INSTALLATION INSTRUCTIONS

Original Issue Date: **7/95**
Model: **6-15ROY/ROZ**
Market: **Industrial**
Subject: **Double-Wall Subbase Fuel Tanks/Day Tanks**

Introduction

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. Double-wall fuel tanks are UL listed and have all vent fittings necessary to meet NFPA requirements. See Figure 1 for fuel tank specifications.

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.

Double-Wall Subbase Fuel Tank with Day Tank Option

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

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

Standard Features

The following features are standard on all 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%.

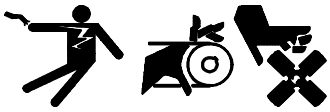
Normal Vent Kit with 5 in. (127 mm) Riser and Mushroom Cap. Includes 1 1/4 in. NPT, 5 in. NPT riser pipe, and matching mushroom cap for normal vent.

Model	Capacity, L (gal.)	Dimensions, mm (in.)			Tank Weight, kg (lb.)
		Length	Width	Height	
6ROY/6ROZ	95 (25)	1359 (53.5)	737 (29.0)	318 (12.5)	148 (325)
	133 (35)	1359 (53.5)	737 (29.0)	457 (18.0)	214 (471)
10ROY/10ROZ	95 (25)	1605 (63.2)	737 (29.0)	318 (12.5)	150 (331)
	133 (35)	1605 (63.2)	737 (29.0)	457 (18.0)	219 (481)
15ROY/15ROZ	148 (39)	1600 (63.0)	737 (29.0)	318 (12.5)	159 (349)
	190 (50)	1600 (63.0)	737 (29.0)	457 (18.0)	200 (441)
	254 (68)	1600 (63.0)	737 (29.0)	559 (22.0)	283 (625)

Figure 1 Fuel Tank Specifications

Safety Precautions

⚠ 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 connected equipment, disable the generator set as follows: (1) Move the generator set master 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 starting of the generator set by an automatic transfer switch, remote start/stop switch, or engine start command from a remote computer.

⚠ WARNING

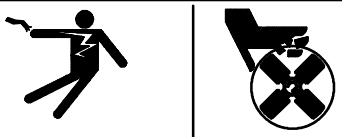
Explosive fuel vapors.
Can cause severe injury or death.

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

The fuel system. Explosive fuel vapors can cause severe injury or death. Vaporized fuels are highly explosive. Use extreme care when handling and storing fuels. Store fuels 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 sparks. Do not smoke or permit flames or sparks to occur near sources of spilled fuel or fuel vapors. Keep the fuel lines and connections tight and in good condition. Do not replace flexible fuel lines with rigid lines. Use flexible sections to avoid fuel line breakage caused by vibration. Do not operate the generator set in the presence of fuel leaks, fuel accumulation, or sparks. Repair fuel 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 the generator set only when all guards and electrical enclosures are in place.

Grounding electrical equipment. Hazardous voltage can cause severe injury or death. Electrocution is possible whenever electricity is present. Open the main circuit breakers of all power sources before servicing the equipment. Configure the installation to electrically ground the generator set, transfer switch, and related equipment and electrical circuits to comply with applicable codes and standards. Never contact electrical leads or appliances when standing in water or on wet ground because these conditions increase the risk of electrocution.

Servicing the day tank. Hazardous voltage can cause severe injury or death. Service the day tank electrical control module (ECM) as prescribed in the equipment manual. Disconnect the power to the day tank before servicing. Press the day tank ECM OFF pushbutton to disconnect the power. Notice that line voltage is still present within the ECM when the POWER ON light is lit. Ensure that the generator set and day tank are electrically grounded. Do not operate the day tank when standing in water or on wet ground because these conditions increase the risk of electrocution.

⚠ WARNING

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

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

⚠ WARNING

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

Do not work on the generator set until it cools.

Servicing the exhaust system. Hot parts can cause severe injury or death. Do not touch hot engine parts. The engine and exhaust system components become extremely hot during operation.

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 your 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. The alarm indicates that the inner tank has leaked into the outer tank and tank replacement is required. The leak alarm is standard with the electronic control module.

Cap Kits

Normal Vent Mushroom Cap Kit. Includes one 1 1/4 in. NPT mushroom cap for use on the 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). The secondary containment tank requires two vents (inner tank and outer tank).

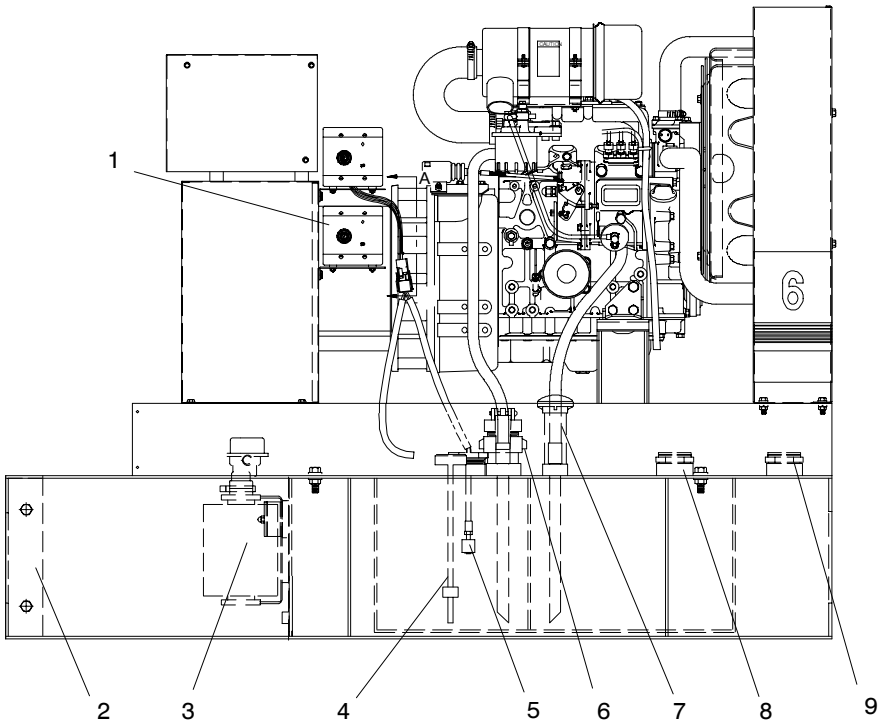
Day Tank Control Modules

Day Tank Electronic Control Module (ECM). Includes 1/3 HP, 110/120 VAC, 50/60 Hz, single-phase motor; 7.57 L/min (2 gpm) 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. The ECM also displays high fuel, low fuel, critical low fuel, fuel in rupture basin, ECM functional, pump running, and power on. The kit requires either a 6.1- or 12.2-m (20- or 40-foot) wiring harness.

Day Tank Relay Control Module. Includes 1/3 HP, 110/120 VAC, 50/60 Hz, single-phase motor; 7.57 L/min (2 gpm) 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 installed.



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

Figure 2 Double-Wall Subbase Fuel Tank Options

Installation

1. Disconnect the engine starting battery, negative (–) lead first.

2. Calculate the weight of the generator set and accessories (including subbase fuel tank and fuel) to determine the strength of the mounting pad construction. Use the current generator set spec sheet for data.

   Calculations to determine total weight of the tank and fuel:

Fuel weight	=	Tank capacity (gallons) x 7.3
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)

3. Use the current generator set spec sheet and subbase tank dimensional drawing to size the 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 the 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.

   Note: Lift the generator set 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.

   Note: 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.

4. Install anchor bolts in the concrete mounting pad before the concrete has set. Otherwise install anchors later by drilling holes in the concrete. Attach the subbase fuel tank to the anchor bolts.

5. 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.

6. 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).

7. Connect low fuel level switch leads 63 and N according to the illustration in Figure 3. Use a connection kit (terminal strip) for easier connection and disconnection of generator accessories.

8. Install the flexible fuel line kit. Refer to installation instructions provided with kit. Connect two lines, a supply line and return line, between the generator set and the subbase fuel tank.

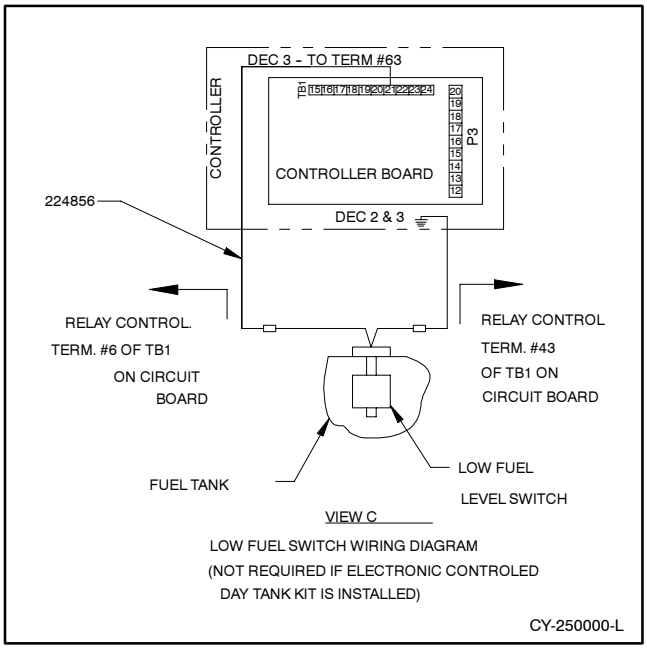


Figure 3 Low Fuel Switch Wiring Diagram

9. If a day tank is required, install the transfer pump kit, float and controls. For day tank relay control module instructions proceed to step 9a. For day tank electronic control module instructions proceed to step 10.

   Note: The controller box assembly is shown at the suggested mounting location.

   If a day tank is not required, proceed to step 11.

   a. Remove the cover plate from controller box assembly. Mount the controller box assembly (A-224862) to the skid using two screws (X-50-3), washers (X-25-36), and nuts (X-6210-5) supplied with the controller box assembly. See Figure 4. Do not yet install cover plate.

   b. Mount the transfer pump assembly to skid using hardware supplied with the tank. See Figure 4.

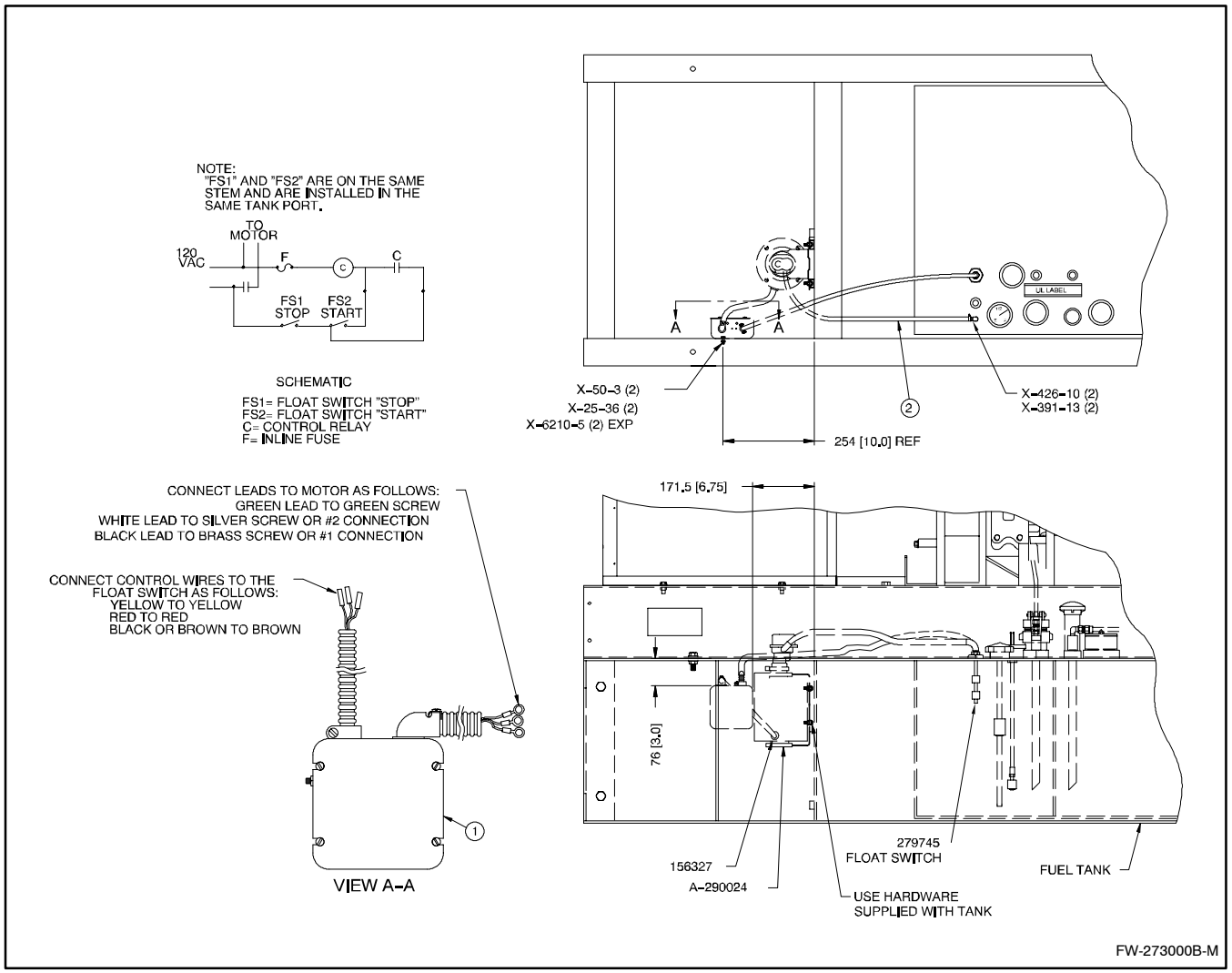


Figure 4 Day Tank Option, Relay Control Module

c. Remove the pipe plug for the fuel inlet connection at the subbase fuel tank. See Figure 5. The pipe plug is not reused. Apply pipe sealant to the male ends of 3/8 in. elbow hose connector (X-391-13), and install. Point the elbow hose connector toward the 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.

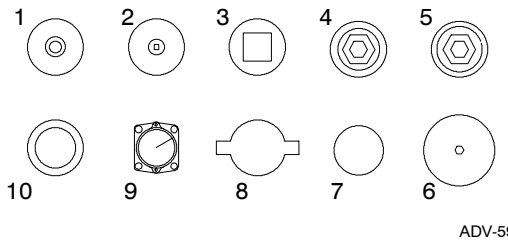
e. Slide hose clamps (X-426-10) over each end of flexible fuel line approximately 1 in. (25 mm), as required. Install fuel line to transfer pump assembly outlet and subbase tank inlet. Position the hose clamps approximately 1/4 in. (6 mm) from the end of the fuel line and tighten.

f. Remove the pipe plug for float switch (224869) installation. See Figure 5. The pipe plug is not reused. Apply pipe sealant to the threads of the float switch and install in the subbase fuel tank.

g. Connect the float switch leads to the controller as follows:

   Yellow to Yellow
   Red to Red
   Black or Brown to Brown

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



1. 1 in. NPT for overflow—2 gpm (7.57 L/min) pump maximum (day tank only)
2. 1 in. NPT for day tank pump fill (day tank only)
3. 2 in. NPT for optional sensor/pump control float (day tank only)
4. 3/8 in. fuel supply connection. Use 3/8 in. to 1/4 in. reducer
5. 3/8 in. fuel return connection. Use 3/8 in. to 1/4 in. reducer
6. 2 in. emergency vent per NFPA 30
7. 1 1/4 in. NPT for optional normal vent and riser
8. 2 in. NPT fill for optional fuel cap and riser
9. 2 in. mechanical fuel level gauge—standard
10. 2 in. NPT for optional low fuel level alarm

Figure 5 Fuel Tank Fittings, Tanks with Day Tank Option

i. Connect green, white, and black leads of the controller box to the transfer pump assembly. Remove the electric motor access plate. the green lead connects to the ground screw on the frame. Refer to the schematic on the electric motor and motor wiring schematic shown in Figure 4 to make connections. Replace the electric motor access plate.

   Note: The electric motor rotation must be clockwise for transfer pump operation. Check the motor schematic for correct rotation. If the rotation is counterclockwise, the motor operates, but the transfer pump will not pump fuel.

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

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

l. Remove the pipe plug for the tank over fill return line. See Figure 5. Install 1 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. Proceed to step 11.

10. If subbase day tank with electronic control module (ECM) is required proceed to step 10a.

    a. Remove the 1/2 in. NPT pipe plug for leak alarm (224863) installation. The pipe plug is not reused. Apply pipe sealant to the threads of the leak alarm and install in the subbase fuel tank. See Figure 6 for positioning and location.

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

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

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

    e. Slide hose clamps (X-426-10) over each end of the flexible fuel line approximately 1 in. (25 mm), as required. Install fuel line (X-422-30) to the transfer pump assembly outlet and the subbase tank inlet. Position the hose clamps approximately 0.25 in. (6 mm) from the end of the fuel line and tighten.

    f. Remove the pipe plug for float sensor (224814) installation. See Figure 5. The pipe plug is not reused. Apply pipe sealant to threads of float sensor and install in the subbase fuel tank.

    g. Connect the float level sensor, leak alarm, and electric motor to the appropriate wiring harness (224880) leads. See Figure 6, Motor Wiring Diagram.

    h. Connect ECM wiring harness (224884) to the required ECM connections. See Figure 6. Mount the ECM in the desired location. The extension harness kit length may limit the location of the ECM.

    Note: The electric motor must rotate clockwise for transfer pump operation. Check the motor schematic for correct rotation. If the rotation is counterclockwise, the motor operates, but the transfer pump will not pump fuel.

    i. Route the wiring harness to the control module. Connect the mating end of the extension harness to the ECM wiring harness and the day tank harness. See Figure 6.

    j. Connect AC voltage to the control module assembly.

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

    l. Remove the pipe plug for tank over fill return line. Install a 3/4 in. NPT 90 degree elbow fitting (not provided) and fuel overflow return line (not provided) back to the primary tank. See Figure 5.

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

    m. 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.

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

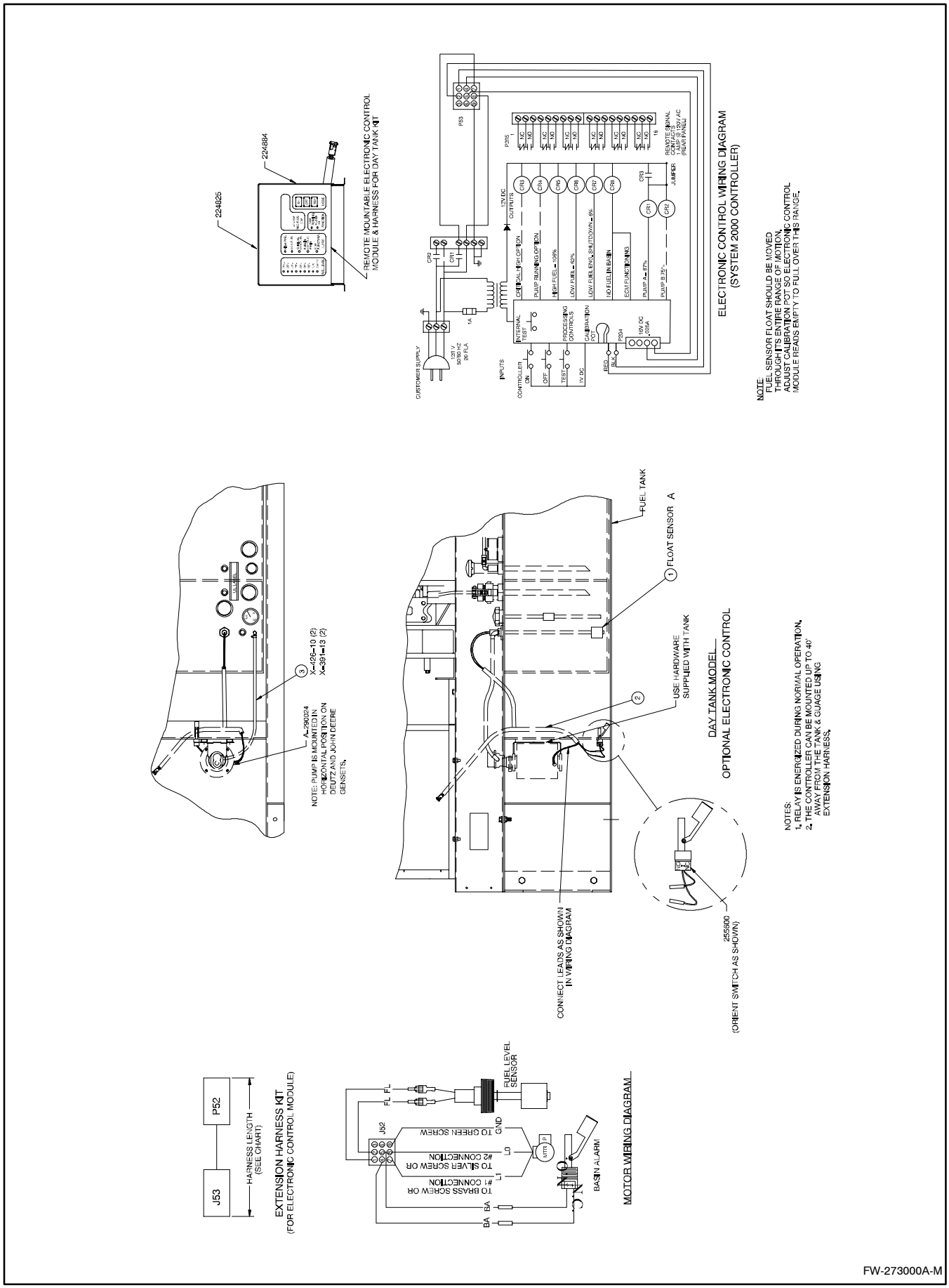


Figure 6 Day Tank Option, Electronic Control Module

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 the day tank. Hazardous voltage can cause severe injury or death. Service the day tank electrical control module (ECM) as prescribed in the equipment manual. Disconnect the power to the day tank before servicing. Press the day tank ECM OFF pushbutton to disconnect the power. Notice that line voltage is still present within the ECM when the POWER ON light is lit. Ensure that the generator set and day tank are electrically grounded. Do not operate the day tank when standing in water or on wet ground because these conditions increase the risk of electrocution.

Level Sensor

An electronic analog float gauge located below the ECM on the mounting bracket determines the day tank fuel level. Nine LEDs on the ECM indicate the day tank fuel level from full to empty. See Figure 7 for front panel layout.

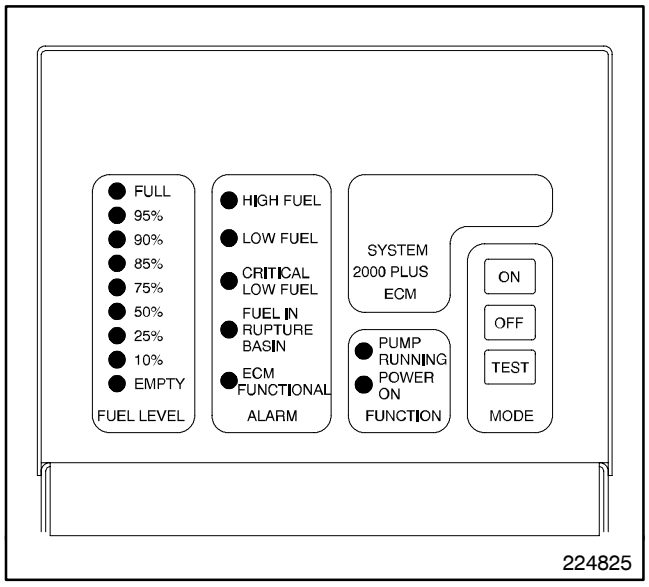


Figure 7 Front Panel Layout

Alarms

The ECM has five standard alarm conditions. An LED indicates alarms locally. A relay indicates alarms remotely. 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. This enables reaction time to a potential problem before low fuel shutdown occurs.
3. **Critical Low Fuel (engine shutdown).** Alarm activates at 6% of normal fuel level. This enables the customer to shut down engine/generator before fuel runs out.
4. **Fuel In Rupture Basin.** If equipped with a rupture basin float switch, the ECM monitors whether 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 maintenance to the tank system without disrupting the ECM.

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 condition (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).

Parts Lists

Double-Wall Subbase Fuel Tank

Parts List		
	Kits: PA-2244470 to PA-224849	
Qty.	**Description**	**Part Number**
1	Tank, double-wall subbase fuel	(See Fuel Tank Kit/Part Numbers)
1	Wiring harness, alarm plate	226196
1	Bracket, leak alarm	336505
1	Box assembly	A-224862
4	Bolt, Hex Cap	X-129-19
4	Washer, plain, .531 IDx1.062 in.OD	X-25-26
4	Nut, flange spiralock, 1/2-13	X-6210-12
2	Screw, hex washer head, drill	X-794-2

Fuel Tank Part Numbers

		Standard Model	Tank with Daytank Kit
Model	**Fuel Tank Capacity Liters (gal.)**	**Fuel Tank Part No.**	**Fuel Tank Part No.**
6 ROY/ROZ	95 (25)	224469	224471
	133 (35)	224473	—
10 ROY/ROZ	95 (25)	224838	224840
	133 (35)	224842	—
15 ROY/ROZ	148 (39)	224844	224846
	190 (50)	224848	—

Day Tank Relay Controller

Parts List		
	Kit: PA-224878	
Qty.	**Description**	**Part Number**
1	Coupling, conduit-elbow	156327
1	Switch, float	279745
1	Box, controller	A-274818
1	Pump, motor assembly	A-290024
2	Washer,plain,.219 ID x .5 in. OD	X-25-36
2	Connector, 90 deg. (1/2"id hose)	X-391-13
1	Hose	X-422-31
2	Clamp, hose, .5/1 in.	X-426-10
2	SCREW, PAN HD. 10-24X3/4	X-50-3
2	Nut, flange whiz, 10-24	X-6210-5

Day Tank Electronic Controller

Parts List		
	Kit: PA-224877	
Qty.	**Description**	**Part Number**
1	Sensor, float	224814
1	Power Module	224825
1	Wiring harness, day tank, 80-400 kW	224880
1	Wiring harness, 6-15 Kw, 1 phase	224884
1	Switch, float, 1 pole	255600
1	Pump, motor assembly	A-290024
2	Connector, 90 deg. (1/2"id hose)	X-391-13
1	Hose	X-422-31
2	Clamp, hose, .5/1 in.	X-426-10

Accessories

Parts List	
Kits	**Part Number**
Alarm Kits	
Inner Tank Leak Alarm	PA-226202
Vent Kits	
Emergency Pressure Relief 2 in.	PA-224678
Emergency Pressure Relief, Containment, 2 in.	GM22867-KP1
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
Harness Kits	
20 ft. harness	PA-224885
40 ft. harness	PA-224886

Notes