control enclosure.



WARNING: Risk of Electrical Shock.

Disconnect power supply before making electrical connections. More than one disconnect may be required to completely de-energize equipment. Failure to follow these precautions may result in electrical shock or equipment damage.

Wiring

Install all wiring to conform to the National Electrical Code and local regulations. For maximum electrical rating of control, refer to the label inside the control cover. Terminals will accept 12 to 26 AWG wire. Use only copper conductors.

1. Use a 1/8-in.- (3.2 mm) wide-blade screwdriver to push the clamp arm down. (See Figure 8.)
2. Insert the appropriate wire into the opening. (See Figure 9 for terminal designations.)
3. Release the clamp arm to secure the wire.

Note: The W351P control can output a variable signal from 0-10 VDC or 0-20 mA. (Both outputs can be used simultaneously.) Connection can be made to both the **V** and **I** terminals, allowing the W351P control to drive two outputs from the same Humidification or Dehumidification ramp simultaneously. This feature can be used to drive motor actuators of several different types in a single application.

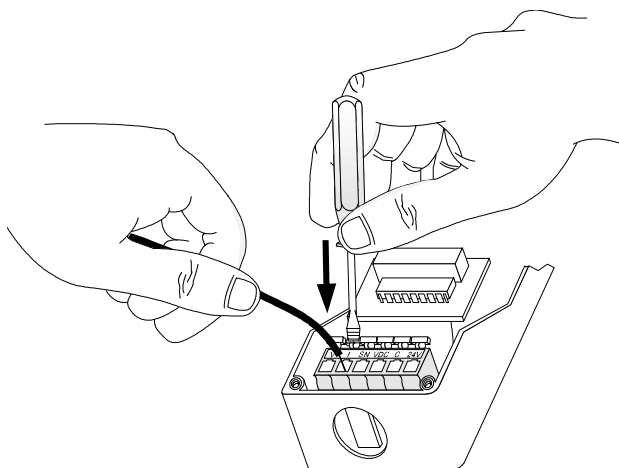


Figure 8: Cage Clamp Terminal Block

Transmitter Wiring

The W351P Humidity Control uses a HE-67S3-0N0BT or a HE-67S3-0N00P Humidity Transmitter, which is powered by the 12 VDC power supply of the W351P control. Connect the transmitter to the 6-conductor terminal block located at the bottom of the lower circuit board. (See Figure 2.) See *TRUE RH™ Series HE-67xx Humidity Element with Temperature Sensor Installation Instructions (Part No. 24-9527-7 Rev. A)* for more information.

Use the 0-10 VDC output of the HE-67S3-0N0BT or HE-67S3-0N00P humidity transmitter as the input to the W351P control.

Shielded cable is not generally required for transmitter wiring on runs of less than 50 feet. When using shielded cable, isolate and tape the shield at the transmitter. Connect the shield to the **C** terminal on the W351P control.

The maximum recommended length of 22 AWG 3-wire shielded transmitter cable is 250 feet (76 meters).

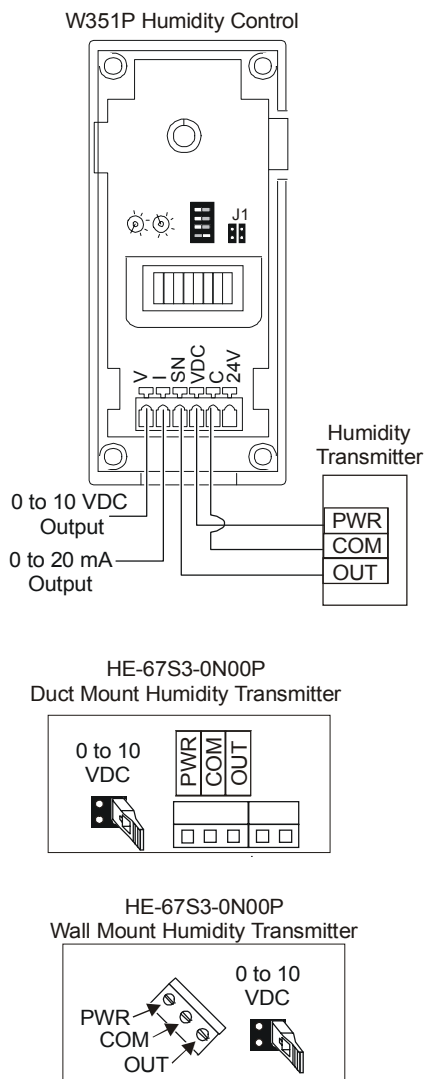


Figure 9: Transmitter Wiring

Add-on Modules

The S351 Stage Modules, D351 Digital Humidity Display Module, and Y350R Power Module connect together and plug into the W351P control via a connector on its right side. The recommended order of the modules is (from left to right) control module, power module, stage module(s), and display module.

S351 Humidity Stage Modules

The S351 Stage Modules receive their power, setpoint, and transmitter input from the W351P Humidity Control. Only the W351P control output is integrated (not the transmitter and setpoint signals) when an integration constant of Slow, Medium, or Fast is selected.

Up to four additional S351 modules can be plugged into a W351P Humidity Control and set for humidification, dehumidification, or a combination of humidification and dehumidification. See *System 350™ S350A Temperature, S351A Humidity, and S352A Pressure Stage Modules Product/Technical Bulletin (LIT-930080)* for more information.

D351 Humidity Display Module

The D351 module receives its power, sensor and setpoint information from the W351P control. A 3-digit, Liquid Crystal Display (LCD) gives continuous display of the sensed humidity. Press the PRESS FOR SETPOINT button to display the setpoint of the adjoining W351P control. See *System 350™ Display Modules Product/Technical Bulletin (LIT-930070)* for more information.

Y350R Power Module

The Y350R module provides a convenient method of powering System 350 Modules from a 120 or 240 VAC power source. The Y350R module supplies power to one W351P control, one D351 module, and up to four S351 stage modules. See *System 350™ Power Module Product/Technical Bulletin (LIT-930090)* for more information.

Adjustments



WARNING: Risk of Electrical Shock.

To perform the following procedures it is necessary to power the control and the controlled equipment while the control cover is removed. Do not touch any exposed metal components with anything other than properly insulated tools or insulated probes of the digital voltage meter. Failure to use properly insulated tools and probes can result in severe electrical shock if live line voltage parts are contacted.

W351P Control

1. Remove W351P control cover by loosening the four captive cover screws.
2. Position the jumpers on jumper block J1 vertically for humidification or horizontally for dehumidification. (See Figure 2.) The jumpers are factory-set for humidification.
3. Adjust the throttling range potentiometer to desired setting. Rotate the potentiometer clockwise to increase the throttling range.

If the W351P control is to be used in proportional plus integral mode, do not set the initial throttling range adjustment below 10% RH. A narrow throttling range used in conjunction with the integration may result in unstable control.

4. Set the minimum output potentiometer to the desired position if minimum output is required. Output can be read with a voltmeter or can be adjusted using the ten segment LED on the front of the control.

Note: Before setting the minimum output potentiometer, be sure the control is not generating an analog output signal.

For each 10% increase in range, one segment will light on the LED, up to six LED segments (60% is the upper limit of the minimum output adjustment). In a milliampere application, each segment equals 2 mA. In a voltage application, each segment equals 1 volt. (See Figure 3 for a milliampere example.)

Example: To set the W351P control for a minimum output of 4 mA, turn the minimum output potentiometer clockwise until the second LED segment lights. Slowly turn the potentiometer counterclockwise until the second segment just goes out.

5. Make sure the system is stable before selecting integration. Refer to the *Checkout* section of this bulletin.
6. Replace the cover, tighten the four captive cover screws, and adjust the control to the desired setpoint.

Note: The W351P control setpoint is factory calibrated at midscale to a tolerance of $\pm 1\%$ RH. The setpoint tolerance at the extreme ends of the setpoint scale may be $\pm 2.5\%$ RH. The D351 display module is unaffected by this tolerance shift. Use the D351 module for the most accurate setpoint selection. Press and hold the setpoint button on the D351 module while rotating the setpoint dial.

S351 Stage Module

When the W351P control is used in conjunction with one or more S351 modules, the following adjustments must be made to each S351 module. Additional information about adjusting the stage module is available in the *S350 Temperature, S351 Humidity, and S352 Pressure Stage Modules Product/Technical Bulletin (LIT-930080)*. (See Figure 10 for adjustment locations.)

1. Remove the S351 module cover by loosening the four cover screws.
2. Set the humidification/dehumidification jumper blocks to the desired mode of operation.

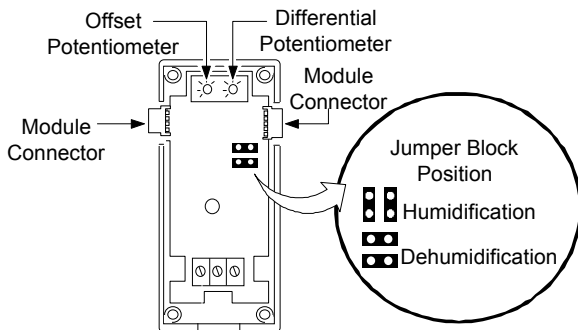


Figure 10: S351 Stage Module

3. Adjust the differential potentiometer to the desired offset from the setpoint of the W351P control. (See Figure 11 for a sample multistage application if needed.)

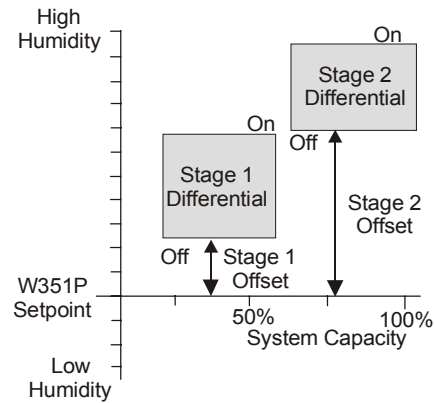


Figure 11: On/Off Dehumidification Using Two S351 Stage Modules

4. Adjust the offset potentiometer to the % RH from the W351P control setpoint (above setpoint with dehumidification mode selected or below setpoint with humidification mode selected) so that the stage relay will de-energize.
5. Replace the cover and fasten in place with the four screws.

Troubleshooting

Checkout

1. Before applying power, make sure that the installation and wiring connections are according to job specifications.
2. After making necessary adjustments and electrical connections, put the system in operation and observe at least three complete operating cycles before leaving the installation to determine that the system is stable.
3. If integration is required, select the Fast, Medium, or Slow integration constant. Slow is the recommended initial setting. (Refer to the *Integration Constant* section.)
4. Put the system back into operation. Observe system operation and make any additional adjustments to obtain stable control (if necessary).



WARNING: Risk of Electrical Shock.

To perform the following procedures it is necessary to power the control and the controlled equipment while the control cover is removed. Do not touch any exposed metal components with anything other than properly insulated tools or insulated probes of the digital voltage meter. Failure to use properly insulated tools and probes can result in severe electrical shock if live line voltage parts are contacted.

If the control system does not function properly, verify that the proper mode is selected on each module (humidification/dehumidification) and then use the following procedures to determine the cause of the problem.

1. Check for proper voltages on the W351P Humidity Control:
 - a. Connect a Digital Voltmeter (DVM) between the 24V (+) and C (-) terminals located on the W351P control's terminal block (Figure 2).
 - If an external transformer is used, select AC volts on the DVM and verify that the voltage is 20-30 VAC.
 - If a Y350R Power Module is used, select DC volts on the DVM and verify that the voltage is 16-38 VDC.
 - If an external DC power supply is used, select DC volts on the DVM and verify that the voltage is 22-29 VDC.
 - b. If the DVM reading is within the indicated voltage range, select DC volts on the DVM (DVM must be accurate to ± 0.1 VDC) and connect the (+) lead to the VDC terminal and the (-) lead to the C terminal.
 - If the DVM voltage is 11.9-12.1 VDC, proceed to Step 2.
 - If the DVM voltage is above 12.1 VDC, replace the W351P control.

- If the DVM voltage is below 11.9 VDC, then disconnect the humidity transmitter completely and check the voltage again.
 - If the DVM voltage rises to 11.9-12.1 VDC, replace the transmitter.
 - If the DVM voltage is still below 11.9 VDC, replace the W351P control.

2. Check humidity transmitter for proper output voltage:
 - a. Disconnect the transmitter OUT wire from the W351P control's SN terminal.
 - b. Take a humidity reading with a properly-calibrated, accurate humidity measuring device. This reading is the actual humidity.
 - c. Connect a DC voltmeter between the transmitter OUT wire and the control C terminal. Using Figure 12, convert the voltage to % RH. This is the humidity reading at the transmitter (RH_T).

Note: A transmitter output of 0-10 VDC should correspond to a humidity of 0-100% RH (see Figure 12).

- If the RH_T is close to the actual humidity, proceed to Step 3.
- If the RH_T deviates substantially from the actual humidity, replace the transmitter.

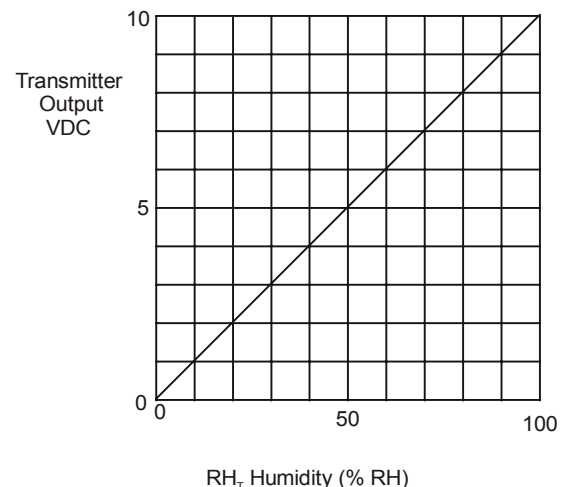


Figure 12: Transmitter Voltage vs. Humidity

3. Check the W351P Humidity Control for proper operation:

Note: Perform steps 1 and 2 first.

- a. Reconnect the transmitter OUT wire to the W351P control's SN terminal. Select the minimum throttling range and a minimum output equal to zero by turning both potentiometers counterclockwise. Switch the integration off and select the Humidification mode.
- b. Connect the DVM (+) lead to the W351P control's SN terminal and the (-) lead to the C terminal.
- c. If the sensor voltage is less than 9 V, go to Step 3d. If the voltage is greater than 9 V, then adjust the setpoint to 80% RH.
 - The output terminal **V** should be less than 0.1 VDC and all segments in the LED should be off. If not, replace the W351P control.
 - Adjust the minimum output to the maximum by turning the potentiometer clockwise. As the potentiometer is turned clockwise, the segments in the LED should come on from left to right until the fifth or sixth segment is on. If not, replace the W351P control.
 - Adjust the minimum output to zero again and select the Dehumidification mode.
 - If the right most segment in the LED is on (**V** terminal = 10 VDC; **I** terminal = 20 mA), go to Step 3e. If not, replace the W351P control.

- d. If the sensor voltage is below 9 V, adjust the setpoint to match the RHT. (See Figure 11.) The output terminal **V** should be less than 0.1 VDC and all segments in the LED should be off.

Note: Some tolerance error is present between the setpoint scale and the setpoint knob pointer. See the *Adjustments* section.

- Increase the setpoint by 2% RH.
- As the setpoint is increased, the W351P control's **V** output voltage should go from 0 to 10 VDC, the **I** output current should go from 0 to 20 mA, and the LED segments should come on one at a time from left to right.
- If the LED segments do not turn on or the **V** or **I** outputs do not change as described above, replace the W351P control.

- e. Re-adjust the W351P control back to the desired control settings.

4. Check the S351 Stage Modules for proper operation (if applicable):

IMPORTANT:	There is a possibility that a defect in one S351 module could cause defective symptoms in all modules. Plug each S351 module into the W351P control individually and check its performance as outlined in Step 4.
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Note: Steps 1, 2, and 3 must be performed first.

- a. Turn the W351P control's setpoint dial to minimum.
- b. Increase the setpoint by slowly turning the dial until the S351 module's relay and LED turn On or Off as shown in Table 1.
- c. Decrease the setpoint slowly until the S351 module's relay and LED turn Off or On as described in Table 1.
- d. If the relay does not perform as indicated in Table 1, adjust the differential and offset potentiometers to minimum and try again.
- e. If the relay still does not turn on and off, replace the defective S351 module(s).

Table 1: S351 Module Relay Troubleshooting

Mode of Operation	LED Status	Normally Open Relay Status	Setpoint Dial Setting*
Humidify	On	Closed	(RHT) + offset + differential
Humidify	Off	Open	(RHT) + offset
Dehumidify	On	Closed	(RHT) - offset - differential
Dehumidify	Off	Open	(RHT) - offset

* See Figure 11 for RH_T vs. Humidity illustration.

5. Check the D351 Display Module (if applicable).

Note: Perform Steps 1 through 4 first.

- a. Check the RH_T as determined in Step 2c. The display should show the same humidity reading.

- b. If the D351 module does not show the correct RH_T, replace the D351 module.
- c. Press the setpoint button on the display module to read the selected setpoint.
- d. If the D351 module displays a reading other than the expected setpoint value, check the setpoint potentiometer setting and correct if necessary. If the display continues to read an incorrect or out-of-range value (>100% RH), replace the D351 module.

Repairs and Replacement

Do not calibrate or make field repairs.

HE-67S3-0N0BT and HE-67S3-0N00P humidity transmitters and replacement controls are available through local Johnson Controls representatives or wholesale distributors.

Table 2: Ordering Information

Item	Product Code Number	Description
W351P Proportional Plus Integral Humidity Control	W351PP-1C	Without transmitter, Range: 10-90% RH; Throttling: 2-20% RH
	W351PN-1C	With room RH transmitter (HE-67S3-0N0BT), Range: 10-90% RH; Throttling: 2-20% RH
	W351PN-2C	With duct RH transmitter (HE-67S3-0N00P), Range: 10-90% RH; Throttling: 2-20% RH
Display Module	D351AA-1C	Digital Humidity Display Module
Stage Module	S351AA-1C	Humidity Stage Model with % RH Scale
Power Module	Y350R-1C	120/240 VAC, 50/60 Hz Input
Humidity Transmitters	HE-67S3-0N0BT	All-polymer, Wall Mount Humidity Transmitter
	HE-67S3-0N00P	All-polymer, Duct Mount Humidity Transmitter
Conduit Adapter	ADP11A-600R	1/2-in. Snap-fit EMT Conduit Adapter (box of 10)
DIN Rail Sections	BKT287-1R	35 x 7.5 mm, 0.305 m (12 in.) long
	BKT287-2R	35 x 7.5 mm, 1.0 m (39.4 in.) long
DIN Rail End Clamps	PLT344-1R	Consists of Two End Clamps
Cable for Remote Mounting of D351 Display Module	WHA29A-600R	(0.9 m) 3 ft*
	WHA29A-603R	(7.6 m) 25 ft
	WHA29A-604R	(15.2 m) 50 ft

* WHA29A-600R can also be used to daisy chain S351 Stage Modules together.

Specifications

Product	W351P Electronic Proportional Plus Integral Humidity Control		
Sensor Input Range	0-10 VDC; corresponding to 0-100% RH		
Setpoint Range	10-90% RH		
Throttling Range	2-20% RH		
Supply Voltage*	AC Supply:	20-30 VAC Class 2, 50/60 Hz, or a Y350R Power Module: See <i>Add-on Modules</i> .	
	DC Supply:	22-29 VDC @ 150 mA Maximum	
Analog Output	0-10 VDC (550 ohm Load Minimum) and 0-20 mA (600 ohm Load Maximum) Both outputs are designed to withstand short circuits to COM and 24 VAC.		
Minimum Output	Adjustable from 0-60% of the Output		
Output Indication	A ten-segment LED indicates percentage of output.		
Control Action	Dehumidification or Humidification action is jumper selectable.		
Power Consumption	3.2 VA Maximum		
Integration Constant	Three Selectable Rates (Slow, Medium, Fast), and an Off Position		
Ambient Temperatures	Operating:	-30 - 150°F (-34 - 66°C)	
	Shipping:	-40 - 185°F (-40 - 85°C)	
Humidity (all modules)	0-95% RH Non-condensing; Maximum Dew Point: 85°F (29°C)		
Material	Case, Cover: NEMA 1 High-impact Thermoplastic		
Agency Listing	UL Listed, File E27734, CCN XAPX cUL Listed, File E27734, CCN XAPX7		
Transmitter	HE-67S3-0N0BT All-Polymer, Wall-mount Humidity Transmitter; 0-10 VDC, 0-100% RH HE-67S3-0N00P All-Polymer, Duct-mount Humidity Transmitter; 0-10 VDC, 0-100% RH		
Add-on Modules:	S351	Input Power:	Provided by the W351P control
		OFFSET:	2-30% RH
		DIFF:	2-10% RH
	Y350R	Supply Voltage:	120/240 VAC, 50/60 Hz
	D351	Display Range:	10-90% RH

* Only one input voltage source may be used.

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult Johnson Controls/PENN Application Engineering at 1-(800)-275-5676. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.



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