Air Cushion Technology

AirSpeed™ SMART V3
Technical Manual
## Revision History

<table>
<thead>
<tr>
<th>Rev</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>04/15/13</td>
<td>Original</td>
</tr>
<tr>
<td>1</td>
<td>05/02/13</td>
<td>Added detail in Section 4.2 on Bin Sensors</td>
</tr>
<tr>
<td>2</td>
<td>07/22/13</td>
<td>Updated advanced menu to match version 2 software</td>
</tr>
</tbody>
</table>
TABLE OF CONTENTS

SECTION 1 - Overview ..............................................................1
  1.1 Introduction ......................................................................1

  1.2 Sensors ...........................................................................1
    1.2.1 Jaw Sensor ...............................................................1
    1.2.2 Lost Film Sensor .......................................................2

SECTION 2 - Operation .............................................................3
  2.1 General Operation Screen ..................................................3
    2.1.1 Special operation for a run length of 0:00 .......................3

  2.2 Setting Screens ...............................................................3
    2.2.1 Temperature Setting Screen .........................................4
      2.2.1.1 Temperature Setting Timeout ...............................4
      2.2.1.2 Temperature Test Mode .......................................4
    2.2.2 Inflation Setting Screen ..............................................4
      2.2.2.1 Inflation Setting Timeout .....................................5

SECTION 3 - Advanced Setup ...................................................6
  3.1 Password Screen .............................................................6
    3.1.1 Password Entry Timeout ..............................................6
    3.1.2 Special Processing after entering a valid password ..........6

  3.2 Advanced Setup Screen ....................................................6
    3.2.1 Exiting Advanced Setup .............................................8
    3.2.2 Individual Parameters ...............................................8
      3.2.2.1 Version .............................................................8
      3.2.2.2 Belt Odo ............................................................8
      3.2.2.3 Test Mode ........................................................8
      3.2.2.4 Temp Low & Temp High ......................................8
      3.2.2.5 Air Low & Air High .............................................9
      3.2.2.6 Speed ..............................................................9
      3.2.2.7 Start Delay .......................................................9
      3.2.2.8 Air Offset ........................................................9
      3.2.2.9 Bin Sensor .......................................................10
      3.2.2.10 Sensor Delay ..................................................10
      3.2.2.11 Units ............................................................10
      3.2.2.12 Language .......................................................10

SECTION 4 - Optional Accessories ..........................................11
  4.1 Foot Pedal ......................................................................11

  4.2 Bin Sensor ....................................................................11
    4.2.1 Infrared Sensor ......................................................11
    4.2.2 Ultrasonic Sensor ....................................................12

SECTION 5 - Unit Burn IN .........................................................13
  5.1 Introduction ....................................................................13

  5.2 Operational State ..........................................................13

  5.3 Burn-in State .................................................................13
    5.3.1 Overview ...............................................................13
    5.3.2 Selecting between Bin Sensors ..................................14
5.3.3 Initial Change from Idle to Run ................................................................. 14
5.3.4 Stopping Unit ......................................................................................... 14
5.3.5 Sample Display – Idle ......................................................................... 14
5.3.6 Sample Display – Run ......................................................................... 15
5.4 Selecting between ‘Operational’ and ‘Burn-in’ Modes ........................................ 15

SECTION 6 – Loading New Software ................................................................... 16
6.1 Introduction ............................................................................................... 16
6.2 Procedure ................................................................................................... 16
SECTION 1 – OVERVIEW

1.1 Introduction
This document describes how to operate the new Pregis AirSpeed™ SMART unit, commonly referred to as Version 3. The document is written for Pregis Systems field technicians, therefore, familiarity with the original SMART unit is assumed.

The new Pregis AirSpeed™ SMART operator’s interface consists of a membrane keypad and a two line LCD display. Optionally, there is a foot switch and a bin sensor. *Figure 1* shows the front panel with the membrane keypad and display.

1.2 Sensors
The unit has two standard sensors that provide feedback on the unit’s status.

1.2.1 Jaw Sensor
The jaws must be closed for the unit to start. If the unit is running and the jaws are opened, the unit stops.
1.2.2 Lost Film Sensor

The lost film sensor monitors the rotation of the film roller. If the rotation stops for more than three seconds, film is assumed to have been exhausted or jammed; the unit immediately stops. The lost film sensor can be ignored by setting ‘test mode’ in the advanced settings, see Section 3.
SECTION 2 – OPERATION

2.1 General Operation Screen

The unit powers on with the last setting for run length displayed. Run length is in time (minutes:seconds) where the arrow keys are used to increase or decrease. Pressing **Play** starts the unit. While running, the timer counts down to 0:00 then stops. When stopped the display returns to the previously entered run length. Pressing **Play**, while running, stops the unit and causes it to return to the entered run length.

Pressing **Up** or **Down** arrow keys, increment or decrement the run time, respectively.

Pressing **Enter** has no effect

Pressing **Menu** takes you to the Air Adjustment Screen (or the Temperature Setting screen and then the Air Adjustment Screen if the Advanced Setup is active see Section 3).

Pressing **Play** toggles the running state of the unit and returns to the General Operation screen

2.1.1 Special operation for a run length of 0:00

A setting of 0:00 causes the unit to run continuously. The unit will start and run until the stop button is pressed.

2.2 Setting Screens

Two settings, **seal wire temperature** (Temperature) and **air inflation** (Air Adjustment), can be changed while the unit is running or stopped. The **seal wire temperature** can be changed only by factory or field service personnel while **air inflation** can also be changed by users.

---

1 Maximum is 20:00.
2.2.1 Temperature Setting Screen

The Temperature Setting screen is available only after the entry of a valid password, see section 3.1. While in the General Operation screen, pressing the **Menu** button brings you to the Temperature Setting screen. Use the arrow keys to increase or decrease the temperature of the seal wire. The value is a percentage of the allowed temperature range that is set using the Advanced Setup screen. Temperature Setting screen can be entered while the unit is running and any changes take effect immediately.

Pressing **Up** or **Down** arrow keys, increment or decrement the temperature, respectively.

Pressing **Enter** returns to General Operation screen

Pressing **Menu** takes you to the Inflation Setting screen

Pressing **Play** toggles the running state of the unit and remains at the Temperature Setting screen

2.2.1.1 Temperature Setting Timeout

If you don’t press a key for 60 seconds, Temperature Setting screen times-out and the unit returns to the General Operation screen.

2.2.1.2 Temperature Test Mode

When test mode is enabled, see 3.2.2.3 Viewing the Temperature Setting Screen will display the Set Temperature percentage and the actual temperature of the thin film heater.

2.2.2 Inflation Setting Screen

If the Advanced Setup is not activated then the **Menu** button will bring you to the Inflation Setting screen directly from the General Operation Screen. When Advanced Setup is activated pressing the **Menu** button while in the

---

2 If a valid password has not been entered you are taken to the Inflation Setting screen, section 2.2.2
Temperature Setting screen, brings you to the Inflation Setting screen. Use the arrow keys to increase or decrease the air inflation setting. The value is a percentage of the allowed inflation range that is set on the Advanced Setup screen. The Inflation Setting screen can be entered while the unit is running and any changes take effect immediately.

Pressing **Up** or **Down** arrow keys, increment or decrement the setting, respectively.

Pressing **Enter** returns to the General Operation screen

Pressing **Menu** returns to the General Operation screen

Pressing **Play** toggles the running state of the unit then either remains in the Inflation Setting screen or returns to the General Operation screen depending on valid password entered or not entered, respectively.

### 2.2.2.1 Inflation Setting Timeout

If you don’t press a key for 60 seconds, the Inflation Setting screen times-out and the unit returns to the General Operation screen
SECTION 3 – ADVANCED SETUP

Advanced setup is available to factory or field personnel by entering a password.

3.1 Password Screen

While in the General Operation screen and while the unit is not running, you can bring up the password screen which, in turn, allows entry to the advanced setup. First press (and hold) the Enter key, then press (and hold) the menu key for five seconds. Use the arrow keys to enter a three digit code (for quicker entry hold down an arrow key), then press Enter. A successful password brings you to the Advanced Setup screen. If unsuccessful, you can try again.

Pressing Menu returns to the General Operation screen

Pressing Play starts the unit and returns to the General Operation screen

3.1.1 Password Entry Timeout

If you don’t press a key for 30 seconds, the Password screen times-out and the unit returns to the General Operation screen.

3.1.2 Special Processing after entering a valid password

Once you have entered a valid password, you don’t need to enter it again for fifteen minutes. That is, when in the General Operation screen and you go to the Password screen, password entry is skipped and you immediately go to the Advanced Setup screen. The Advanced Setup and Temperature Setting screen will be available for fifteen minutes or until power is cycled to the machine.

3.2 Advanced Setup Screen

The Advanced Setup is used view and change parameters that are not available to users. Since the unit has a two line display, you need to scroll
through the parameters using the arrow keys. Pressing the down arrow scrolls to the next parameter in the list. Some parameters you can change; others are view only. When a changeable parameter is at the top of the screen, it is identified by an underline immediately to the right of its value. *Figure 2* shows example.

```
TEMP LOW  10_ -
TEMP HIGH  90 -
```

*Figure 2 Underline shows editable field*

To change a parameter press the **Enter** key, the underline changes to a block. You then use the arrow keys to adjust the parameter.

```
TEMP LOW  10
TEMP HIGH  90
```

*Figure 3 Up and down arrows change value*

After changes, press the **Enter** key which returns you to the scroll mode.

```
VERSION    2.01
BELT ODO  3777 FT
TEMP LOW  0
TEMP HIGH  100
AIR LOW  20
AIR HIGH  100
SPEED  100
START DELAY  55
AIR OFFSET  100 MS
BIN SENSOR  OFF
SENSOR DELAY  1 S
UNITS  ENGLISH
LANGUAGE  ENGLISH
```

*Figure 4 Display shows window into parameters*

While in scroll mode pressing the **Menu** key returns you to the General Operation screen. Pressing the **Play** key starts the unit and returns you to the General Operation screen.
3.2.1 Exiting Advanced Setup

Pressing the **Menu** key returns you to the General Operation screen.

Pressing the **Play** key starts the unit and returns you to the General Operation screen.

If you don’t press a key for 60 seconds, the Advanced Setup screen times-out and the unit returns to the General Operation screen.

3.2.2 Individual Parameters

The following subsections discuss each individual parameter. Some are changeable, some are not and some are reserved for future enhancements.

3.2.2.1 Version

The version parameter displays the unit’s software version. It is a view only parameter.

3.2.2.2 Belt Odo

This is the belt odometer reading in feet. To reset: press (and hold) the enter key, then press (and hold) the up key for five seconds when the number line is selected. The odometer reading will display in meters if the Units are changed to metric. Note: divide meters by 1000 to get kilometers.

3.2.2.3 Test Mode

The ‘test mode’ parameter allows the unit to run regardless of the ‘lost film sensor’. Test mode times out after 15 minutes.

3.2.2.4 Temp Low & Temp High

These parameters form the range in which an operator can set the sealer’s temperature setpoint, see section 2.2.1. Both values are expressed as a percentage of the sealer’s range; from ‘full off’ (0) to ‘full on’ (100).

**Temp Low** can be set from zero to Temp High minus one.

**Temp High** can be set from Temp Low plus one to 100.
3.2.2.5 Air Low & Air High

These parameters form the range in which an operator can set the inflation value, see section 2.2.2. Both values are expressed as a percentage of the blowers speed; from ‘full off’ (0) to ‘full on’ (100).

**Air Low** can be set from zero to Air High minus one.

**Air High** can be set from Air Low plus one to 100.

3.2.2.6 Speed

The speed parameter specifies the motor speed (i.e. how fast product is feed through the unit). It is expressed as a percentage of ‘full on’. The minimum value is 50.

3.2.2.7 Start Delay

Start delay is the time between turning on the sealer’s heater and starting of the motor, see Figure 5. Start delay can be 0 to 100. The Start delay is a percentage and denotes how hot the sealer must be before turning on the motor. Example, a Start delay of 75 means “turn the motor on when the sealer reaches 75% of setpoint”. For sealer setpoint see section 2.2.1.

3.2.2.8 Air Offset

Air offset is the time between the blower starting and start of the sealer, see Figure 5. Air offset can be 0 to 999 milliseconds.
3.2.2.9 Bin Sensor
This parameter selects the bin sensor. Set this parameter to OFF if no sensor is present, IR if the infrared sensor is present and US if the Ultra Sonic Bin sensor is present. See section 4.2 for a detailed explanation of the bin sensors.

3.2.2.10 Sensor Delay
This parameter is the amount of time the bin sensor needs to be triggered before the SMART machine will stop.

3.2.2.11 Units
This parameter changes the machine’s units from English to Metric.

3.2.2.12 Language
This parameter is reserved for a future enhancement. Changing it has no effect on the unit’s operation.
SECTION 4 – OPTIONAL ACCESSORIES

4.1 Foot Pedal

The foot pedal operates the same as the play button. When the Time Adjustment is set to 0:00 - pressing the foot pedal once starts the unit, pressing a second time stops the unit. If the Time Adjustment is something other than 0:00 then pressing the foot pedal will start the unit; the unit will run for the given time or until the pedal is pressed again.

4.2 Bin Sensor

The bin sensor is used to control the AirSpeed™ SMART as it fills an overhead bin. The bin sensor will start the AirSpeed™ SMART when no product is detected and will stop the SMART machine when product is detected. There are two different sensors that work with the AirSpeed™ SMART, the flat pack Infrared (IR) sensor and the Ultrasonic Sensor. The bin sensor is binary. That is, the bin is either full or empty; there is no half full, quarter full or any other indications.

When using a bin sensor the setup up of the device controls the AirSpeed™ SMART. The timer setting should be set to 0:00 for best results. A setting other than 0:00 will lead to erratic machine cycles.

4.2.1 Infrared Sensor

The Infrared sensor is the original sensor designed to work with the AirSpeed™ SMART. The sensor has a sensitivity adjustment for fine tuning material detection. The yellow LED will be turn ON when there is material present and OFF when there is no material. Position the IR sensor over the material. Follow the instructions in Section 3 for selecting the IR sensor. Set the timer to 0:00 and press Play. When Play is pressed, if the bin sensor shows empty the unit starts and continues until 1) play is pressed or 2) bin sensor shows full. When the bin sensor shows empty the unit starts again and the cycle repeats. When the play button is pressed, if the bin sensor shows full, the unit waits until the sensor shows empty then

---

3 At the time of writing the infrared sensor was a Carlo Gavazzi ED5506NPAP and the ultrasonic sensor was a Pepperl & Fuchs UB1000-18GM7-75-U-V15.
starts. If the bin sensor shows full and the unit is powered down, when the unit’s power is restored, the unit automatically starts when the bin sensor shows not full.

4.2.2 Ultrasonic Sensor

The Ultrasonic sensor – is the original sensor designed to work with the A5000 System. The AirSpeed™ SMART V3 was enhanced to include the capability to use this sensor. The sensor has a required adjustment procedure for configuring the sensor. Please read the 20120613 US Sensor Training document on the Pregis Tech Portal. The sensor is designed to turn ON when there is material present and OFF when there is no material. Position the Ultrasonic sensor over the material. Follow the instructions in Section 3 for selecting the US sensor. Set the timer to 0:00 and press Play. When Play is pressed, if the bin sensor shows empty the unit starts and continues until 1) play is pressed or 2) bin sensor shows full. When the bin sensor shows empty the unit starts again and the cycle repeats. When the play button is pressed, if the bin sensor shows full, the unit waits until the sensor shows empty then starts. If the bin sensor shows full and the unit is powered down, when the unit’s power is restored, the unit automatically starts when the bin sensor shows not full.
5.1 Introduction

At unit power-up the controlling software interrogates a jumper on the processor card. If the jumper is not installed the unit enters its ‘operational’ state. If the jumper is installed the unit enters its ‘burn-in’ state.

5.2 Operational State

The unit’s ‘operational’ state is everything describe up to this point. That is, section 1 through section 4.

5.3 Burn-in State

The unit’s ‘burn-in’ state allows you to exercise the unit’s components for an extended period without an operator.

5.3.1 Overview

The burn-in state has three modes ‘idle’, ‘run’ and ‘sealer test’. During ‘idle’ the motor, sealer and blower are off. Button presses are shown on the display as are changes in either the ‘lost film’ or ‘bin’ sensor’. When play is pressed the unit enters ‘run’ mode. While in ‘run’ the unit operates the motor, sealer and blower for about one minute and then rests for about one minute with the motor, sealer and blower off. The unit can be loaded with product or not as the ‘lost film’ sensor is ignored. The unit remains in ‘run’ state changing from ‘run’ to ‘rest’ and back again continuously until the unit is stopped or is powered-down.

The ‘sealer test’ state is used to run the sealer from full-off to full-on and back to full-off. Its purpose is to verify the drivers for the sealer before plugging in the actual sealer. The actual sealer must NOT be plugged in; you need to use the sealer simulator. The ‘sealer test’ state is entered from the ‘idle’ state by switching DIP SWITCH #1 to the ON position. As long as the switch is on, the sealer is cycled between full-off and full-on and back to full-off. When the switch is turned off, the sealer test exits after completing a cycle.
5.3.2 Selecting between Bin Sensors

Once the unit has entered burn-in mode the jumper (JP2) is reassigned to be a ‘bin sensor select’. If the jumper is installed the burn-in software looks for the Infrared sensor. If the jumper is not installed the burn-in software looks for the Ultrasonic sensor.

5.3.3 Initial Change from Idle to Run

When burn-in starts, the unit is placed into ‘idle’ and remains there until the play button is pressed. At this time the unit changes to ‘run’ and the operation discussed in the section 5.3.1 commences.

5.3.4 Stopping Unit

To stop the unit from cycling between ‘rest’ and ‘run’ press the play button. The unit goes ‘idle’ but will not restart until the play button is pressed again.

5.3.5 Sample Display – Idle

Two sample ‘idle’ displays are shown in Figure 6. The top display is immediately after pressing the UP arrow button and the bottom immediately after pressing the MENU button.

![UNIT TEST V 1.51
UP
UNIT TEST V 1.51
MENU](image)

Figure 6 Last Button Pressed is Displayed
5.3.6 Sample Display – Run

A sample ‘run’ display is shown in Figure 7. The display shows the sealer temperature and the time remaining in the ‘run’ state

| SEALER TEMP: 215.5 |
| RUN STATE 420 |

Figure 7 Sample Running Display

5.4 Selecting between ‘Operational’ and ‘Burn-in’ Modes

The jumper plug JP2 on the cpu board is used to select between ‘Operational’ and ‘Burn-in’ modes. When the two pins of JP2 are shorted, ‘Burn-in’ mode is selected. When open the ‘Operational’ mode is selected. NOTE: This jumper is also utilized to select which bin sensor is active during ‘Burn-in’ mode only.
SECTION 6 – LOADING NEW SOFTWARE

6.1 Introduction

At power-on the AirSpeed™ Smart’s Bootloader executes. This bootloader is used to update the unit’s application software. If the bootloader does not detect new software, the existing application software is started.

6.2 Procedure

1. The new software is stored on a USB memory stick.
2. Power off the unit
3. Open the unit and install the USB memory stick into the control board.
4. Install jumper JP2
5. Power on the unit.
6. After a few seconds the bootloader recognizes the USB stick and loads the new software.
7. After software is loaded, it is started and enters the unit ‘burn-in’.
8. Power off the unit
9. Remove jumper JP2
10. Remove the USB memory stick
11. Power on unit and verify that the unit is operational. That is, it is not in unit ‘burn-in’.

Notes:

You must install both the USB memory stick and JP2 as the bootloader looks for the USB memory stick only if JP2 is installed.