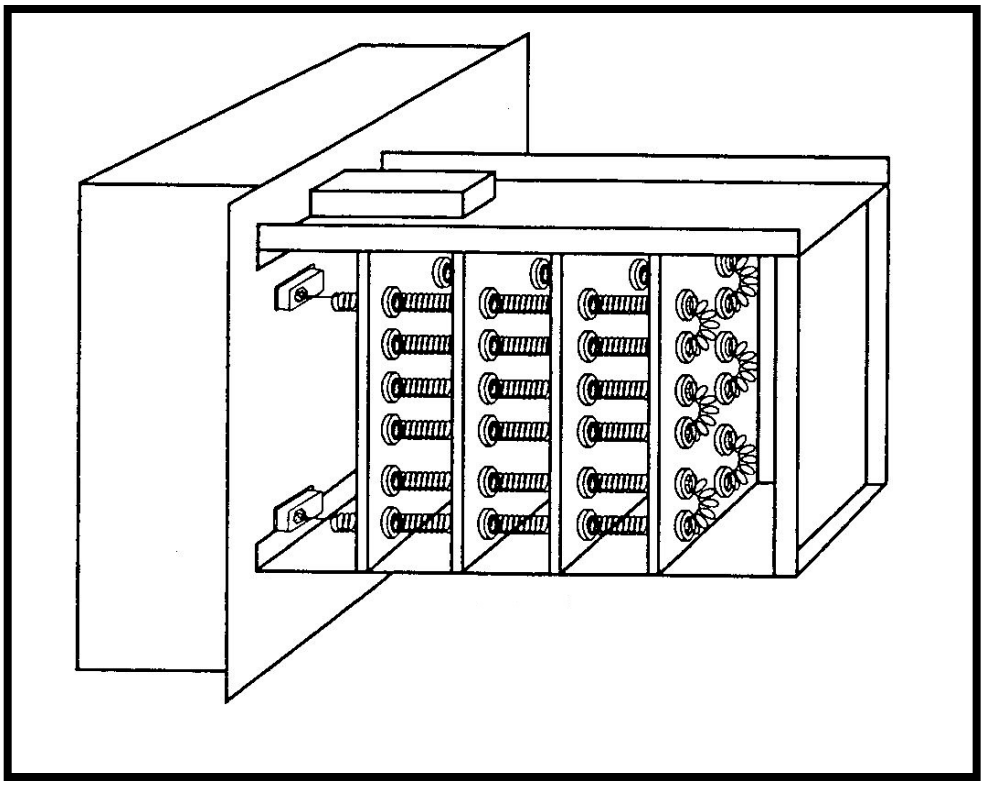
acutherm™

DownstreamSolutions®

Variable Air Volume Systems Optimized!

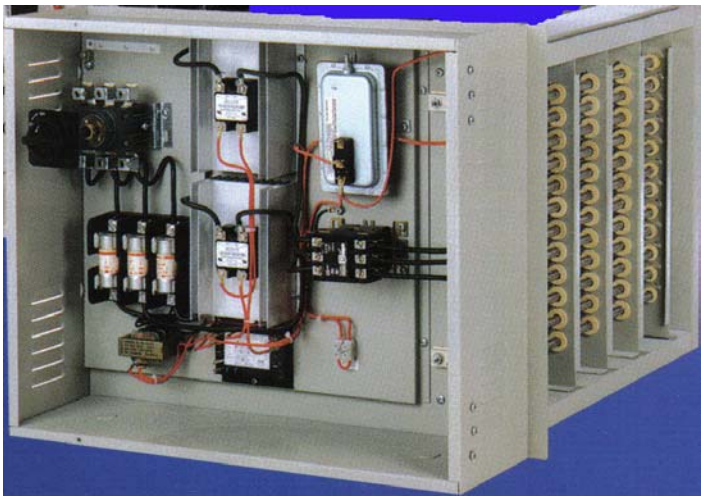
Acu–Zone™ II E

Installation, Operation, and Maintenance Manual



Acu-Zone™ II

Square or Rectangular Heating Units



Acu-Zone™ - II E

Electric Zone Heaters

Acu-Zone™ II-E

The model AZON-II-E open coil electric zone heaters are available in larger round sizes—14"Ø and 16"Ø or can be manufactured in any square or rectangular size to meet your requirements. Any capacity or voltage can be provided making your selection and application effortless. Units are full SCR or SSR controlled (depending on KW) and feature discharge temperature control and airflow monitoring on most sizes.

The availability of custom sizes, along with any voltage make the Acu-Zone™ heater ready to meet your large zone needs with relative ease. When used with the Therma-Fuser™ Diffusers in an office layout, much larger zones of air flow can be created and the heaters located centrally to each other in an office layout because the diffusers are doing the finite temperature control within their small, individual zones of control.

Inspection

Damage or Shortage

All Acutherm equipment is shipped F.O.B. Factory which means that the title for the goods passes to you from Acutherm when the shipment is picked up. Therefore, inspect all equipment for shortage and damage upon receipt. Note all shortages and damage on the delivery receipt—Bill of Lading - this action notifies the carrier that YOU intend to file a claim. If there is any shortage or damage discovered when the unit (s) are unpacked, call the delivering freight carrier for a concealed damage or shortage inspection. Have all related paperwork for the inspector including the delivery receipt and the carrier's liability for

Installation Instructions:

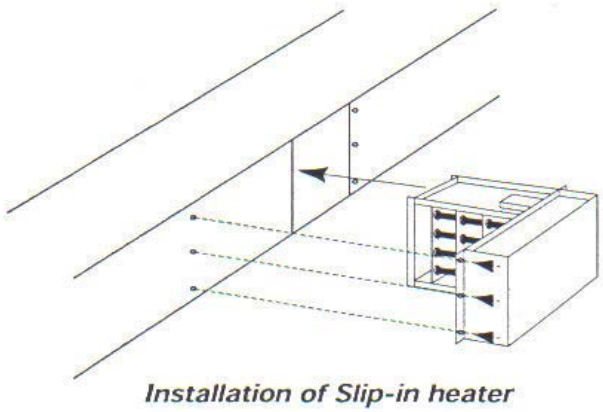
The following Installation, Operation, and Maintenance instructions are for the Acu-Zone™ I model AZON. Please follow the instructions for a successful installation and do not discard. This document contains important information regarding the proper handling, installation, operation, wiring, trouble-shooting, and maintenance.

Handling

1. Remove the shipping covers just before installation
2. Inspect the heater carefully and report any damage to the freight carrier (See Inspection)
3. Do not install a damaged heater
4. See the *Minimum Velocity Chart* in these instructions for the minimum FPM through the heater to maintain full rated KW. Inlet air should not exceed 80°F

Installation: (Slip-in Type – Standard Heater)

1. The axis of the duct must always be perpendicular to the face of the heater
2. The heating elements must always be installed horizontally
3. Cut an opening in the side of the duct. See Figure # 1
4. Slip the heater into the duct until the hole is completely covered by the flanges around the heater
5. Fasten the heater to the duct with sheet metal screws and seal the openings with a suitable (high temperature) sealing compound
6. Use additional support for the heater – as the duct may not be strong enough to sup port the weight of the heater



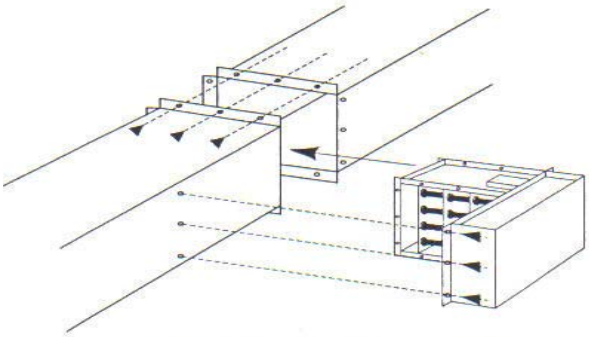
Installation of Slip-in heater

Figure # 1

Installation Instructions

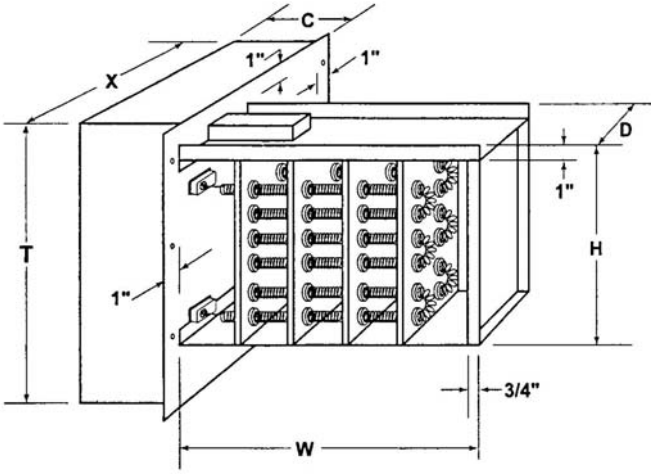
(Flange Type – Optional)

1. Flange both ends of the ductwork outwards on three sides to match the heater flanges. See Figure # 2
2. Fasten the heater to the duct flanges with sheet metal screws (for larger, heavier heaters use nut and bolt fastening and additional hangers to support the heater



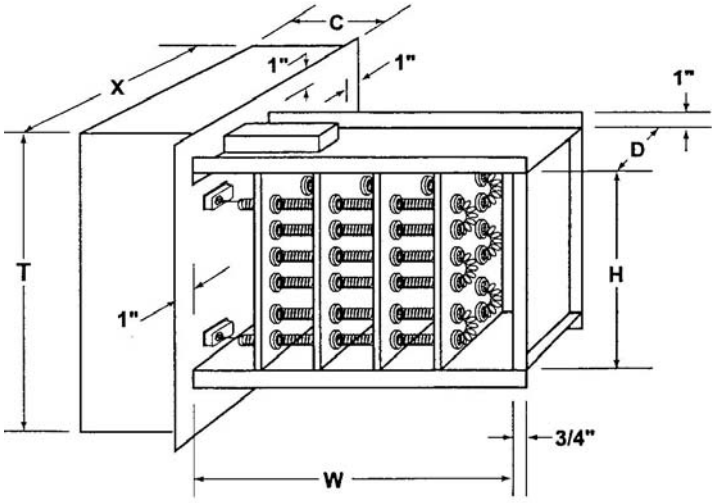
Installation of flanged heater

Figure # 2



Acu-Zone™ II—E

Slip-in Installation Dimensions



Acu-Zone™ II—E

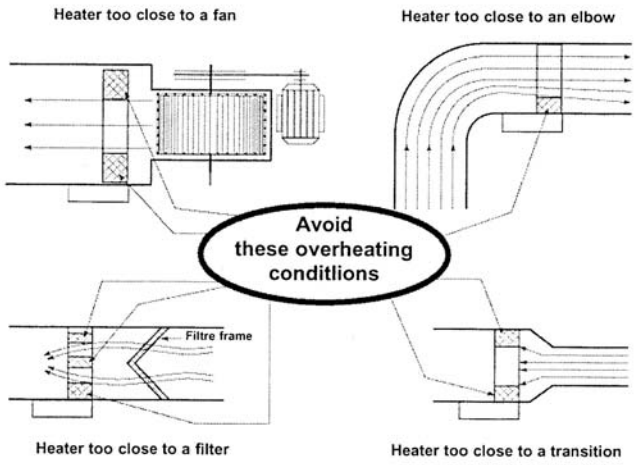
Flanged (Optional) Installation Dimen-

Installation Instructions:

Spacing requirements to obtain optimal operating conditions (Figures # 3 & 4)

Item #	Clearance Distance (Inches)	Description
1	24”	Between the heater and filter frames
2	***	Between the heater and duct elbows
3	***	Between the heater and ductwork branches
4	***	Between the heater and sharp duct transitions
5	48”	Between the heater and a double fan outlet
6	24”	Between the heater and access doors or diffusers
7	1”	Between the duct at the outlet side and combustible materials for a

*** Minimum distance Equals the largest of the two duct dimensions (W or H) up to 48”.



Important Installation Notes:

Do not install a duct heater in a vertical duct directly above a ceiling diffuser or an opening in the ceiling

Do not install standard heaters outdoors

Do not install spray humidifiers upstream from the heaters

Do not cover the control box with thermal insulating materials

All duct should be installed in accordance with SMACNA Standards, Local, State, and Federal Codes, and in compliance with NFPA Standards- 90A and 90B

Size Limitations:

Although there are virtually no limitations to the maximum size of Acutherm custom built heaters, all CSA Listed heaters must comply with the following dimensions:

	Slip-in Type Open Coil	Flanged Type Open Coil
Minimum Duct Width Dimension "W"	6"	5"
Minimum Duct Height Dimension "H"	5"	4"

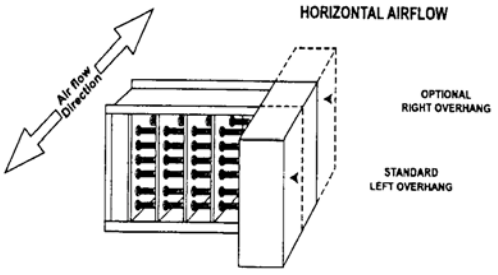
Table 3 – Heater Size Limitations

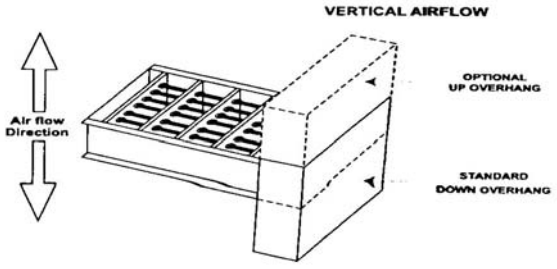
CSA listed custom heaters (Acu-Zone™ II) heaters are available in any KW rating; however, the listing is restricted to a maximum KW density of 22.5KW per square foot of heated area for open coil type heaters. For a quick approximation of the maximum KW available in a particular duct size, please use the following formula:

$$\text{Maximum KW} = \frac{22.5 \times \text{“W” (Inches)} \times \text{“H” (inches)}}{144}$$

Universal Mounting of Acu-Zone™ Heaters

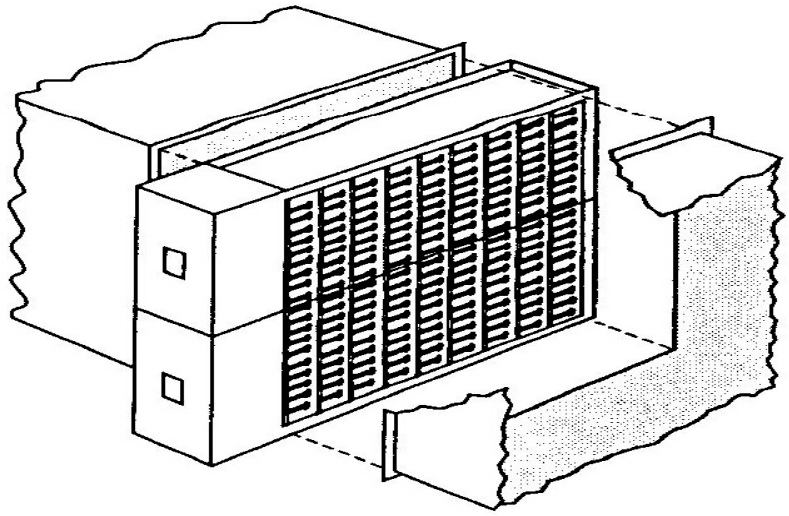
The heaters are manufactured to be non-sensitive to airflow direction. The built-in high limit cut-outs are located such that the airflow can be in either direction without impairing the safety of the heater. The very same heater can be installed in horizontal or vertical duct.





Multiple Heaters in a Duct:

Electric heaters are not normally designed to be used is series in a heating installation. Very large Acu-Zone II heaters can be manufactured and shipped so they can be simplified by using two or more units specifically designed for parallel installation. Each section has cutouts and there are terminal blocks provided to interconnect the controls in the field.



Two stacked sections in a duct

Installation Instructions:

Electrical Installation

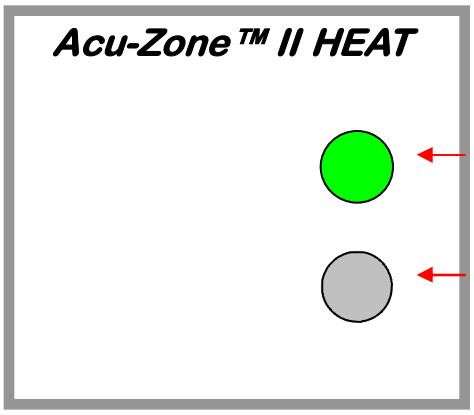
All electrical work must conform to all electrical and national electrical codes for wiring. The heater electrical supply should be a separate cable feed of the appropriate gauge, and with appropriate protection and grounding.
Please refer to the following sample wiring diagrams for the Acu-Zone™ units. Your actual application and wiring may vary from these sample diagrams.

General Notes:

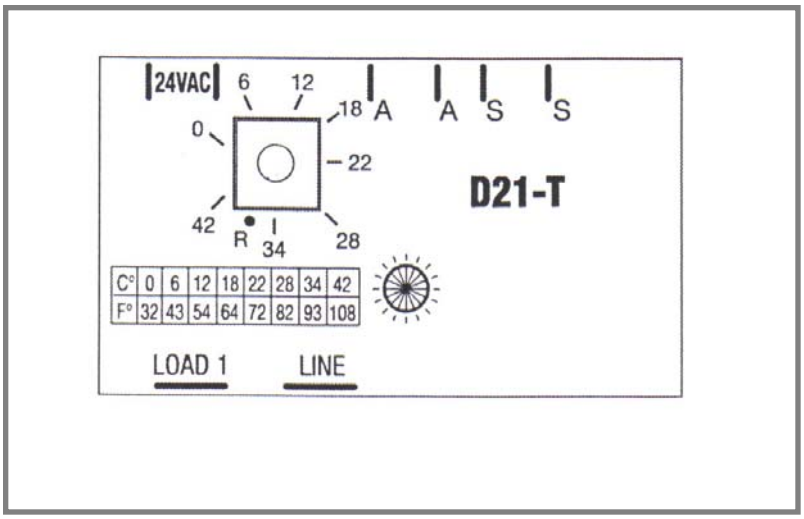
- Disconnect all power sources before opening the control box and working on the heater
- Read the NAMEPLATE carefully and consult the wiring diagram before starting to wire
- **Supply Wires** – use only wires suitable for 75°C and they should be sized according to NEC, CEC, and any and all Local, State and Federal requirements. All wires should be brought through knock-outs.
- **Disconnecting Means** – A disconnect switch is provided as standard equipment on all Acu-Zone™ heaters
- **Control Circuit Wiring** – Use Class 2 wiring for control circuit connections to the duct heater
- **Magnetic Contactors** – see additional information
- **External Control Ratings** – the rating of the external control devices shall be suitable for handling the VA ratings as marked on the NAMEPLATE
- **Air Flow Interlock** – Heaters are generally supplied with one extra terminal marked (1) for fan interlock or air sensing device connection. Remove the jumper between terminals I and C before connecting the fan interlock. Select a suitable air flow sensing device of the differential pressure sensing type with snap acting contacts. A slow make and slow break device may cause undue cycling and in some instances a chattering of the contactors.

Wall Sensor Installation

Acu-Zone II Thermostat/Sensor: #AZONIITSDT-25347



This wall mounting Sensor works in conjunction with a Discharge Thermostat to control the SCR for the heat. One wall sensor is available with an On/ Standby switch for operator interface and the other without the switch. In the "On" mode, the Discharge Thermostat is energized to maintain a constant discharge air temperature of 90°F. The Wall Mounting Sensor will have built-in pre-assigned and adjustable temperature ranges for both the "Room Set Point" and the "Set-Back" Temperature. Factory set "Room Set Point Range" will be 70°F to 72°F and the "Set Back" Temperature will be 65°F ± 1.5°F. The "Set Back" feature will always be energized even when the unit is "Stand By." The return from a power failure will energize the system in whatever mode that it was in upon the failure.



The figure to the left shows the typical SCR Controller located inside of the control box.

The internal sensor (Acu-Sensor™) to monitor duct discharge temperature is usually connected to terminals "S S" and the wall sensor (3 wires) above is wired through the 24V circuit so that the SCR Controller is energized on a call for heat from the wall mounting mode sensor (AZON T – 25346).

The 'arrow" on the controller should be pointed at the 34°C or the 93°F.

DO NOT TURN THE ARROW TO "R" AS THIS WILL DISABLE THE DISCHARGE SENSOR.

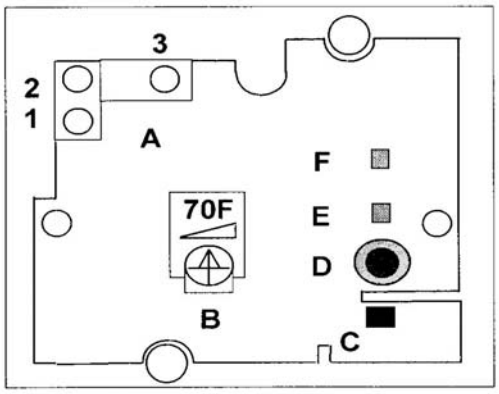
Installation Instructions:

Readjusting the Internal Set-Point Range

Acu-Zone™ Wall Sensor # AZONIITST-25347

Room Thermostat for Acutherm (RTA)

Internal view and main components



A: Input/Output Terminal Blocks

1: 24V AC input

2: GND input

3: Output, when heater is ON, internal TRIAC connects this terminal to GND.

B: Set Point adjusting Potentiometer.

Control range is 65 °F to 75°F. In the middle position the Set point is 70 °F.

C: Temperature sensor.

D: Push button.

Every push-release alternates operation mode between Setback and Normal.

E: Mode indicator LED.

Normal mode: full ON, Setback mode: flashing.

F: Internal LED.

Indicates when the RTA enables the Heater.

Normal mode, LED is ON

When the space temperature falls below the Set point, then the heat is energized and will stay on until the temperature reaches Set point +5 °F.

Set Back mode, LED is flashing

When the space temperature falls below 65 °F, then the heat is energized and will stay on until the temperature reaches 65 °F +3°F.

When there is a power failure and the power comes back, the RTA switches to the to the last mode it was on (Setback or normal).

Installation Instructions:

Operation

1. Make sure that he air flow noted on the NAMEPLATE is available to pass through the heater at all times. Air flow should be evenly distributed across the entire face of the heater. Use turning vanes at duct elbows and splitter dampers at branch take-off's to streamline the air flow in the heater. Insufficient airflow will result in the opening of the auto-reset thermal cut-out or damage the heating elements.

2. **Warning** – the air flowing through the duct in which the heater is installed shall not contain any combustible particles or any flammable vapor or gas.

3. **Air Temperature** – the air temperature should not exceed 27°C (81°F) at the heater inlet and 66°C (151°F) at the heater outlet

4. **Minimum Static Pressure and Air Direction** – the heater is protected with a differential pressure switch or an electronic air flow sensor. A minimum total pressure of 0.07" W.G. must be maintained to insure that the differential switch is closed. Air flow must only be present to engage the electronic air flow sensor

5. **Manual Reset Thermal Cut-out** – this protection device is standard on all heaters of less than 300V and 30KW and is optional on all other heaters. Be sure to check the auto-reset thermal cut-out BEFORE resetting the manual thermal cut-out. If the auto-reset is defective, then it must be replaced PRIOR to resetting the manual cut-out.

Maintenance

Visual Inspection – Acutherm strongly recommends that each heater is periodically inspected. This precautionary step will help to keep the heaters operating well, and will insure that the heaters are on-line when needed. Sign of problems: accumulation of dust on the electrical elements, signs of overheating on the heater frame and wrapper, traces of water or rust

Electrical Inspection – Approximately two weeks after start-up, all electrical connections to contactors should be checked and tightened up. Before each heating season, check the resistance between the heating elements and ground. It is also recommended to check the electrical connections to the heating elements, magnetic contactors, and main power lugs.

What are the Checkpoints?

- Check all fuses
- Check the resistance to ground for each circuit
- Check the resistance phase to phase for each circuit
- Check the tightening of all connections at all contactors and heating elements
- Check all contactors

Installation Instructions:

Maintenance

4. **Off –Season Maintenance** – If a heater is shut-down for an extended period of time, it is recommended that you carefully check the resistance to ground for each circuit. It is important not to power the heater when a low resistance to ground is measured. Control components such as step controllers or modulating valves (SCR) should be maintained and checked according to their respective manufacturer's instructions. Any defective components should be replaced with identical original equipment parts.

Trouble Shooting

Type of Problem	Possible Causes
No Heat	1. Main Disconnect Switch is closed 2. Blown power fuses 3. Broken or shorted wire in the control circuit 4. Control circuit improperly connected 5. Defective High Limit Switch 6. Manual reset high limit switch is in the open position 7. Discharge thermostat not properly wired 8. Incoming air is too hot 9. Air handler not operating 10. Insufficient control transformer capacity 11. Defective space mode sensor or discharge thermostat
Not Enough Heat	1. Dirty filter (s) 2. Cycling of the unit 3. Blocked outlet (s) 4. Heater not sized properly – not enough capacity for demand 5. Low airflow

Installation Instructions:

Trouble Shooting

Type of Problem	Possible Causes
Short Element Life	1. Unit is operating at a voltage that is much different than the rated voltage (excessive amp draw) 2. Damaged or broken ceramic insulators causing a partial ground or a short 3. High temperatures due to defective electronic sensor (Acu-Sensor™), insufficient, or low air flow 4. Unit is cycling too often 5. Unit is overloaded due to amp draw
Blown Line Fuses	1. Improperly Wired Unit 2. Unit voltage is improper—high amp draw 3. Fuses are too small
	1.

Installation Instructions:

Minimum Velocity

KW Per Sq. Ft.	FPM Without Insulation	FPM With Insula-tion	KW Per Sq. Ft.	FPM Without Insulation	FPM With Insulation	KW Per Sq. Ft.	FPM Without Insulation	FPM With Insulation
1			10.75	660	880	20.5	1080	1280
1.25			11	370	890	20.75	1090	1285
1.5			11.25	685	900	21	1100	1290
1.75			11.5	700	905	21.25	1115	1300
2		200	11.75	710	910	21.5	1130	1310
2.25	200	225	12	720	920	21.75	1140	1320
2.5	215	250	12.25	735	935	22	1150	1330
2.75	230	275	12.5	750	950	22.25	1165	1340
3	250	300	12.75	755	965	22.5	1175	1350
3.25	265	320	13	760	980	22.75	1185	1360
3.5	280	340	13.25	770	990	23	1200	1375
3.75	300	360	13.5	780	1000	23.25	1215	1385
4	320	380	13.75	790	1010	23.5	1230	1395
4.25	335	410	14	800	1020	23.75	1240	1410
4.5	350	440	14.25	815	1030	25	1250	1420
4.75	365	465	14.5	830	1040	24.25	1265	1435
5	380	490	14.75	840	1055	24.5	1280	1450
5.25	390	510	15	850	1075	24.75	1290	1460
5.5	400	530	15.25	860	1080	25	1300	1475
5.75	415	545	15.5	870	1085	25.25	1310	1485
6	430	560	15.75	880	1088	25.5	1320	1490
6.25	445	580	16	890	1090	25.75	1330	1495
6.5	460	600	16.25	900	1100	26	1340	1500
6.75	475	625	16.5	905	1105	26.25	1050	1510
7	490	650	1675	910	1112	26.5	1360	1520
7.25	505	670	17	920	1120	26.75	1370	1535
7.5	520	690	17.25	935	1130	27	1380	1550
7.75	530	710	17.5	950	1140	27.25	1390	1560
8	540	725	17.75	965	1155	27.5	1400	1565
8.25	555	745	18	980	1170	27.75	1410	1570
8.5	570	765	18.25	990	1185	28	1420	1580
8.75	580	780	18.5	1000	1200	28.25	1430	1590
9	590	790	18.75	1010	1205	28.5	1450	1600
9.25	600	810	19	1020	1210	28.75	1465	1615
9.5	610	830	19.25	1030	1220	29	1480	1630
9.75	620	840	19.5	1040	1230	29.25	1490	1635
10	630	850	19.75	1050	1245	29.5	1500	1640
10.25	640	860	20	1060	1260	29.75	1510	1645
10.5	650	870	20.25	1070	1270	30	1520	1650

Acu-Zone™ I—E Electric Zone Heaters

Two Year Warranty

Acutherm warrants that the model AZON Electric Zone Heater, exclusive of any options and accessories (whether factory or field installed) shall be free from defects in material or workmanship for a period of two (2) years from the date of shipment and agrees to repair or replace, at its option, any parts that fail during said two (2) year period due to any such defects which would not have occurred had reasonable care been taken, provided that such parts have been inspected by Acutherm and found defective and provided the units have been given normal and proper usage and all parts and controls remain unaltered. Acutherm makes no WARRANTY OF MERCHANTABILITY OF PRODUCTS OR OF THEIR FITNESS FOR ANY PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY WHICH EXTENDS BEYOND THE LIMITED WARRANTY ABOVE. ACUTHERM'S LIABILITY FOR ANY AND ALL LOSSES AND DAMAGES RESULTING FROM DEFECTS SHALL IN NO EVENT EXCEED THE COST OF REPAIR OR REPLACEMENT OF PARTS FOUND DEFECTIVE UPON EXAMINATION BY ACUTHERM. IN NO EVENT SHALL ACUTHERM BE LIABLE FOR INCIDENTAL, INDIRECT, OR CONSEQUENTIAL DAMAGES OR DAMAGES FOR INJURY TO PERSONS OR PROPERTY. Acutherm shall not be responsible for freight to or from its plant (s) in connection with the inspection, repair or replacements of parts under the terms of this limited warranty nor for cost of removal or installation.

For further information, please refer to the Acutherm website: www.acutherm.com or the Acutherm Catalog: Complete System Design Manual

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Variable Air Volume Systems Optimized!

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