ORBCOMM®

CONNECTING THE WORLD'S ASSETS

PT 6000 NPC or OPC or SPC Installation Guide (Carrier)

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LEGAL NOTICE

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CONTACT INFORMATION

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ABOUT THIS INSTALLATION GUIDE

Disclaimer

CAUTION: This guide contains information about the PT 6000 system. No representations or warranties are made as to the accuracy or completeness of the information contained herein. No representations or warranties are made as to the completeness and compliance of any installations that are performed using this guide.

Purpose

This guide contains product information for the PT 6000 system and Carrier reefers. The intended audiences for this guide include field support personnel, product evaluators, and certified third-party personnel. It is particularly intended for personnel who are responsible for system installation and activation. In addition, and as is appropriate, this guide may be used for customer training.

Cautions Concerning Servicing the PT 6000

CAUTION: The reefer must be turned off when service work is required, and there may be a temperature change within the refrigerated compartment that may lead to the loss of the load. ORBCOMM is not liable for lost loads. Be aware of the temperature within the refrigerated compartment during servicing.

CAUTION: Remove the cable from the negative terminal of the reefer battery and secure the cable to prevent accidental contact before performing any installation or service procedure. Only trained service personnel should perform the procedures outlined in this installation manual. These procedures may allow exposure to high electrical energy that could result in electric shock and injury to untrained personnel during servicing, maintenance, and installation of the unit.

CAUTION: To avoid personal injury, the reefer battery should be disabled by disconnecting the negative terminal cable prior to installation or servicing.

CAUTION: Be aware of your working environment. Take appropriate steps to ensure that the PT 6000 cable harness and especially its connectors are not exposed to soil, water, or other contaminants that may be present at the installation site.

OVERVIEW

The following steps outline the overall procedure to follow when installing the PT 6000:

1. Gather the required tools
2. Identify the system components
3. Disconnect the reefer battery
4. Mount the antenna and the PT 6000
    - Mount the optional ST 2100
5. Install the main harness and power control
6. (optional) Connect sensors
7. Reconnect the reefer battery
8. Field test the PT 6000
9. Send the installation form to ORBCOMM

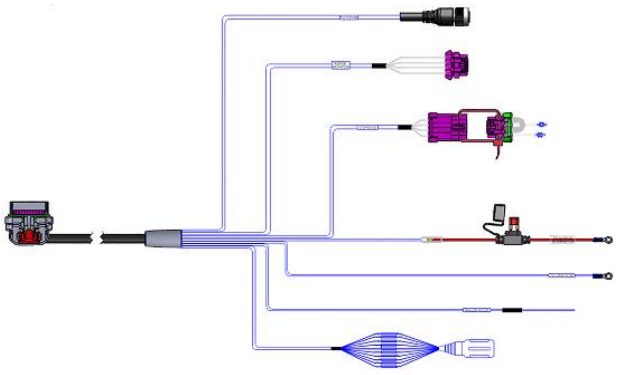
1 GATHER THE REQUIRED TOOLS

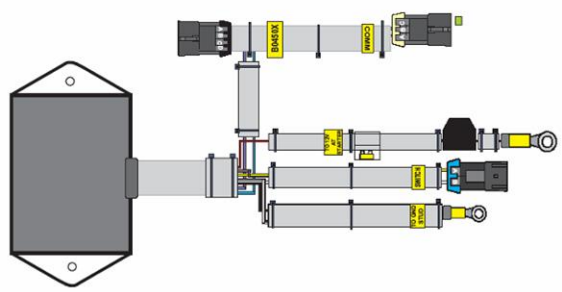
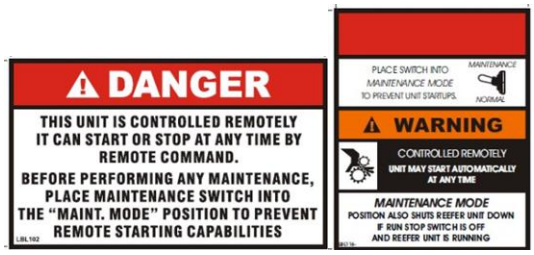
Table 1 lists the tools that are required for a standard installation.

Table 1: Required Tools

Quantity	Description
1	Heavy-duty electric drill
1	1/8-inch drill bit
1	5/16-inch socket
1	3/8-inch socket
1	5/16-inch driver to mount on drill
1	3/8-inch ratchet
1	7/16-inch socket
1	7/16-inch open-end wrench
1	7/16-inch speed ratchet
1	9/16-inch open-end wrench
1	Wire cutters
1	Wire crimpers
1	Heat gun or small torch (for heat shrink connectors)
1	Medium size adjustable Crescent-style wrench
1	Wire snake
1	T10 Torx driver
1	Small flat head screwdriver
1	Phillips head screwdriver
1	Socket wrench - ¼-inch drive
1	6-inch extension socket
1	Approximately 14’ ladder
1	Step ladder (8’) (Optional)
1	Flood lamp (Optional)
1	100’ extension cord (Optional)
1	25’ wire snake tool (for running the fuel sensor wire)

2 IDENTIFY THE SYSTEM COMPONENTS

	PT 6000
	Combination GSM/GPS Antenna
	ST 2100 (optional)
	PT 6000 Main Harness (p/n ST101067)

	Series Power Controller (only for SPC installations)
	Override Power Controller (only OPC installations) (p/n OP100-001)
	Hardware Kit: • Danger label • Warning label • Four Teks mounting screws

3 DISCONNECT THE REEFER BATTERY

CAUTION: WARNING: Risk of Electric Shock
Before you continue the installation, first remove the cable from the negative terminal of the refrigerated unit battery, and then remove the cable from the positive terminal. Only trained service personnel should perform the procedures outlined in this installation manual. These procedures may allow exposure to high electrical energy that could result in electric shock and injury to untrained personnel during unit servicing, maintenance, and installation.

1. Remove the battery cable from the negative terminal of the refrigeration unit battery before you remove the battery cable from the positive terminal.

Note: Be aware of your working environment. Ensure that the PT 6000 cable harness and especially its connectors are not exposed to soil, water, or other contaminants that may be present at the installation site.

4 MOUNT THE ANTENNAS AND THE PT 6000

On all Carrier reefers, the GSM/GPS antennas are mounted on the upper-right corner of the reefer front cowl.

Figure 1: Antenna Mounting Location

4.1 Mount the GSM/GPS Antenna

1. Use the supplied tech screws to mount the bracket to the cross frame on the street-side of the reefer.

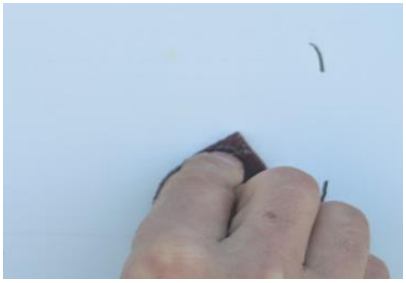
2. Clean the mounting surfaces thoroughly with the included alcohol prep pad.

3. Wait for the surface to dry, use the included adhesive foam to mount the GSM/GPS antenna to the bracket, and

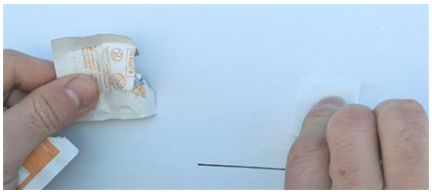
then apply moderate pressure for 30 seconds.

4.2 (Optional) Install the ST 2100

1. Identify the mounting location for the ST 2100 on the front cowl of the reefer, and then record the Mobile ID of the ST 2100.
2. Prepare the mounting surface:
    a. Review the important inclement weather guidelines in APPENDIX G.
    b. Ensure that the mounting surface and the VHB tape are both at least 15°C (60°F). If necessary, use a heat lamp or heat gun to warm them.
    c. Use a surface preparation pad to lightly scratch the surface of the mounting location.



    d. Use an alcohol pad or wipe to clean the bottom of the ST 2100 and the surface mounting location. Ensure that the area is clear of any dirt or particles.



e. Apply 3M primer to the mounting location, and then wait at least 30 seconds for the primer to dry.

3. Remove the liner from the VHB pad on the ST 2100, and then affix it to the mounting surface. Press firmly on the entire surface of the ST 2100 for 60 seconds.

   CAUTION: DO NOT touch the VHB tape.

   CAUTION: VHB tape installation temperature must be above 15°C (60°F).

4. Route the ST 2100 pigtail of the PT 6000 main harness up the driver's side of the reefer to the mounting location for the ST 2100.

5. Before making any harness connections, slide the provided shrink tube over the ST 2100 pigtail on the PT 6000 main harness.
6. Twist the two cable ends (between the ST 2100 and the PT 6000 main harness) together until you feel it lock in place.
7. Slide the shrink tube into place over the mated connectors and then heat to shrink.
8. Secure the harness to the reefer cowl by drilling holes into the lip of the cowl and securing with cable / zip ties.

4.3 Route the Antenna Cables and Mount the PT 6000

1. Route all antenna cables downward, toward the back of the reefer microprocessor location.

Note: Route the wires with the other black (low voltage) cables. Keep the wires away from the orange (high voltage) cables.

2. Remove the PT 6000 antenna connector cover with a T10 Torx driver, and plug in the FAKRA connectors.

   The FAKRA connectors are color-coded and keyed so that they can go in only one way.

3. Replace the antenna connector cover and fasten with screws.

4. Use the provided mounting bracket and fasteners to mount the PT 6000 in a location that will not expose it to abrasion or excessive heat. Mount it with the antenna connectors face down (not up), to prevent water from collecting inside.

Preferred multi-temp install location

Preferred single-temp install location

5. Plug the main harness connector into the PT 6000, so that it locks into place.

6. Use an included ring clamp (Adel clamp) to affix the main harness to the side of the PT 6000.

7. Secure the clamp with one of the four mounting screws.

5 INSTALL THE HARNESS, POWER CONTROL, AND REEFER CONNECTIONS

The wiring harness connects the PT 6000, reefer +12V, reefer ground, and reefer microprocessor. The wiring harness is designed for a rugged installation.

The instructions below apply to both an Override Power Controller (OPC) and a Series Power Controller (SPC) installation, unless noted otherwise.

5.1 PT 6000 Main Harness Connections and Details

Table 2: PT 6000 Main Harness Connections

Cable	Connector Name	Figure Reference	Connects To
PT 6000 Main Harness	PT 6000 Main Connector - 24-Pin right-angle	J101	PT 6000 in the reefer compartment
	To Gnd Stud	J102	Chassis Ground
	To 12V at Starter	J103	+12 Volt stud on the engine starter
	CAP	J104 with jumper	Must be plugged into J106 when Psion, laptop, or Jett CE is not connected
	Reefer monitor	J105	J102 of the power control harness for the Vector 6500® ST with power control
	Console	J106	Psion, laptop, or Jett CE Must have J104 plugged in when not connected to Psion, Laptop, or Jett CE
	Tractor hook	N/A	ABS line on trailer 7-way
	Pigtails	N/A	Used for optional fuel sensor, door sensor, or remote temperature sensor

Figure 2: PT 6000 Main Harness (ST101067-001)

Refer to APPENDIX D for details.

5.2 Install the Main Harness

1. Open the relevant access panels and doors.
2. Start from the J101 connector on the main harness connected to the PT 6000 and locked into place.

3. Use the provided cable ties to secure the cable harness. Ensure that the harness does not interfere with the ability to close any door or access panel.

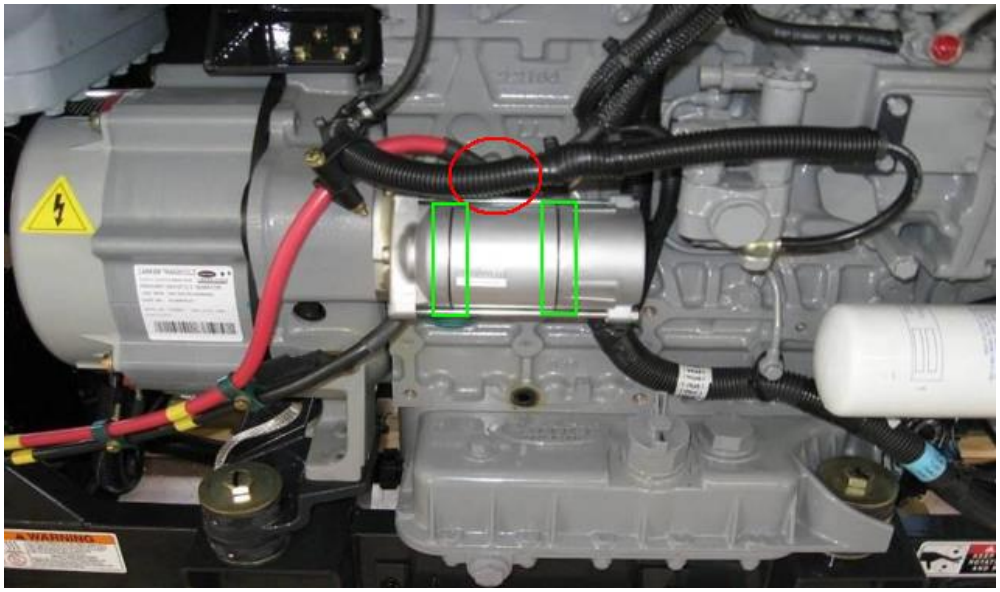
   Avoid routing the main harness closer than three inches from any plumbing pipes and valves. These pipes become hot during reefer operation.

4. Attach TO GND STUD (J102) on the main harness to a ground stud on the reefer frame.

CAUTION: Ground connections for the override power control should be made to the same or to a nearby grounding point on the reefer frame.

5. Route the fused TO 12V AT STARTER (J103) connector on the main harness along the existing Carrier main harness.

6. Attach the connector to the positive terminal lug on the engine starter (heavy red Carrier wire, circled in red).



7. Secure the ground wire and +12V wire with cable ties. Leave the in-line fuse holder accessible with some service loop in the cable.

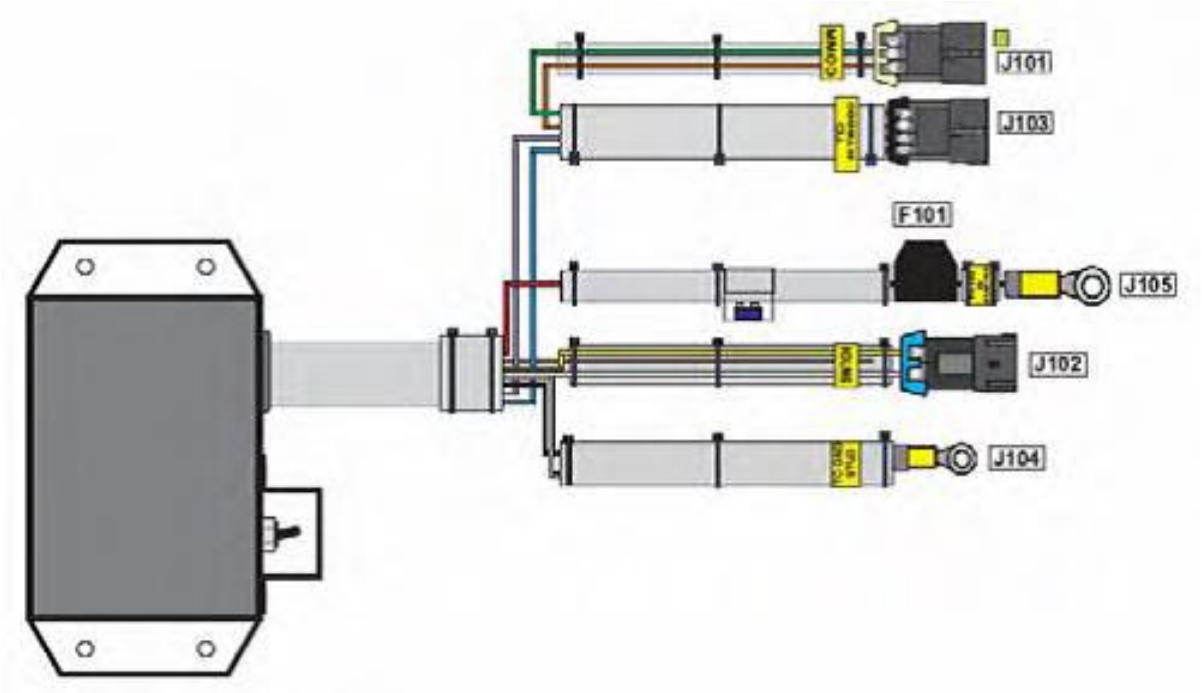
5.3 Review the Power Control Connections

Table 3: PT 6000 Connections

Power Controller	Connector Name	Figure Reference	Connects To
SPC and OPC	TO REEFER (COMM two-pin male)	J101	SatCom connector on the Carrier wiring harness behind the reefer microprocessor
	TO TERMINAL (PT6000 four-pin male)	J103	J105 REEFER MONITOR on the main harness
	TO GND STUD	J104	Ground on the reefer frame
	+12v at STARTER	J105	+12Volt: To stud on the engine starter
	SWITCH	J102	J1 connector on the Carrier wiring harness under the reefer microprocessor
Non-power control	COMM two-pin male	J101	SatCom connector on the Carrier wiring harness behind the reefer microprocessor
	To PT6000 four-pin male	J103	J105 REEFER MONITOR on the main harness
	Switch	J102	J1 connector on the Carrier wiring harness under the reefer microprocessor

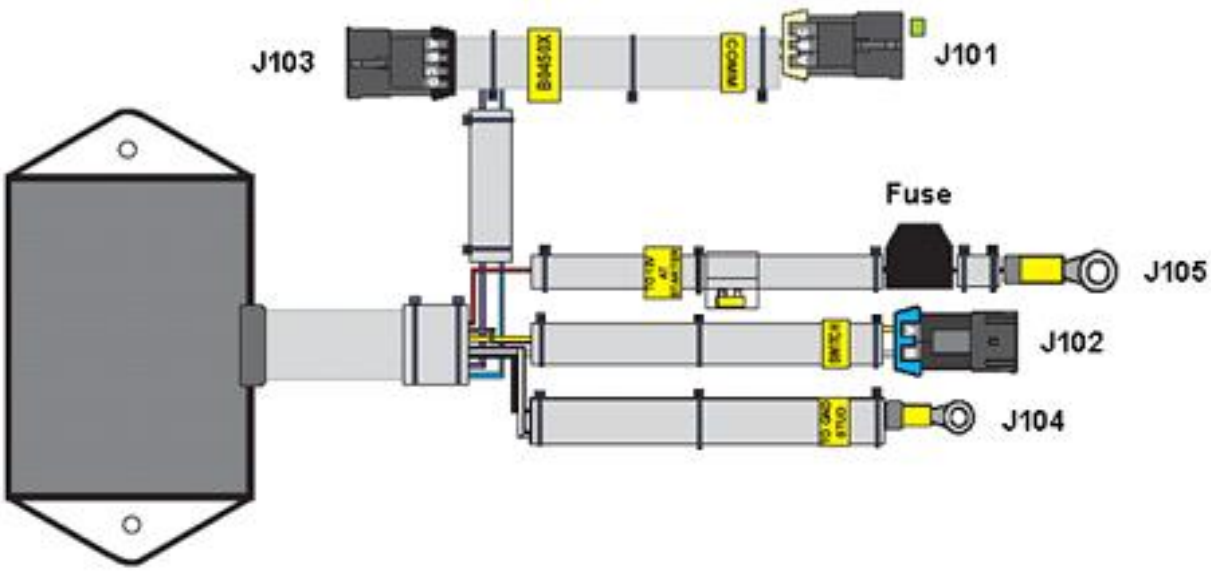
For Override Power Controller Installations

Figure 3: Override Power Control

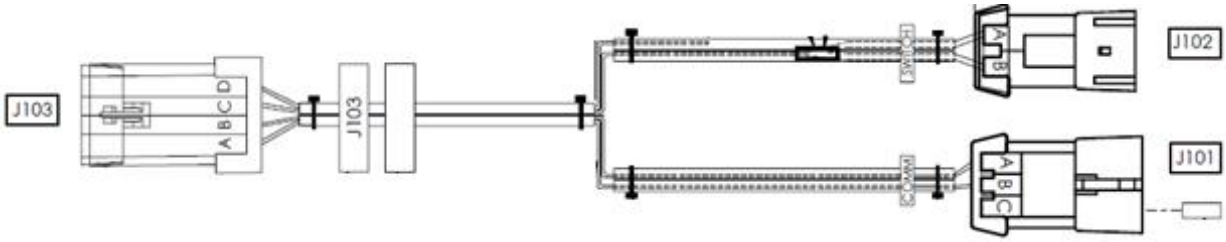


For Series Power Controller Installations

Figure 4: Series Power Control



For Non-Power Controller Installations



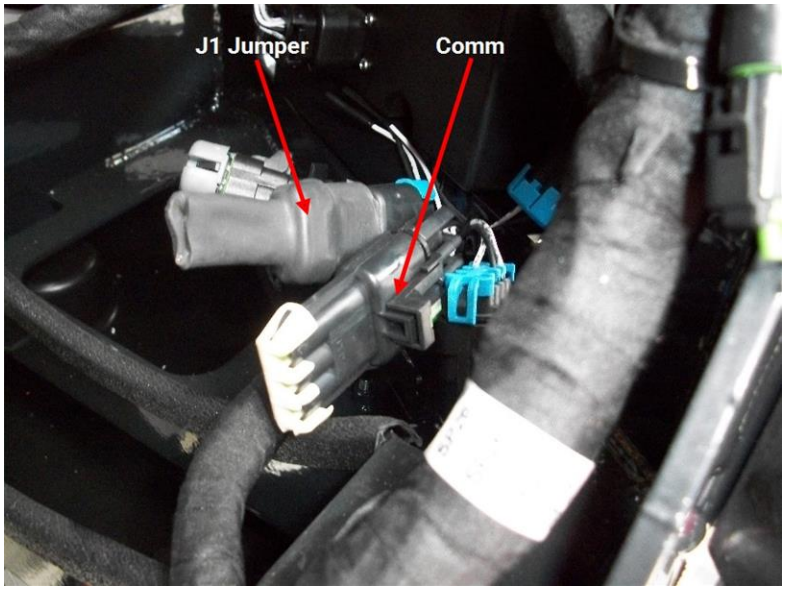
5.4 Perform the Installation

If installing an override power control or a series power control, follow the steps in section 5.4.1.

If installing a non-power control, follow the steps in section 5.4.2.

5.4.1 Install the Override or Series Power Control

1. Mount the override/series power control under the reefer using the provided self-drilling 8-18 x3/4" Teks screws.
2. Before you run the cable through the bottom of the reefer, route the override/series power control cable to form a drip loop underneath.
3. Connect TO GND STUD (P4) from the override/series power control to a ground stud on the reefer frame, at or near the main harness ground.
4. Plug TO TERMINAL (P2) from the override/series power control into REEFER MONITOR (J105) on the main harness.
5. Plug the three-wire SatCom connector in the Carrier wiring harness underneath the reefer microprocessor into the three-pin TO REEFER (P7-Comm) from the override/series power control.



6. Route the fused rung log TO 12V AT STARTER from the override/series power control harness alongside the existing Carrier main harness. Attach the connector to the positive terminal of the starter.

7. Plug the two-wire J1 jumper power connector of the Carrier main harness into the two-wire SWITCH (P3) connector on the override/series power control harness.

   Ensure that the jumper plug removed from the Carrier harness is secured near the J1 plug and remains with the asset.

8. Tie off any excess cable along the frame and secure with plastic cable ties.

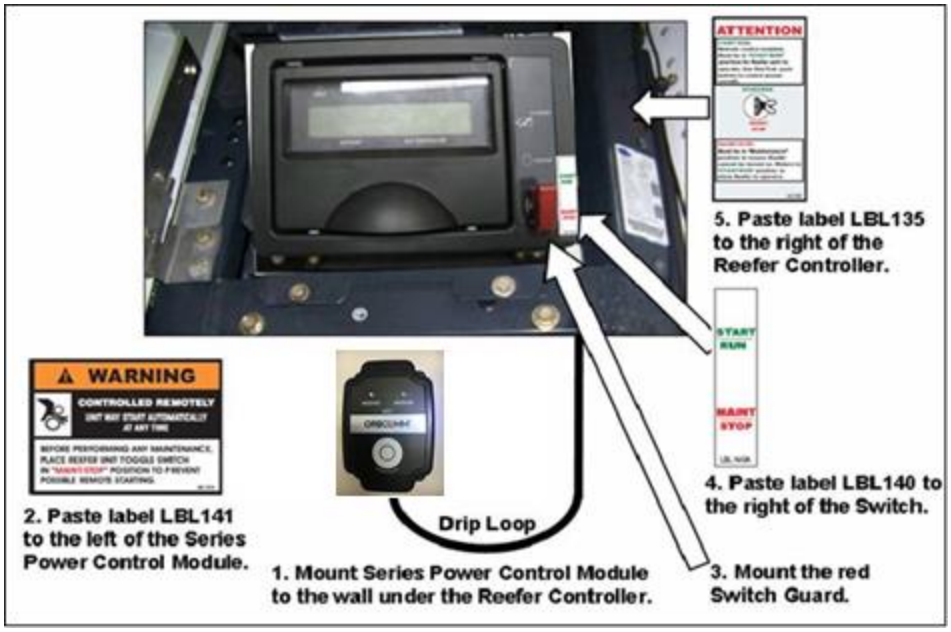
   Make sure that the CONSOLE (J106) connector on the main harness is accessible and visible when the reefer microprocessor panel is opened. Jumper (J104) must remain connected to the CONSOLE (J106) connector during normal operation.

9. (For SPC Installations ONLY) Mount the red switch guard over the START/RUN and OFF switch on the reefer microprocessor:
   a. Loosen the locking nut on the front of the panel.
   b. Push the switch back through the panel.
   c. Remove the backing nut from the switch.
   d. Position the switch in the panel.
   e. Lay the 7/8” OD x 0.048” flat washer, provided, over the switch handle.
   f. Position the Switch Guard over the switch handle with the Switch Guard hinge below the switch handle.
   g. Tighten with the locking nut.
   h. Check the mechanical operation of the switch handle. When the Switch Guard is closed, the switch handle should be in the RUN/START position. When the Switch guard is open, the switch handle should be able to move to the OFF position.

10. Affix the appropriate labels.

    For an OPC Installation : Affix a DANGER label outside and near the override power control.

    For an SPC Installation: Affix the labels outside and near the power control.



5.4.1.1 Ensure Safe Operation

For Single Temperature Override Power Control - OPC Only

CAUTION: To prevent an unexpected reefer start during installation, set the toggle switch to Maintenance mode before pulling off the yellow tape. The override power controller must be in Maintenance mode when the reefer battery is reconnected.

Figure 5: Override Power Control Front Panel

CAUTION: Before you perform any maintenance on the reefer, set the override power control maintenance switch to Maintenance mode.

CAUTION: Before you perform any work on the reefer unit, disconnect the negative lead of the battery terminal.

After you perform any maintenance to the reefer, set the maintenance switch back to Normal mode, to allow remote control of the reefer.

Table 4 describes the LEDs that indicate the status of the power control module.

Table 4: Single-Temperature Override Power Control Safe Operation

Local LED	Remote LED	Power Control State	Description
ON	OFF	Local Mode	The local reefer controls are active until a remote command

Local LED	Remote LED	Power Control State	Description
Short FLASH every 10 seconds [1]			
OFF	ON	Remote Mode	The reefer is controlled remotely. Local controls have no effect. Push the button to switch to Local mode.
	Short FLASH every 10 seconds		
One second ON, one second OFF	OFF	Maintenance Mode	Local reefer controls are active, and remote control is disabled.

For Single Temperature Series Power Control - SPC Only

The B0450 Series Power Control operates a relay wired in series with the START/RUN and MAINT/STOP switch. For the reefer to operate, this switch must remain in the START/RUN position. A switch guard ensures that the switch remains in the START/RUN position during normal operation.

The reefer is kept OFF with the switch in the MAINT/STOP position. To place the switch in the MAINT/STOP position, first flip the switch guard down. Then move the switch handle down. This position functions as a MAINTENANCE switch, disabling any remote powering of the reefer. It also functions as a local KILL switch, again forcing the reefer OFF.

Table 5 summarizes the operating mode of the B0450 Series Power Control.

Table 5: Series Power Control Safe Operation

Control	Action	Switch set to START / RUN	Switch set to MAINT / STOP
Local Control	Push REEFER ON/OFF once	Turns reefer ON locally when it is OFF	Reefer OFF
		Turns reefer OFF locally when it is ON	
Remote Control	Send remote command to turn ON	Turns reefer ON remotely when it is OFF	
	Send remote command to turn OFF	Turns reefer OFF remotely when it is ON	

The front panel LED labeled REEFER POWER is lit when power is applied to the reefer microprocessor.

[1] LEDs flash when the reefer is OFF to conserve battery power.

Figure 6: Series Power Control Front Panel

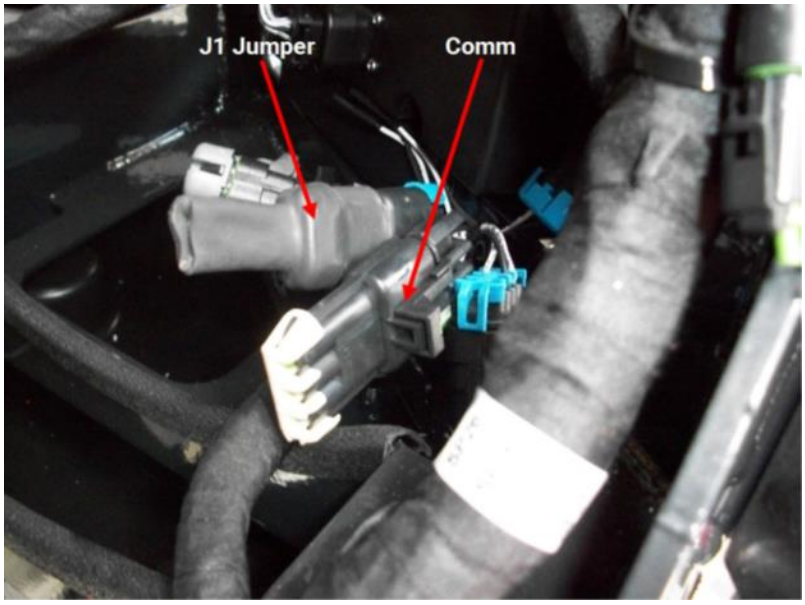
CAUTION: Before you perform any work on the reefer unit, disconnect the negative lead of the battery terminal.

After you perform any maintenance to the reefer, set the maintenance switch back to Normal Mode, to allow the remote control of the reefer.

5.4.2 Install the Non-Power Control

1. Plug (J103) from the non-power control adapter into REEFER MONITOR (J105) on the main harness.
2. Plug the three-wire SatCom connector in the Carrier wiring, harness underneath the reefer microprocessor, into the three-pin COMM (J101) from the non-power control.adapter.
3. Plug the two-wire J1 jumper power connector of the Carrier main harness into the two-wire SWITCH (J102)

connector on the non-power control adapter harness.



6 (OPTIONAL) CONNECT SENSORS

If this installation does not include sensors wired to the PT 6000, skip this section. The Fuel Sensor Y-Adapter Kit enables a single fuel sensor to be read through both the reefer microprocessor and through the CargoWatch® platform. Door sensor connections enable door opening/closing to be monitored by the system.

Refer to the appropriate appendix for your specific type of sensor.

7 RECONNECT THE REEFER BATTERY

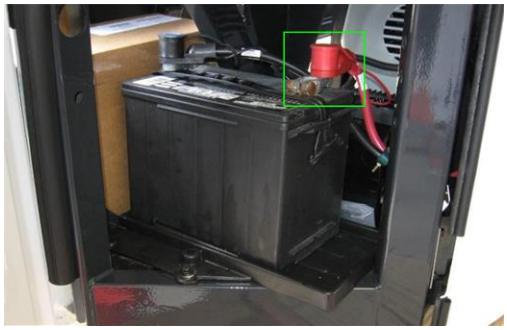
CAUTION: After all hardware and wiring is installed, power may be applied to the PT 6000 for the first time.

Note: The grounding point for the PT 6000 should be the same as the grounding point for the wireless receiver. This eliminates potential electrical noise problems in the sensor readings.

1. Verify that all cable and individual wiring connections are properly connected and weather-sealed before reconnecting the negative terminal of the reefer battery.

   Note: Set the microprocessor to Maintenance mode before reconnecting the battery. SPC comes up hot if the microprocessor is not in Maintenance mode.

2. Reconnect the cable to the positive terminal of the reefer battery. When the cable is reconnected to the negative terminal, the PT 6000 powers on. Refer to APPENDIX F for a description of the PT 6000 LED behavior.



8 FIELD TEST THE PT 6000

Note: Perform field testing outside.

8.1 Install DataTrak for the Carrier Advance Microprocessor

The Carrier Advance microprocessor can accept DataTrak, which is an optional wireless communication feature. DataTrak allows two-way communication through various wireless communication systems, such as the PT 6000. The DataTrak option must be either factory-installed or field-installed using a DataTrak option card.

To install the DataTrak option card:

1. Open the reefer side door that contains the microprocessor.
2. To access the microprocessor, locate the two bolts that hold the metal door closed on the microprocessor and remove them.
3. Insert the DataTrak option card into the PCMIA slot, with the instructions facing the caution label on the microprocessor.
4. Set the reefer switch to the On/Run position and watch for instructions on the display.
5. When prompted, remove the DataTrak option card.

   The PT 6000 can now communicate with the reefer.
6. If the DataTrak option is already installed in the Advance microprocessor, but the SatCom configuration is set to Qualcom, change it to OTHER.

   This setting provides the proper communication from the Carrier Advance microprocessor to the PT 6000.

8.2 Enable DataTrak for the Carrier APX Microprocessor

The Carrier APX microprocessor has a USB port for enabling the DataTrak option.

1. Locate the USB port on the front of the microprocessor.
2. Follow the approved Carrier procedure for enabling DataTrak.
3. Set the SatCom configuration to OTHER.

8.3 Field Auto-Association and Testing

1. Ensure that the asset name is programmed into the microprocessor.
2. Turn the reefer on (locally).
3. Confirm green LED light is flashing on the PT 6000.
4. Run reefer for 10 minutes.
5. In CargoWatch, confirm the asset has named properly and is reporting temps and fuel (if applicable).
6. Send remote off command and confirm reefers shuts down.

APPENDIX A INSTALL THE FUEL SENSOR (OPTIONAL)

1. Apply dielectric grease to the female side before mating the Fuel Sensor Extension Cable (B0200) to the fuel sensor.
2. Secure the connectors and fuel sensor fuel lines insuring they do not rub against the trailer floor.
3. On the main harness pigtails, remove the RED/WHITE, WHITE/BLACK, and BLACK wires from the loom.
4. Butt-splice or solder and shrink wrap the RED wire of the fuel sensor extension cable to the RED/WHITE (FUEL PWR) wire of the main harness (J101-Pin 17).

Signal	Wire Color
FUEL PWR	RED/WHITE
FUEL IN	WHITE/BLACK
GROUND	BLACK

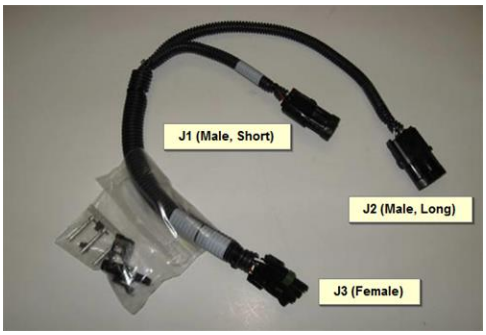
5. Butt-splice or solder and shrink wrap the WHITE wire of the fuel sensor extension cable to the WHITE/BLACK (FUEL IN) wire of main harness (J101-Pin 10).

6. Butt-splice or solder and shrink wrap the BLACK wire of the fuel sensor extension cable to the BLACK (GROUND) wire of the main harness (J101-Pin 5).
7. Use cable ties to secure the fuel cable wiring harness approximately every 12 inches (30 cm).

Fuel Sensor Y-Adapter

Locate the Fuel Sensor Y Cable and the Fuel Y Adapter kit as shown in Table 6. The Fuel Sensor Y Cable connects the fuel sensor with the reefer microprocessor and the PT 6000. It includes parts for a spare 3-circuit weatherproof female connector. The Fuel Y Adapter kit includes cable ties and contains connector shells, pins, and seals to assemble one 3-circuit weatherproof male connector and one 3-circuit weatherproof female connector.

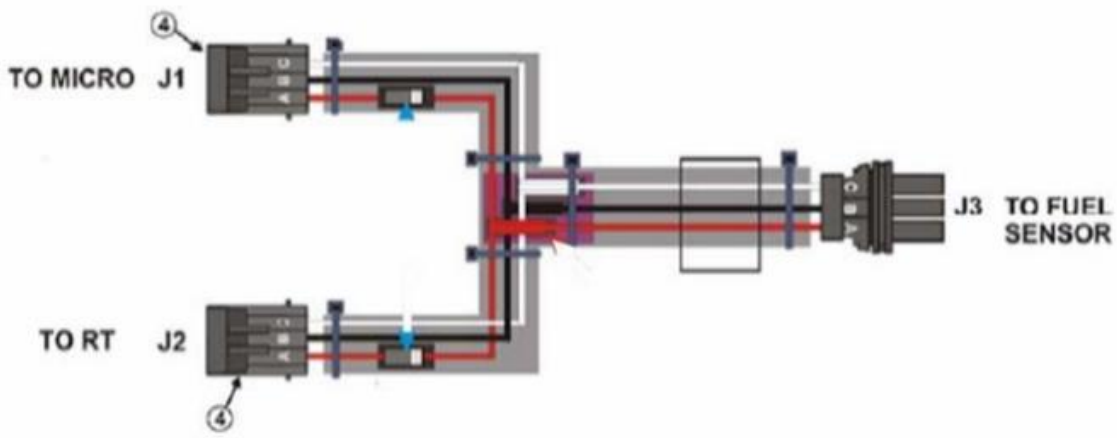
Table 6: Fuel Sensor Y-Adapter Kit Components



Fuel Sensor Y Cable (B0275)

Fuel Y Adapter Kit (B0287)

1. Install the Fuel Sensor Y Cable behind the reefer microprocessor.



2. Locate the power, ground, and signal return for the fuel sensor at the reefer microprocessor.
3. Disconnect the connector coming from the fuel sensor.
4. Match polarity of the fuel sensor connections with the Fuel Sensor Y Cable.
5. Verify the type of connector coming from the fuel sensor. If necessary, replace with the weatherproof connector provided.
6. Connect J3, the 3-circuit female, to the fuel sensor cable.

7. Connect J1, the 3-circuit male with the shorter leg, to the fuel sensor input to the microprocessor.
8. Locate the PT 6000 harness pigtail, just before all legs branch out of the PT 6000 harness.
9. Locate the RED, WHITE, and BLACK wires in the pigtail. Install seals, pins and a connector shell onto these wires. The seals go on before crimping the connector pins (Table 7).

Table 7: Pin Connections

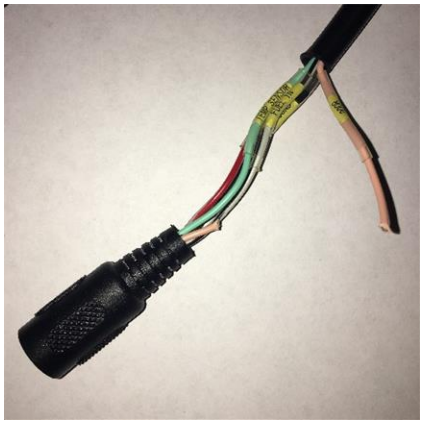
Pin A	Red (12 V+)
Pin B	Black (Ground)
Pin C	White (Signal)

10. Rotate the locking feature on the shell into place.
11. Connect J2, the 3-circuit male with the longer leg, to the PT6000 harness pigtails.
12. Dress and secure the harness neatly behind the existing harness with cable ties. Ensure all cables are secured.

APPENDIX B INSTALL THE DOOR SENSOR (OPTIONAL)

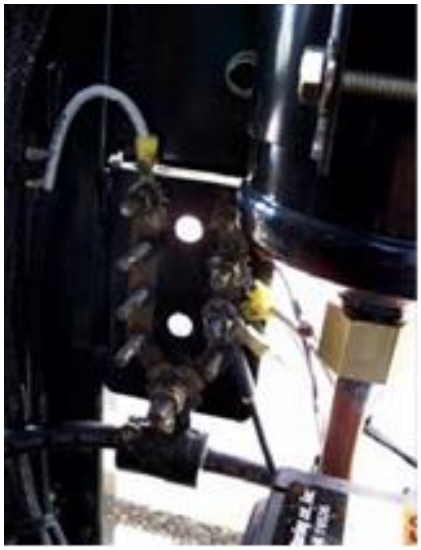
A single door sensor can be connected to the PT 6000.

1. Locate the pigtail leads on the main harness.
2. Remove the PINK wire from the bundle.
3. Butt-splice one side of the door sensor to the PINK wire in the bundle of pigtail leads. This connects to Pin 8 on J101 of the main harness.



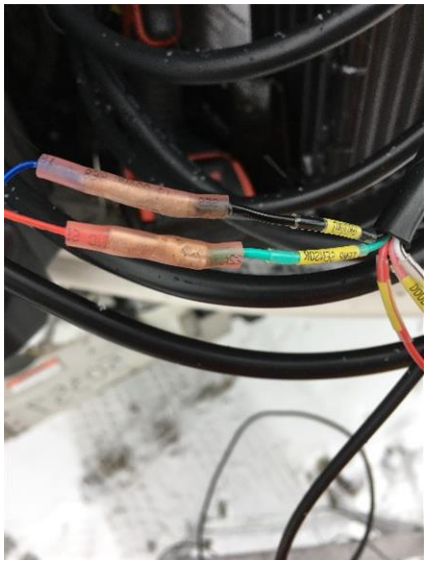
Note: The Door wire was GREEN/WHITE on earlier wiring harnesses.

4. Connect the other side of the door sensor to the trailer chassis ground. Make sure there is a strong electrical connection.



APPENDIX C INSTALL THE TEMPERATURE SENSOR (OPTIONAL)

1. Locate the pigtail leads on the main harness.
2. Remove the GREEN Temp Sensor and the BLACK Ground wire from the bundle.
3. Butt-splice the RED/WHITE wire of the Temp Sensor to the GREEN wire on the main harness pigtail.
4. Butt-splice the BLACK or Blue wire of the Temp Sensor to the BLACK ground wire on the main harness pigtail.



Note: Power +12V, Door Power+ In, Ground connections for the Wireless Receiver Harness are not made through the main harness.

APPENDIX D PT 6000 MAIN HARNESS

Figure 7: PT 6000 Main Harness (p/n ST101067)

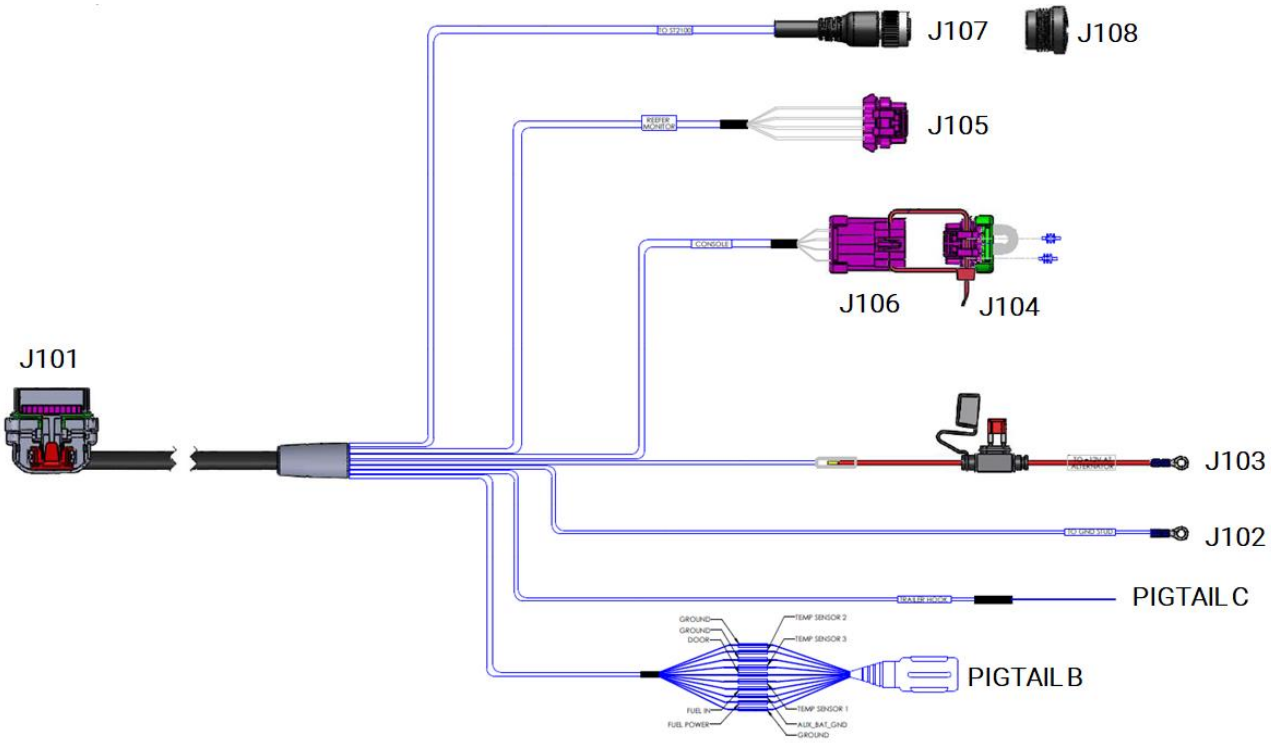


Table 8: Connector Views

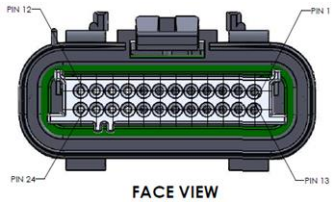
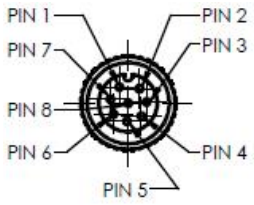
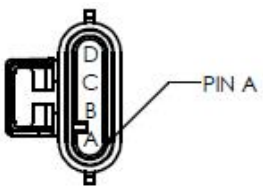
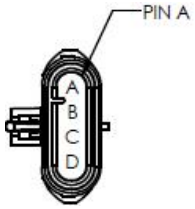
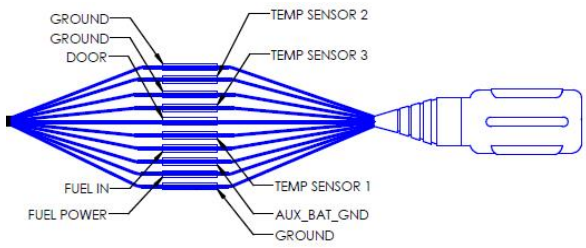
J101	J107 (Female)	J105	J104
			
PIGTAIL B			
			

Figure 8: PT 6000 to ST 2100 Main Connector - J101 (Face View)

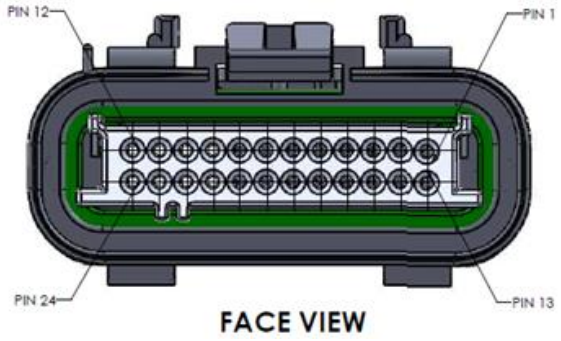


Figure 9: PT 6000 to ST 2100 Main Connector Pin Connections

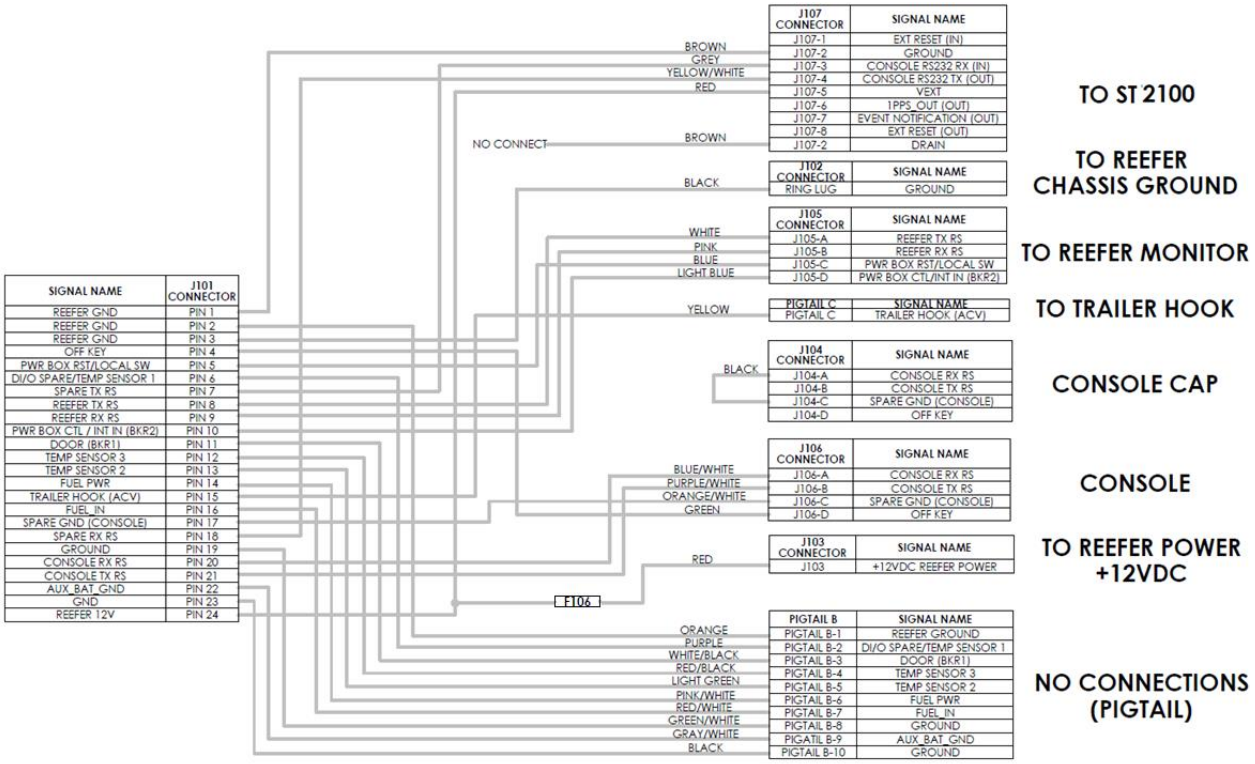


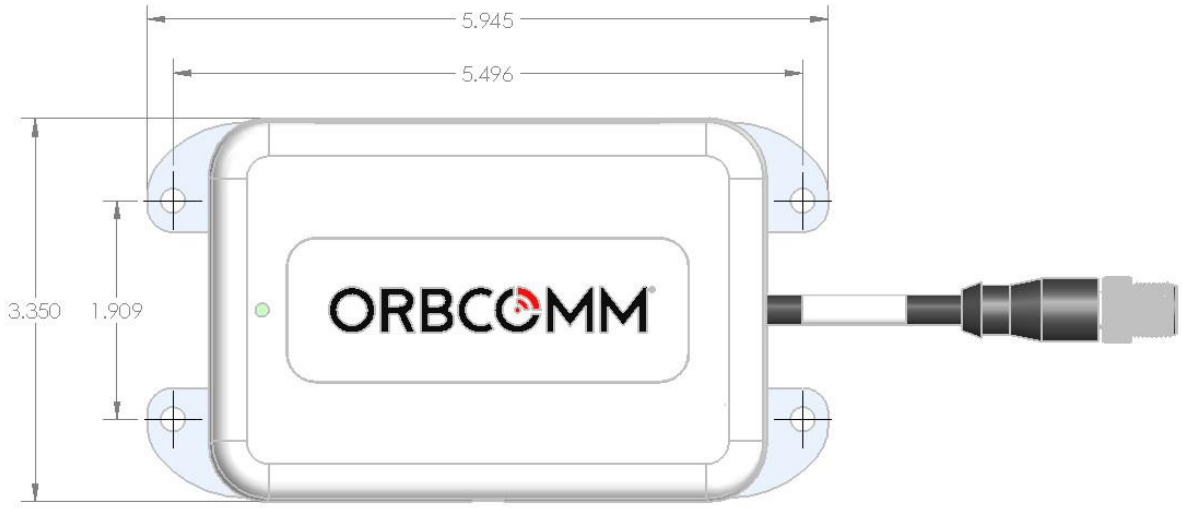
Table 9: PT 6000 Main Harness Wiring

	Signal Name	Wire Color	Mating Connector	Male Header Mating	Notes
PIN 1	REEFER GND	BROWN	J107-2	PIN 23	Secondary wire - shield @ J107, AWG - 24
PIN 2	REEFER GND	ORANGE	PIGTAIL B-1	PIN 24	AWG - 18

	Signal Name	Wire Color	Mating Connector	Male Header Mating	Notes
PIN 3	REEFER GND	BLACK (BROWN/WHITE)	J102	PIN 23	AWG - 18
PIN 4	OFF KEY	GREEN	J106-D	PIN 22	AWG - 18
PIN 5	PWR BOX RST/LOCAL SW	BLUE	J105-C	PIN 21	AWG - 18
PIN 6	DI/O SPARE/TEMP SENSOR 1	PURPLE	PIGTAIL B-2	PIN 20	AWG - 18
PIN 7	SPARE TX RS	GRAY	J107-3	PIN 19	AWG - 24
PIN 8	REEFER TX RS	WHITE	J105-A	PIN 18	AWG - 18
PIN 9	REEFER RX RS	PINK	J105-B	PIN 17	AWG - 18
PIN 10	PWR BOX CTL / INT IN (BKR2)	LIGHT BLUE	J105-D	PIN 16	AWG - 18
PIN 11	DOOR (BKR1)	WHITE/BLACK	PIGTAIL B-3	PIN 15	AWG - 18
PIN 12	TEMP SENSOR 3	RED/BLACK	PIGTAIL B-4	PIN 14	AWG - 18
PIN 13	TEMP SENSOR 2	LIGHT GREEN	PIGTAIL B-5	PIN 13	AWG - 18
PIN 14	FUEL PWR	PINK/WHITE	PIGTAIL B-6	PIN 12	AWG - 18
PIN 15	TRAILER HOOK (ACV)	YELLOW	PIGTAIL C	PIN 11	Secondary wire - solder to PURPLE/18 AWG/2 feet (60 cm), connector - PIGTAIL, AWG - 18
PIN 16	FUEL_IN	RED/WHITE	PIGTAIL B-7	PIN 10	AWG - 18
PIN 17	SPARE GND (CONSOLE)	ORANGE/WHITE	J106-C	PIN 9	AWG - 18
PIN 18	SPARE RX RS	YELLOW/WHITE	J107-4	PIN 8	AWG - 24
PIN 19	GROUND	GREEN/WHITE	PIGTAIL B-8	PIN 7	AWG - 18
PIN 20	CONSOLE RX RS	BLUE/WHITE	J106-A	PIN 6	AWG - 18
PIN 21	CONSOLE TX RS	PURPLE/WHITE	J106-B	PIN 5	AWG - 18
PIN 22	AUX_BAT_ GND	GRAY/WHITE	PIGTAIL B-9	PIN 4	AWG - 18
PIN 23	GND	BLACK	PIGTAIL B-10	PIN 3	AWG - 18
PIN 24	REEFER 12F	RED	F106-1	PIN 2	Secondary wire - F106-2 RED/16 AWG/6 in. (15 cm). connector J103, AWG - 18

	Signal Name	Wire Color	Mating Connector	Male Header Mating	Notes
-	ST 2100 EXTERNAL POWER (VEXT)	RED	J107-5	PIN 1	AWG - 24
-	-	BLACK	J104--A	-	Secondary wire - J106-C

APPENDIX E ST 2100 DIMENSIONS



APPENDIX F PT 6000 LED DESCRIPTION

To help diagnose performance, the PT 6000 incorporates a series of LEDs on its top cover, which provides visual feedback. Refer to Table 10 to determine whether the PT 6000 is operating correctly.

Table 10: PT 6000 LED Description

Event	Green	Duration (sec)	Frequency (Hz)	Yellow	Duration (sec)	Frequency (Hz)	Red	Duration (sec)	Frequency (Hz)
Startup	ON	20	-	ON	20	-	OFF	OFF	OFF
Micro Comm	Blink 3x	1.2	2	OFF	OFF	OFF	OFF	OFF	OFF
Micro OFF/Not Detected	Blink 7x	0.7	10	OFF	OFF	OFF	OFF	OFF	OFF
Micro Read Error	OFF	OFF	OFF	OFF	OFF	OFF	Blink 7x	0.7	10
U-blox Comm/Antenna Error	OFF	OFF	OFF	OFF	OFF	OFF	Blink 3x	1.2	2
GSM Error: No Comm	OFF	OFF	OFF	Blink 3x	1.2	2	OFF	OFF	OFF
GSM Warning: No Service	OFF	OFF	OFF	Blink 7x	0.7	10	OFF	OFF	OFF

APPENDIX G INCLEMENT WEATHER GUIDELINES

The primary means of securing the ST 2100 to an asset is VHB. Proper VHB application requires that the VHB tape is kept warm and the asset surface is both clean and dry.

Mandatory Guidelines for Installation in Wet Weather

The installation surface on the asset must be completely clean and dry for the VHB to bond. If it is raining or snowing hard enough that the surface cannot be kept dry, do NOT proceed with the installation.

Mandatory Guidelines for Installation in Cold Weather

Below 15°C (60°F) the VHB starts becoming firm which makes it more difficult to bond to the asset.

If the guidelines below are followed correctly the ST 2100 can be installed at temperatures down to -20°C (-5°F).

- At or below freezing temperatures (0°C or 32°F), both the ST 2100 and the VHB primer must be kept at room temperature , for example, inside an idling vehicle or a warm building.
- Keep the primer warm (room temperature) until ready to apply. The primer will not dry quickly at cold temperatures however, in this situation the VHB should be applied when the primer is still wet, as it improves initial bond.
- Keep the ST 2100 warm (room temperature) until it is time to mount it to the asset.
- Press firmly on the entire top surface of the ST 2100 (15 pounds for 60 seconds) to bond the VHB to the asset.
- Failing to follow these guidelines will compromise the installation.

APPENDIX H RETURN MATERIAL AUTHORIZATION PROCESS

ORBCOMM has a formal Return Material Authorization (RMA) process in place to accommodate warranty returns.

When you need to return a product under warranty to ORBCOMM, the proper individual should call and speak with ORBCOMM Customer Care for an RMA number and instructions. A unique RMA number is assigned to each individual item being returned. It helps the process if the person calling has the following information available:

- Name, address and telephone of the person processing the RMA (this is the person to whom the warranty replacement unit will be sent)
- Model Number of the unit being returned
- Serial Number of the unit being returned
- Reason the unit is being returned

Additionally:

- The warranty replacement units will ship typically within 48 business hours via ground freight. Expedited shipment is available at an additional cost.
- Each warranty replacement will arrive with an individual RMA Form which must be filled out and returned with the RMA unit (the unit being replaced).
- The RMA unit must be returned (FOB destination) within 15 days of the original RMA to avoid being invoiced for the new unit.
- The RMA number must be referenced on the OUTSIDE of the box to insure proper routing within ORBCOMM.
- Items received without proper documentation will be returned and the replacement unit invoiced.

The RMA unit must be properly packed. Items damaged during shipment will be returned and the replacement unit invoiced. If you have any questions regarding this process, feel free to speak with the Customer Care team.