

June 2001

Installation & Instruction Manual for PCS-2000 Proofer Control System



W. H. Cooke & Co., Inc.
6868 York Rd.
Hanover, PA 17331

Phone: 1-800-772-5151

www.whcooke.com

Table of Contents

Introduction	4-6
Installation	7-11
Suggested spare parts	12
Connecting a Recorder or PLC	13-14
Programming the 2600-F-R & 2600-RH-R controls	15
Programming the 2600-F-MA & 2600-RH-MA controls	16
Errors/Troubleshooting	17-18

In 1986 the first PCS-2000 Proofer Control System was built at the request of a well known bakery in Baltimore, Maryland. Although improvements have been made to make the system even more user friendly and flexible, the basic concept of eliminating the problems associated with the wet/dry bulb method of measuring humidity in a proof box is still at the heart of our system.

The PCS-2000 control system uses plug in, state of the art, solid state components to make it the most accurate trouble free proof box control system available anywhere.

Our V-2001-ST solid state sensor is actually two sensors in one. Thin film capacitance and resistance sensors measure humidity and temperature and are protected from flour dust and physical damage by a porous teflon filter cap. The protective cap allows air in but keeps harmful elements out. The sensor is extremely responsive which you will see in just a few minutes. The sensors are specially oriented to operate in a vertical plane. Please take special note of this and be sure to install the sensor as described in step 3 under installation instructions for best results.

Our controllers were specially selected and modified with software options so that operators quickly become comfortable with the system and so that the program cannot be modified unless you want to do so. The only setting the operator can change is the set point - and only if you want them to change it!

All components plug in and are housed in a Nema 4X enclosure with a see through door to keep flour dust and water out.

The PCS-2000 system was specifically designed to control the environment in proof boxes and fermentation rooms and can be easily field modified to interface to your present equipment. The panel is pre-wired to control either solenoid valves or proportional valves that are pneumatic or motor driven. Your system is already set up to operate per your instructions to us at the time of order, but it can be field changed at any time. Call us for details if the need ever arises.

High and low alarms operate lamps on the front panel and provide 115 VAC power to terminals for use in remote alarming or operating air conditioning in a fermentation room application. During hot summer months some customers use the high temperature alarm to "dump" or exhaust excess hot air in the proof box.

The low alarm of the temperature controller is also wired through a "humidity lock out relay" to prevent steam from being introduced into the proof box until the temperature inside is within 15 °F of the set point of the temperature controller. For example, with a temperature set point of 115 °F, the humidity controller will not begin to operate until the temperature inside the box is up to 100 °F. This prevents condensation from forming inside the proof box.

Should you have the need to record the temperature and humidity inside the proof box, the system is pre-wired to provide dual 4 to 20 milliamp outputs to a remote device such as a recorder or PLC. Cooke Co. has a two pen circular chart recorder available for this purpose. Request price and delivery on our model 7100 recorder.

We've designed the PCS-2000 Proofer Control System after having interviewed Bakery Owners, Engineers and Production Supervisors around the country. We've listened carefully and believe this system fulfills the need for an accurate, reliable system that is easily retrofitted to your existing proof box. We think you'll agree.

Please read the following installation and operating instruction pages carefully. Call us if you have any questions at all.

Installation instructions for PCS-2000 Proofer Control Systems

Step 1 Unpacking & Checking it Out.

The PCS-2000 Proofer Control System is shipped pre-wired for quick check out upon arrival. Open the see-thru door and the swing-out inner door and make sure that all components are secure. Connect the #V-2001-ST sensor/transmitter to the pre-wired #V-1002-MS cable. Plug the pre-wired line cord into a 120 VAC receptacle and observe the readings on the two digital controllers.

Place your hand around or breathe on the white sensor cover at the tip of the unit. The change in humidity will be rapid. The change in temperature will be slower, as air movement is required for a fast response. You should see the readings on the controllers change as you test the unit in this way. When you are satisfied that the system is reacting to changes in temperature and humidity, proceed to step two.

Step 2 Mounting the Control Enclosure.

Bolt the control enclosure to a suitable surface such as a wall or bracket taking care not to twist the cabinet with too much torque. If this happens, the inside door will not close properly as the enclosure is out of square. Tighten bolts evenly and or shim the case square and wire your permanent 120 VAC supply to the terminal strip.

Step 3 Installing the #V2001-ST sensor / transmitter & cable.

Drill a 1/2" round hole through the side of the return duct (never the bottom) or through the wall of the proof box itself and slide the sensor tube through the 1/2" opening. Use the two sheet metal screws provided to attach the head to the side of the duct.

There are two holes through the square sensor head assembly for this purpose. Always install the sensor horizontally and always mount the unit so that the cable connection is facing downwards towards the floor. The sensors inside of the protective cap are specially oriented to operate in this position.

When installing the sensor in the duct work, placement of the sensor should be well downstream from the point of entry of the return air. It is sometimes necessary to move the sensor around until the best location is found. For instance, if installing the sensor through the side wall of the proof box, do not mount the sensor near the door where an inrush of plant air will cause the readings to change rapidly. The sensor responds quickly to changes in the air and will cause the controllers to take corrective action.

Plug the cable connector into the sensor/transmitter connector and screw together until snug.

Important Note: Never expose the square sensor head assembly on the end of the tube to excessive heat or humidity as this portion of the assembly is not designed to be installed inside the duct of the proof box. Install the tube as far inside the box as practical with a minimum insertion of 5 inches.

Step 4 Observing Readings on Controllers.

Power up the control enclosure and observe the readings on the controllers for a few days before wiring control outputs to your valves. This will give you a better idea of where to set the control points.

Important Note: Do not be alarmed if the reading on the humidity controller does not agree with your old system. The PCS-2000 reads in direct relative humidity, while your old system is probably indicating a wet bulb value. It is normal for the reading to be different.

Step 5 Changing Set Points.

To change the set point of either controller, push the index key on the front keypad once. (Refer to page 8 of the controller manufacturer's manual at the back of this booklet for identification of the front panel keys) SP1 will appear at the bottom half of the display and the set point will be on the top half. Use the up or down switch to get to the new desired control point. Then press enter immediately. You have 30 seconds to press enter. If you do not, you'll have to start over.

Important Note: This system is equipped with a humidity lock out relay and is pre-programmed so that steam (humidity) will not be introduced to the proof box until the temperature inside the proof box has risen to within 15 °F of SP1 (set point 1) of the temperature controller.

Example: If SP1 (set point 1) on the temperature controller is set at 115 °F, the output from the humidity controller will be "locked out" until the box reaches 100 °F. You can observe this by watching the lights on the front panel. The purpose of this feature is to prevent condensation from occurring inside of a cold box on start up.

STOP.

If you have purchased the MA (milliamp) output control system go to page 11 to continue the instructions, otherwise continue with the relay output instructions below.

Step 6 Installing the snubbers.

Install a model 1006-RC snubber across the coil of each solenoid valve you are controlling. If you have two solenoids for the humidity coil and one for the temperature coil then you will need a total of three. We normally supply two snubbers with the system unless the customer specifies otherwise.

Step 7 Connecting the Control Outputs.

Connect the control outputs to your solenoid valves from the terminal strip inside the control panel using 16 gauge electrical wire. Terminals 2 & 17 provide a 120 VAC signal for the temperature solenoid valve. Terminals 2 & 27 provide a 120 VAC signal for the humidity solenoid valve. A wiring diagram which follows shows the proper terminals.

Skip to page 12.

(continued from page 10) (For "MA" milliamp output control systems)

Step 6 Installing the I to P Converters.

Install the two I to P (current to pneumatic) transducers as near the valves as practical. Any distance within 50 ft. is acceptable. Hook up your filtered and regulated 20 PSI air supply to the transducers and wire the converters to the main control panel in accordance with the instruction booklet provided with the transducers. As you can see from the wiring diagram at the back of this manual, the milliamp output from the temperature controller comes from terminals 15(+) and 16(-). The milliamp output from the humidity controller comes from terminals 25(+) and 26(-). When properly piped and wired these transducers will convert the 4 to 20 MA signal from the temperature and humidity controllers to 3 to 15 PSI at your steam valve. The controllers are set up for reverse acting operation. As you approach the set point, the milliamp output from the controller will decrease. Please bear this in mind when wiring the controllers to the I to P converters.

Step 7 Connecting the Control Outputs.

As mentioned above in step 6, connect the control outputs to the leads of the I to P converters from the two sets of orange terminals on the terminal strip inside the control panel using 18 gauge twisted/shielded wire and observe for proper control operation. The orange terminals 25(+) and 26(-) provide the output signal (4 to 20 milliamp) from the humidity controller and the orange terminals 15(+) and 16(-) provide the output signal (4 to 20 milliamp) from the temperature controller. See the wiring diagram insert.

Suggested spare parts for the R (relay) Control System:

1. One (1) model V-2001-ST sensor/transmitter
2. One (1) model 2600-F-R (relay output) temperature controller
3. One (1) model 2600-RH-R (relay output) humidity controller

Suggested spare parts for the MA (milliamp) Control System:

1. One (1) model V-2001-ST sensor/transmitter
2. One (1) model 2600-F-MA (milliamp output) temperature controller
3. One (1) model 2600-RH-MA (milliamp output) humidity controller

If you wish to connect a recorder or PLC to the system so that you can record or monitor the temperature or humidity, see the recorder installation section immediately following.

Congratulations! You have just joined the growing number of satisfied users of the "Cooke Proofer Control System".

Connecting a Recorder or PLC

To connect the Cooke model 7100 recorder:

1. Remove the jumpers from the blue terminals marked C1+ and C1- and C2+ and C2- in the main control panel.
2. Using a twisted shielded pair of 18-22 gauge instrument wire, connect the pair between C1+ and C1- on the terminal strip and terminals TB4 (1+) and TB4 (2-). See figure 2-4 on page 13 and figure 2-8 on page 15 of the recorder manual for wiring instructions. Be sure to observe polarity or recorder will not read the proper temperature. This connection is for the temperature side and works with the red pen.
3. Using a twisted shielded pair of 18-22 gauge instrument wire, connect the pair between C2+ and C2- on the terminal strip and terminals TB5 (1+) and TB5 (2-). See figure 2-4 on page 13 and figure 2-8 on page 15 of the recorder manual for wiring instructions. Be sure to observe polarity or recorder will not read proper humidity. This connection is for the humidity side and works with the green pen.
4. Connect a 120 VAC power source to terminals TB1 located in top right corner of recorder's back panel and ground the recorder. See figure 2-5 on page 14 of the recorder manual for proper connections.

Connecting your recorder or PLC:

The signals which are provided at the blue terminal sets mentioned above correspond to the two 4-20 milliamp signals from the V-2001-ST sensor/transmitter. Your receiver (recorder, PLC, etc) must be capable of accepting these two signals and should be scaled to correspond to the same ranges. 0-160 °F for the temperature side and 0-100% Rh for the humidity side.

Programming instructions for 2600-F-R relay output temperature controller for driving solenoid valves.

See the instrument manufacturer's manual at the back of this booklet marked **Relay Output Temperature Controller**. Read pages 9 and 10 so you understand how to access the proper security level. Security level needs to be in level "4" to enable you to program the instrument for your application.

Now begin on page 26 with "secure" menu and program each item so that it agrees with the highlighted selection. After finishing "secure menu" go to page 19 and program the "secondary" menu programming each item so that it agrees with the highlighted selection.

Now go back to page 9 and reprogram security level for "2" to prevent tampering with settings by unauthorized personnel.

Programming instructions for 2600-RH-R relay output humidity controller for driving solenoid valves.

See the enclosed instrument manufacturer's manual marked **Relay Output Humidity Controller**. Read pages 9 and 10 so you understand how to access the proper security level. Security level needs to be in level "4" to enable you to program instrument for your application.

Now begin on page 26 with "secure" menu and program each item so that it agrees with the highlighted selection. After finishing "secure menu" go to page 19 and program the "secondary" menu programming each item so that it agrees with the highlighted selection.

Now go back to page 9 and reprogram security level for "2" to prevent tampering with settings by unauthorized personnel.

Programming instructions for 2600-F-MA milliamp output temperature controller for driving solenoid valves.

See the instrument manufacturer's manual at the back of this booklet marked **Milliamp Output Temperature Controller**. Read pages 9 and 10 so you understand how to access the proper security level. Security level needs to be in level "4" to enable you to program instrument for your application.

Now begin on page 26 with "secure" menu and program each item so that it agrees with the highlighted selection. After finishing "secure menu" go to page 19 and program the "secondary" menu programming each item so that it agrees with the highlighted selection.

Now go back to page 9 and reprogram security level for "2" to prevent tampering with settings by unauthorized personnel.

Programming instructions for 2600-RH-MA milliamp output humidity controller for driving pneumatic or motor actuated valves.

See the enclosed instrument manufacturer's manual marked **Milliamp Output Humidity Controller**. Read pages 9 and 10 so you understand how to access the proper security level. Security level needs to be in level "4" to enable you to program instrument for your application.

Now begin on page 26 with "secure" menu and program each item so that it agrees with the highlighted selection. After finishing "secure menu" go to page 19 and program the "secondary" menu programming each item so that it agrees with the highlighted selection.

Now go back to page 9 and reprogram security level for "2" to prevent tampering with settings by unauthorized personnel.

TROUBLESHOOTING INSTRUCTIONS FOR PCS-2000 CONTROL SYSTEMS

<u>DISPLAY</u>	<u>POSSIBLE PROBLEMS</u>	<u>ACTION REQUIRED</u>
"UFL" flashes	Loose or disconnected wire somewhere between sensor and control enclosure or terminals RBW on terminal strip and terminals 14 and 15 on the two controllers.	Check or replace sensor cable.
"UFL" flashes	Power supply is bad.	Replace controller (24 VDC power supply is built into the controller.)
"OFL" flashes	Sensor is saturated, faulty or sensor has been installed with conduit connection not facing floor.	Replace sensor and consult Cooke Co.
Check "SPL", "SPH", "SCAL", "SCAH" flashes.	Controller improperly programmed.	Consult programming manual or Cooke Co.

<u>DISPLAY</u>	<u>POSSIBLE PROBLEMS</u>	<u>ACTION REQUIRED</u>
No display appears on controller.	Fuse has blown.	Replace fuse.
No output from humidity controller and Green indicator light will not come on.	Low alarm on temperature controller [humidity controller will not function unless proofer is within 15°F of SP1].	Make sure proof box temperature is no less than 15°F below SP1.
Controller reads incorrectly.	Controllers may have been swapped (top for bottom) (Temperature control is in RH slot and vice versa)	Check program in controller against W.H. Cooke's factory settings.
Controller reads Incorrectly.	Sensor is defective.	Swap out with spare sensor or with unit in another proof box to verify problem is in sensor.
Controller set point can only be adjusted downward	Controller has received voltage "spike" and memory is corrupted	Reset controller memory in accordance with instructions below.

To reset controller memory do the following:

1. Go to input (InP) - first thing under secure menu and push down arrow until ---- appears (4 dashes).
2. Push enter key and then down arrow until FACt dFLt appears.
3. Push down key and enter key simultaneously and hold until control resets. Takes about 4 seconds.
4. Now reprogram the controller in accordance with the settings in the instruction manual for that controller - either Temperature or Humidity.

If after re programming the instrument you are still experiencing problems, return the instrument to us at the address below. It is not necessary to call for a return authorization number although you can call and advise us of the problem and tell us that you are sending it in for repair. It is advisable to include a note and a contact with phone number in the box with the controller.

Send to:

W. H. Cooke & Co., Inc.
6868 York Road
Hanover, PA 17331
Attn: Repair Dept.

Phone: 800-772-5151

Email: sales@whcooke.com

NOTES:

1. Make sure controllers are programmed exactly as per Cooke Co. instructions.
2. Make sure sensor has been installed with conduit connection facing floor as per instruction manual.

