

# **BAM-1020 WEATHERPROOF ENCLOSURE MANUAL**

**BX-902B-9800 REV C**



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Model BX-902B is a weatherproof outdoor enclosure/shelter. It provides a clean, dry operating environment for the BAM-1020 particulate monitor when a walk-in lab shelter is not practical. BX-902B series has been completely updated and redesigned in 2010 to better suit the needs of the current BAM-1020 configurations.

The standard model BX-902B enclosure is suitable for areas where the summer ambient temperature does not normally exceed 40 degrees C (104 deg F). It is designed to mitigate the effects of high or low ambient temperature by means of a thermostat controlled heater and aspiration fan system, in addition to insulation and a separate vented pump compartment. In any case, the inside of the enclosure must stay between 0 and 50 degrees C for proper BAM-1020 operation. Met One recommends the optional model BX-592-1 room temperature sensor for all non-air conditioned BAM shelters. This allows the BAM to log the shelter temperature in the standard data array.

Hotter regions require an air conditioner. The optional model BX-902B-AC is the same enclosure, except that the standard heater and aspiration fan are deleted and a 1500 BTU air conditioner is installed. The enclosure temperature is regulated to near 25 degrees C by default. **Note:** It is important not to over-cool the BAM shelter when used in hot, humid ambient conditions! This can cause moisture to condense inside the BAM-1020 causing measurement errors or failures. The solution is to increase the setpoint of the air conditioner to perhaps 30 or 35 degrees C.

## Setup and Installation

The model BX-902B enclosure is designed for easy setup:



**BX-902B Enclosure with BAM-1020 PM10 System**

1. Position the enclosure on a flat, level surface in an area that meets the general siting criteria as described in the BAM-1020 manual. The BX-902B may be installed on top of a larger building as long as the enclosure is properly secured against falling. The stand may be bolted to the mounting surface if necessary.
2. The sampling site must be equipped with electrical service. The BX-902B does not have a circuit breaker or GFI inside. A single 15A service with a dedicated circuit breaker is preferred. A heavy gauge extension cord may be used for temporary deployments.
3. Install the BAM-1020 into the enclosure. The rack mount inside the enclosure comes with a pre-positioned cross member at the correct height so that the BAM-1020 PM<sub>10</sub> inlet will be at least 2 meters high when the included 27" inlet tube is used. The cross member supports the BAM-1020 while the rack screws (supplied with the BAM-1020) are installed.

**Note:** The cross member and BAM-1020 may be positioned in a higher location in the rack in order to allow a separate datalogger or telemetry instrument to be installed below it. If this is done, then *there must still be at least 8 inches of space between the top of the BAM inlet tube receiver and the inside of the enclosure roof to allow the inlet heater to be installed.*

4. The enclosure comes with a 8119 inlet seal assembly that must be threaded into the hole in the roof. Use Teflon pipe tape and install the seal tightly. Remove the white cap and black rubber grommet from the inlet seal before lowering the supplied short inlet tube through. Slip the Smart Inlet Heater assembly onto the inlet tube before inserting the tube into the top of the BAM. Reinstall the black rubber grommet and white cap over the inlet tube and tighten securely to prevent leaks around the tube. Tighten the two set screws in the BAM inlet tube receiver.

**Note:** Longer inlet tubes up to 4 feet long may be used instead of the supplied short tube. However, the inlet heads must be easily reachable for cleaning and flow calibrations

5. Position the Smart Inlet Heater so that it is two inches above the top of the BAM inlet tube receiver, then tighten the two set screws to secure it to the inlet tube. Install the white insulation sleeve around the heater. It may be trimmed if necessary. Connect the heater power cord to the BAM as described in the BAM manual.

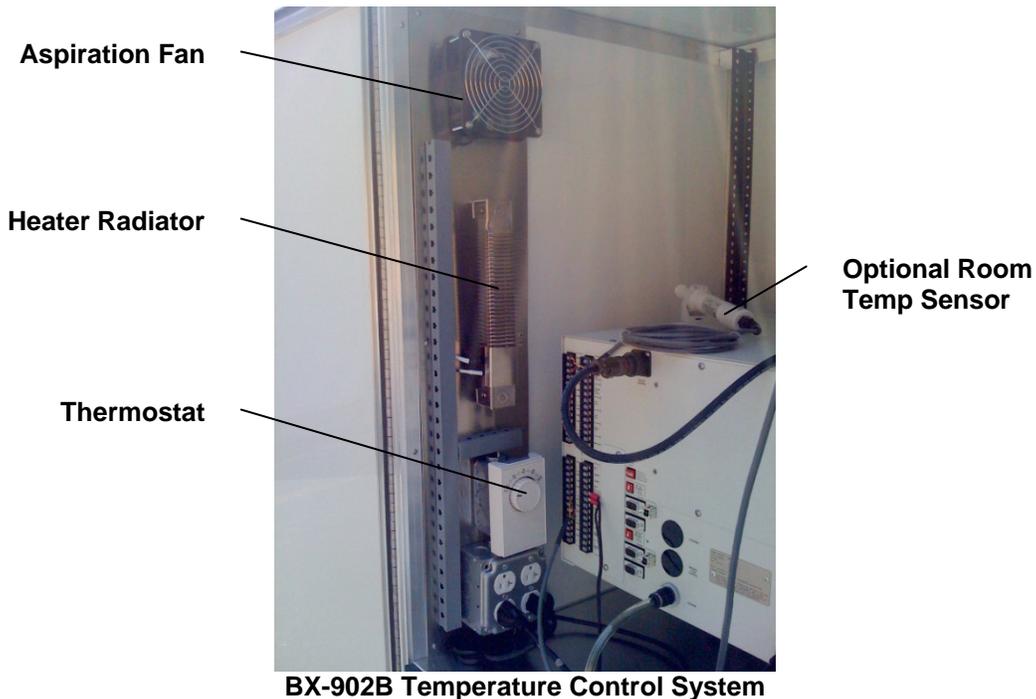
**Note:** Additional enclosure heat control may be achieved by insulating the inlet tube inside the shelter with hot water pipe insulation, available at a hardware store.

6. Install the ambient temperature sensor (supplied with the BAM-1020) onto the inlet tube above the roof of the enclosure. Feed the sensor cable through one of the four cable entry points on the left side wall of the enclosure and connect it to channel six of the BAM as described in the manual. Coil up the extra cable length with a zip tie.
7. Install the PM<sub>2.5</sub> cyclone (if used) and the PM<sub>10</sub> inlet head onto the inlet tube.
8. Position the vacuum pump (supplied with the BAM) into the pump compartment in the bottom of the enclosure. Route the power cord up through the grommet hole. Route the pump control cable through the hole and connect it to the pump and the BAM, then coil up the extra cable with a zip tie. Cut a length of pump tubing and route it through the same hole. Save the extra tubing for replacements.
9. Install any other optional met sensors or accessories as needed, then install filter tape into the BAM and run a SELF TEST routine.

## Operating The Thermal Controls

The BX-902B temperature control system should be tested for proper operation. Make sure that nothing obstructs the 500 watt heater radiator or the fan, and that no combustible materials are located near it the heater. The optional BX-592-1 temperature sensor (if used) should not be positioned near the heater, but instead near the BAM-1020 front door.

The thermostat controls both the aspiration fan and the heater. Whenever the shelter temperature is above the thermostat setting, the aspiration fan should turn ON and the heater should turn OFF. Whenever the shelter temperature is below the thermostat setting, the aspiration fan should turn OFF and the heater should turn ON. The thermostat can be set from 10 to 32 degrees C, and should be set at 10 degrees C for most applications. In warm weather, it is common for the enclosure temperature to stay about 5 to 10 degrees C above ambient even with the aspiration fan running.



**Extreme cold environments:** During very cold periods, the vents in the pump compartment and the vents for the aspiration fan may be stopped up with insulation. However, the pump compartment must still be able to exhaust the pump pressure. If the enclosure heater is not able to keep the shelter above 0 degrees C, then the insulation may be removed from around the smart inlet heater to supply additional heating to the inside of the shelter.

**Air conditioned version:** The model BX-902B-AC air conditioned version does not have the aspiration fan, heater, or thermostat. It has a preset temperature setpoint of 25C. It is important to insulate the inlet tube in all air conditioned mini shelters so that cold air does not cause condensation in the tube.

## Setting the Smart Heater Idle Mode Wattage

The Smart Inlet Heater used on the BAM-1020 can contribute considerable heat to the inside of the mini enclosure, even when the sample RH is low. When the sample RH is below 35%, the Smart Heater does not turn completely off, but instead is reduced to a lower “idle mode” setting of 20% duty cycle (40W). This default idle mode wattage can be set to a lower value to reduce unwanted excess heat inside a BX-902 mini shelter in the summer.

Set the Idle Mode as follows:

1. Enter the SETUP menu on the BAM-1020. While the **SETUP** menu is displayed, press F1, F6, F3, F4 on the keypad to enter a hidden ADVANCED MENU setup menu.
2. Select HEATER from the advanced menu. The BAM screen should display the following:

```
SETUP HEATER OFF :  
  
OFF: 06 ( 20% )  
  
SAVE                EXIT
```

3. The default idle mode OFF constant value is 06 (20%). Use the arrow keys to change the constant to a lower value such as 03 (10%), 02 (6%), or 00 (0%). If unsure, set the value to 02 (6%) which is about 12 Watts and is the preferred setting in Europe. If the setting is changed to 00 (0%), then the Smart Heater would turn off entirely whenever the filter RH is less than 35%.
4. Press the SAVE key and exit to the main menu. Don't change any other parameters in the advanced menu without specific instructions from Met One.