

AGN 227 – Anti-Condensation Heaters

DESCRIPTION

The type of anti-condensation heater used in an AvK or STAMFORD alternator is dependent on the alternator model and size. The anti-condensation heater could be a Cartridge, Flexible Pad or Circular Ring type. All of these anti-condensation heater types are designed to combat moderate humidity levels over periods of alternator inactivity. They are not to be used when the alternator is in use.

Anti-condensation heaters reduce the moisture level in the air immediately around the alternator when the alternator is stationary. They also maintain the atmosphere inside the alternator above the dew point during long periods of inactivity, such as when the alternator is used in a standby application.

If a situation exists where humidity levels are known to be high, the accepted way of dealing with this situation is to install space heaters around the Generating Set, in the canopy or room, combined with motorised ventilation louvres to shut out the damp atmosphere.

The design criteria for anti-condensation heaters used on AvK and STAMFORD alternators was to support an insulation system by maintaining sufficient residual temperature within an alternator that has just completed an operation (run) to stop condensation forming or being absorbed during the inactive period. The actual heater wattage is a compromise of design requirement and the space available within the non-drive end (NDE) area of the alternator.

Anti-condensation heaters are NOT adequate for drying out an alternator.

A separate power supply is required for the anti-condensation heaters. Customers usually arrange a power supply connection that automatically switches on when the Generating Set is

shut down. The anti-condensation heaters can operate at various voltages. The heater wattage and number of anti-condensation heaters also vary depending on the alternator frame size.

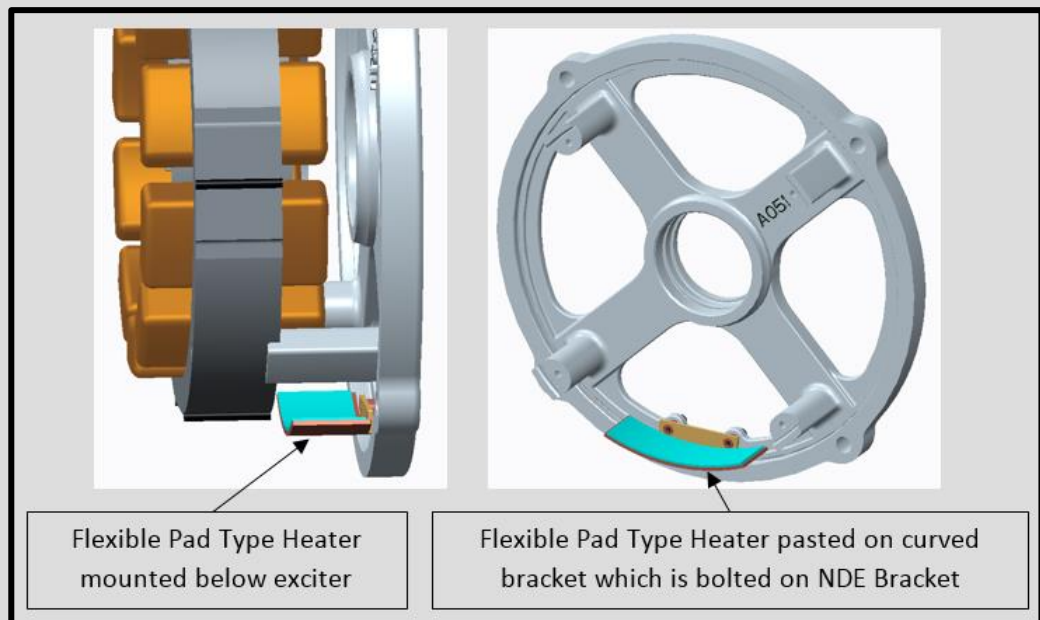
ANTI-CONDENSATION HEATER TYPES

Refer to Drawing number A12-H11 for the anti-condensation heater connection details.

S0L1 / S0L2 Alternators

The Flexible Pad type heater is pasted on a curved bracket and the bracket is bolted to the alternator's Non-Drive End (NDE) bracket, below the exciter assembly.

There are four options for the anti-condensation heater depending on the supply voltage: 12 VDC, 24 VDC, 115 VAC and 230 VAC. The heater output powers are 30W for S0L1 and 45W for S0L2.



Heater options for the S0L1 are (Drawing A12-H11):

- 12V (DC); 30 Watts
- 24V (DC); 30 Watts
- 115V (AC); 30 Watts
- 230V (AC); 30 Watts

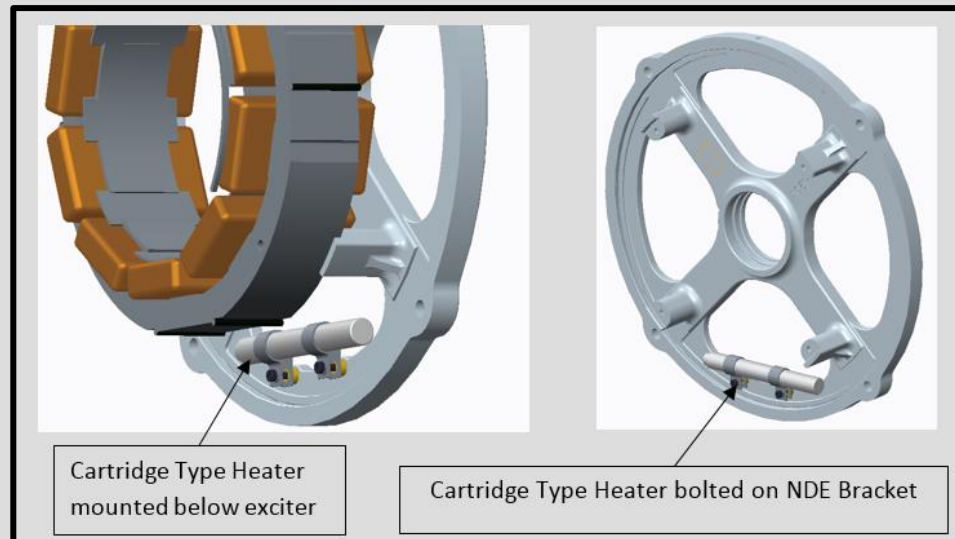
Heater options for the S0L2 are (Drawing A12-H11):

- 12V (DC); 45 Watts
- 24V (DC); 45 Watts
- 115V (AC); 45 Watts
- 230V (AC); 45 Watts

S1L2 Alternators

The Cartridge type heater is mounted on the alternator's NDE bracket, below the exciter assembly.

There are four options for the anti-condensation heater depending on the supply voltage: 12 VDC, 24 VDC, 115 VAC and 230 VAC. The heater output power is 80W.

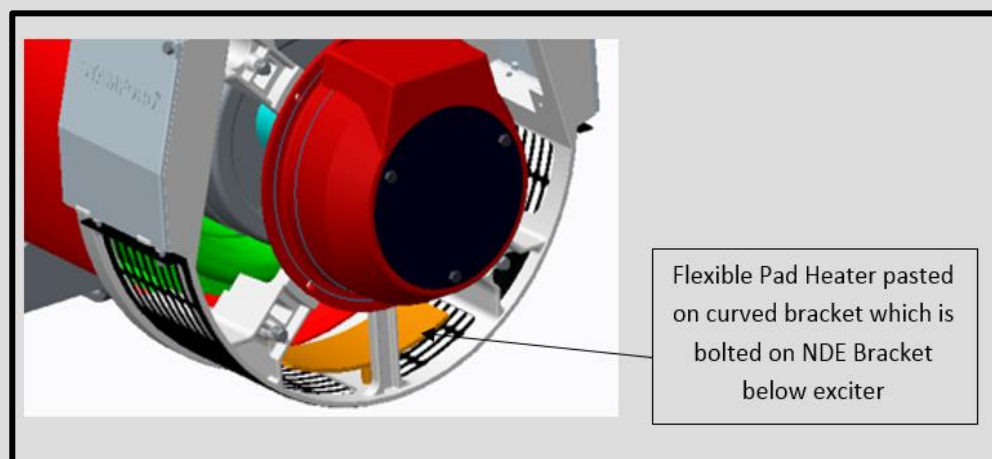


Heater options for the S1L2 are (Drawing A12-H11):

- 12V (DC); 80 Watts
- 24V (DC); 80 Watts
- 115V (AC); 80 Watts
- 230V (AC); 80 Watts

P0/P1 Alternators

The Flexible Pad type heater element is secured to the NDE Bracket and below the exciter windings. There are four options for the anti-condensation heater depending on the supply voltage: 12 VDC, 24 VDC, 115 VAC and 230 VAC. The heater output power is 30W.



Heater options for the P0/P1 are (Drawing A12-H11):

- 12V (DC); 30 Watts
- 24V (DC); 30 Watts
- 115V (AC); 30 Watts
- 230V (AC); 30 Watts

UC 22 (S2) Alternators

The UC 22 (S2) alternators have a 1 element cartridge heater and there are 2 options:

- 1 element: 110 to 125V; 90 to 115W (Drawing A7-H11 Fig 1)
- 1 element: 220 to 260V; 90 to 125W (Drawing A7-H11 Fig 1)

UC 27 (S3) Alternators

The UC 27 (S3) alternator have a 1 element cartridge heater and there are 2 options:

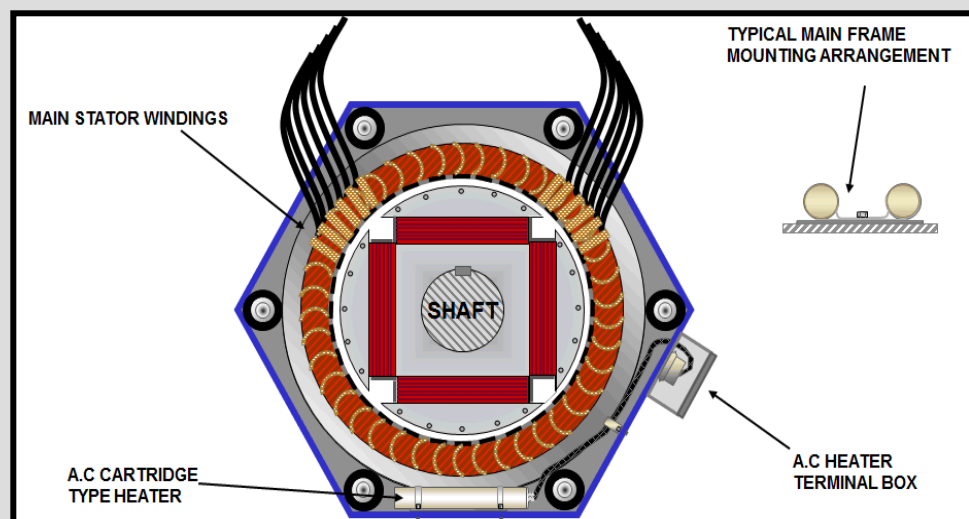
- 1 element: 110 to 125V; 90 to 115W (Drawing A7-H11 Fig 1)
- 1 element: 220 to 260V; 90 to 125W (Drawing A7-H11 Fig 1)

S4 Alternators

The S4 alternators have has a 2 element cartridge heater and there are 3 options:

- 2 elements in parallel (standard): 110 to 125V; 250 to 325W (Drawing A7-H11 Fig 2)
- 2 elements in parallel (standard): 220 to 260V; 250 to 350W (Drawing A7-H11 Fig 2)
- 2 elements in parallel (higher power option): 220 to 277V; 450 to 715W (Drawing A7-H11 Fig 2)

On the UC 22 (S2), UC 27 (S3) and S4 alternators, the heaters are mounted underneath the Main Stator windings at the NDE (Non-Drive End), at the bottom of the frame:



HC5 (S5) Alternators

The HC5 (S5) alternators have options for 1 element or 2 element cartridge heaters:

- 1 element (standard): 110 to 138V; 225 to 355W (Drawing A7-H11 Fig 1)
- 1 element (standard): 220 to 277V; 225 to 360W (Drawing A7-H11 Fig 1)
- 2 elements in parallel (option): 220 to 277V; 450 to 715W (Drawing A7-H11 Fig 2)
- 2 elements in series (option): 440 to 554V; 450 to 715W (Drawing A7-H11 Fig 4)

S6 Alternators

The S6 alternators have options for 1 element or 2 element cartridge heaters:

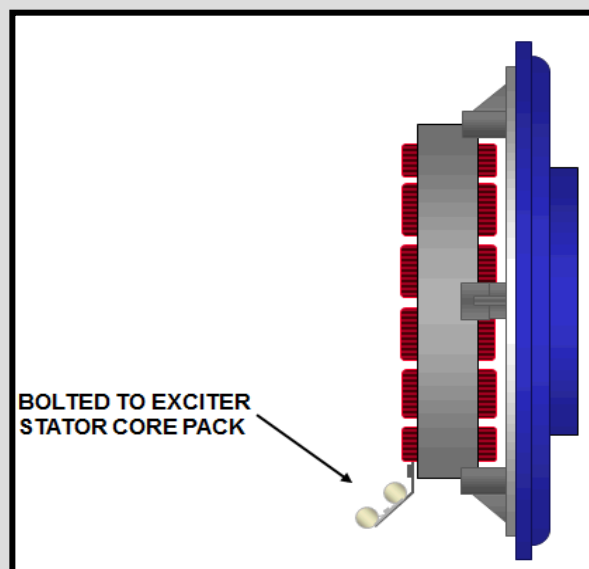
- 1 element (standard): 110 to 138V; 225 to 355W (Drawing A7-H11 Fig 1)
- 1 element (standard): 220 to 277V; 225 to 360W (Drawing A7-H11 Fig 1)
- 2 elements in parallel (option): 220 to 277V; 450 to 715W (Drawing A7-H11 Fig 2)
- 2 elements in parallel (option): 250 to 305V; 450 to 670W (Drawing A7-H11 Fig 2)

P7 (S7) Alternators

The P7 (S7) alternators have either 2 element or 4 element cartridge heaters, depending on the core length:

- P7A-F: 2 elements in parallel: 110 to 138V; 450 to 710W (Drawing A7-H11 Fig 2)
- P7A-F: 2 elements in parallel: 220 to 277V; 450 to 715W (Drawing A7-H11 Fig 2)
- P7G-H: 4 elements in parallel: 110 to 138V; 900 to 1415W (Drawing A7-H11 Fig 3)
- P7G-H: 4 elements in parallel: 220 to 277V; 900 to 1425W (Drawing A7-H11 Fig 3)

On the HC5 (S5), S6 and P7 (S7) alternators, the heaters are mounted on a bracket, which is then bolted on the Exciter Stator core pack:



P80 (S8/S9) Alternators

The P80 (S8/S9) alternators have two circular ring tubular heaters, which can be connected either in series or in parallel. There are specific ranges for the heater output power depending on the voltage applied to the heaters. Heaters are mandatory and therefore fitted as standard on Medium and High Voltage P80 alternators (MV80/ HV80).

When connected in parallel, the voltage operating range across the two heaters is 100 to 138V, resulting in output power of 1062W to 2022W.

When connected in series, the voltage operating range across the two heaters is 200V to 277V, resulting in output power of 1058W to 2029W.

The output power range corresponds to the minimum and maximum supply voltages. So for example, if 200V was applied across the two heaters, the power output would be 1058W, and if 277V was applied across the two heaters, the power output would be 2029W.

Any operating voltage between 200V and 277V requires a calculation to determine the output power. For example, heaters operating at 220V: $(220^2 / 200^2) \times 1058W = 1280W$.

The supply voltage range of the heaters is specified by the customer during the alternator order placement. The heaters will then be connected based on customer's specification (in series or in parallel) and the wiring diagram will reflect the voltage and output power range of the heaters. Instead of having a separate heater connection diagram, the heater connection is included in the complete Wiring Diagram for a P80 alternator.



AvK DSG/DSU/DIG Alternators

Anti-condensation heaters are fitted on every DSG/DSU/DIG alternator. The output power of the heaters depends on the alternator frame size. There is also the option to select heaters with increased output powers depending on the application needs.

Alternator	Alternator Type	Heater Output Power (Standard)	Heater Output Power (Optional)
DSG/ DSU	62, 74	350W	N/A
	86, 99	500W	1000W
	114	1000W	1500W
DIG	110, 120, 130	500W	1000W
	140, 142	1000W	1500W

There are several supply voltage options for the heaters. Other supply voltages not listed below can also be considered on a case-by-case basis:

- 120V, 1-phase, AC/DC
- 230V, 1-phase, AC/DC
- 400V, 1-phase, AC/DC
- 480V, 1-phase, AC/DC
- 230V, 3-phase
- 400V, 3-phase
- 480V, 3-phase
- 600V, 3-phase

The anti-condensation heaters are generally mounted at the non-drive-end (NDE) of the alternator, below the exciter stator assembly:

