
INSTALLATION INSTRUCTIONS

Original Issue Date: **1/99**

Model: **1250–2000 kW (Detroit Diesel Series 4000)**

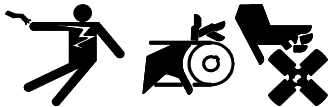
Market: **Industrial**

Subject: **Block Heater Kits PA-365311, PA-365311-SD, PA-365314–320, PA-365314-SD–320-SD**

The block heater kit heats the engine coolant, making starting easier and warm-up quicker.

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

⚠ WARNING



**Accidental starting.
Can cause severe injury or death.**

Disconnect the battery cables before working on the generator set. Remove the negative (–) lead first when disconnecting the battery. Reconnect the negative (–) lead last when reconnecting the battery.

Disabling the generator set. Accidental starting can cause severe injury or death. Before working on the generator set or equipment connected to the set, disable the generator set as follows: (1) Turn the generator set master switch and switchgear engine control switch to the OFF position. (2) Disconnect the power to the battery charger. (3) Remove the battery cables, negative (–) lead first. Reconnect the negative (–) lead last when reconnecting the battery. Follow these precautions to prevent the starting of the generator set by an automatic transfer switch or a remote start/stop switch.

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

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

NOTE

Pay special attention to the coolant level. After draining the coolant, when filling cooling system, 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. Block heater elements not immersed in water fail.

NOTE

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

⚠ WARNING

Hot coolant and steam. Can cause severe injury or death. Before removing the pressure cap, stop the generator set and allow it to cool. Then loosen the pressure cap to relieve pressure.

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

Installation

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

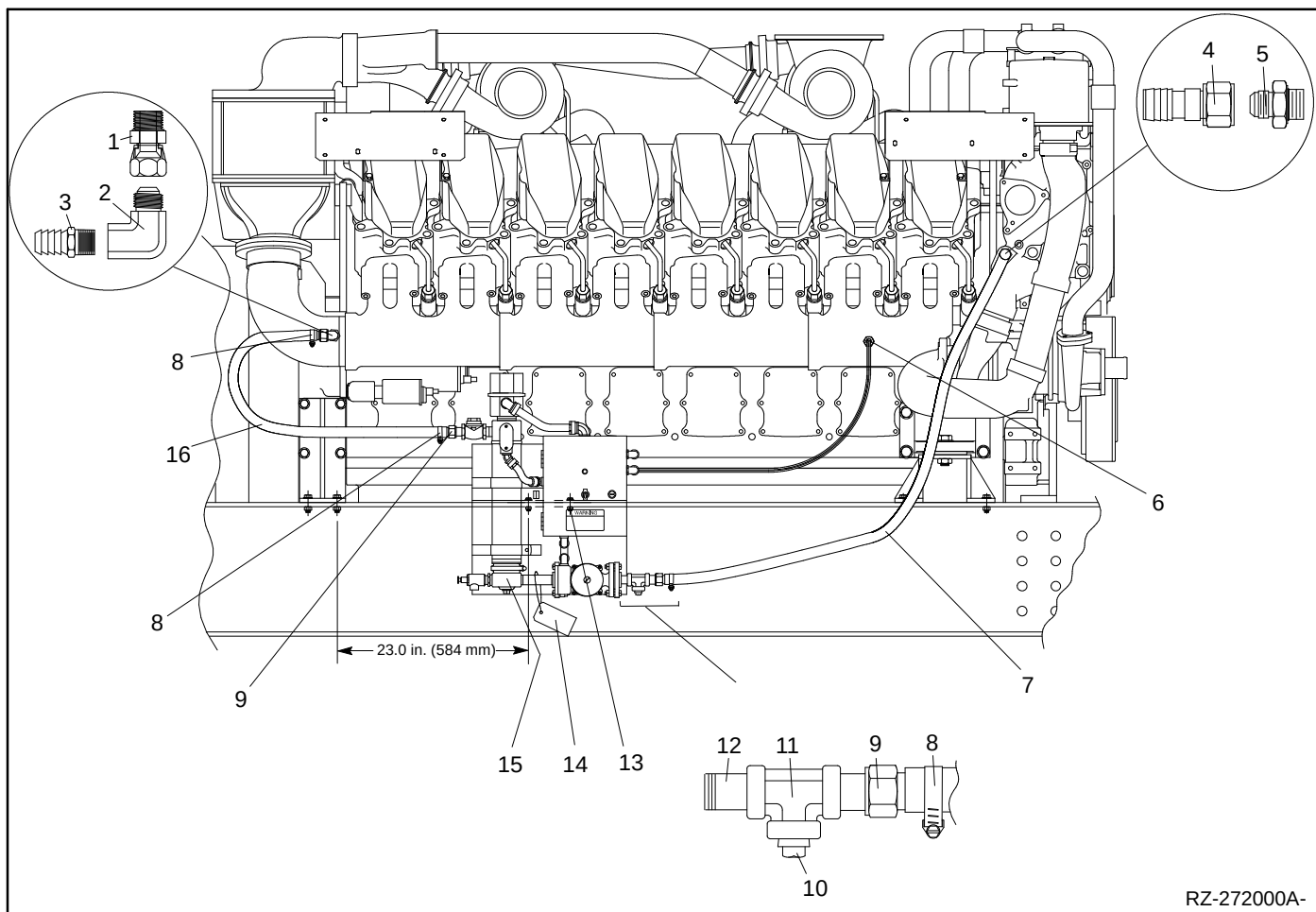
NOTE

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)
1250	447 (1692)
1500	455 (1722)
1750	492 (1862)
2000	565 (2138)

**Figure 1. Radiator System Coolant Capacities
(including the engine water jacket)**

5. Remove the plug from the right rear of the engine block for the installation of the block heater outlet hose connectors. See Figure 2.
6. Install the 3/4" flared swivel (361596) in the engine block where the plug was removed in step 5. See Figure 2.
7. Install the 90° elbow (361597). Secure the flared side of the elbow to the swivel installed in step 6. Position the elbow toward the rear of the generator set. See Figure 2.
8. Apply pipe sealant to the male threads of the 1/2 NPT hose connector (X-582-7) and install the hose connector in the elbow installed in step 7. See Figure 2.
9. Remove the plug from the front right of the engine block for the installation of the block heater inlet hose connectors. See Figure 2.
10. Install the half-union connector (X-296-17) where the plug was removed in step 9. See Figure 2.
11. Install the 3/4" swivel hose connector (X-6370-4) to the half-union connector installed in step 10. See Figure 2.
12. Mount the block heater assembly to the generator set skid using existing holes at the position shown in Figure 2. Secure the assembly with two M8-35 hex cap screws (M933-08030-60) and beveled washers (X-6011-4).
13. Apply pipe sealant to the male threads of the 1 NPT hose connector (X-582-15) and install the hose connector in the block heater outlet. See Figure 2.
14. Connect one end of the 2.9 ft. (0.9 m) hose (X-691-30) to the hose connector installed in step 8 (rear of engine). Secure the hose to the connector with one hose clamp (X-426-12). Place the hose clamp 0.25 in. (6 mm) from the hose end and tighten the clamp.
15. Route the loose end of the hose connected in step 14 to the block heater assembly as shown in Figure 2. Connect the hose to the block heater outlet hose connector. Secure the hose to the connector with one hose clamp (X-426-12). Place the hose clamp 0.25 in. (6 mm) from the hose end and tighten the clamp.
16. Apply pipe sealant to the male threads on one end of the 1.5 in. (38 mm) pipe (X-218-24) and install the pipe in the block heater inlet. See Figure 2.

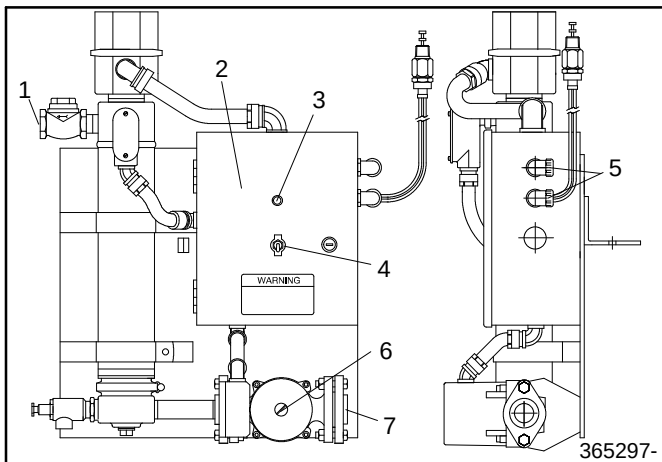


- | | |
|--|---|
| 1. 37° flared swivel (361596) | 9. Hose connector (X-582-15) |
| 2. 90° elbow (361597) | 10. Pipe plug (X-75-13) |
| 3. Hose connector (X-582-7) | 11. Pipe tee (X-203-2) |
| 4. 37° swivel hose connector (X-6370-4) | 12. Pipe (X-218-24) |
| 5. Half-union connector (X-296-17) | 13. Hex cap screws (M933-08030-60) and beveled washers (X-6011-4) |
| 6. Block heater thermostat installation location | 14. Instruction tags (279047 and 299896) |
| 7. Hose, 3.8 ft. (1.2 m) or 5.4 ft. (1.6 m) (X-691-15 or X-691-19) | 15. Block heater |
| 8. Hose clamp (X-426-12) | 16. Hose, 2.9 ft. (0.9 m) (X-691-30) |

Figure 2. Block Heater Installation

17. Apply pipe sealant to the exposed threads of the pipe installed in step 16 and install the 1 in. (25 mm) pipe tee (X-203-2). Position the pipe tee as shown in Figure 2.
18. Apply pipe sealant to the threads of the pipe plug (X-75-13) and install the pipe plug in the bottom of the pipe tee. See Figure 2.
19. Apply pipe sealant to the male threads of the 1 NPT hose connector (X-582-15) and install the hose connector in the pipe tee. See Figure 2.
20. Connect one end of either the 3.8 ft. (1.2 m) (X-691-15) or the 5.4 ft. (1.6 m) (X-691-19) hose to the block heater inlet hose connector installed in step 19. Secure the hose to the connector with one hose clamp (X-426-12). Place the hose clamp 0.25 in. (6 mm) from the hose end and tighten the clamp.
21. Route the loose end of the hose connected to the block heater inlet in step 20 to the hose connector on the front of the engine. See Figure 2. Connect the hose to the hose connector. Secure the hose to the connector with one hose clamp (X-426-12). Place the hose clamp 0.25 in. (6 mm) from the hose end and tighten the clamp.
22. Remove the plug from the engine for the block heater thermostat. See Figure 2 for the location.
23. Install the block heater thermostat where the plug was removed in step 22. See Figure 2.
24. Open the control box door. See Figure 3.
25. Install the relay mounting track (347278) in the control box with drill screws (X-794-2). See Figure 4 or Figure 5.

26. Secure the relay hardware (X-6124-4) and relay (291309) to the mounting track. See Figure 4 or Figure 5.
27. Attach the two loose leads in the control box from the thermostat terminal strip to the relay. See Figure 4 or Figure 5 for connections.
28. Route one end of the block heater wiring harness (279956) through the top conduit connector and secure leads 70 and 7N to the relay terminals A and B. See Figure 4 or Figure 5 for the connections.
29. Route the block heater wiring harness from the circulating pump control box to the junction box along the engine wiring harness. Use cable ties (X-468-1) to secure the block heater wiring harness to the engine wiring harness.
30. Secure the block heater wiring harness to the safeguard terminal block in the junction box. See Figure 4 or Figure 5.
31. Verify that the block heater ON/OFF toggle switch, located on the front center of the control box door is in the OFF position before continuing the installation.



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

Figure 3. Block Heater Assembly

32. Connect the wiring inside of the circulating pump control box for the desired voltage. Connect the control box to the generator set controller. See Figure 4 or Figure 5 for wiring connections and options.
33. Connect the block heater to the main power source.

NOTE

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

34. Close the petcock valves on the radiator and/or engine block.
35. Fill the cooling system with fresh coolant. See the Engine Operation or Service manual for correct coolant and mixture.

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.

36. Check that the generator set master switch is in the OFF position.
37. Check that the block heater ON/OFF switch is in the OFF position.
38. Reconnect the generator set engine starting battery(ies), negative (–) lead last.
39. Reconnect the power to the battery charger, if equipped.
40. Bleed air from the circulating pump by removing the screw located on the front side. See Figure 3.

NOTE

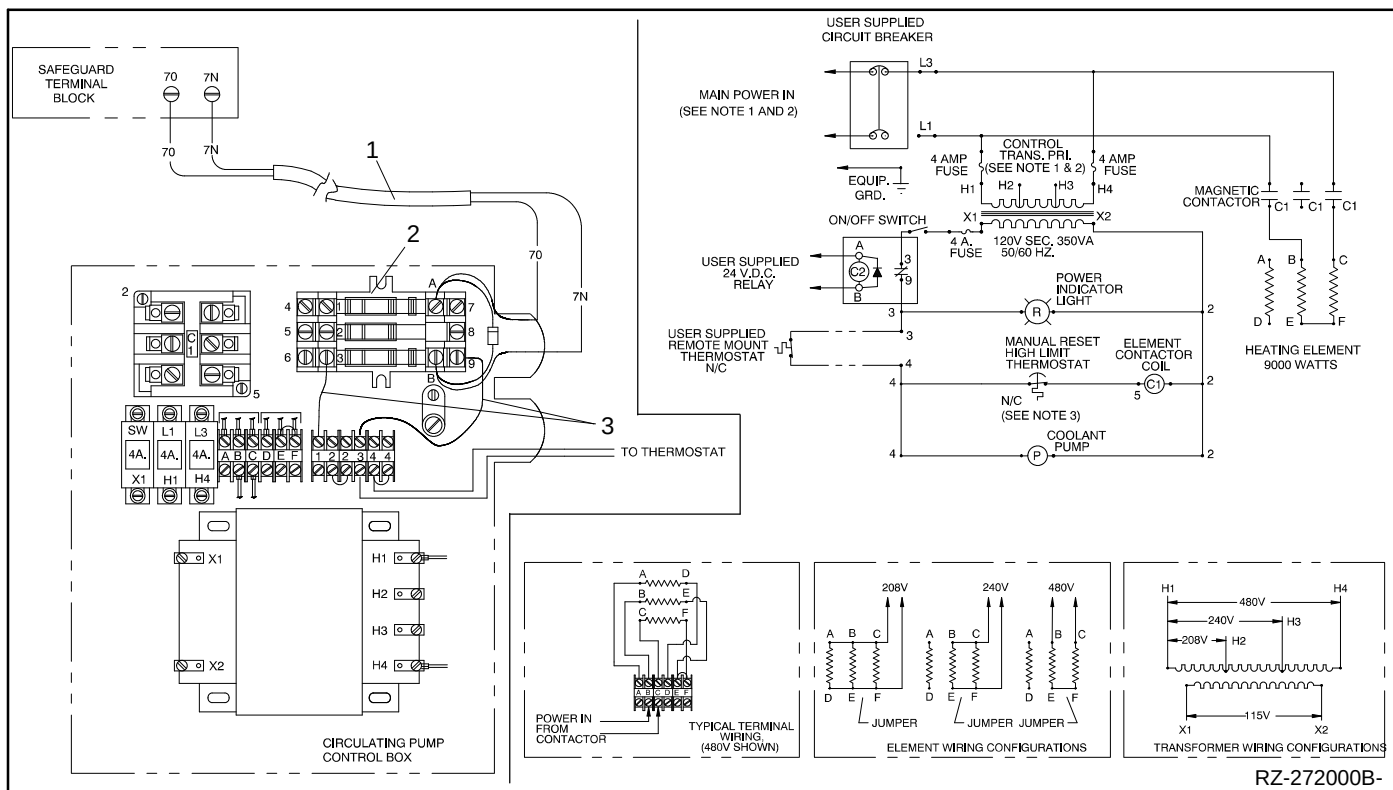
DO NOT discard the air bleed screw.

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

NOTE

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

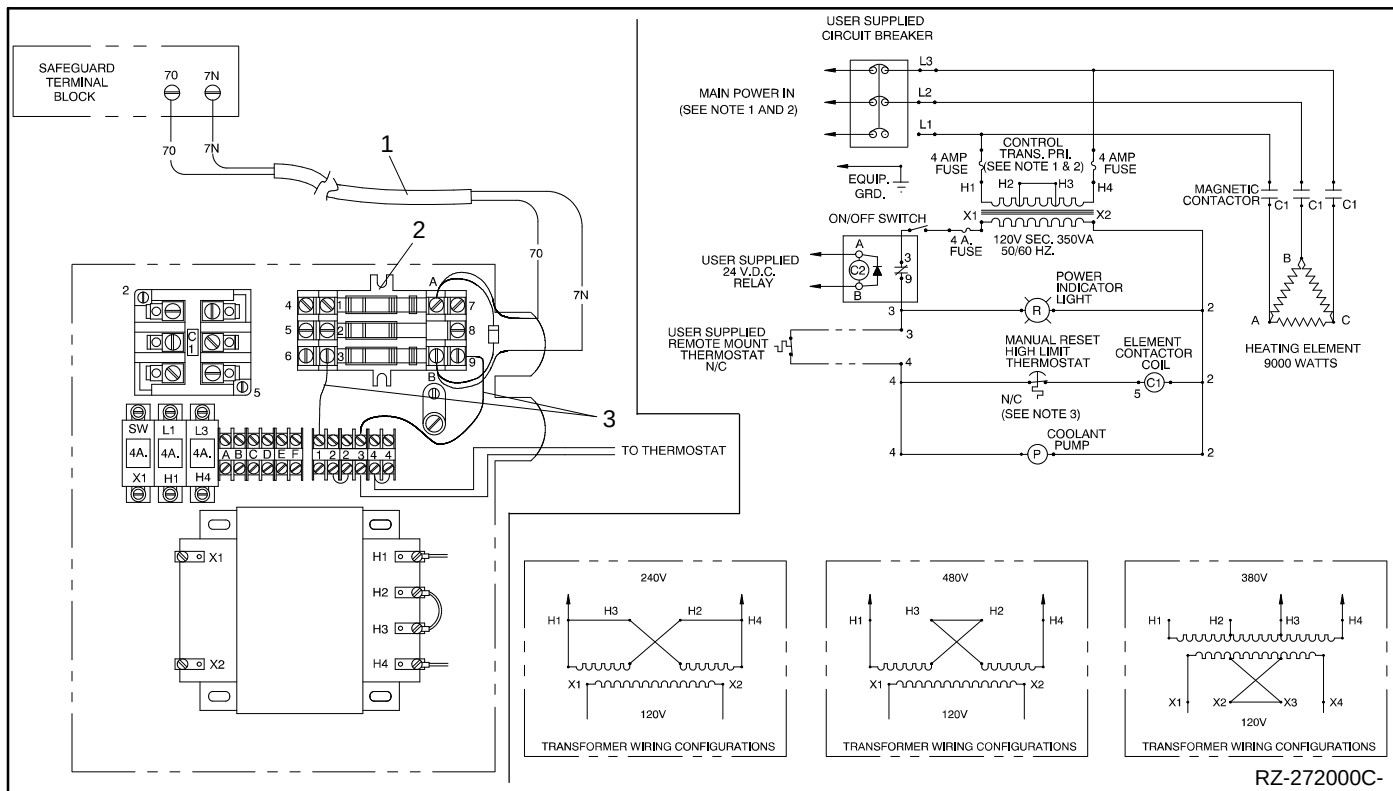
42. Allow the pump to run for a few seconds before placing the toggle switch back in the OFF position. Replace the air bleed screw removed in step 41.
43. See the Engine Operation or Service manual for the procedure on bleeding the air from the cooling system.
44. Test run the generator set for a few minutes to check for leaks and to ensure that all the air is purged from the system. Failure to purge the air from the system may cause block heater element failure.
45. Stop the generator set.



1. Block heater wiring harness (279956)
2. Mounting track (347278), relay (291309), relay hardware (X-6124-4), and drill screws (X-794-2)

3. Thermostat terminal strip leads

Figure 4. Circulating Pump Control Box and Wiring— Single Phase



1. Block heater wiring harness (279956)
2. Mounting track (347278), relay (291309), relay hardware (X-6124-4), and drill screws (X-794-2)

3. Thermostat terminal strip leads

Figure 5. Circulating Pump Control Box and Wiring— Three Phase

Block Heater Kits

Parts List						
Kits: PA-365311, PA-365311-SD, PA-365314, PA-365314-SD, PA-365315, PA-365315-SD, PA-365316, PA-365316-SD			Unique Parts			
Qty.	Description	Common Parts	PA-365311 PA-365311-SD	PA-365314 PA-365314-SD	PA-365315 PA-365315-SD	PA-365316 PA-365316-SD
2	Screw, hex cap, M8-35	M933-8030-60				
1	Plug, pipe	X-75-13				
1	Tee, pipe, 1 x 1 x 1	X-203-2				
1	Pipe, 1 x 1-1/2	X-218-24				
1	Connector, union	X-296-17				
4	Clamp, hose, 1.25 max.	X-426-12				
6	Tie, cable	X-468-1				
1	Connector, hose, 1/2 NPT	X-582-7				
2	Connector, hose, 1 NPT	X-582-15				
1	Hose, 5.4 ft. (1.6 m)	X-691-19				
1	Hose, 2.9 ft. (0.9 m)	X-691-30				
2	Screw, drill	X-794-2				
2	Washer, beveled	X-6011-4				
1	Hardware, relay	X-6124-4				
1	Connector, hose	X-6370-4				
1	Tag, hang	279047				
1	Harness, block heater	279956				
1	Relay, 10 A, 24 VDC	291309				
1	Tag, instruction	299896				
1	Track, mounting	347278				
1	Fitting, 37 _swivel	361596				
1	Fitting, 90 _elbow	361597				
1	Heater, block		365297	365298	365299	365300

Block Heater Kits

Parts List						
Kits: PA-365317, PA-365317-SD, PA-365318, PA-365318-SD, PA-365319, PA-365319-SD, PA-365320, PA-365320-SD			Unique Parts			
Qty.	Description	Common Parts	PA-365317 PA-365317-SD	PA-365318 PA-365318-SD	PA-365319 PA-365319-SD	PA-365320 PA-365320-SD
2	Screw, hex cap M8-35	M933-8030-60				
1	Plug, pipe	X-75-13				
1	Tee, pipe, 1 x 1 x 1	X-203-2				
1	Pipe, 1 x 1-1/2	X-218-24				
1	Connector, union	X-296-17				
4	Clamp, hose, 1.25 max.	X-426-12				
6	Tie, cable	X-468-1				
1	Connector, hose, 1/2 NPT	X-582-7				
2	Connector, hose, 1 NPT	X-582-15				
1	Hose, 3.8 ft. (1.2 m)	X-691-15				
1	Hose, 2.9 ft. (0.9 m)	X-691-30				
2	Screw, drill	X-794-2				
2	Washer, beveled	X-6011-4				
1	Hardware, relay	X-6124-4				
1	Connector, hose	X-6370-4				
1	Tag, hang	279047				
1	Harness, block heater	279956				
1	Relay, 10 A, 24 VDC	291309				
1	Tag, instruction	299896				
1	Track, mounting	347278				
1	Fitting, 37 _swivel	361596				
1	Fitting, 90 _elbow	361597				
1	Heater, block		365297	365298	365299	365300