
INSTALLATION INSTRUCTIONS

Original Issue Date: **2/97**

Model: **1200-2000 kW**

Market: **Industrial**

Subject: **Block Heater Kits PA-328036, PA-328036-SD, PA-328037, PA-328037-SD, PA-347687, PA-347687-SD**

The block heater kit heats engine coolant, making starting easier and warm-up quicker while reducing energy costs. The thermostat automatically turns off the heater when coolant temperature reaches 120°F (49°C).

This procedure refers to radiator-cooled models. City water cooled models are similar; however, procedures and capacities may vary. Observe the following safety precautions while installing the kit.



Accidental starting.
Can cause severe injury or death.

Disconnect battery cables before working on generator set (disconnect negative lead first and reconnect it last).

Disabling generator set. Accidental starting can cause severe injury or death. Turn generator set master switch and switchgear engine control switch to OFF position, disconnect power to battery charger, and remove battery cables (remove negative lead first and reconnect it last) to disable generator set before working on the generator set or connected equipment. The generator set can be started by automatic transfer switch or remote start/stop switch unless these precautions are followed.

WARNING	
 Hazardous voltage.	 Moving rotor.
Can cause severe injury or death. Operate generator set only with all guards and electrical enclosures in place.	

Engine block heater. Hazardous voltage can cause severe injury or death. Engine block heater can cause electrical shock. Remove engine block heater plug from electrical outlet before working on block heater electrical connections.

NOTE

Pay special attention to the coolant level. After draining the coolant, allow time for complete refill of the engine water jacket. Check coolant level as prescribed in the Prestart Checklist of the Operation Manual.

NOTE

Do not turn on block heater before filling cooling system. Run engine until warm and refill radiator to purge air from the system before energizing block heater. If heater element is not immersed in water block heater will fail.

⚠ WARNING



Hot coolant and steam. Can cause severe injury or death.

Before removing pressure cap, stop generator set and allow it to cool. Then loosen pressure cap to relieve pressure.

Checking coolant level. Hot coolant can cause severe injury or death. Allow engine to cool. Release pressure from cooling system before opening pressure cap. To release pressure, cover the pressure cap with a thick cloth; then slowly turn it counterclockwise to the first stop. Remove cap after pressure has been completely released and the engine has cooled. Check coolant level at tank if generator set is equipped with a coolant recovery tank.

Installation

1. Place generator set master switch in OFF position.
2. Disconnect generator set engine starting battery(ies), negative (–) lead first. Disconnect power to battery charger, if equipped.
3. With generator set sufficiently cooled, drain the coolant into a suitable container. Drain enough coolant to allow removal of pipe plug from lower radiator tube. See Figure 1 for cooling system capacities. Petcock drain valves are located on radiator bottom and/or engine bottom.

NOTE

Dispose of used engine coolant in an environmentally safe manner. Do not pour coolant on the ground, down sewers, or into streams or other bodies of water.

Model	Coolant Capacity U.S. Gal. (L)
1200	97 (367)
1250	97 (367)
1500	104 (394)
1600	104 (394)
2000	155 (587)

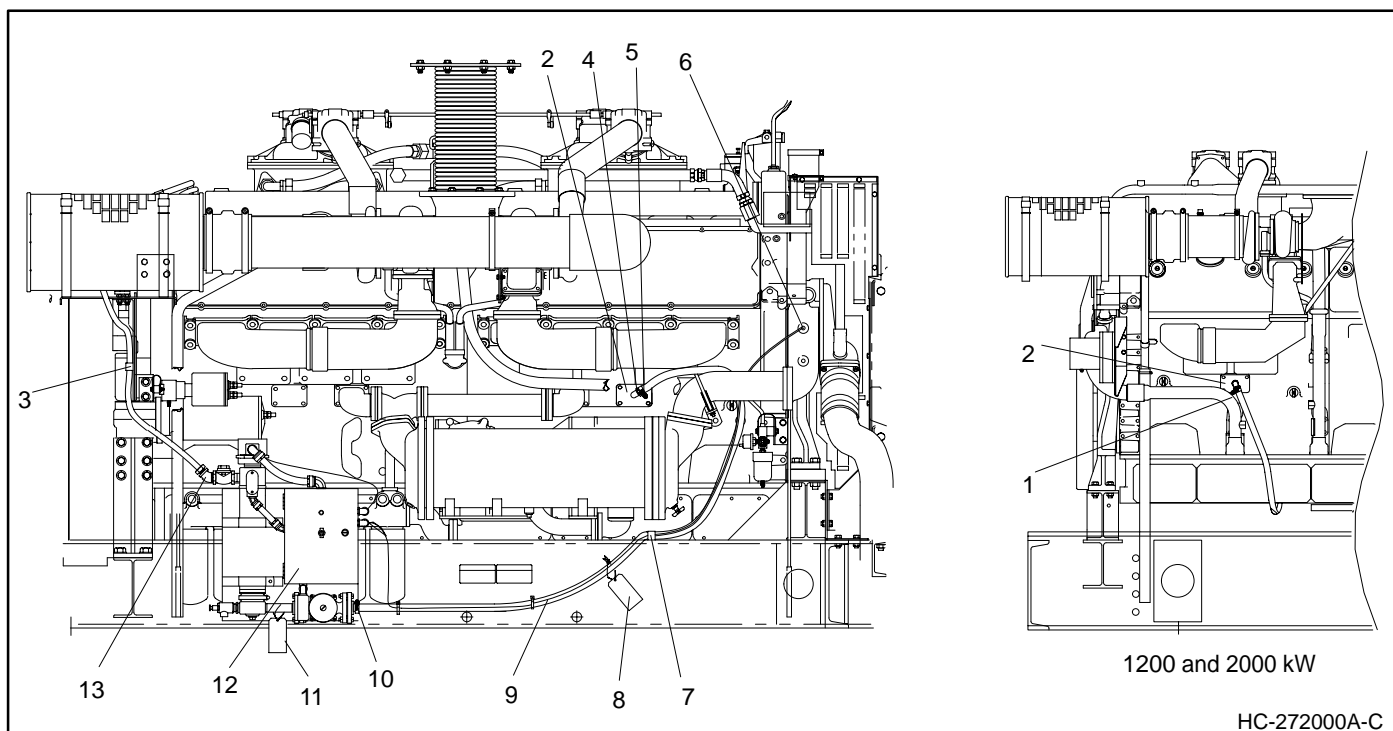
**Figure 1. Radiator System Coolant Capacities
(Including Engine Water Jacket)**

4. Remove water jacket cover plate. On 1200 and 2000 kW units the cover plate is on the left side of the engine. On 1500 and 1600 kW units the cover plate is on the right side of engine. See Figure 2.

NOTE

Save the four water jacket cover plate mounting screws. Screws will be reused.

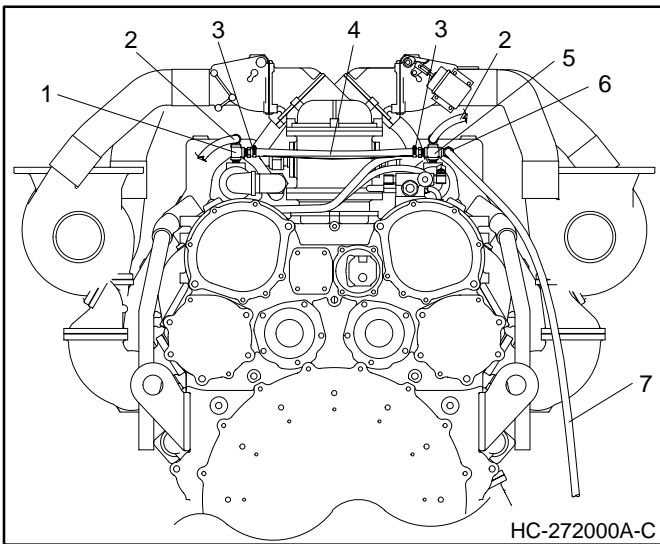
5. Clean the cover plate gasket surface completely. Place gasket (274882) and adapter plate (274881) in place of previously removed water jacket cover plate. Secure adapter plate and gasket with four screws removed in step 4.
6. Apply pipe sealant to threads of reducer bushing (X-202-18) and install into adapter plate.
7. Apply pipe sealant to threads of hose connector (X-582-8) and install into reducer bushing installed in step 6.
8. Attach one end of hose (X-691-33 for 1200 and 2000 kW units or X-691-34 for 1500 and 1600 kW units) to hose connector and secure with one hose clamp (X-426-12). Place hose clamp 0.25 in. (6 mm) from hose end and tighten. Route hose as shown in Figure 2.
9. Mount block heater (279933) to skid rail using existing holes at position indicated in Figure 2. Mount block heater with hex screws, plain washers, beveled washers, and whiz nuts. Position plain washers under bolt heads and beveled washers between whiz nuts and skid rail.
10. Apply pipe sealant to 45° elbow (X-274-10 or 151385) and install in block heater outlet. Position elbow as shown in Figure 2.
11. Apply pipe sealant to threads of hose connector (X-582-15) and install in elbow installed in step 10.
12. Attach loose end of hose installed in step 8 to hose connector. Secure hose to connector with one hose clamp (X-426-12). Place hose clamp 0.25 in. (6 mm) from hose end and tighten.



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| <p>1. Reducer bushing (X-202-18), hose clamp (X-426-12), and hose connector (X-582-8)</p> <p>2. Adapter plate (274881) and adapter plate gasket (274882)</p> <p>3. Insulating clamp (X-672-3)</p> <p>4. Pipe nipple (X-206-9) and pipe elbow (X-215-2)</p> <p>5. Hose connector (X-582-8) and hose clamp (X-426-12)</p> <p>6. Reducer bushing (153659) and thermostat assembly (279813 or 347742)</p> <p>7. Insulating clamp (X-672-3), beveled washer (X-6011-4), and 3/16-16 mounting hardware.</p> | <p>8. Hang tag (279047)</p> <p>9. Hose (X-691-33 or X-691-34)</p> <p>10. Hose connector (X-582-15) and hose clamp (X-426-12)</p> <p>11. Instruction tag (299896)</p> <p>12. Block heater (279933 or 347686)</p> <p>13. Hose connector (X-582-15), elbow (1500-2000 kW X-274-10 or 1200 kW 151385) and hose clamp (X-426-12)</p> |
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Figure 2. 1200-2000 kW Block Heater Installation

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| <p>13. Disconnect coolant hoses connected to elbows in the ends of the water manifolds. See Figure 3.</p> <p>14. Remove elbows from water manifolds. Save elbows for reinstallation.</p> <p>15. Apply pipe sealant to pipe nipples (X-204-9) and install in water manifolds where elbows were removed in step 14.</p> <p>16. Apply pipe sealant to black iron tee (X-203-15) and connect to pipe nipple on left side. See Figure 3.</p> <p>17. Apply pipe sealant to black iron cross and connect to pipe nipple on right side of engine. See Figure 3.</p> <p>18. Apply pipe sealant to hose connectors (X-582-11) and install in black iron tee and cross as shown in Figure 3.</p> | <p>19. Connect hose (X-691-25) between black iron tee and cross. Secure hose to connectors with one hose clamp (X-426-12) on each end. Place hose clamps 0.25 in. (6 mm) from hose end and tighten.</p> <p>20. Apply pipe sealant to threads of elbows removed in step 14 and reinstall in the top of the black iron tee and cross. See Figure 3.</p> <p>21. Reconnect coolant hoses disconnected in step 13 to elbows.</p> <p>22. Apply pipe sealant to 90° elbow (X-391-23) and install in black iron cross. See Figure 3.</p> <p>23. Connect hose (X-691-19) to elbow installed in step 22. Secure hose to elbow with one hose clamp (X-426-12). Place hose clamp 0.25 in. (6 mm) from hose end and tighten.</p> |
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1. Pipe nipple (X-204-9) and black iron tee (X-203-15)
2. Existing hose and elbow
3. Hose connector (X-582-11) and hose clamp (X-426-12)
4. Hose (X-691-25)
5. Pipe nipple (X-204-9) and pipe cross (X-207-5)
6. 90° elbow (X-391-23)
7. Hose (X-691-19) and hose clamp (X-426-12)

**Figure 3. Water Manifold Assembly
(End View of Engine)**

24. Connect hose installed in step 23 to block heater outlet. Secure hose to connector with one hose clamp (X-426-12). Place hose clamp 0.25 in. (6 mm) from hose end and tighten.
25. Remove pipe plug from opening in thermostat housing on right side of engine. See Figure 2.
26. Apply pipe sealant to threads of reducer bushing (153659) and install where pipe plug was removed in step 25.
27. Apply pipe sealant to threads of block heater thermostat (279813 or 347742) and install into reducer bushing installed in step 26.
28. Attach thermostat lead from circulating pump control box to block heater thermostat. Secure thermostat lead to inlet hose with cable ties as necessary.
29. Route heater harness (279956) from circulating pump control box to generator set controller along engine harness. Use cable ties (X-468-1) to secure heater harness to engine harness.

NOTE

Verify that block heater ON/OFF toggle switch, located on front center of control box door is in OFF position before continuing installation.

30. Connect wiring inside of circulating pump control box for desired voltage. Connect control box to generator set controller. See Figure 5 for wiring connections and options.

31. Connect block heater to main power source.

NOTE

Have a certified electrician or qualified electrical technician make all electrical connections.

32. Close petcock valves on radiator and/or engine block.
33. Fill cooling system with fresh coolant. Use a solution of 50% ethylene glycol and 50% clean, softened water to inhibit rust/corrosion and to provide freezing protection.

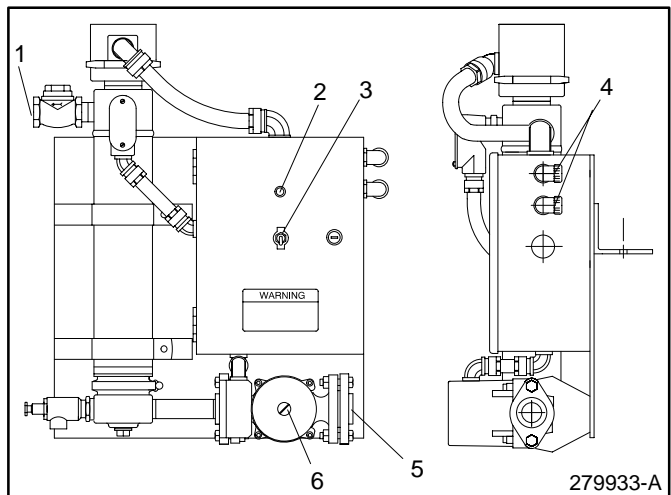
NOTE

Coolant mixtures exceeding 50% ethylene glycol may cause block heater element failure. Failure to bleed all air from the system may cause block heater element failure.

34. Check that the generator set master switch is in the OFF position. Check that the block heater ON/OFF switch is in the OFF position.
35. Reconnect generator set engine starting battery, negative (–) lead last. Reconnect power to battery charger, if equipped.
36. Bleed air from the circulating pump by removing the screw located on the front side. See Figure 4.

NOTE

DO NOT discard air bleed screw.



1. Block heater outlet
2. Power indicator light
3. On/off switch
4. Conduit connectors
5. Block heater inlet
6. Air bleed screw

Figure 4. Block Heater Assembly

37. Turn block heater ON/OFF toggle switch to ON position. Look into air bleed screw hole and verify pump is rotating.

NOTE

If pump fails to rotate, check that pump toggle switch is in the ON position and/or that pump is correctly wired to main power source.

38. Allow pump to run for a few seconds before placing toggle switch back in the OFF position. Replace air bleed screw removed in step 37.
39. Test run generator set for a few minutes to check for leaks and to ensure that all air is purged from the system. Failure to purge air from the system may cause block heater element failure.

NOTE

Pay special attention to the coolant level. After draining the coolant, allow time for complete refill of the engine water jacket. Check coolant level as prescribed in the Prestart Checklist of the Operation Manual.

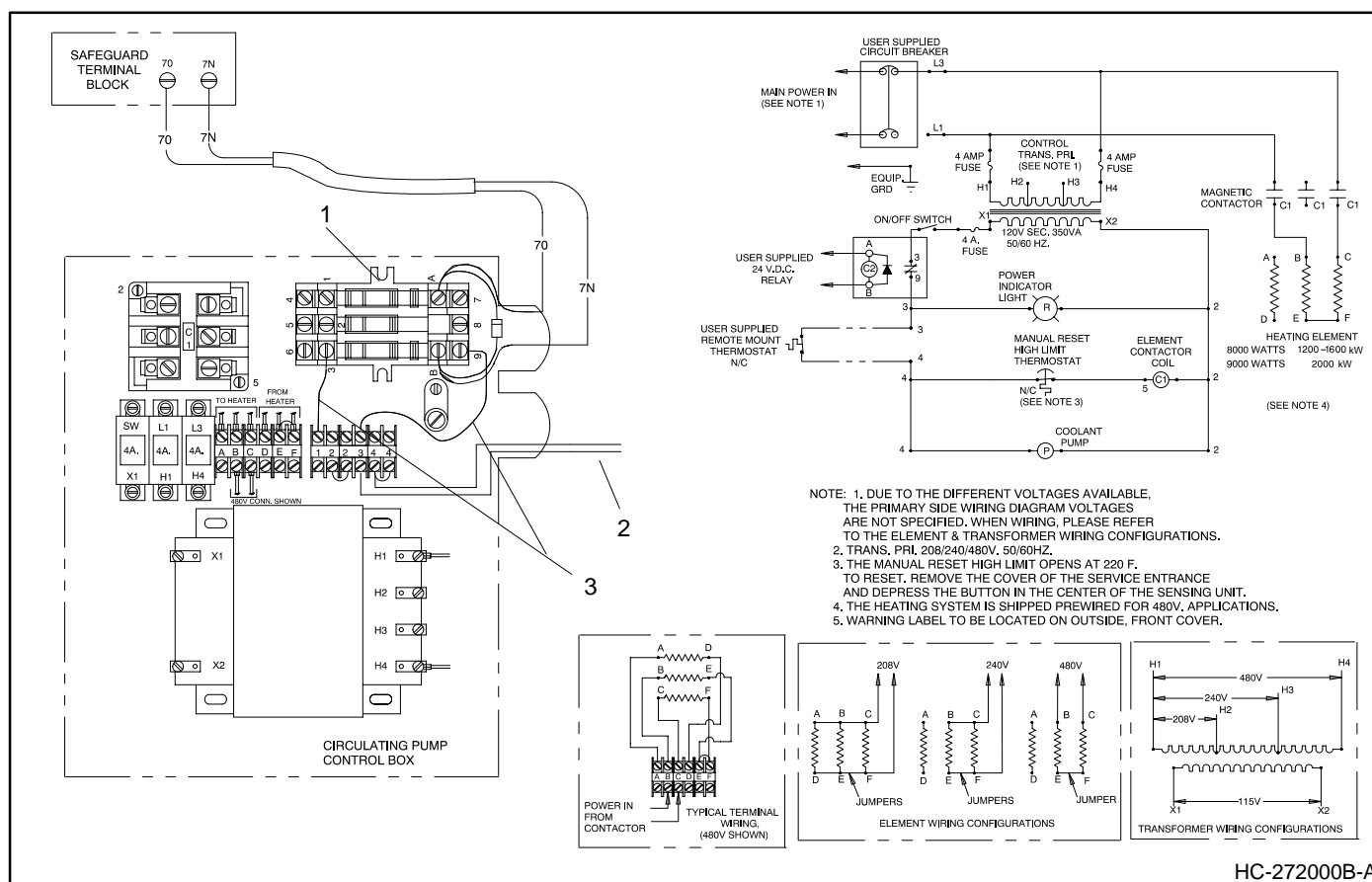
NOTE

Engine Damage! Failure to bleed air from cooling system may cause overheating and subsequent engine damage.

NOTE

Do not turn on block heater before filling cooling system. Run engine until warm and refill radiator to purge air from the system before energizing block heater. If heater element is not immersed in water block heater will fail.

40. Stop generator set.



1. Mounting track (347278), relay (291309), socket (X-6124-4), and screws (X-794-2)

2. Thermostat leads
3. Loose control box leads to relay terminals 3 and 9

Figure 5. Circulating Pump Control Box and Wiring

Block Heater Kits

Parts List					
Kits: PA-328036, PA-328036-SD, PA-328037, PA-328037-SD			Unique Parts		
Qty.	Description	Common Parts	PA-328036 PA-328036-SD	PA-328037 PA-328037-SD	PA-347687 PA-347687-SD
3	Washer	X-25-37			
1	Bushing, reducer 3/4 x 1	X-202-18			
1	Tee, black iron 3/8 x 3/8 x 3/8	X-203-15			
2	Nipple, pipe 3/8 x 1	X-204-9			
1	Nipple, pipe		X-206-9	X-206-9	
1	Cross, pipe	X-207-5			
1	Elbow, pipe 3/4		X-215-2	X-215-2	
1	Elbow, 45° 1 N.P.T.			X-274-10	X-274-10
1	Elbow, 90° 3/8 N.P.T.	X-391-23			
6	Clamp, hose 1.25 max.	X-426-12			
9	Tie, cable	X-468-1			
1	Connector, hose 3/4 N.P.T.	X-582-8			
2	Connector, hose 3/8 N.P.T.	X-582-11			
2	Connector, hose 1 N.P.T.	X-582-15			
2	Clamp, insulating	X-672-3			
1	Hose, oil proof 5.42 ft.				X-691-19
1	Hose, oil proof 1.5 ft.	X-691-25			
1	Hose, oil proof 9.08 ft.		X-691-33		X-691-33
1	Hose, oil proof 6.50 ft.			X-691-34	
1	Hose, oil proof 5.00 ft.		X-691-35	X-691-35	
2	Screw, drill	X-794-2			
3	Washer, beveled	X-6011-4			
1	Socket	X-6124-4			
3	Nut, spiralock	X-6210-9			
1	Screw, 3/8-16 x 1.5	X-6238-5			
2	Screw, h.c.	X-6238-11			
1	Elbow, black iron 1 in.	151385			
1	Bushing, reducing 3/4 x 1/2	153659			
1	Adapter, plate	274881			
1	Gasket, adapter plate	274882			
1	Tag, hang	279047			
1	Thermostat, block heater		279813	279813	347742
1	Heater, block		279933	279933	347686
1	Harness, block heater	279956			
1	Relay, 10A 24 vdc	291309			
1	Tag, instruction	299896			
1	Track, mounting	347278			