SMART System
Standard Operating Procedure - Basic Components and Operation

Introduction

The SMART System is a ventilated rack that provides warmth to part of the cage floors using electronically controlled heat plates. There are two platters per system: The top platter has a heating option, and the bottom platter is unheated. There are two USB's for each heated cage slot for any passive USB-powered device to dock to. The system requires a standard 120 Volt AC power outlet and can be easily modified to operate on 100-240 Volt AC power with the change of the power plug. Each rack comes with a rack mounted power supply, two switches for USB power and temperature controller power, temperature controller, heat plate thermal couple, and airflow damper. Animal Care Systems recommends hooking up the SMART System to the building HVAC; however, stand-alone blowers can be supplied if the rack is to be situated in a location where HVAC exhaust is unavailable.

SMART System

Powering the Rack

1. Verify that all 10 station switches and the fused power supply switch are in the OFF position (0).
2. Connect the included power cord to the power supply (Figure 1) under the fused switch.
3. Connect the other end of the power cord to a 120 VAC grounded outlet using the power cable (Figure 2). Once plugged in, do not block access to outlet.

Note: Never connect to ungrounded power or use an adapter that eliminates the ground conductor.

Figure 1: Power Supply Plug

Figure 2: Electrical Connect / Disconnect

4. Turn on the power switch on the power supply to power up the USBs. This will also supply power to the temperature controllers through a circuit breaker switch at each station.
5. Turn on switch at desired station(s) to turn on temperature control (Figure 3).

Figure 3: Individual Temperature Controller Power Switch

Figure 4 shows all the features of the control panel. The USB ports can supply up to 2.5 Amps (5.0 Amps per station) continuously. Above 2.5 Amps the individual port will shut off until the overload is removed. The output voltage is a nominal 5.0 VDC ± 0.25 VDC. Only passive USB devices or devices conforming to the 60950 standard should be connected to the included USB ports.

NOTE: CANNOT BE USED FOR DATA

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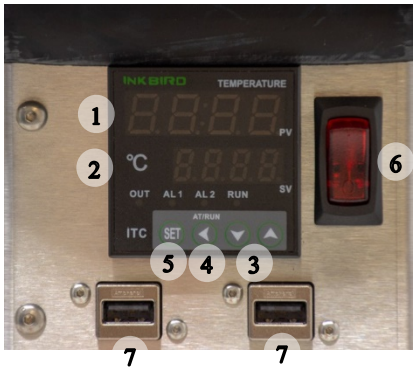

Figure 4: Panel Description

Actual plate temperature readout

1) Temperature set point readout
2) Temperature up/down setting
3) Digit selector button for temperature setting
4) Sets temperature point
5) Power switch and circuit breaker (resettable)
6) Passive USB ports

Adjusting Temperature

Figure 5: Temperature control

Figure 6: Temperature digit selection

Figure 7: Temperature set

There are 10 temperature control panels, one for each cage station. Each station will store and recall the previously set temperature even after being shut off.

1. Press the up or down button to activate temperature adjustment mode (Figure 5); use the up and down arrows to reach the desired temperature (Figure 6); use the < button to switch which between digits.
2. Press the SET button to exit temperature adjustment mode; the decimal point will stop blinking (Figure 7).

The green displays can be covered by the included slidable metal clips (depicted in image to left) in order to protect the animals from disruptive light.
Do not discard the clips.

Tissue damage begins at 45 ˚C (113 ˚F).
Do not set the temperature above this point.

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Locking and Unlocking the Control Panel

Each control panel comes with its own locking feature, which temporarily disables all data manipulation for that cage station.

1. Press and hold the SET button, and press the SET button to cycle through the other settings until the upper display reads Loc (Figure 8).
2. Use the up or down arrow to change the value to 1, and then hold the SET key to confirm and exit the setting (Figure 9); if the unit is not in use for 10 seconds, the unit will automatically exit the settings mode (Figure 10).

Figure 8: Temperature locking

Figure 9: Value set to 1 for lock

Figure 10: Normal operation

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Airflow Setup

1. Connect the air flow flange to the top of the SMART system and twist clockwise until fully engaged (Figure 11).
2. Connect the air damper to the air flow flange and twist clockwise until fully engaged (Figure 12).
3. Connect the included exhaust hose to an exhaust flange within an animal room.
4. Connect the other end of the exhaust hose to the top of the air damper and twist clockwise until fully engaged (Figure 13).

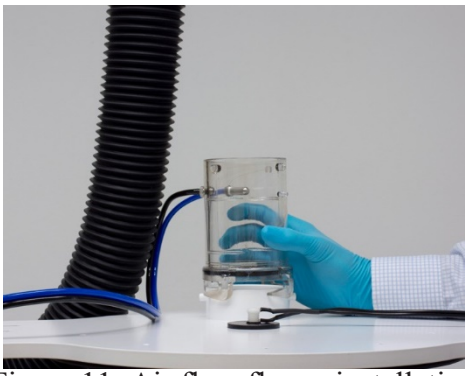

Figure 11: Air flow flange installation

Figure 12: Damper installation

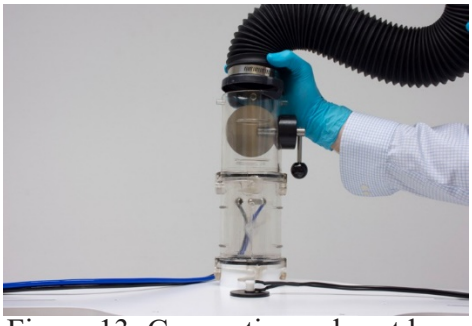

Figure 13: Connecting exhaust hose

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5. Dock cages on the rack, and use the damper (Figure 13) to reach the appropriate airflow shown in the table on the following page.
6. After assembling the rack status monitor, position the monitor into the mounts on the left side of the top of the rack, and then rotate the unit downward (Figure 14).

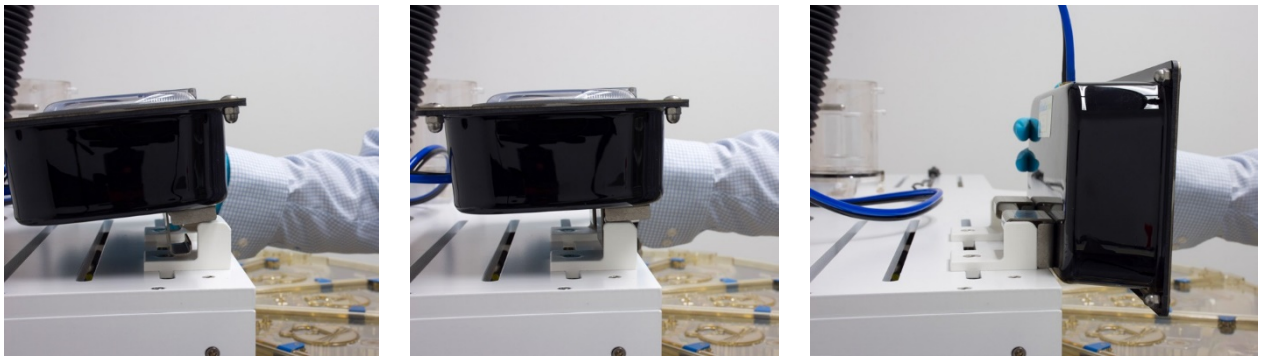

Figure 14: Installing the status monitor

7. Use a small flat-head screwdriver to zero the two gauges of the rack status monitor (Figure 15).

Figure 15: Zeroing the status monitor

Optimice SMART System Airflow and Static Pressure Guide			
	ACH, avg.	**Static pressure, in. H_2O**	**Cubic feet/min**
If fewer than 10 cages and/or lower desired ACH	35	0.05 - 0.06	20
If more than 10 cages and/or higher desired ACH	45	0.06 - 0.08	30

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Cleaning and Sterilizing

1. Wipe down the rack with a disinfectant to clean it.
   Do not put it through a tunnel washer or any process that sprays water.

2. Sterilize the rack using wiping methods compatible with electronics.

   Approved Chemicals:
   Alcohol: 70% isopropyl alcohol
   Chlorine dioxide: Vital Oxide
   Accelerated hydrogen peroxide – Rescue (Accel)

Consult Animal Care Systems about a different chemical than the ones listed above before using the chemical on the SMART System; it is the user's responsibility not to use a cleaning agent that might react with parts of the SMART System.

The SMART System contains electronic components: Do not sterilize with steam or heat.

Do not put it into a rack washer.

Vaporized Hydrogen Peroxide

1. If using vaporized hydrogen peroxide, open the spring-loaded column drain door on the underside of the lower platter (Figure 16).
2. Attach a fail-safe fan to the top of the rack and plug in the extra cable of the power transmitter into the fan.
3. Turn on the power supply and fan before putting it into the decontamination chamber. **Do not use a steam sterilizer or oven.**
4. After sterilization, close the drain door, if necessary.

Figure 16: Column drain door

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Servicing the fuses on the power supply


Step 1


Step 2


Step 3


Step 4


Step 5


Step 6


Step 7

Turn off and remove the power cord from the power supply.

Steps:

1) Use a flat blade screwdriver to lift the plastic fuse cover enough to grab it with your fingers
2) Pull the fuse cover out until it stops (about ½ inch)
3) Fold it towards the power plug (it will stay attached)
4) Use needle nose plyers to extract the bad fuses (there are 2)
5) Install the new fuses into the plastic fuse cover
6) Fold it back into place
7) Press the fuse cover back into the fuse holder

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Important Information

This section contains information and warnings that must be followed by the user for safe operation and to keep the product in a safe condition

Safety Warnings:

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water or moisture.
6. Only used approved cleaning chemicals (listed in the cleaning section) using a wiping only protocol.
7. Do not block any ventilation openings.
8. Protect the power cord from being walked on or pinched, particularly at plugs.
9. Unplug this apparatus during lightning storms or when unused for long periods of time.
10. Do not use the product where subject to flammable or explosive gas.
11. Never disassemble, modify or repair the product or touch any of the internal components, there are no internal user serviceable components.
12. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
13. Do not replace the detachable mains supply cords with inadequately rated cords.

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Technical Specifications

- Power
  - Input Voltage: 100-240 VAC
  - Frequency: 50/60 Hz
  - Fuse: 6 Amp / 250 V 5mm x 20mm
  - Maximum rated power: 450 Watts
  - Detachable mains supply cord with a minimum 18 AWG / 3 Conductor, 300 V
  - The mains plug is used as the disconnect device, such disconnect device shall remain readily operable and accessible.
  - Power Supply Fuse Replacement: Must utilize 6 amp fast-blow 5mm x 20mm fuses.
- Environmental Conditions
  - Working temperature: 0º C to +40° C
  - Working humidity: 20% to 90% RH non-condensing
  - Storage temperature: -40º C to +60° C
  - Storage humidity: 10% to 95% RH non-condensing
- This product must be used indoors. It is neither designed nor tested for use outdoors.
- Must operate unit connected to building HVAC system or external blower unit.
- Only passive USB devices or devices conforming to the 60950 standards should be connected to the included USB ports. CANNOT BE USED FOR DATA
- Use only USB cables with a 3-Amp rating when pulling more than 0.5 Amps from the USB ports

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