Arctica Solar 1500 Series Heater Installation Manual

A wall mounted Arctica Solar 1500 series solar heater + PV panel demonstration wall

The 1500 Series Solar Air Heater from Arctica Solar is designed to provide solar heated air to a space of about 150 sqft of living area with heating equivalent to a 1500 W space heater.

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**Installation:**

Installation of the 1500 Series Air Heater occurs in three steps. **Step 1** is the routing of air ducting into the living space. **Step 2** is installation of the heater on a south facing wall or roof by either mounting the heater directly to a wall (recommended), mounting using commercially available uni-strut or mounting using PV module racking. **Step 3** is connection of the PV panel and the thermostat to the heater.

**Description of the Heater**

Figure 0.1 shows the front and back of an Arctica Solar 1500 series heater as removed from the box. Connection to the exhaust and intake collars will occur with commercially available 4” insulated ducting or duct material.

Mounting of the heater to the external structure of the room / house / shed / etc. can occur by mounting the heater directly to the wall (recommended), to interstitial commercially available Unistrut or PV module racking (typically for a roof mount).

A cardboard template identical to the SN of your heater marking the location of the duct intake and exhaust is provided with the heater to assist with proper and accurate installation.

*Figure 0.1:* Front and Back of the 1500 heater with exhaust and intake ports labeled.
Product Items Included:
- 1x 1500 Series solar air heater
- 1x 10W PV panel with DC 5.5mm connector
- 1x Heat-Only thermostat
- 1x 10’ of thermostat wire, connected to heater

Items Not Included:
- 4” flexible insulated ducting (available from all big box hardware stores)
- 2x (one for intake, one for exhaust) duct covers / air diffusers – optional purchase
- 2x Washable air filters for Duct covers – optional purchase, cut to size
- Unistrut (if doing mounting configuration B)

Tools and Items needed to complete the installation:

Materials:
- 4” insulated ducting (available from Home Depot in 25’ lengths) OR alternative 4” ducting
- 2x 4” air diffusers in a style of your choosing (not shipped with heater, see Figure 1.2)
- 6” PVC tubing – length 1” greater than thickness of mounting wall if using flexible duct
- Mounting hardware (depending on wall, stand off or roof mounting approach) for heater. Use no larger than ¼” screws for mounting to lip of heater.
- Washable air filter material – such as Frost King Cut to Size 0.1875” thick air filter material

Tools:
- For clothes dryer style non-insulated duct routing – 1x 4” hole bit – available at most hardware stores
- For insulated ducting holes – 1x 6 3/8” hole bit – available at most hardware stores in electrical section, common tool for recessed lighting installation
- For mounting – Cordless drill, 1/4” drill bit, Philips / flat heat bit
- Duct tape – metalized all weather / extreme weather is best
- Silicone Caulking – Such as GE Silicone 1
- Foam in Place insulation – Such as Great Stuff, for sealing install cracks and crevices (optional)
**Step 1.0:** Routing of Air Ducting into the heated space

An exhaust (hot air) hole and intake (cool air) hole must be added to the structure. A cardboard template is included with your heater and can be used to locate the intake and exhaust duct holes. It can also be used to locate the Unistrut if mounting off of the wall.

If routing through a roof, a roofing contractor is best used to ensure leak proof install of the proper flashing and connection to the intake and exhaust of the heater.

*If routing through a wall with no vapor barrier and no need for insulation of exhaust ducting,* this process can be done in two ways. First is similar to the installation of a 4” dryer duct, as seen in videos such as referenced below. Locate wall studs prior to drilling to ensure that they will not interfere with the path of the heater ducting. It is best to mount the heater closest to the point of use as possible. The videos below can serve as reference to this part of the installation process:

YouTube: [How to install fume hood](https://www.youtube.com/watch?v=Qn6QVtQjw20)

YouTube: [How to install dryer duct](https://www.youtube.com/watch?v=Qn6QVtQjw20)
If routing through a wall where sealing the vapor barrier is required and insulated ducting is best, then we recommend using a 6\" PVC tube installed as a conduit for the flexible insulated ducting as seen in the process below.

**Figure 0.1:** Use a 6 3/8\" hole bit to place a through hole on the exterior wall and opposite interior wall. Feed a 6\" PVC tube and cut leaving ¼\" proud of the interior wall and exterior wall. Seal to interior wall and exterior wall (or vapor barrier) with a vapor barrier membrane or silicone sealant. This tube will act as the conduit for the flexible ducting.

**Figure 0.2:** Route 4\" insulated ducting into the conduit. Secure the inner membrane to the end of a 6\" air diffuser with duct tape.
Figure 0.3: A 6” air diffuser can now pop into the 6” PVC conduit. Cut the exterior insulated ducting to the wall thickness (red arrow), but allow for extra interior 4” ducting (which will compress back into the wall) to make mounting the heater easier. Secure insulation to heater collar with a 6” screw clamp or using the provided click-collar.

For heaters shipped with Quick Disconnect Duct fittings

Quick disconnect duct collars are shipped on most heaters. Connection is easy, twisting the female fitting into the heater male fitting for a click fit. However, we recommend applying a bead of sealing silicone (such as GE Silicone 1) to the interface between the female and male collar before the final mating. This will ensure no air leaks between the fittings and act as a mild adhesive between the parts.
For Heaters shipped with a solid plastic or metal offtake duct:

Depending on your install, route insulated or non-insulated ducting for intake and exhaust collar locations of the heater. Be sure to re-seal the vapor barrier of the house to the ducting vapor barrier external sheathing (seen in Figure 1.1) using either duct tape or a vapor barrier membrane.

As seen in Figure 1.1, the heater interfaces with commercially available 4” ducting. The plastic inner liner is held in place on the heater exhaust and intake plastic collars using screw clamps.
Figure 1.1: (top) Insulated 4” ID ducting and screw clamps are available at local hardware stores such as Home Depot or Lowes. Slide the internal plastic liner of the ducting over the intake and exhaust collars of the heater and secure each with a screw clamp. (bottom) Once secured with a screw clamp slide insulation and vapor barrier back over the clamp and wrap with duct tape or an additional screw clamp to secure in place.

The intake and exhaust holes in the interior of the room:

For the inside of the structure, install a commercially available air diffuser (either 4” or 6” depending on your duct routing, as seen in Figure 0.3) and a washable foam air dust filter (Figure 1.2 top left) overtop the intake duct hole. Place filters behind the air intake to prevent dust build up (Figure 1.2 top right)

Figure 1.2: (left) A 4” air diffuser for the intake duct hole. Use round foam filters (such as Metro Air Force – (right), or cut to size Frost King Washable Filter material – (below)) behind the intake duct cover to prevent buildup of dust inside the heater or on fan blades.

Arctica does not provide duct covers as different customer have different style needs. We do offer some styles for sale as optional. Please email for more information.
Step 2.0: Mounting the Solar Air Heater

Figure 2.1: Wall and roof mounting of Arctica 1500 series solar air heater. Man in top picture is 5’ 9”.
The heater is designed to mount (a) directly to a building wall (recommended), (b) to commercially available uni-strut, or (c) appropriate PV panel racking via the aluminum lip around the outside of the heater. The heater should be held with at least 4x fasteners: for example, 2x on the top and 2x on the bottom of the installed heater for a wall mounted application.

The installer should feel free to drill into the lip of the heater and connect with no less than (4x) 1/4” screws to the building structure. Holes are not predrilled in the product to allow for the variability of installation conditions at the installation site.

Figure 2.2: Front of heater with mounting lip identified. Mount at least 4x fasteners to structure as seen with the red dots if doing a flush wall mount.

Make sure the intake and exhaust holes are properly aligned with the mounting of the heater to make sure air can flow properly too and from the heater.
Before mounting to the wall, it is important to identify where wall studs are located by either using a stud finder, drilling pilot holes or marking every 16 inches from a known stud (U.S. standard wall stud spacing is typically 16 – 18 inches). Mark the location of studs as well as the outline of the heater on the wall before drilling. **Use the cardboard template provided with the heater to mark all wall penetrations and cuts prior to heater mounting.**

![Figure 2.3: Stud and heater markings on wall (left) using the provided cardboard template. Heater placed on wall in relation to markings (right).](image)
Figure 2.3b: With walls removed, modeling of the heater via a wall mount and placement of the studs on a normal 18" stud center to center construction. Place the 6" PVC conduits as shown using the provided heater cardboard template. Front image, back image and isometric image.
Mounting Configuration A:

For attachment of the heater directly to the wall (Figure 2.3), drill 1/4 inch holes into the frame of the heater at the location of each stud at the top and bottom (4x holes total). Then drill into the wall at the location of each wall stud (we suggest starting with a smaller pilot hole – less than 1/8 inch diameter) to verify you are drilling into the correct location on the wall.

Figure 2.4a: Heater attached directly to wall. ¼” bolts are drilled directly through the heater frame into the wall at the studs. When mounting flush with the wall, Arctica recommends placing weather stripping between the rear of the heater frame and the wall to keep out dirt, dust, insects and the like.
**Mounting Configuration B:**

To attach the heater to a uni-strut (Figure 2.4), drill the uni-strut directly to the wall at the desired location. It is important that the height of each uni-strut is accurate (the center of the uni-strut should line up with the desired drill holes) as they will be attached directly to the frame with a ¼” bolt as shown in figure 2.3. Alternatively, there are alternate uni-strut attachments that can be used to attach the heater without the need of drilling into the heater frame. Unistrut mounting should be used if the structure has uneven studs or does not allow for flush mounting due to the type of exterior wall material such as siding.

**Figure 2.5:** Heater attached to commercially available uni-strut mounts or something similar. Heater can be attached to channel spring nuts with threaded bolts drilled directly through the heater frame as shown in the image.

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Mounting Configuration C:

Attachment to PV panel racking (Figure 2.6) will vary by product and the respective installation guide should be referred to. Figure 2.5 below shows just an example of a PV mounted system using some of the most popular commercially available mounting systems.

Figure 2.6: Heater attached to a typical PV mounting system.
**Step 3.1:** Connection of PV panel

The small 12V, 10W PV panel provided with the solar heater is the power source for the air handling system.

Depending on the orientation of the panel during mounting, connect the PV panel close to the heater with the provided hardware. **Be sure the heater does not shade the PV panel during operation.** If needed use the provided (2x) angle brackets to mount the PV panel to the same wall or roof of the structure.

Once installed, connect the male DC plug of the PV panel to the female insert of the heater control box OR the bottom rail of the heater (depending on the model purchased) as seen in Figure 3.1.

![Figure 3.1: Connect the PV panel DC plug into the female plug adapter at the bottom of the 1500 heater](image-url)
Step 3.2: Connection to thermostat

The 1500 heater is controlled by a commercial heat-only thermostat provided with the heater and 12’ of two-wire thermostat cabling bundled around the intake collar of the heater.

Unravel the thermostat wire and route it through the wall(s) as necessary into the living / heated space. Cut to length if needed.

Route the thermostat wire through the back of the thermostat backplate. Connect one wire to terminal RH. Connect the other to terminal W. The color of the wire to each terminal does not matter. Mount the thermostat backplate to the wall and reattach the front plate with batteries installed.

Figure 3.2: Connection of the thermostat control wires to the thermostat.

Set the thermostat to the desired room temp. The heater is activated by a thermal switch internal to the heater; when the inside of the heater reaches above 30 C / 86 F the heater will activate and start delivering warm air into the living space if the desired temperature is below the thermostat room temperature. Be careful to plate the thermostat at a distance from the exhaust of the heater.

If you want the heater to run continuously, remove the thermostat and twist the red and black wires from the thermostat wire together.
Other recommended installation considerations (not required, but encouraged):
Apply to back of heater on back of frame on all 4x sides prior to securing against the wall.
Installing the Solar PV panel with the 1500 Series Solar Air Heater

In normal environments:

Mount 2x nails at 5.71” apart and hang the PV module on the existing holes as seen in the picture.

In extreme environments or for more secure mounting:

Use commercially available Z brackets of proper size to secure panel frame physically to the mounting wall. Feel free to drill into the PV module frame carefully to better secure the Z brackets if needed.
Arctica suggests you filter the incoming air into the heater. We recommend using a cut-to-size filter material, such as the Frost King Washable Cut To Fit Air Filter.

A circle of filter can be cut and then inserted between the vent cover of choice and the intake vent. The filter should be removed annually and washed, and any remaining dust vacuumed out of the heater intake collar.

Using the heater without filtering incoming air will lead to faster soiling and potentially reduced performance.