PDC INTERNATIONAL
THE POWER BEHIND THE PACKAGE

# Steam Tunnel

# KST80-712

## Serial Number: 441


8 Sheehan Avenue, South Norwalk, CT 06854 USA 203-853-1516 F 203-854-0834 www.pdc-corp.com

PDC INTERNATIONAL
THE POWER BEHIND THE PACKAGE

## Table of Contents




8 Sheehan Avenue, South Norwalk, CT 06854 USA 203-853-1516 F 203-854-0834 www.pdc-corp.com

THE POWER BEHIND THE PACKAGE

# 1. INTRODUCTION

## 1.1 Overview

The PDC Model KST80-712 is for use in shrink-fitting the labels or neckbands to consumer product containers, downstream of the label/neckband application point on a production-line conveyor.

## 1.2 Confidentiality

This manual and the information contained herein are confidential property of PDC International Corporation. They may not be reproduced and may only be used in conjunction with the purchased PDC tunnel.

## 1.3 Manual Storage

Please keep this manual in a safe and accessible place for all operators and other parties that may be responsible for this machine.

## 1.4 Warranty Note

The machine is warranted as per PDC "terms and conditions" to work with the materials and products with which it was tested.


8 Sheehan Avenue, South Norwalk, CT 06854 USA 203-853-1516 F 203-854-0834 www.pdc-corp.com

PDC INTERNATIONAL
THE POWER BEHIND THE PACKAGE

## 2. SAFETY PRECAUTIONS

### 2.1 Warning Statement

Failure to install, service, and operate this tunnel in accordance with the instructions in this manual, proper training, adherence to warning labels, exercising common sense, and due caution may result in serious bodily injury.

Please read this manual carefully and understand it before operating this tunnel.

Please contact PDC International directly at (203) 853-1516 with any questions or for any problems or conditions that arise that you do not understand.

### 2.2 Danger, Warning, and Caution

(Danger, Warning, and Cautions are based on definitions in ANSI Z535.4 -2007, Section 4.)

Before any work is to be done on the tunnel, turn off the steam supply and turn the power ON/OFF switch to the OFF position. Allow the tunnel sufficient time to cool down properly and then disconnect the main power supply and then follow proper lockout/tagout procedures.

⚠ ***Danger: Before opening the filter or condensate trap for any reason, be sure to first relieve all pressure and to wear appropriate protective clothing! Some components are under pressure and can cause serious bodily injury or death!***

⚠ ***Warning: Do not touch tunnel components (other than the console) until unit is off and has had time to cool down. Unit is hot and can burn, causing serious bodily injury.***

⚠ ***Caution: Before any work is to be done on the machine, or before reaching into the machine for any reason, if possible turn all switches to the off position including the main power fused disconnect switch and then follow proper lockout/tagout procedures!***

PDC INTERNATIONAL
THE POWER BEHIND THE PACKAGE

⚠ ***Caution***: ***Ensure that all gauges read zero prior to doing any work on the tunnel system.***

© Clarion Safety Systems, LLC

(The safety label above is located on each side of this tunnel and on the overhead exhaust tubing to the vent blower.)


(This warning label may or may not appear on the filter housing, depending on the type of filter used for this tunnel. ***In either case, please make all operators aware of this danger as the message is applicable in all options***.)

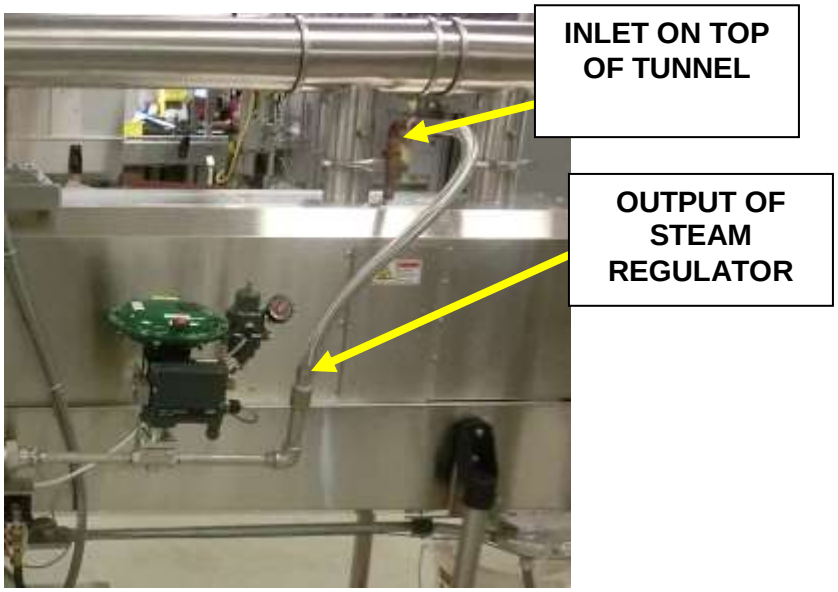
PDC INTERNATIONAL
THE POWER BEHIND THE PACKAGE

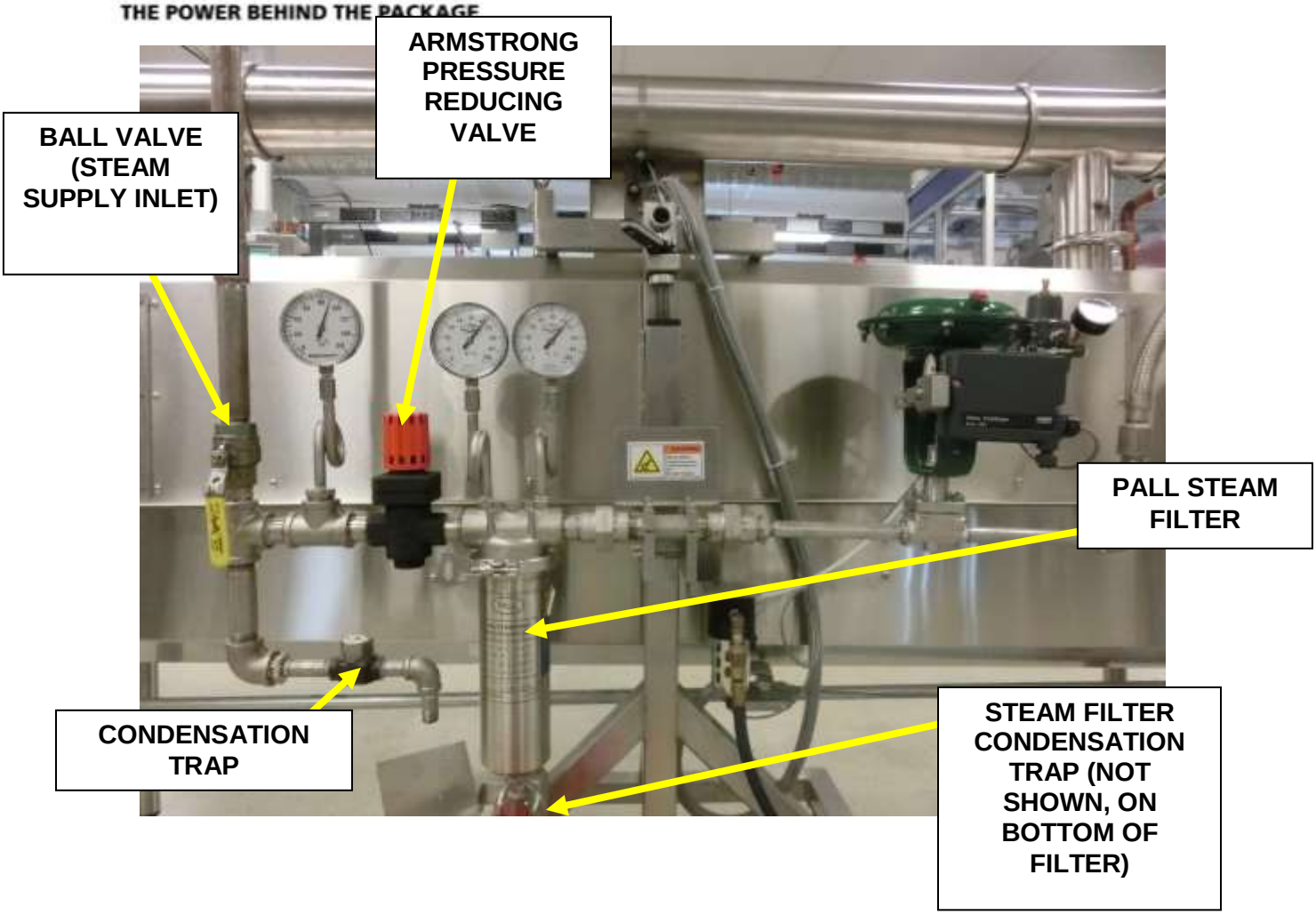
## 3. INSTALLATION & SETUP

This procedure should only be performed by qualified technicians. Incoming steam lines should be isolated from the steam generator and all lockout/tagout procedures should be followed.

Connect the drain lines from the steam filter canister and condensation trap to a suitable drain or condensate return line. Be sure the adjustment knob on the Armstrong pressure reducing valve is turned to the maximum counterclockwise position (zero pressure). Connect the steam hose from the output of the steam regulator to the inlet on top of the tunnel (if shipped separately). Connect a steam input line from the steam generator to the ball valve located at the steam supply inlet on the steam tunnel. Connect air line for electronic regulator.

Refer to the installation drawing (in the Assembly Drawings tab of this binder) for details.

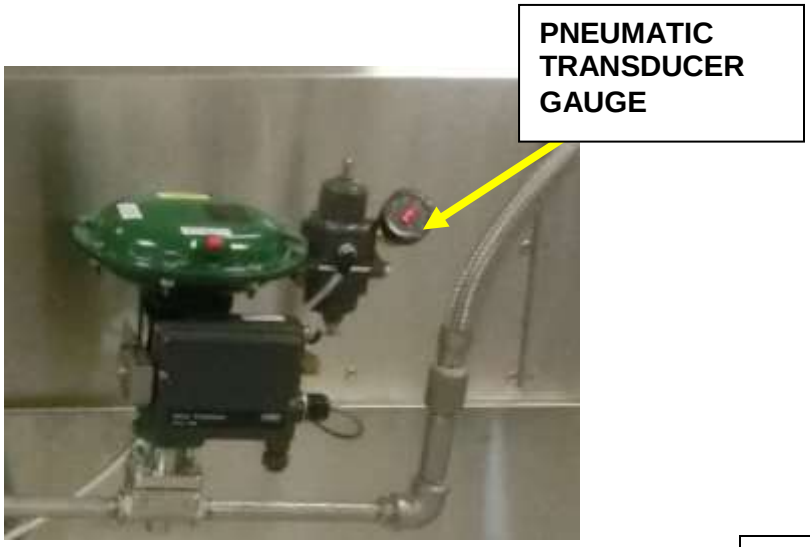




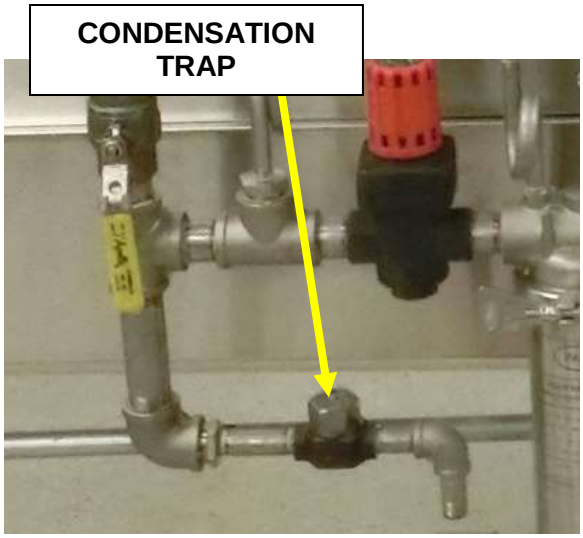

***** Please read carefully the entire manual before operating this machinery or performing the checklist that follows.***** *After* reading this manual, the following is a useful checklist to refer back to, for startup of the tunnel and associated equipment.

1.) Install. Connect the power and air (as discussed above).
2.) Power up the conveyor (and vent blower, if one exists).
3.) Check the setup sheet. Adjust the steam valves, blower speed, and vents, accordingly.
4.) Check temperature settings on the controller.
5.) Adjust pneumatic regulator, to 18-22 psi (see below).
6.) Open the steam valve.

PDC INTERNATIONAL
THE POWER BEHIND THE PACKAGE




The pneumatic precision regulator adjusts the flow for steam going inside the tunnel. The air pressure setting at the pneumatic transducer should be targeted at 20 psi initially – range 18-22 psi.



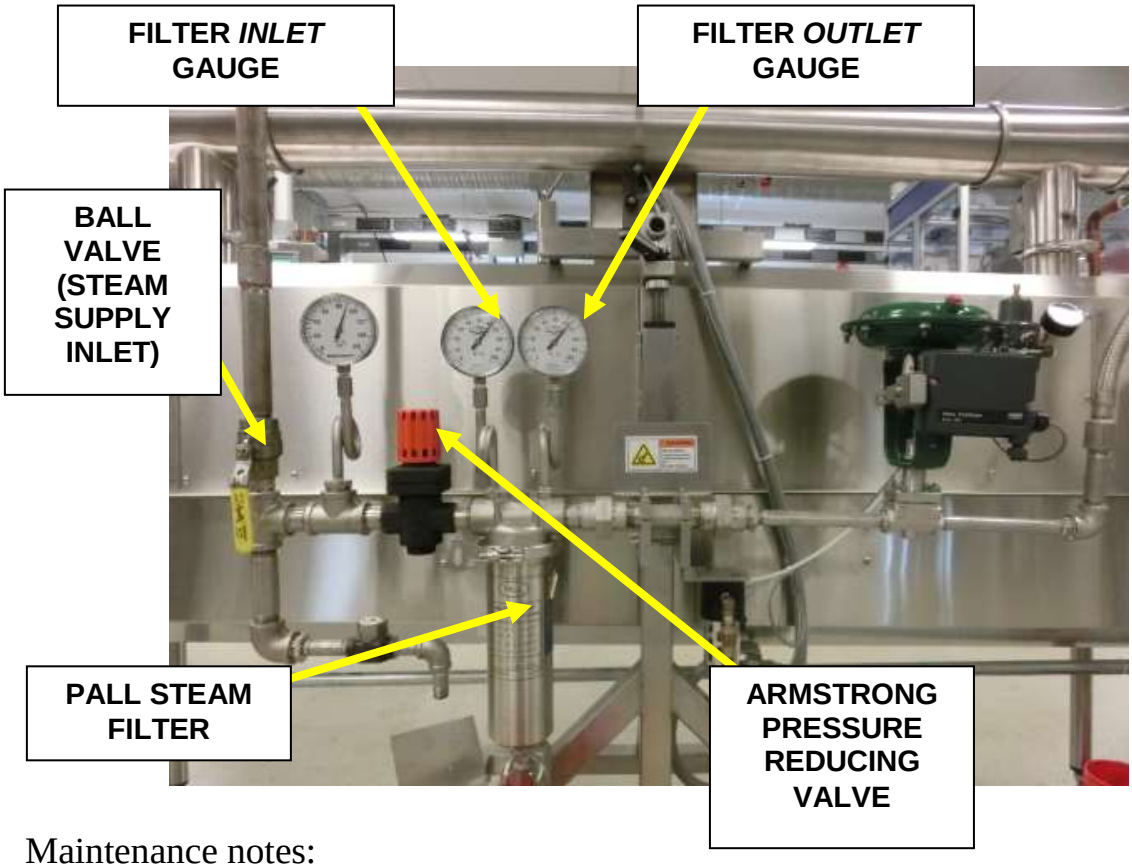

The thermodynamic steam trap opens to release condensate. It is normal for it to exhaust intermittently, but if it exhausts continually, then there may be debris on the seat that may be causing it to stay open.

***Please see the Troubleshooting Section below, for more details, before taking any corrective action, and do not attempt to fix any part of this unit if you are not trained and comfortable doing so, as the discharge can be sudden and hot!***

PDC INTERNATIONAL
THE POWER BEHIND THE PACKAGE

## 3.1 Regulator Setup

Slowly open the ball valve at the steam inlet to allow steam to flow into the steam tunnel manifold. Turn the knob on the Armstrong pressure reducing valve to adjust until of reading of 75 PSI is achieved on the filter inlet gauge.




Maintenance notes:

- When the pressure differential between the filter inlet gauge an the filter outlet gauge is greater than 5 PSI, the filter needs to be replaced.
- Replacing the filter approximately every 3 months will minimize other issues such as those that could occur that might not be as noticeable as a pressure change in the line.
- Old filters can be cleaned and reused.
- For assistance with this, please contact Anthony Caccamo or Todd Smith at PDC at (203) 853-1516.

PDC INTERNATIONAL
THE POWER BEHIND THE PACKAGE

# 4. CONTROLS

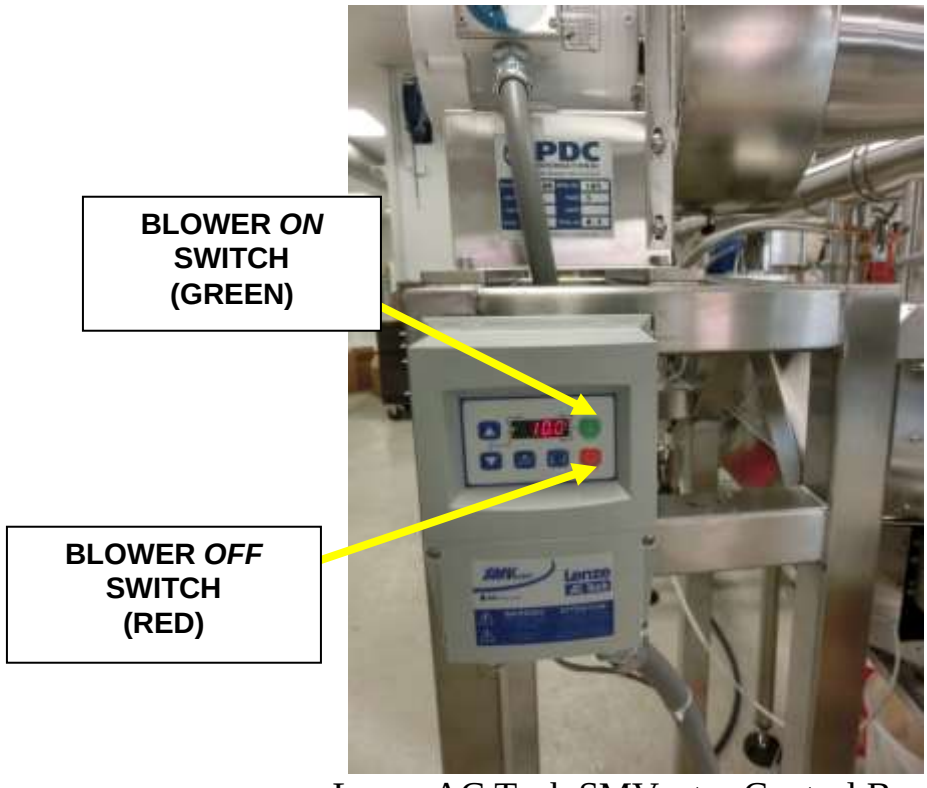
## 4.1 Power

The electrical power for this tunnel may vary. Please refer to the installation drawing of your particular unit (in the Assembly Drawings tab of this binder) for details.

## 4.2 Exhaust Blower

To turn on the exhaust blower, locate the Lenze VFD on the blower that is located downstream from the tunnel, and press the green button on it.

The Lenze Operating Manual is included in the Literature section that accompanies this manual. Please see pages 22-24 of that operating manual especially, as it shows the basic keypad functions.




Lenze AC Tech SMVector Control Box

PDC INTERNATIONAL
THE POWER BEHIND THE PACKAGE

## 4.3 Tunnel Temperature Controller

At the front of the tunnel, turn the tunnel electronic temperature control power switch (green) to "on". ***This green switch turns on the KST80-712 tunnel.***


After turning this switch, the tunnel temperature will rise to the temperature setting on the controller. To change the temperature, push either of the buttons, marked with the up or down arrow, to raise or lower the temperature, respectively.

Read the supplied temperature controller manual (blue manual from Red Lion) in the Literature section that accompanies this manual, before making any other changes to the temperature controller settings.

THE POWER BEHIND THE PACKAGE

## 4.4 TCU Temperature Controller Parameters Default Parameters

| UNIT NUMBER | | |
|---|---|---|
| **MNEMONIC** | **PARAMETER** | **USER SETTING** |
| SP | Temperature Setpoint | Per product setup sheet |
| OPOF | Output Power Offset | 0 |
| OP | Output Power | 100 |
| ProP | Proportional Band | 12 |
| Intt | Integral Time | 10 |
| dErt | Derivative Time | 0 |
| P-2 | Proportional Band#2 (secondary) | - |
| It-2 | Integral Time #2 (secondary) | - |
| dt-2 | Derivative Time #2 (secondary) | - |
| rtio | Remote Setpoint Ratio | - |
| bIAs | Remote Setpoint Bias | - |
| AL-1 | Alarm 1 | 10 |
| AL-2 | Alarm 2 | 10 |
| **CONFIGURE INPUT** | | |
| **MNEMONIC** | **PARAMETER** | **USER SETTING** |
| tYPE | Input Sensor Type | T |
| SCAL | Temperature Scale Units | °F |
| dCPt | Temperature Resolution | 0 |
| FLtr | Digital Filtering | 1 |
| SPAN | Input Slope | 1000 |
| SHFt | Input Offset | 0 |
| SPLO | Setpoint Lower Limit | 0 |
| SPHI | Setpoint Upper Limit | 250 |
| SPrP | Ramp Rate | 60 |
| InPt | User Input | PLOC |
| HCur | Heater Current Scaling | 50 |
| **CONFIGURE OUTPUT** | | |
| **MNEMONIC** | **PARAMETER** | **USER SETTING** |
| CYCt | Cycle Time | 2 |
| OPAC | Control Action | REV |
| OPLO | Output Power Lower Limit Range | 0 |
| OPHI | Output Power Upper Limit Range | 100 |
| OPFL | Sensor Fail Power Preset | 0 |
| OPdP | Output Power Dampening | 3 |
| CHYS | ON/OFF Control Hysteresis | 1 |
| Tcod | Auto-Tune Dampening Code | 2 |
| ANAS | Linear Output Assignment | OP |
| ANLO | Linear Output Scale Value | 0 |
| ANHI | Linear Output Scale Value | 100 |
| ANdb | Linear Output Deadband | 0 |


8 Sheehan Avenue, South Norwalk, CT 06854 USA 203-853-1516 F 203-854-0834 www.pdc-corp.com

| | | |
|---|---|---|
| ANut | Linear Output Update Time | 0 |
| **CONFIGURE LOCKOUTS** | | |
| **MNEMONIC** | **PARAMETER** | **USER SETTING** |
| SP | Setpoint Access | ENT |
| OP | Output Power | ENT |
| dEv | Access Deviation Display | RED |
| HCur | Access Heater Current Display | RED |
| IN-2 | Access Second Analog Input | RED |
| UdSP | Access Display Units | RED |
| Code | Access Code Number | O |
| PID | Access Primary PID Values | ENT |
| PID2 | Access Secondary PID Values | LOC |
| Rtbs | Access Ratio and Bias Values | LOC |
| AL | Access Alarm(s) Values | ENT |
| ALrS | Enable Reset Alarm (s) | ENBI |
| SPSL | Enable Local/Remote Setpoint Selection | LOL |
| trnF | Enable Auto/Man Transfer | ENBL |
| tUNE | Enable Auto-Tune | ENBL |
| **CONFIGURE ALARMS** | | |
| **MNEMONIC** | **PARAMETER** | **USER SETTING** |
| Act1 | Alarm 1 Operation Mode | B-IN |
| rSt1 | Alarm 1 Reset Mode | AUTO |
| Stb1 | Alarm 1 Standby Enabled | NO |
| AL-1 | Alarm 1 Value | 10 |
| Act2 | Alarm 2 Operation Mode | B-IN |
| rSt2 | Alarm 2 Reset Mode | AUTO |
| Stb2 | Alarm 2 Standby Enabled | NO |
| AL-2 | Alarm 2 Value | 10 |
| AHYS | Alarm Hysteresis Value | 1 |
| | | |
| | | |
| **CONFIGURE COOLING** | | |
| **MNEMONIC** | **PARAMETER** | **USER SETTING** |
| CYC2 | OP2 Output Cycle Time | 2 |
| GAN2 | Relative Cooling Fan | 1 |
| db-2 | Heat-Cool Overlap/Deadband | 0 |
| **CONFIGURE SERIAL COMMUNICATIONS** | | |
| **MNEMONIC** | **PARAMETER** | **USER SETTING** |
| bAUd | Baud Rate | 1200 |
| PArb | Parity Bit | ODD |
| Addr | Unit Address | 0 |
| Abrv | Abbrev. Or Full Transmission | NO |
| PrAt | Automatic Print Rate | 0 |
| PoPt | Print Options | NO |

| | | |
|---|---|---|
| | INP | YES |
| | SEt | YES |
| | OPr | YES |
| | Pdb | NO |
| | INt | NO |
| | dEr | NO |
| | AL1 | NO |
| | AL2 | NO |
| | dEv | NO |
| | OFP | NO |
| | r_P | NO |
| | Crg | NO |
| | Cdb | NO |
| | OSt | NO |
| | rAt | NO |
| | bIA | NO |
| | RSP | NO |
| | IN2 | NO |
| | Pb2 | NO |
| | It2 | NO |
| | Dt2 | NO |
| | SP2 | NO |
| | HCr | NO |

PDC INTERNATIONAL
THE POWER BEHIND THE PACKAGE

## 5. ADJUSTING THE TUNNEL

### 5.1 Steam Valve Flow Volume Control

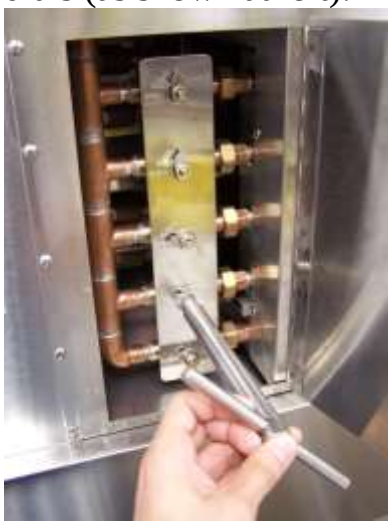
The tunnel valve tools (Steam Tunnel Key and Steam Tunnel Wrench) are located at the top of the tunnel in a sheet metal box.

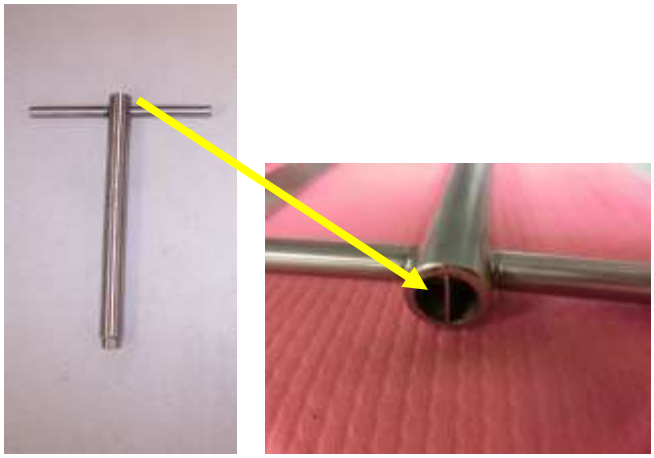
Using the steam tunnel key (T wrench), adjust the flow control valves to the indicated settings on the product set up sheet.

The *top* portion of the T (shown below) may be used as a screwdriver to turn the slotted pin that fastens the door panel, to access the flow control valves that are behind the panel.

**Caution: If opening panel doors for any reason after tunnel has been turned on or before it has cooled off after use, exercise caution and stand back as steam may escape rapidly as soon as door is opened.**

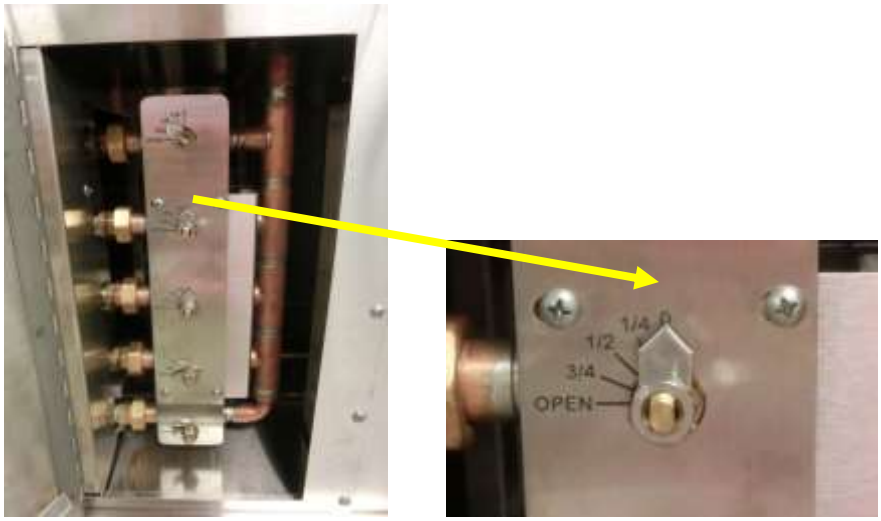
The *bottom* portion of the T contains a cutout that is used to turn the control valve dials (as shown at left).





**Steam Tunnel Key (T Wrench)**
**PDC Part # PDC-231-00**

There are five (5) steam control valves on each side of the steam tunnel for a total of ten (10) steam control valves on the entire tunnel.



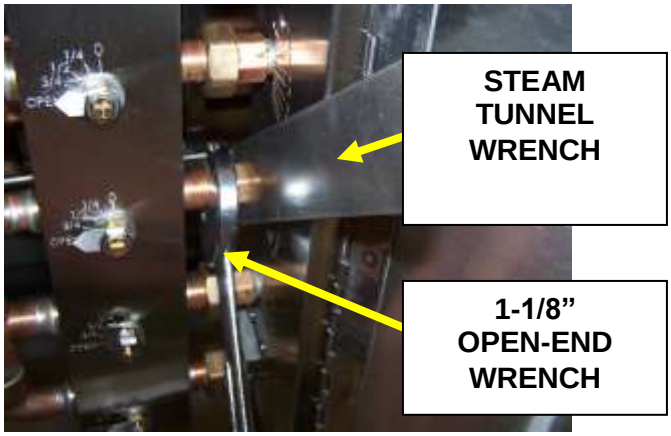

Each of the steam control valves has a flow control scale as indicated by the valve indicators. An operator can select a setting of “0” (fully closed), “1/4”, “1/2” , “3/4”, or “OPEN” (fully open).

Be sure to reseal each door panel with the top end of the T wrench (or a screwdriver) when finished (turn screwdriver, or T wrench, a half turn to secure door).

PDC INTERNATIONAL
THE POWER BEHIND THE PACKAGE

## 5.2 Steam Valve Direction Control

The spray pipes can be rotated to direct the steam where it is required for the shrink process. Loosen the pipe union with the supplied 1-1/8" open-end wrench and then use the steam tunnel wrench (shown below) to rotate the spray pipe to position (see following page).




**Loosening the Union**

**Steam Tunnel Wrench**
**PDC Part # PDC-231A00**

THE POWER BEHIND THE PACKAGE

Record the position number that is aligned to each pointer indicator.


8 Sheehan Avenue, South Norwalk, CT 06854 USA 203-853-1516 F 203-854-0834 www.pdc-corp.com

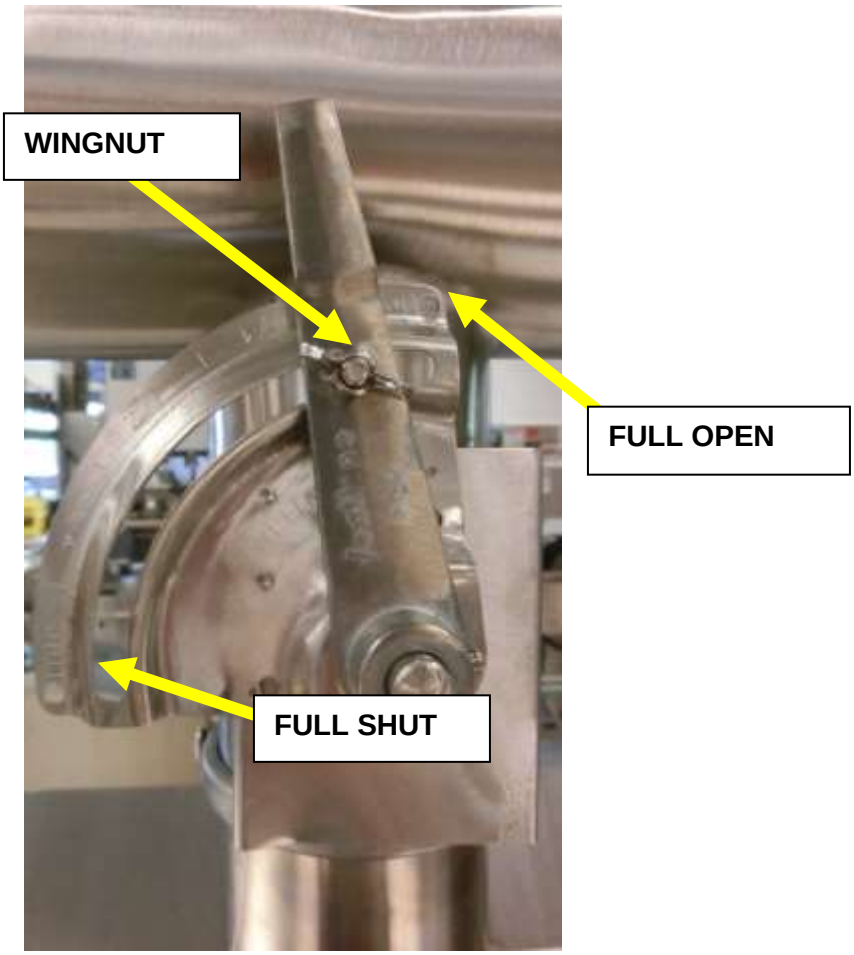
PDC INTERNATIONAL
THE POWER BEHIND THE PACKAGE

# 6. STEAM VENTING PACKAGE

## 6.1 Adjusting the Vent Valves

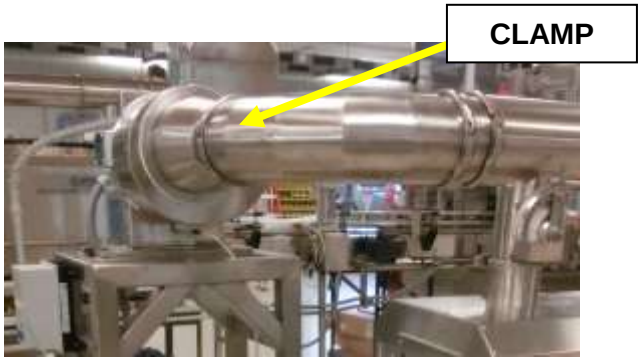
Refer to the setup form and adjust each vent according to the amount of shut/open needed. For each valve handle, 12 o'clock (upward) position is full open, and 9 o'clock (pointed left) position is full shut, and dial indicates increments of shut between these two points. (For example, "3/4" indicates 3/4 shut).

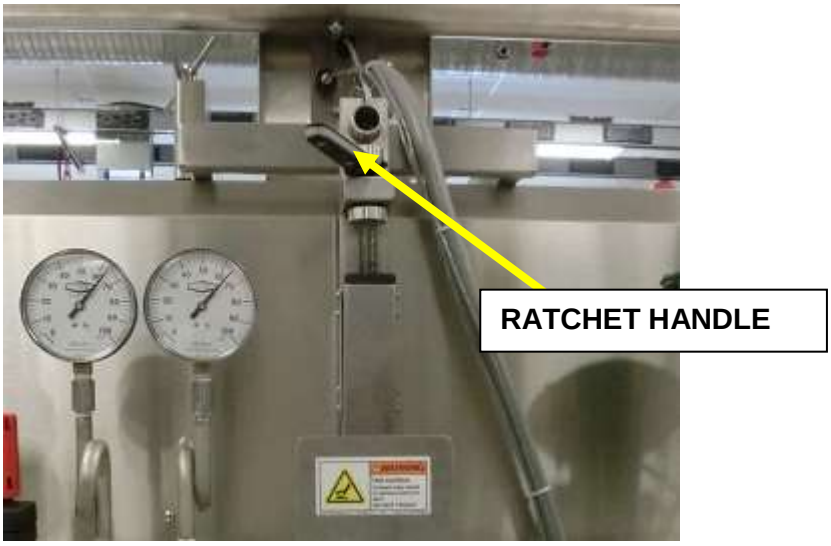
Loosen wingnut to adjust valve. Retighten wingnut after adjustment.



## 6.2 Adjusting the Tunnel Stand

Loosen the clamp that connects the tunnel tubing to the vent blower (see below). Adjust the tunnel to the desired height with the ratchet handle, located centrally at the back of the tunnel. Once at the desired height, remove fallen containers and/or perform maintenance. Once completed, make sure that the O-ring is in place in the clamp joint before retightening the tubing clamp.



PDC INTERNATIONAL
THE POWER BEHIND THE PACKAGE

## 7. SHUTDOWN

To shut down the steam system, close the steam supply valve to the regulator. The condensate trap will discharge any water that is still in the trap.

***After all pressure gauges read zero***, then turn off the power to the temperature controller (and vent blower, from the blower VFD ) and shut off the air supply to the transducer filter/regulator. Turn off the boiler generator, if one is present.

Turn the main power fused disconnect switch to the "off" position.

Follow lockout/tagout procedures.

## 8. GENERAL TROUBLESHOOTING

⚠ ***Danger: Before opening the filter or condensate trap for any reason, be sure to first relieve all pressure and to wear appropriate protective clothing! Some components are under pressure and can cause serious bodily injury or death!***

⚠ ***Warning: Do not touch tunnel components (other than the console) until unit is off and has had time to cool down. Unit is hot and can burn, causing serious bodily injury.***

⚠ ***Caution: Before any work is to be done on the machine, or before reaching into the machine for any reason, if possible turn all switches to the off position including the main power fused disconnect switch and then follow proper lockout/tagout procedures!***

⚠ ***Caution: Ensure that all gauges read zero prior to doing any work on the tunnel system.***

(For more details on installation, operation, and maintenance of the individual components, refer to the Literature tab of the binder that accompanies this manual.)

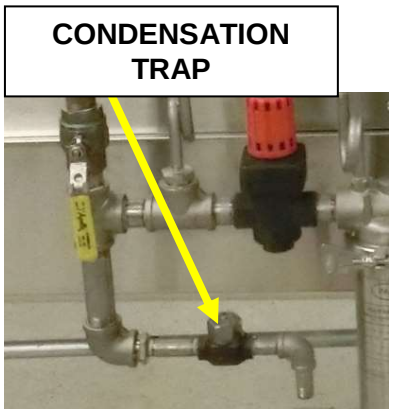

8 Sheehan Avenue, South Norwalk, CT 06854 USA 203-853-1516 F 203-854-0834 www.pdc-corp.com

If there is a lack of steam, check the following:

- Is the temperature controller on?
- Is the air supply on, and at pressure (18-22 PSI at the steam control valve, as read from the pneumatic transducer gauge)?
- Is the steam supply valve open, and at pressure (80-100 PSI, as read from the gauge just upstream of the Armstrong pressure regulator)?
- Is a thermocouple defective?
- Is the pressure differential between the filter inlet gauge and the filter outlet gauge greater than 5 PSI? (if this last answer is a yes, then the steam filter needs replacing)

If there is a *constant* exhaust of steam coming out of the piping downstream of the condensate trap, then perform the following (only if properly trained and comfortable performing these steps, if not, please contact PDC directly at 203-853-1516, to have someone perform these steps for you):

- First, turn off the steam supply,
- Then second, ensure proper lockout/tagout procedures are followed, and
- Then third, unscrew the cap, and remove any debris on the seat that may have caused it to stay open. ***Use caution when performing these steps because discharge can be sudden and hot.***




PDC INTERNATIONAL
THE POWER BEHIND THE PACKAGE

## 9. BOILER

The boiler feeds the water into the tunnel and it is important that the boiler is set up appropriately for the tunnel to perform suitably.

- It is recommended that the boiler be within 90 ft of the tunnel. Boiler size is for installation near tunnel. If remote, a larger unit will be required.
- Boiler should be fed by a nearby hot water heater at least 20 gallons in size.
- Boiler to be installed and commissioned by customers' local plumbing contractor .
- Prior to entering boiler, water may require treatment or softening for maximum boiler and tunnel life and that if the water entering these units is not suitable it can potentially lead to clogging of the valves and nozzles of the tunnel. Contact local water treatment company for installation and service.


8 Sheehan Avenue, South Norwalk, CT 06854 USA 203-853-1516 F 203-854-0834 www.pdc-corp.com

PDC INTERNATIONAL
THE POWER BEHIND THE PACKAGE

## 10. TECHNICAL INFORMATION

Refer to the Literature tab that is included in this binder, for further information.

## 11. CUSTOMER SERVICE CONTACT INFORMATION

If you have machine servicing, maintenance, parts replacement, or any other customer service needs or questions, please contact Anthony Caccamo or Todd Smith at PDC International in the United States at 00-1-203-853-1516 and they will be happy to assist you.