INSTALLATION INSTRUCTIONS

Original Issue Date: **7/95**
Model: **20-180 kW (Perkins-Powered)**
Market: **Industrial**
Subject: **Double-Wall Subbase Fuel Tanks/Day Tanks Standard and Sound Shield Enclosure-Ready**

Double-wall subbase fuel tanks provide fuel storage immediately beneath the generator set where the engine fuel transfer pump easily draws fuel for starting and running. The subbase fuel tank also provides a convenient location to connect fuel injector return lines.

There are two types of double-wall subbase fuel tanks: secondary containment and closed-top diked. Each type is available as standard or sound-enclosure ready. See Figure 1 for available fuel tanks. Double-wall fuel tanks are UL listed and have all vent fittings necessary to meet NFPA requirements.

NOTE

Order the subbase fuel tank with sound shield mounting capability if installing a sound shield.

	Standard Fuel Tanks	Sound Shield Ready Fuel Tanks
Secondary Containment Fuel Tanks	X	X
Closed-Top Diked Fuel Tanks	X	X

Figure 1. Available Double-Wall Subbase Fuel Tanks

Secondary Containment Double-Wall Subbase Fuel Tank

Diesel generator sets use an above-ground rectangular secondary containment fuel tank as a subbase fuel tank. The purpose of the outer tank is to contain liquids if a leak or rupture of the inner tank occurs. The inner tank is sealed inside the outer tank except for the necessary vents. The UL-listed secondary containment fuel tank has emergency relief vent fittings on the inner and outer tanks. The secondary containment subbase fuel tank allows for direct mounting of the generator set.

Closed-Top Diked Double-Wall Subbase Fuel Tank

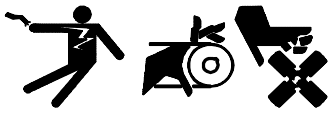
The purpose of an integral steel dike is to contain fuel from an inner tank leak or rupture. The protected top of the diked tank prevents precipitation, debris, and/or other elements from entering the diked area. The top incorporates a vent negating the need for emergency venting of the secondary containment tank (outer tank). The design of the UL listed, closed-top diked subbase fuel tank allows for direct mounting of the generator set.

Double-Wall Subbase Fuel Tank with Day Tank Option

For double-wall subbase day tank use, add float switch and transfer pump. Transfer pump specifications:

- Capable of lifting fuel a maximum of 17 ft. (5.2 m)
- 120-volt AC single phase
- Pump 2 gpm (7.57 L/min)
- Motor-driven, 1/3 HP

⚠ WARNING



Accidental starting.
Can cause severe injury or death.

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

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

⚠ WARNING

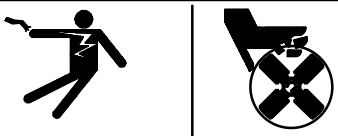
Explosive fuel vapors.
Can cause severe injury or death.

Use extreme care when handling, storing, and using fuels.

Fuel system. Explosive fuel vapors can cause severe injury or death. All fuels are highly explosive in a vapor state. Use extreme care when handling and storing fuels. Store fuel in a well-ventilated area away from spark-producing equipment and out of the reach of children. Never add fuel to the tank while the engine is running because spilled fuel may ignite on contact with hot parts or from spark. Do not smoke or permit flame or spark to occur near sources of spilled fuel or fuel vapors. Keep fuel lines and connections tight and in good condition. Do not replace flexible fuel lines with rigid lines. Use flexible sections to avoid breakage caused by vibration. Do not operate generator set in the presence of fuel leaks, fuel accumulation, or sparks. Repair systems before resuming generator set operation.

Fuel tanks. Explosive fuel vapors can cause severe injury or death. Gasoline and other volatile fuels stored in day tanks or subbase fuel tanks can cause an explosion. Store only diesel fuel in tanks.

⚠ WARNING



Hazardous voltage. Moving rotor.

Can cause severe injury or death.

Operate generator set only with all guards and electrical enclosures in place.

Grounding generator set. Hazardous voltage can cause severe injury or death. Electrocution is possible whenever electricity is present. Open main circuit breakers of all power sources before servicing equipment. Configure the installation to electrically ground the generator set and electrical circuits when in use. Never contact electrical leads or appliances when standing in water or on wet ground, as the chance of electrocution increases under such conditions.

Servicing day tank. Hazardous voltage can cause severe injury or death. Service day tank Electrical Control Module (ECM) as prescribed in equipment manual. Disconnect power to day tank before servicing. Press the day tank ECM OFF pushbutton to disconnect power. Be aware that line voltage is still present within the ECM when the POWER ON light is lit. Be sure that generator set and day tank are electrically grounded. Do not operate day tank when standing in water or on wet ground as the chance of electrocution increases under such conditions.

⚠ WARNING

Unbalanced weight.
Improper lift can cause severe injury or death and/or equipment damage.

Do not use lifting eyes.
Lift generator set using lifting bars inserted through skid lifting holes.

⚠ WARNING

Hot engine and exhaust system.
Can cause severe injury or death.

Do not work on generator set until it is allowed to cool.

Servicing exhaust system. Hot parts can cause severe injury or death. Do not touch hot engine parts. An engine becomes hot while running and exhaust system components become extremely hot.

Fuel Tank Kit/Part Numbers

20-180 kW Perkins-Powered Models
Standard Double-Wall Subbase Fuel Tanks

	Closed-Top Diked Fuel Tanks				Secondary Containment Fuel Tanks			
Fuel Tank Capacity Gallons (L)	**Std. Fuel Tank Kit No.**	**Fuel Tank Part No. (included in kit)**	**Std. Fuel Tank w/Day Tank Option Kit No.**	**Fuel Tank Part No. (included in kit)**	**Std. Fuel Tank Kit No.**	**Fuel Tank Part No. (included in kit)**	**Std. Fuel Tank w/Day Tank Option Kit No.**	**Fuel Tank Part No. (included in kit)**
20 kW								
20 (76)	224948 224948-SD	224900 224900	224951 224951-SD	224903 224903	224952 224952-SD	224904 224904	224955 224955-SD	224907 224907
40 (151)	224949 224949-SD	224901 224901			224953 224953-SD	224905 224905		
60 (227)	224950 224950-SD	224902 224902			224954 224954-SD	224906 224906		
116 (439)	228918 228918-SD	228750 228750			228919 228919-SD	228751 228751		
144 (545)	228920 228920-SD	228752 228752			228921 228921-SD	228753 228753		
173 (655)	228922 228922-SD	228754 228754			228923 228923-SD	228755 228755		
30-60 kW								
45 (170)	224956 224956-SD	224908 224908	224959 224959-SD	224911 224911	224960 224960-SD	224912 224912	224963 224963-SD	224915 224915
85 (322)	224957 224957-SD	224909 224909			224961 224961-SD	224913 224913		
130 (492)	224958 224958-SD	224910 224910			224962 224962-SD	224914 224914		
255 (965)	228924 228924-SD	228756 228756			228925 228925-SD	228757 228757		
318 (1204)	228926 228926-SD	228758 228758			228927 228927-SD	228759 228759		
382 (1446)	228928 228928-SD	228760 228760			228929 228929-SD	228761 228761		
80-100 kW								
65 (246)	224964 224964-SD	224916 224916	224967 224967-SD	224919 224919	224968 224968-SD	224920 224920	224971 224971-SD	224923 224923
130 (492)	224965 224965-SD	224917 224917			224969 224969-SD	224921 224921		
200 (757)	224966 224966-SD	224918 224918			224970 224970-SD	224922 224922		
384 (1453)	228930 228930-SD	228762 228762			228931 228931-SD	228763 228763		
480 (1817)	228932 228932-SD	228764 228764			228933 228933-SD	228765 228765		
576 (2180)	228934 228934-SD	228766 228766			228935 228935-SD	228767 228767		

Fuel Tank Kit/Part Numbers (continued)

20-180 kW Perkins-Powered Models
Standard Double-Wall Subbase Fuel Tanks

	Closed-Top Diked Fuel Tanks				Secondary Containment Fuel Tanks			
Fuel Tank Capacity Gallons (L)	**Std. Fuel Tank Kit No.**	**Fuel Tank Part No. (included in kit)**	**Std. Fuel Tank w/Day Tank Option Kit No.**	**Fuel Tank Part No. (included in kit)**	**Std. Fuel Tank Kit No.**	**Fuel Tank Part No. (included in kit)**	**Std. Fuel Tank w/Day Tank Option Kit No.**	**Fuel Tank Part No. (included in kit)**
125 kW								
100 (378)	224972 224972-SD	224924 224924	224975 224975-SD	224927 224927	224976 224976-SD	224928 224928	224979 224979-SD	224931 224931
180 (681)	224973 224973-SD	224925 224925			224977 224977-SD	224929 224929		
275 (1041)	224974 224974-SD	224926 224926			224978 224978-SD	224930 224930		
480 (1817)	228936 228936-SD	228768 228768			228937 228937-SD	228769 228769		
600 (2271)	228938 228938-SD	228770 228770			228939 228939-SD	228771 228771		
720 (2725)	228940 228940-SD	228772 228772			228941 228941-SD	228773 228773		
150 IMS* - 180 kW								
125 (473)	224988 224988-SD	224940 224940	224991 224991-SD	224943 224943	224992 224992-SD	224944 224944	224995 224995-SD	224947 224947
250 (946)	224989 224989-SD	224941 224941			224993 224993-SD	224945 224945		
375 (1375)	224990 224990-SD	224942 224942			224994 224994-SD	224946 224946		
696 (2634)	228942 228942-SD	228774 228774			228943 228943-SD	228775 228775		
870 (3293)	228944 228944-SD	228776 228776			228945 228945-SD	228777 228777		
1044 (3951)	228946 228946-SD	228778 228778			228947 228947-SD	228779 228779		

* Improved motor starting (optional alternator)

Fuel Tank Kit/Part Numbers (continued)

20-180 kW Perkins-Powered Models
Sound Shield Enclosure-Ready Double-Wall Subbase Fuel Tanks

	Secondary Containment Fuel Tanks				Closed-Top Diked Fuel Tanks			
Fuel Tank Capacity Gallons (L)	**Std. Fuel Tank Kit No.**	**Fuel Tank Part No. (included in kit)**	**Std. Fuel Tank w/Day Tank Option Kit No.**	**Fuel Tank Part No. (included in kit)**	**Std. Fuel Tank Kit No.**	**Fuel Tank Part No. (included in kit)**	**Std. Fuel Tank w/Day Tank Option Kit No.**	**Fuel Tank Part No. (included in kit)**
20 kW								
20 (76)	327258 327258-SD	327282 327282	327276 327276-SD	327300 327300	327210 327210-SD	327234 327234	327228 327228-SD	327252 327252
40 (151)	327259 327259-SD	327283 327283			327211 327211-SD	327235 327235		
60 (227)	327260 327260-SD	327284 327284			327212 327212-SD	327236 327236		
30-60 kW								
40 (170)	224581 224581-SD	224580 224580	224583 224583-SD	224582 224582	224438 224438-SD	224437 224437	224440 224440-SD	224439 224439
75 (284)	224585 224585-SD	224584 224584			224442 224442-SD	224441 224441		
120 (454)	224587 224587-SD	224586 224586			224444 224444-SD	224443 224443		
80-100 kW								
65 (246)	327264 327264-SD	327288 327288	327278 327278-SD	327302 327302	327216 327216-SD	327240 327240	327230 327230-SD	327254 327254
130 (492)	327265 327265-SD	327289 327289			327217 327217-SD	327241 327241		
180 (681)	224617 224617-SD	224599 224599			224458 224458-SD	224457 224457		
125 kW								
100 (378)	224596 224596-SD	224595 224595	224598 224598-SD	224597 224597	224454 224454-SD	224453 224453	224456 224456-SD	224455 224455
180 (681)	224617 224617-SD	224599 224599			224458 224458-SD	224457 224457		
275 (1041)	224619 224619-SD	224618 224618			224460 224460-SD	224459 224459		
150 kW								
100 (378)	224621 224621-SD	224620 224620	224623 224623-SD	224622 224622	224462 224462-SD	224461 224461	224464 224464-SD	224463 224463
200 (757)	224625 224625-SD	224624 224624			224466 224466-SD	224465 224465		
300 (1135)	224627 224627-SD	224626 224626			224468 224468-SD	224467 224467		
150 IMS*-180 kW								
125 (473)	327273 327273-SD	327297 327297	327281 327281-SD	327305 327305	327225 327225-SD	327249 327249	327233 327233-SD	327257 327257
250 (946)	327274 327274-SD	327298 327298			327226 327226-SD	327250 327250		
375 (1419)	327275 327275-SD	327299 327299			327227 327227-SD	327251 327251		

* Improved Motor Starting (optional alternator)

Specifications

20-180 kW Perkins-Powered Models
Standard Double-Wall Subbase Fuel Tanks

	Closed-Top Diked (CTD) and Secondary Containment (SC) Fuel Tank Specifications					
Fuel Tank Capacity Gallons (L)	**Emergency Relief Vent Size in. (mm)**	**Fuel Tank Length in. (mm)**	**Fuel Tank Width in. (mm)**	**Fuel Tank Height in. (mm)**	**CTD Approx. Empty Fuel Tank Weight lbs. (kg)**	**SC Approx. Empty Fuel Tank Weight lbs. (kg)**
20 kW						
20 (76)	2 (50.8)	75.0 (1905.0)	29.0 (736.6)	12 .5 (318.0)	457 (207)	454 (206)
40 (151)	2 (50.8)	75.0 (1905.0)	29.0 (736.6)	18 .0 (457.0)	598 (271)	589 (267)
60 (227)	2 (50.8)	75.0 (1905.0)	29.0 (736.6)	24 .0 (610.0)	734 (333)	724 (328)
116 (439)	3 (76.2)	82.0 (2082.8)	29.0 (736.6)	30 .0 (762.0)	928 (421)	905 (410)
144 (545)	3 (76.2)	93.0 (2362.2)	29.0 (736.6)	30 .0 (762.0)	1033 (469)	1000 (454)
173 (655)	3 (76.2)	104.0 (2641.6)	29.0 (736.6)	30 .0 (762.0)	1138 (516)	1095 (497)
30-60 kW						
45 (170)	2 (50.8)	82.0 (2082.8)	29.0 (736.6)	12.5 (318.0)	564 (256)	538 (244)
85 (322)	2 (50.8)	82.0 (2082.8)	29.0 (736.6)	24 .0 (610.0)	781 (354)	761 (345)
130 (492)	2 (50.8)	82.0 (2082.8)	29.0 (736.6)	30 .0 (762.0)	962 (436)	934 (424)
255 (965)	4 (101.6)	113.0 (2870.2)	29.0 (736.6)	36 .0 (914.4)	1428 (648)	1373 (623)
318 (1204)	4 (101.6)	102.0 (2590.8)	43.0 (1092.2)	32 .0 (812.8)	1553 (704)	1467 (665)
382 (1446)	4 (101.6)	102.0 (2590.8)	49.0 (1244.6)	32 .0 (812.8)	1685 (764)	1582 (718)
80-100 kW						
65 (246)	2 (50.8)	96.0 (2438.4)	34.0 (863.6)	12.5 (318.0)	693 (314)	649 (294)
130 (492)	3 (76.2)	96.0 (2438.4)	34.0 (863.6)	24 .0 (610.0)	962 (436)	922 (418)
200 (757)	3 (76.2)	96.0 (2438.4)	34.0 (863.6)	30 .0 (762.0)	1185 (538)	1133 (514)
384 (1453)	4 (101.6)	135.0 (3429.0)	34.0 (863.6)	36.0 (914.4)	1775 (805)	1684 (764)
480 (1817)	4 (101.6)	116.0 (2946.4)	54.0 (1371.6)	32.0 (812.8)	1943 (881)	1809 (821)
576 (2180)	4 (101.6)	116.0 (2946.4)	63.0 (1600.2)	32.0 (812.8)	2154 (977)	1992 (904)
125 kW						
100 (378)	2 (50.8)	104.5 (2654.3)	34.0 (863.6)	18 .0 (457.0)	889 (403)	845 (383)
180 (681)	3 (76.2)	104.5 (2654.3)	34.0 (863.6)	24 .0 (610.0)	1112 (504)	1050 (476)
275 (1041)	4 (101.6)	104.5 (2654.3)	34.0 (863.6)	36 .0 (914.0)	1437 (652)	1377 (625)
480 (1817)	4 (101.6)	159.0 (4038.6)	34.0 (863.6)	36 .0 (914.0)	2055 (932)	1937 (879)
600 (2271)	4 (101.6)	125.0 (3175.0)	59.0 (1498.6)	32 .0 (812.8)	2201 (998)	2031 (921)
720 (2725)	5 (127.0)	125.0 (3175.0)	69.0 (1752.6)	32 .0 (812.8)	2451 (1112)	2246(1019)
150/180 kW						
125 (473)	3 (76.2)	113.0 (2870.2)	45.0 (1143.0)	12 .5 (318.0)	1019 (462)	920 (417)
250 (946)	3 (76.2)	113.0 (2870.2)	45.0 (1143.0)	24 .0 (610.0)	1347 (611)	1255 (569)
375 (1419)	4 (101.6)	113.0 (2870.2)	45.0 (1143.0)	36 .0 (914.0)	1725 (782)	1634 (741)
696 (2634)	5 (127.0)	166.0 (4216.4)	45.0 (1143.0)	36 .0 (914.0)	2461 (1116)	2285(1036)
870 (3923)	5 (127.0)	133.0 (3378.2)	77.0 (1955.8)	33 .0 (838.2)	2795(1268)	2705(1227)
1044 (3951)	5 (127.0)	140.0 (3556.0)	77.0 (1955.8)	36 .0 (914.4)	3055(1386)	3076(1395)

Specifications (continued)

20-180 kW Perkins-Powered Models
Sound Enclosure Ready Double-Wall Subbase Fuel Tanks

	Closed-Top Diked (CTD) and Secondary Containment (SC) Fuel Tank Specifications					
Fuel Tank Capacity Gallons (L)	**Emergency Relief Vent Size in. (mm)**	**Fuel Tank Length in. (mm)**	**Fuel Tank Width in. (mm)**	**Fuel Tank Height in. (mm)**	**CTD Approx. Empty Fuel Tank Weight lbs. (kg)**	**SC Approx. Empty Fuel Tank Weight lbs. (kg)**
20 kW						
20 (76)	2 (50.8)	113.0 (2870.2)	29.0 (736.6)	12.5 (318.0)	702 (318)	698 (317)
40 (151)	2 (50.8)	113.0 (2870.2)	29.0 (736.6)	12.5 (318.0)	778 (353)	752 (341)
60 (227)	2 (50.8)	113.0 (2870.2)	29.0 (736.6)	12.5 (318.0)	881 (400)	833 (378)
30-60 kW						
40 (170)	2 (50.8)	113.0 (2870.2)	29.0 (736.6)	12.5 (318.0)	776 (352)	730 (331)
75 (284)	2 (50.8)	113.0 (2870.2)	29.0 (736.6)	12.5 (318.0)	893 (405)	838 (380)
120 (454)	2 (50.8)	113.0 (2870.2)	29.0 (736.6)	18.0 (457.0)	1076 (488)	1019 (462)
80-100 kW						
65 (246)	2 (50.8)	149.0 (3784.6)	34.0 (863.6)	12.5 (318.0)	1188 (539)	1109 (503)
130 (492)	3 (76.2)	149.0 (3784.6)	34.0 (863.6)	18.0 (457.0)	1461 (663)	1368 (621)
180 ()	3 (76.2)	149.0 (3784.6)	34.0 (863.6)	24.0 (610.0)	1720 (554)	1615 (733)
125 kW						
100 (378)	2 (50.8)	149.0 (3784.6)	34.0 (863.6)	12.5 (318.0)	1188 (539)	1109 (503)
180 (681)	3 (76.2)	149.0 (3784.6)	34.0 (863.6)	18.0 (457.0)	1461 (663)	1368 (621)
275 (1041)	4 (101.6)	149.0 (3784.6)	34.0 (863.6)	24.0 (610.0)	1720 (780)	1615 (733)
150 kW						
100 (378)	3 (76.2)	149.0 (3784.6)	45.0 (1143.0)	12.5 (318.0)	1193 (541)	1116 (506)
200 (757)	3 (76.2)	149.0 (3784.6)	45.0 (1143.0)	18.0 (457.0)	1507 (684)	1405 (637)
300 (1135)	3 (76.2)	149.0 (3784.6)	45.0 (1143.0)	18.0 (457.0)	1743 (791)	1583 (718)
150 IMS* 180 kW						
125 (473)	3 (76.2)	149.0 (3784.6)	45.0 (1143.0)	12.5 (318.0)	1297 (588)	1199 (544)
250 (946)	3 (76.2)	149.0 (3784.6)	45.0 (1143.0)	18.0 (457.0)	1644 (746)	1506 (683)
375 (1419)	4 (101.6)	149.0 (3784.6)	45.0 (1143.0)	22.0 (558.8)	1900 (865)	1746 (792)

* Improved Motor Starting

Standard Features

The following features are standard on non-sound shield-enclosure ready fuel tanks. Order these items separately for sound shield-enclosure ready subbase fuel tanks.

2 in. NPT Lockable Fill Cap Kit with 2 in. (50.8 mm) Riser. Includes 2 in. NPT diameter, 2 in. NPT riser pipe with lockable cap. This kit allows for a convenient way to fill the tank.

Low Fuel Level Alarm Kit. Includes float switch and wiring to microprocessor controller. Alarm annunciates when tank fuel level reaches approximately 50%.

Normal Vent Kit with 5 in. (127 mm) Riser and Mushroom Cap. Includes 1 1/4 in. NPT, 5 in. NPT riser pipe, and matching mushroom cap for normal vent.

Accessories

Several accessories are available for double-wall subbase fuel tanks. Local, state, or federal codes and ordinances may require installation of one or more of the following kits. Contact local inspector or generator distributor to determine which accessories to install to comply with codes. See Figure 2 for double-wall subbase fuel tank features.

NOTE

Seal all unused fittings with steel pipe plugs. The plastic plugs in these fittings are for shipping and are not intended for permanent use. See available pipe plug kits.

Alarm Kits

Inner Tank Leak Alarm Kit. Includes one light, one horn remote annunciator panel, leak alarm switch, and wiring. Alarm indicates a need for tank replacement when the inner tank has leaked into the outer tank. Leak alarm is standard with electronic control module.

Cap Kits

Normal Vent Mushroom Cap Kit. Includes one 1 1/4 in. NPT mushroom cap for use on normal vent.

Vent Kits

Emergency Pressure Relief Vent Kit. Includes one emergency pressure relief valve which opens to relieve the internal tank pressure when the pressure exceeds 1/2 psi (3.4 kPa). Relief valve is fully open at 2 1/2 psi (17.2 kPa). Secondary containment tank requires two vents (inner tank and outer tank) and closed-top, diked tank requires one vent (inner tank).

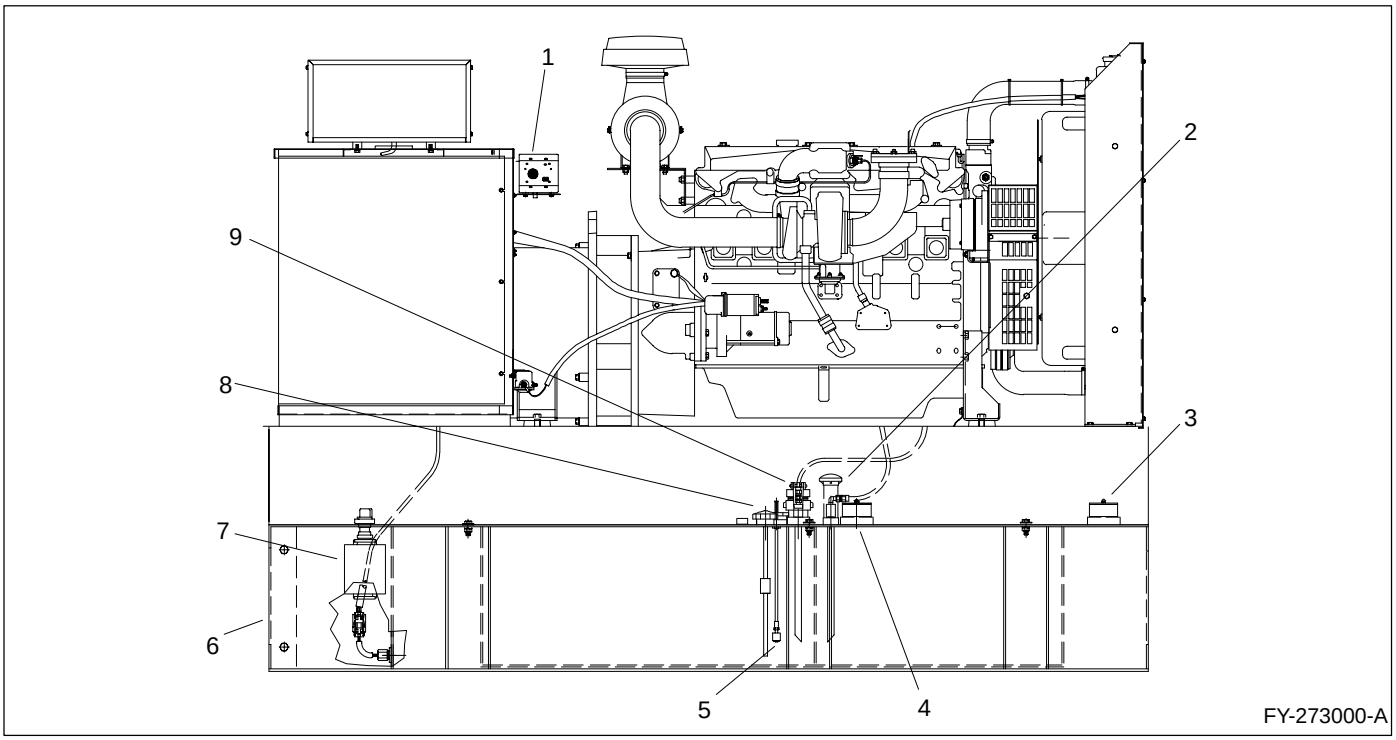
Day Tank Control Modules

Day Tank Electronic Control Module (ECM). Includes 1/3 HP, 110/120 vac, 50/60 Hz, single-phase motor, 2 gpm (7.57 L/min) pump, float switch, leak alarm, electronic control module, and wiring. The ECM activates the pump when the tank fuel level reaches 50%. The ECM displays fuel level at Full, 95%, 90%, 85%, 75%, 50%, 25%, 10%, and Empty. ECM also displays high fuel, low fuel, critical low fuel, fuel in rupture basin, ECM functional, pump running, and power on. Kit requires either a 20- or 40-foot (6.1- or 12.2-m) wiring harness.

Day Tank Relay Control Module. Includes 1/3 HP, 110/120 vac, 50/60 Hz, single-phase motor, 2 gpm (7.57 L/min) pump, float switch, relay control, and wiring. Use this kit with the double-wall subbase fuel tank kit with the day tank option. The motor and pump are controlled via the float switch through relays. The float switch activates the pump when the tank fuel level reaches 50%.

Pipe Plug Kits

Pipe Plug Kits. Kit includes one pipe plug. Plugs sized 1/2 in. NPT through 4 in. NPT are square head, and 5 in. NPT pipe plugs are slotted bar head. NPT pipe plugs are required for fittings where optional accessories are not required.



1. Inner tank-leak alarm kit
2. Normal vent kit with riser and mushroom cap
3. Outer tank emergency pressure relief vent kit (secondary containment tank only)
4. Emergency pressure-relief vent kit
5. Low fuel level alarm kit
6. Removable end channel
7. Day tank kit
8. Mechanical fuel gauge (standard)
9. Lockable fill cap and riser kit

Figure 2. Double-Wall Subbase Fuel Tank Options

Kits	Part Number
Alarm Kits	
Inner Tank Leak Alarm	224806
Vent Kits	
Emergency Pressure Relief 3 in.	224679
Emergency Pressure Relief 4 in.	224680
Normal Vent	224686
Pipe Plug Kits	
1/2 in. (13 mm)	224666
1 in. (25 mm)	224667
2 in. (51 mm)	224668
3 in. (76 mm)	224669
4 in. (102 mm)	224670
5 in. (127 mm)	224671

Figure 3. Double-Wall Subbase Fuel Tank Accessories

Installation

1. Disconnect engine starting battery, negative (–) lead first.
2. Remove sound shield, if equipped, from generator set.
3. Calculate the weight of the generator set and accessories (including subbase fuel tank and fuel) to determine the necessary strength of the mounting pad. Use respective generator set spec sheet for data.

NOTE

Calculations to determine total weight of the tank and fuel:

Fuel weight	=	Tank capacity (gallons) x 7.3 lbs.
Total weight of tank and fuel	=	Fuel weight + tank weight (see specifications chart)
Total weight of generator set with subbase tank	=	Total weight of tank and fuel + weight of generator set (see spec sheet)

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4. Use current generator set spec sheet and subbase fuel tank dimensional drawing to size mounting pad.

NOTE

The lifting contractor determines the type and suitability of the subbase fuel tank lifting device. Lift the subbase fuel tank as one unit if shipped separately from the generator set. Use lifting eyes if equipped on subbase fuel tank; otherwise, use chains or cables to lift the subbase fuel tank. If using lifting straps, protect the strap from sharp fuel tank edges.

Lift the generator set (up to 400 kW) and subbase fuel tank together provided the fuel tank is empty and the subbase fuel tank does not extend beyond the perimeter of the generator set skid.

In all other cases, remove the mounting hardware and wiring between the the generator set and subbase fuel tank. Lift the generator set and subbase fuel tank separately. It is not necessary to drain fuel tank when lifting just the fuel tank.

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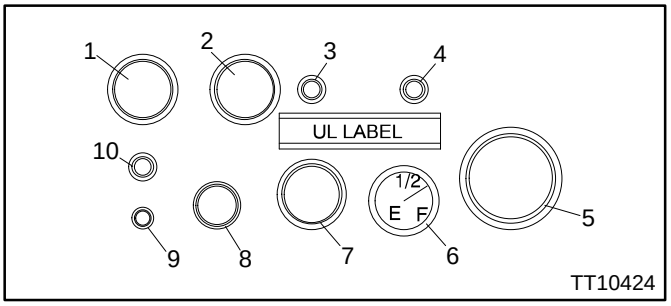
5. Attach the subbase fuel tank to the concrete using anchor bolts placed in the cement before it has set. Otherwise to install anchors later drill holes in the concrete.
6. Size all hoist equipment accordingly. Hoist the generator set into place and bolt it to the subbase fuel tank. Use grade 5 minimum bolts and associated hardware when mounting hardware is not supplied in the kit. Torque all hardware using a value that corresponds to the hardware size.
7. Install emergency pressure relief vents as required. Secondary containment tanks require two vents (inner tank and outer tank) and closed-top, diked tanks require one vent (inner tank).
8. Connect low fuel level switch leads 63 and N according to the illustration in Figure 5. Use a connection kit (terminal strip) for easier connection and disconnection of generator accessories.



1. 2 in. NPT for optional sensor/pump control float (day tank only)
2. 2 in. NPT for optional low fuel level alarm
3. 1/2 in. (12.7 mm) dip tube-fuel return and 1/2 in. (12.7 mm) to 3/8 in. (9.5 mm) reducer
4. **20-100ROZP:** 3/8 in. (9.5 mm) dip tube-fuel supply and 1/4 in. (6.4 mm) to 3/8 in. (9.5 mm) reducer. **125-180ROZP:** 1/2 in. (12.7 mm) dip tube-fuel supply and 1/2 in. (12.7 mm) to 3/8 in. (9.5 mm) reducer
5. Emergency vent per NFPA 30 (see specification chart for size)
6. 2 in. mechanical fuel level gauge—standard
7. 2 in. NPT fill for optional fill cap and riser
8. 1-1/4 in. NPT for optional normal vent and riser
9. 3/8 in. NPT for day tank pump fill (day tank only)
10. 3/4 in. NPT for overflow—2 gpm (7.57 L/min) pump maximum

Figure 4. Fuel Tank Fittings

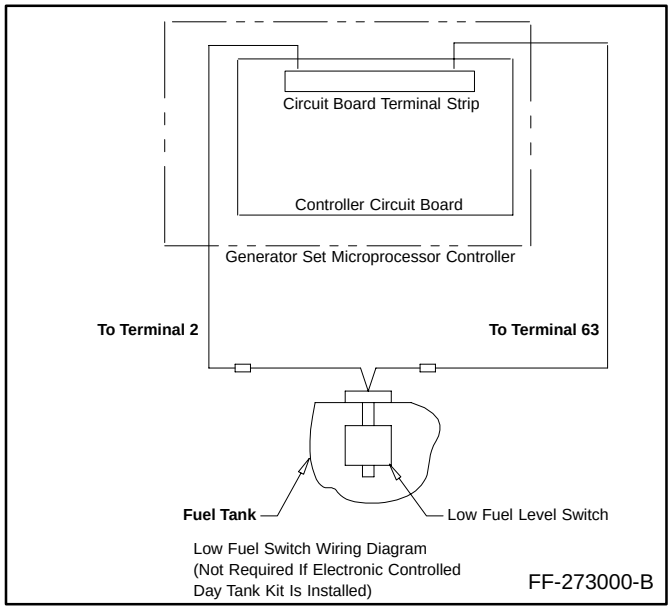


Figure 5. Low Fuel Switch Wiring Diagram

9. Install flexible fuel line kit. Refer to installation instructions provided with kit. Connect two lines, a supply line and a return line, between the generator set and the subbase fuel tank.
10. If subbase day tank is required, install transfer pump kit, float, and controls.

    For day tank relay control module instructions proceed to step 12a. For day tank electronic control module instructions proceed to step 13. If subbase day tank is not required proceed to step 14.

NOTE

Controller box assembly shown at suggested mounting location only.

a. Remove cover plate from controller box assembly. Mount controller box assembly (A-224874 or A-274818) to skid using two screws (X-50-3), washers (X-25-36), and nuts (X-6210-5) supplied with the controller box assembly. Do not install cover plate. See Figure 6.

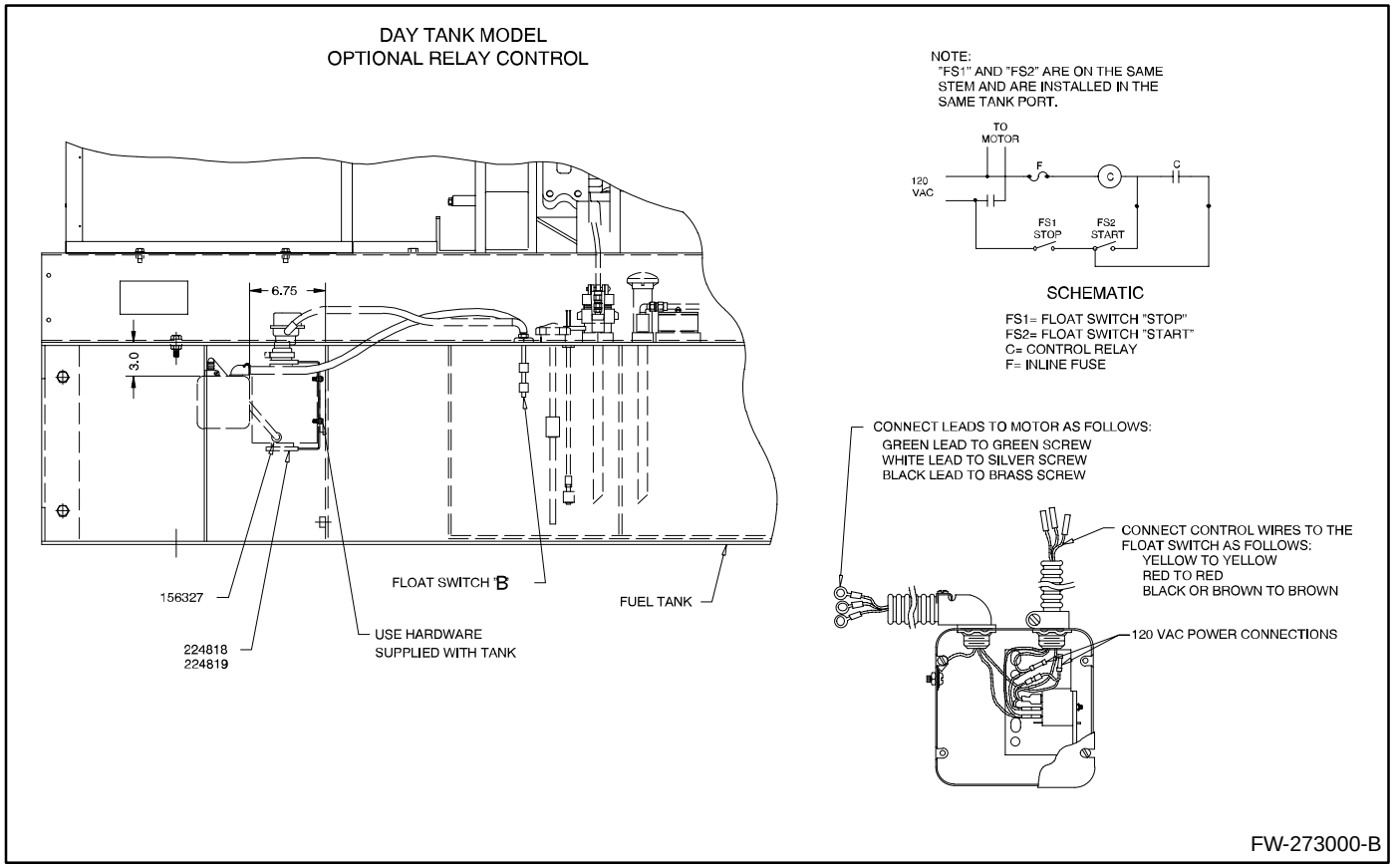


Figure 6. Relay Control Module

b. Mount transfer pump assembly to skid using hardware supplied with the tank. See Figure 6.

c. Remove 3/8 in. NPT pipe plug for fuel inlet connection at subbase fuel tank. See Figure 4. Pipe plug is not reused. Apply pipe sealant to male ends of 3/8 in. (9.5 mm) elbow hose connector (X-391-13) and install. Point elbow hose connector toward transfer pump assembly when final tightened.

d. Apply pipe sealant to elbow hose connector (X-391-13) and install into transfer pump assembly outlet. Point elbow hose connector toward subbase fuel tank when final tightened.

e. Slide hose clamps (X-426-10) over each end of flexible fuel line approximately 1 in. (25 mm), as required. Install fuel line to transfer pump assembly outlet and subbase tank inlet. Position hose clamps approximately 1/4 in. (6 mm) from fuel line end and tighten.

f. Remove 2 in. NPT pipe plug for float switch (224869 or 279746) installation. See Figure 4. Pipe plug is not reused. Apply pipe sealant to threads of float switch and install in subbase fuel tank.

g. Connect float switch leads to controller as follows:

   Yellow to Yellow
   Red to Red
   Black or Brown to Brown

h. Install conduit connector (156327) to transfer pump assembly.

i. Connect green, white, and black leads of controller box to transfer pump assembly. Remove electric motor access plate. Green lead connects to ground screw on frame. Refer to schematic on electric motor and motor wiring schematic shown in Figure 6 to make connections. Replace electric motor access plate.

NOTE

Electric motor rotation must be clockwise for transfer pump operation. Check motor schematic for correct rotation. If rotation is counterclockwise, motor operates, but transfer pump will not pump fuel.

j. Make AC voltage connections to controller box assembly. Remove knockout and add conduit as necessary. Replace controller box cover.

k. Leave circuit breaker connected to transfer pump assembly power line open until external fuel tank is filled and all piping completed.

l. Remove 3/4 in. NPT pipe plug for tank over fill return line. See Figure 4. Install 3/4 in. NPT 90 degree elbow fitting (not provided) and fuel overflow line (not provided) back to primary tank.

NOTE

To prevent overflow from the fill cap or normal vent, locate the return line lower than the fill cap.

m. Sound shield-equipped units—with surfaces clean and dry apply foam tape 1/2 in. (12.7 mm) from perimeter of mounting surface and reinstall sound shield.

n. Upon completion of relay control module installation proceed to step 14.

11. If subbase day tank with electronic control module (ECM) is required proceed to step 13a.

    a. Remove 1/2 in. NPT pipe plug for leak alarm (224863) installation. Pipe plug is not reused. Apply pipe sealant to threads of leak alarm and install in subbase fuel tank. See Figure 7 for positioning and location.

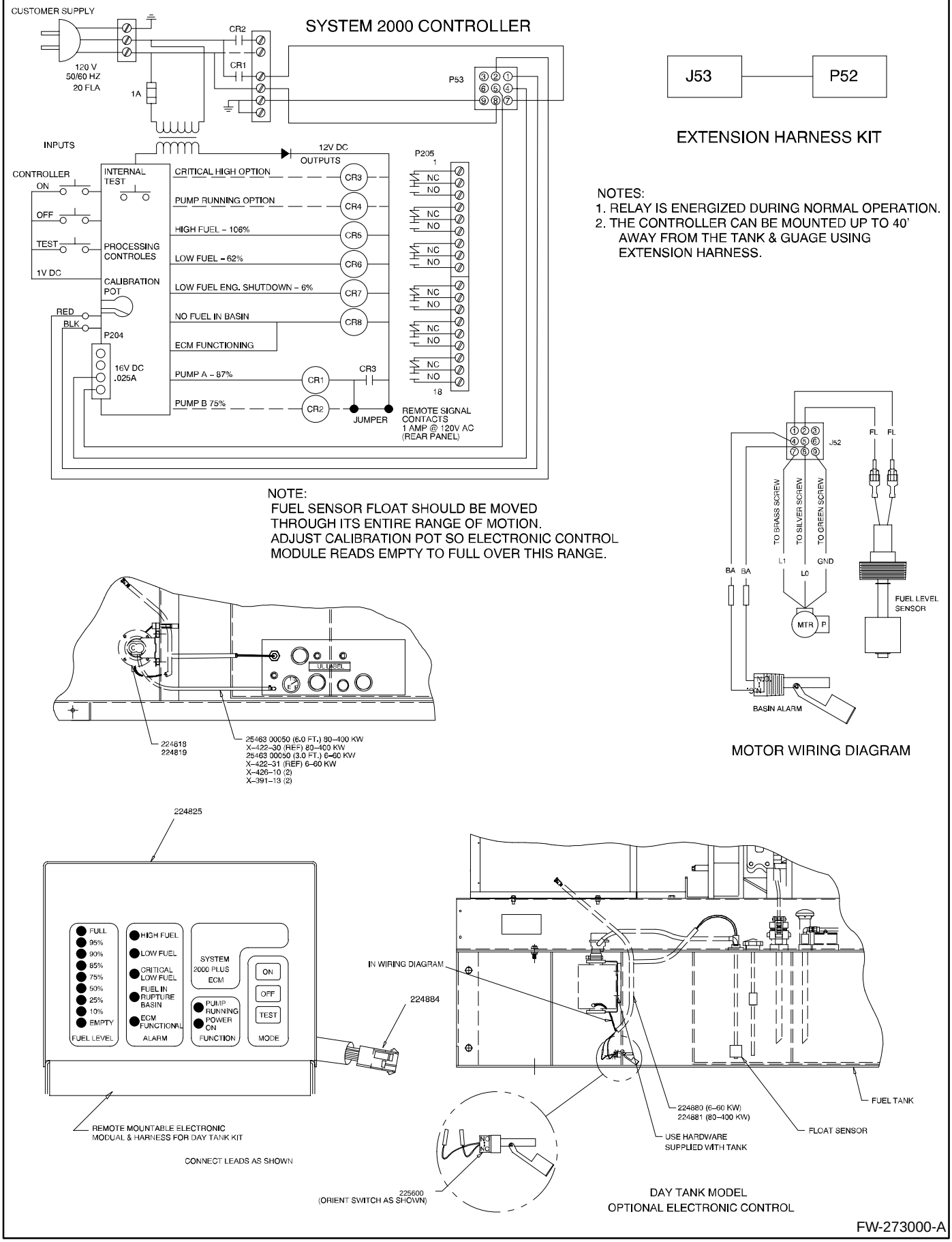


Figure 7. Electronic Control Module

b. Mount transfer pump assembly to skid using hardware supplied with tank.

c. Remove 3/8 in. NPT pipe plug for fuel inlet connection at subbase fuel tank. Pipe plug is not reused. Apply pipe sealant to male end of 3/8 in. (9.5 mm) elbow hose connector (X-391-13) and install. Point elbow hose connector toward transfer pump assembly when final tightened.

d. Apply pipe sealant to elbow hose connector (X-391-13) and install into transfer pump assembly outlet. Point elbow hose connector toward subbase fuel tank when final tightened.

e. Slide hose clamps (X-426-10) over each end of flexible fuel line approximately 1 in. (25 mm), as required. Install fuel line (X-422-30 or X-422-31) to transfer pump assembly outlet and subbase tank inlet. Position hose clamps approximately 1/4 in. (6 mm) from fuel line end and tighten.

f. Remove 2 in. NPT pipe plug for float sensor (224815 or 224814) installation. See Figure 4. Pipe plug is not reused. Apply pipe sealant to threads of float sensor and install in subbase fuel tank.

g. Connect fuel level sensor, leak alarm, and electric motor to appropriate wiring harness (224881 or 224880) leads. See Figure 7, Motor Wiring Diagram.

h. Connect ECM wiring harness (224884) to appropriate ECM connections. See Figure 7. Mount ECM in desired location. Extension harness kit length may limit location of ECM.

NOTE

Electric motor rotation must be clockwise for transfer pump operation. Check motor schematic for correct rotation. If rotation is counterclockwise, motor operates, but transfer pump will not pump fuel.

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i. Route wiring harness to control module. Connect mating end of extension harness to the ECM wiring harness and the day tank harness. See Figure 7.

j. Make AC voltage connection to control module assembly.

k. Leave transfer pump circuit breaker open until external fuel tank is filled and all piping completed.

l. Remove 3/4 in. NPT pipe plug for tank over fill return line. Install 3/4 in. NPT 90 degree elbow fitting (not provided) and fuel overflow return line (not provided) back to primary tank. See Figure 4.

NOTE

To prevent overflow from the fill cap or normal vent, locate the return line lower than the fill cap.

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m. Sound shield-equipped units—with surfaces clean and dry apply foam tape 1/2 in. (12.7 mm) from perimeter of mounting surface and reinstall sound shield.

n. See Operation (ECM) for electronic control module operation.

NOTE

Seal all unused fittings with steel pipe plugs. The plastic plugs in these fittings are for shipping and are not intended for permanent use. See available pipe plug kits.

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12. Complete the remaining installation and start-up procedures as required by contractor/distributor.

Operation (ECM)

General

The electronic control module (ECM) maintains the fuel level of the day tank by controlling a pump/motor. The pump remains off at the normal fuel level and activates at 87% full. A pump running indicator LED lights when the pump activates. The motor relay is prewired to the pump/motor. Another function light on the ECM panel is the power ON. This LED lights when the power is applied to the ECM. Follow all safety precautions listed in the front of this manual.

Servicing day tank. Hazardous voltage can cause severe injury or death. Service day tank Electrical Control Module (ECM) as prescribed in equipment manual. Disconnect power to day tank before servicing. Press the day tank ECM OFF pushbutton to disconnect power. Be aware that line voltage is still present within the ECM when the POWER ON light is lit. Be sure that generator set and day tank are electrically grounded. Do not operate day tank when standing in water or on wet ground as the chance of electrocution increases under such conditions.

Level Sensor

An electronic analog float gauge located below the ECM on the mounting bracket determines the the day tank fuel level. Nine LEDs on the ECM indicate the day tank fuel level from full to empty. See Figure 8 for front panel layout.

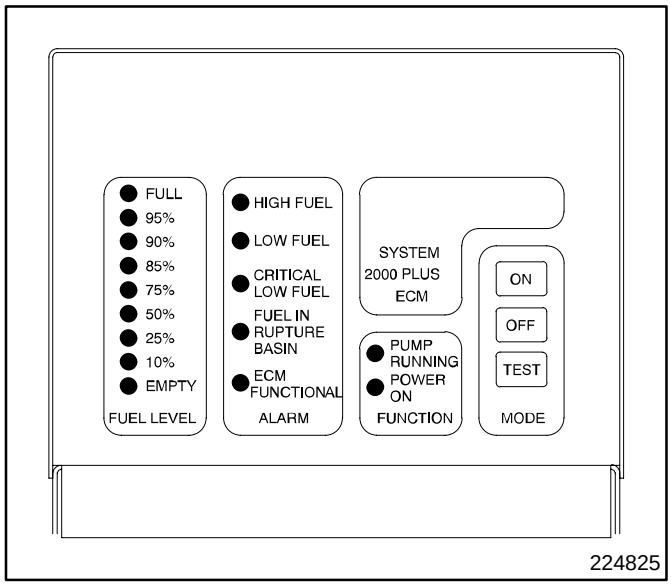

Figure 8. Front Panel Layout

Alarms

The ECM has five standard alarm conditions. Each alarm is indicated locally by an LED and remotely by a relay. Normally open and normally closed contacts are provided on these relays for customer connections.

1. **High Fuel.** Alarm activates at 106% of normal fuel level.
2. **Low Fuel.** Alarm activates at 62% of normal fuel level to allow reaction time before low fuel shutdown occurs.
3. **Critical Low Fuel (engine shutdown).** Alarm activates at 6% of normal fuel level. This enables the customer to shutdown engine/generator before fuel runs out.
4. **Fuel In Rupture Basin.** If fuel tank is equipped with a rupture basin float switch, the ECM monitors if fuel has leaked into the rupture basin.
5. **ECM Functional.** The ECM performs many internal checks to ensure correct operation.

Mode

There are three modes of operation on the ECM and one internal test button.

OFF. Pushbutton disables the ECM for routine tank system maintenance without disrupting the ECM.

NOTE

When ECM functional alarm relay de-energizes, it can activate a customer-installed alarm wired to this relay.

ON. Pushbutton activates the ECM after the OFF pushbutton is depressed. On any initial power-up (after a power outage) the ECM automatically turns on.

TEST. Pushbutton tests all front panel LEDs for 3 seconds and activates pump/motor for as long as the pushbutton is depressed. All alarm relays maintain their original positions.

INTERNAL TEST. Pushbutton (located inside ECM) tests each LED and remote annunciation relay in sequential order (high fuel to ECM functional).

Double-Wall Subbase Fuel Tank

Parts List		
Kits: PA-224948 to PA-224979 PA-224948-SD to PA-224979-SD		
Qty.	**Description**	**Part Number**
1	Tank, double-wall subbase fuel	(See Fuel Tank Kit/Part Numbers)

Double-Wall Subbase Fuel Tank

Parts List		
Kits: PA-224988 to PA-224990 PA-224988 to PA-224990-SD		
Qty.	**Description**	**Part Number**
1	Coupling, pipe	X-216-29
2	Connector, 5/8-18 x 1/4	X-296-2
1	Union	X-695-2
1	Line, flexible fuel	225204
1	Line, flexible fuel	324481
1	Tank, double-wall subbase fuel	(See Fuel Tank Kit/Part Numbers)

Double-Wall Subbase Fuel Tank

Parts List		
Kits: PA-224991 to PA-224995 PA-224991 to PA-224995-SD		
Qty.	**Description**	**Part Number**
2	Coupling, pipe	X-216-11
2	Connector, 5/8-18 x 1/4	X-296-2
2	Connector, half union	X-296-11
1	Line, flexible fuel	225204
1	Line, flexible fuel	324481
1	Tank, double-wall subbase fuel	(See Fuel Tank Kit/Part Numbers)

Double-Wall Subbase Fuel Tank

Parts List		
Kits: PA-228918 to PA-228947 PA-228918-SD to PA-228947-SD		
Qty.	**Description**	**Part Number**
1	Tank, double-wall subbase fuel	(See Fuel Tank Kit/Part Numbers)
1	Harness, wiring	224856

Double-Wall Subbase Fuel Tank

Parts List		
Kits: PA-224454, PA-224456, PA-224458, PA-224460 PA-224454-SD, PA-224456-SD, PA-224458-SD, PA-224460-SD		
Qty.	**Description**	**Part Number**
12	Washer, plain	X-25-26
12	Screw,	X-129-19
12	Nut, spiralock	X-6210-12
32	Foam, seal (ft.)	19000 08100
1	Tank, double-wall subbase fuel	(See Fuel Tank Kit/Part Numbers)

Double-Wall Subbase Fuel Tank

Parts List		
Kits: PA-224438 to PA-224444 PA-224581 to PA-224587 PA-327210 to PA-327212 PA-327258 to PA-327260, PA-327228 PA-224438-SD to PA-224444-SD PA-224581-SD to PA-224587-SD PA-327210-SD to PA-327212-SD PA-327258-SD to PA-327260-SD, PA-327228-SD		
Qty.	**Description**	**Part Number**
12	Washer, plain	X-25-26
12	Screw,	X-129-19
12	Nut, spiralock	X-6210-12
26	Foam, seal (ft.)	19000 08100
1	Tank, double-wall subbase fuel	(See Fuel Tank Kit/Part Numbers)

Double-Wall Subbase Fuel Tank

Parts List		
Kits: PA-327216, PA-327217, PA-327230, PA-327264, PA-327265, PA-327278 PA-327216-SD, PA-327217-SD, PA-327230-SD, PA-327264-SD, PA-327265-SD, PA-327278-SD		
Qty.	**Description**	**Part Number**
12	Washer, plain	X-25-26
12	Screw,	X-129-19
12	Nut, spiralock	X-6210-12
30	Foam, seal (ft.)	19000 08100
1	Tank, double-wall subbase fuel	(See Fuel Tank Kit/Part Numbers)

Double-Wall Subbase Fuel Tank

Parts List		
Kits: PA-224464 to PA-224468 PA-224621 to PA-224627 PA-327225 to PA-327227 PA-327273 to PA-327275 PA-224462, PA-224596, PA-224598, PA-224617, PA-224619, PA-327233, PA-327281 PA-224464-SD to PA-224468-SD PA-224621-SD to PA-224627-SD PA-327225-SD to PA-327227-SD PA-327273-SD to PA-327275-SD PA-224462-SD, PA-224596-SD, PA-224598-SD, PA-224617-SD, PA-224619-SD, PA-327233-SD, PA-327281-SD		
Qty.	**Description**	**Part Number**
12	Washer, plain	X-25-26
12	Screw,	X-129-19
12	Nut, spiralock	X-6210-12
34	Foam, seal (ft.)	19000 08100
1	Tank, double-wall subbase fuel	(See Fuel Tank Kit/Part Numbers)

Day Tank Relay Controller

Parts List					
	Kits: PA-224850, PA-224878, PA-224996		Unique Parts		
Qty.	Description	Common Parts	PA-224850	PA-224878	PA-224996
2	Washer, plain	X-25-36			
2	Screw, r.h.m. 10-24 x 3	X-50-3			
2	Connector, elbow	X-391-13			
1	Hose	X-422-31			
2	Clamp, hose	X-426-10			
2	Nut, whiz 10-24	X-6210-5			
1	Connector, conduit elbow	156327			
1	Motor	224818			
1	Pump	224819			
1	Switch, float		279746	279746	224869
1	Box assembly, controller		A-224874	A-224818	A-224818

Day Tank Electronic Controller

Parts List					
	Kits: PA-224809, PA-224810, PA-224877		Unique Parts		
Qty.	Description	Common Parts	PA-224809	PA-224810	PA-224877
2	Connector, elbow	X-391-13			
1	Hose		X-422-30	X-422-38	X-422-31
2	Clamp, hose	X-426-10			
1	Sensor, float		224814	224815	224814
1	Motor	224818			
1	Pump	224819			
1	Module, control	224825			
1	Harness, day tank		224881	224881	224880
1	Harness, wiring	224884			
1	Switch, float	255600			