

AIR^{EL}

Illuminated Thermal Identification System



Installation Manual

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Safety Messages

For your safety, read and understand this manual thoroughly before installing, operating, and servicing the AirEL Illuminated Thermal Identification System. The safety messages presented throughout the manual are reminders to exercise extreme care at all times.

Safety Message to Installers and Operators

The lives of people depend on your proper installation and servicing of Federal Signal/AirEL products. It is important to read and follow all instructions shipped with the products. In addition, listed below are some other important safety instructions and precautions you should follow.

Before Installation or Service

Read all instructions prior to installation.

Qualifications:

- To properly install this product, you must have a good understanding of automotive electrical procedures and systems, along with proficiency in the installation and use of safety warning equipment.

Electrical Hazards:

- When drilling into a vehicle structure, be sure that both sides of the surface are clear of anything that could be damaged.
- File these instructions in a safe place and refer to them when maintaining and/or reinstalling the product.
- Failure to follow all safety precautions and instructions may result in property damage.
- The AirEL Model AEL-PX300 is a load responsive, DC/AC power inverter designed to drive two AirEL Illuminated Public Safety Alphanumeric Characters.
- Model AEL-PX300 power inverter converts automotive DC power (13.8 V nominal) to a smooth sine wave output (160 V_{RMS}/700 Hz nominal) and is intended to drive up to 300 in² of AirEL lit area. (See charts in Wiring Instructions.)
- The Model AEL-PX300 and AEL-PX450 power inverters are fully compliant with FCC regulations for radiant emissions. (Data available upon request.)
- Standby Mode Parasitic Draw for AEL-PX300 and AEL-PX450 inverters is typically < 1 μ A.
- Model AEL-PX450 is a load responsive, DC/AC power inverter designed to drive three AirEL Illuminated Public Safety Alphanumeric Characters.
- Model AEL-PX450 converts automotive DC power (13.8 V nominal) to a smooth sine wave output (160 V_{RMS}/700 Hz nominal) and is intended to drive up to 450 in² of AirEL lit area. (see charts in Wiring Instructions.)
- AirEL Model AEL-PX-IR is DC to AC inverter designed to power the thermal option on the AirEL Illuminated Public Safety Alphanumeric Characters.

- Model AEL-PX-IR converts automotive DC power (13.8 V nominal) to a modified sine wave ($115 V_{\text{RMS}}/60 \text{ Hz}$ nominal) producing up to 300 W of continuous power.

During Installation and Service

Read all instructions prior to installation.

- Clean surface area with clean, dry cloth before adhering AirEL alpha-numeric characters. Do not use a chemical cleaner on surface area.
- Complete and check all wiring and connections prior to activating the AEL-PX300 or AEL-PX450 inverter. All wiring and connections to the lit alphanumeric characters as well as DC power connections should be made prior to applying 12 VDC to the unit.
- Do not operate the AEL-PX450 or AEL-PX300 inverter in a no-load condition. (Lit characters not connected.)
- If lit characters do become disconnected while the AEL-PX450 or AEL-PX300 inverters are operating, turn the inverters off prior to reconnecting the lit characters. Connecting the lit characters to a AEL-PX300 or AEL-PX450 that is operating in a no-load condition can damage the character.

After Installation and Service

Read all instructions prior to installation.

- After installation, test the AirEL system to ensure that it is operating properly.
- To ensure proper operation, test all vehicle functions, including horn operation, vehicle safety functions, and vehicle light systems. Ensure that the installation has not affected the vehicle operation or changed any vehicle safety function or circuit.
- Do not attempt to activate or de-activate the light system control while driving in a hazardous situation.
- You should frequently inspect the AirEL system to ensure that it is operating properly and that it is securely attached to the vehicle.
- After installation and testing are complete, provide a copy of these instructions to instructional staff and all operating personnel.
- File these instructions in a safe place and refer to them when maintaining and/or re-installing the product.
- Failure to follow these precautions may result in property damage, serious injury, or death.

Overview of AirEL System

AirEL Illuminated and Thermal Identification System

Alphanumeric Platform

- Produces powered light for identification
- Produces heat signature for thermal identification

Inverter

- Powers the light source of the alphanumeric platform

Power supply

- Powers heat signature of the alphanumeric platform

Housing Pods

- Cover for connectors on roof or top of AirDek

Additional Items Needed

- RTV or silicone
- Blue Thread Gasket Sealant
- Power Drill
- Phillips Screwdriver
- Clean, dry cloth
- Tape measure
- Cloth squeegee

Installing AirEL System

To install AirDek, do the following:

1. Clean the surface of the roof or AirDek with a clean, dry cloth.

NOTICE

Do not use a soapy water solution to clean surface as it will counteract adhesive properties of character adhesive.

Figure 1 Clean surface of roof



2. Use tape measure to position alphanumeric characters on vehicle roof or AirDek.
 - When using the AirDek, ensure that the housing pods are positioned behind the support rib.
 - On sedan vehicles Dodge Chargers or Ford Taurus, beware of cross member when positioning pods to avoid drilling into it.

Figure 2 Use tape measure to position characters



3. Position housing pod and mark hole for 3/8 grommet hole at the top of the housing pod.

Figure 3 Position housing pod and mark hole



4. Drill 3/8 grommet hole.

Figure 4 Drill 3/8 grommet hole



Avoid drilling into AirDek support rib. For sedans, avoid drilling into cross member.

Figure 5 Drill 3/8 grommet hole



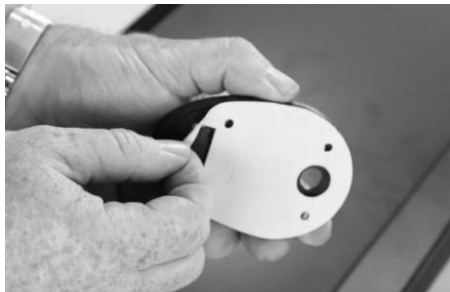
5. Install grommet.

Figure 6 Install grommet



6. Peel off backing on housing pods.

Figure 7 Peel off backing on housing pods



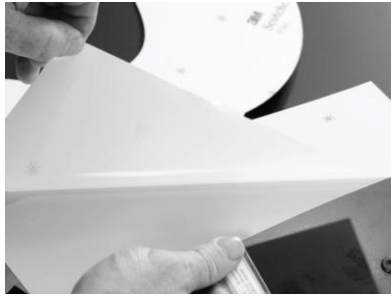
7. Place housing pod aside with base up.

Figure 8 Place housing pod aside



8. Peel off backing of number.

Figure 9 Peel off backing



9. Gently lay number down into position.

Figure 10 Lay number down



10. Thread tail through bottom slit of housing pod.

Figure 11 Thread tail through bottom slit



11. Position pod and align hole with grommet.

Figure 12 Position pod and align hole



12. Drill four (4) holes for the 1/16 mounting holes.

Figure 13 Drill four holes



13. Place gasket into base of housing pod.

Figure 14 Place gasket into base of housing pod



14. Secure base of pod to the surface area.

Figure 15 Secure base of pod to the surface area



15. Thread wires through grommet hole.

Figure 16 Thread wires through grommet hole



16. Plug connector together.

Figure 17 Plug connector together



17. Fill grommet hole and base with RTV or silicone.

Figure 18 Fill grommet hole and base with RTV or silicone



18. Place cover on housing pod.

Figure 19 Place cover on housing pod



19. Fill holes with RTV or silicone.

Figure 20 Fill holes with RTV or silicone



20. Use enclosed Phillips screws to secure.

⚠ CAUTION

Secure firmly, but do not overtighten.

Figure 21 Use enclosed Phillips screws to secure



21. Use RTV or silicone on base of pod.

Figure 22 Use RTV or silicone on base of pod



22. Apply RTV or silicone to the perimeter of the housing pod.

Figure 23 Apply RTV or silicone to the perimeter of the housing pod



23. Wipe off excess RTV or silicone.

Figure 24 Wipe off excess RTV or silicone



24. Use cloth squeegee to break the air capillaries on the numbers. Doing this will release the permanent adhesion of the numbers to the surface.

NOTICE

Using squeegee will permanently adhere number to surface. Ensure proper placement.

Figure 25 Use cloth squeegee to break air capillaries



25. Place inverter in secure location.

NOTICE

Run 22 gauge wiring. See Wiring Instructions.

Figure 26 Place inverter in secure location



26. Follow wiring instructions.

Figure 27 Yellow and orange wires = thermal

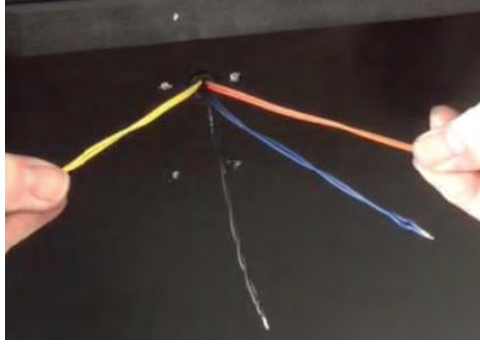
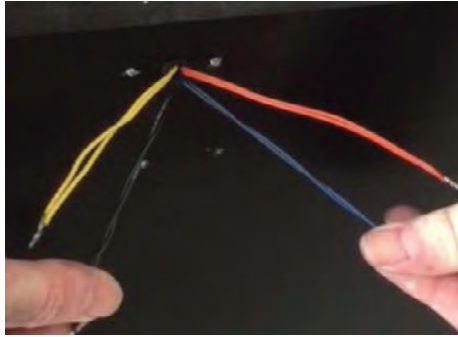


Figure 28 Black and blue wires = luminescent

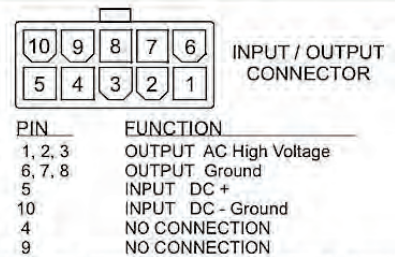


Wiring Instructions



READ ENTIRE DATA SHEET AND ALL INSTRUCTIONS PRIOR TO INSTALLATION

- AirEL™ Model AEL-PX300 is a load responsive, DC/AC power inverter designed to drive two AirEL™ Illuminated Public Safety Alphanumeric Characters.
- AirEL™ Model AEL-PX300 converts automotive DC power (13.8 V nominal) to a smooth sine wave output (160 V_{RMS} / 700 Hz nominal) and intended to drive up to 300 in² of AirEL lit area. (see charts)
- The AEL-PX300 power inverter is fully compliant with FCC regulations for radiant emissions. (Data available upon request)
- Standby Mode Parasitic Draw is typically < 1μA.



All DC-(Ground) Connections (6,7,8,10) are internally common
AC OUTPUT Connections (1,2,3) are internally common.
See additional connection procedures below.

• ALL DATA CONTAINED HEREIN ARE TYPICAL VALUES • NOT FOR SPECIFICATION •

| CHARACTERISTIC | CONDITION | MIN | TYP | MAX | UNIT |
|---|-----------------------------|------|-------|------|-------------------|
| DC INPUT VOLTAGE | | 10.0 | 13.8 | 16.0 | V |
| ----- ALL DATA BELOW ASSUMES A 13.8 VDC NOMINAL INPUT VOLTAGE ----- | | | | | |
| DC INPUT CURRENT | Driving 150 in ² | 1.4 | 1.8 | 2.2 | A |
| | Driving 225 in ² | 1.5 | 1.9 | 2.3 | A |
| | Driving 300 in ² | 1.7 | 2.1 | 2.5 | A |
| AC OUTPUT VOLTAGE | Driving 150 in ² | 155 | 180 | 205 | V |
| | Driving 225 in ² | 135 | 160 | 185 | V |
| | Driving 300 in ² | 130 | 155 | 180 | V |
| AC OUTPUT FREQUENCY | Driving 150 in ² | 735 | 865 | 995 | Hz |
| | Driving 225 in ² | 620 | 730 | 840 | Hz |
| | Driving 300 in ² | 535 | 630 | 725 | Hz |
| EL BRIGHTNESS | Driving 150 in ² | 160 | 200 | 220 | cd/m ² |
| | Driving 225 in ² | 120 | 150 | 165 | cd/m ² |
| | Driving 300 in ² | 105 | 130 | 145 | cd/m ² |
| STANDBY DC CURRENT | | 0.3 | < 1.0 | 5 | μA |



READ ENTIRE DATA SHEET AND ALL INSTRUCTIONS PRIOR TO INSTALLATION

- AirELTM Model AEL-PX450 is a load responsive, DC/AC power inverter designed to drive three AirELTM Illuminated Public Safety Alphanumeric Characters.
- AirELTM Model AEL-PX450 converts automotive DC power (13.8 V nominal) to a smooth sine wave output (160 V_{RMS} / 700 Hz nominal) and intended to drive up to 450 in² of EL lit area. (see charts)
- The AEL-PX450 power inverter is fully compliant with FCC regulations for radiant emissions. (Data available upon request)
- Standby Mode Parasitic Draw is typically < 1μA.



INPUT / OUTPUT CONNECTOR

| PIN | FUNCTION |
|---------|------------------------|
| 1, 2, 3 | OUTPUT AC High Voltage |
| 6, 7, 8 | OUTPUT Ground |
| 5 | INPUT DC + |
| 10 | INPUT DC - Ground |
| 4 | NO CONNECTION |
| 9 | NO CONNECTION |

All DC-(Ground) Connections (6,7,8,10) are internally common
AC OUTPUT Connections (1,2,3) are internally common.

See additional connection procedures below.

• ALL DATA CONTAINED HEREIN ARE TYPICAL VALUES • NOT FOR SPECIFICATION •

| CHARACTERISTIC | CONDITION | MIN | TYP | MAX | UNIT |
|---|-----------------------------|------|-------|------|-------------------|
| DC INPUT VOLTAGE | | 10.0 | 13.8 | 16.0 | V |
| ----- ALL DATA BELOW ASSUMES A 13.8 VDC NOMINAL INPUT VOLTAGE ----- | | | | | |
| DC INPUT CURRENT | Driving 200 in ² | 2.1 | 2.5 | 2.9 | A |
| | Driving 300 in ² | 2.3 | 2.7 | 3.1 | A |
| | Driving 450 in ² | 2.6 | 3.0 | 3.4 | A |
| AC OUTPUT VOLTAGE | Driving 200 in ² | 145 | 175 | 200 | V |
| | Driving 300 in ² | 135 | 160 | 185 | V |
| | Driving 450 in ² | 125 | 145 | 165 | V |
| AC OUTPUT FREQUENCY | Driving 200 in ² | 740 | 875 | 1000 | Hz |
| | Driving 300 in ² | 660 | 775 | 890 | Hz |
| | Driving 450 in ² | 540 | 635 | 730 | Hz |
| EL BRIGHTNESS | Driving 200 in ² | 155 | 195 | 215 | cd/m ² |
| | Driving 300 in ² | 125 | 155 | 170 | cd/m ² |
| | Driving 450 in ² | 100 | 120 | 130 | cd/m ² |
| STANDBY DC CURRENT | | 0.3 | < 1.0 | 5 | μA |



MODEL: PXIR-TH
DC / AC INVERTER

Rev. 0
170130

READ ENTIRE DATA SHEET AND ALL INSTRUCTIONS PRIOR TO INSTALLATION

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1.0 Introduction

The AirEL™ PXIR-TH Sine Wave Inverter converts DC power to AC power and is designed to drive the Infrared component of the AirEL™ Illuminated Public Safety Alphanumeric Characters.

An inverter must have a greater power rating than the load to which it is providing power. To get the most out of the inverter, ensure it is installed and used correctly. Please read the instructions in this manual before installing and using the inverter.



www.air-el.com

www.fedsig.com

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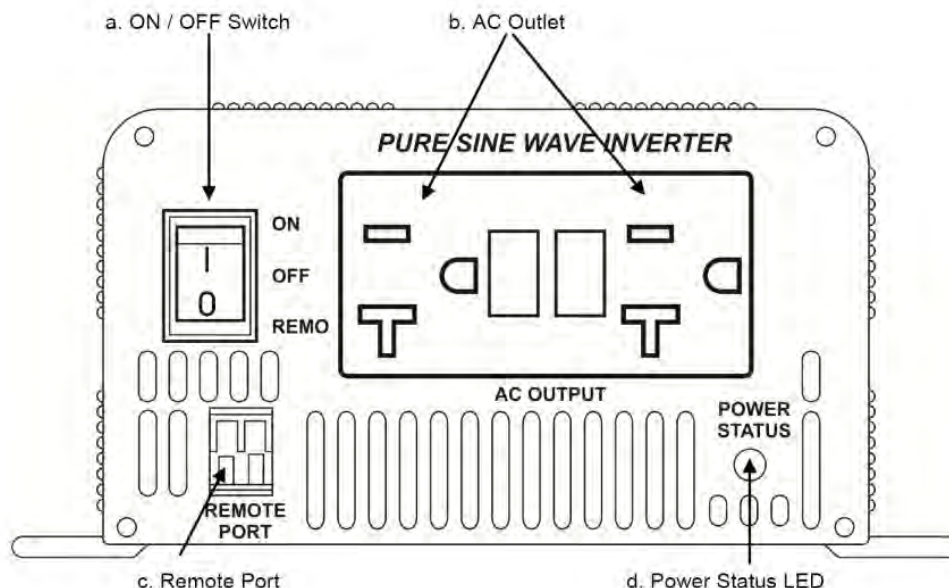
2.0 PXIR-TH

SPECIFICATIONS

| | |
|----------------------------------|--|
| Continuous Output Power | 300 W |
| Surge Rating | 450 W |
| Output Waveform | Pure Sine Wave <3% THD |
| Output Voltage $\pm 5\%$ | 115 VAC RMS @ 60 Hz |
| Input Voltage | 10.5 – 15 VDC |
| Efficiency | 80-90% |
| No Load Current Draw / Powersave | 0.26 A |
| Low Battery Alarm $\pm 2\%$ | 10.5 V |
| Low Battery Shut-Down $\pm 2\%$ | 10.5 V |
| Operating Temperature Range | 0°C - 40°C / 32°F - 104°F |
| Storage Temperature Range | -30°C - 70°C / -22°F - 158°F |
| Cooling | Thermostatically Controlled Fan |
| AC Receptacle | Dual GFCI |
| Remote Port Option | Yes |
| Dimensions (L x W x H) in mm | 237 x 155 x 72 |
| Dimensions (L x W x H) in inches | 9.3 x 6.1 x 2.8 |
| Weight | 2.7 kg / 5.9 lbs |
| Inverter Install Kits | Input: J-PXIR-TH-IN Output: J-PXIR-TH-OUT |

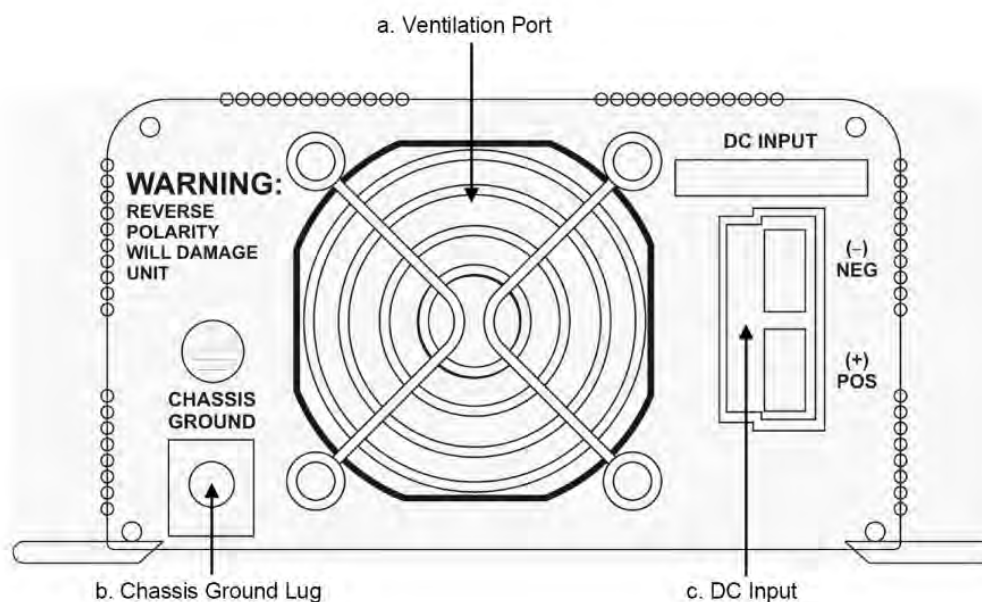
3.0 Main Functions

3.1 PXIR-TH Front View



- a. ON / OFF switch:
Power ON/OFF switch, leave in the OFF position during installation.
 - b. AC outlet: Dual GFCI
This outlet accepts part number J-PXIR-TH-OUT(Included)
 - c. Remote port:
Allows customer to connect 2 wire switch to use as ON/OFF remote.
Ex. Toggle switch or light switch.
 - d. Power status LED:
The LED display indicates the power status of the inverter; see section 5.2 Power *Status* for more information.
- | | |
|-------------------------|-----------------------------------|
| Solid Green: | AC power OK |
| Fast Red Blink: | Over voltage protection (OVP) |
| Slow Red Blink: | Under voltage protection (UVP) |
| Intermittent Red Blink: | Over temperature protection (OTP) |
| Solid Red: | Overload protection (OLP) |

3.2 PXIR-TH Rear View



Operation of the inverter without a proper ground connection may result in an electrical safety hazard.

- a. Ventilation port:
Do not obstruct, allow at least 2 inches (5.08 cm) for air flow.
- b. Connect the chassis ground to the vehicle chassis using a #12 AWG min wire.
- c. DC Input: Anderson Power Pole Connectors
This connector accepts part number J-PXIR-TH-IN(Included)
Use the battery terminals to connect to battery or other power source: black is negative (-), red is positive (+). Observe the DC Input rating.



A reverse polarity connection will blow a fuse in the inverter and will permanently damage the inverter. Damage caused by reverse polarity connection is not covered by the warranty.

4.0 Installation

4.1 Where to Install

The inverter should be installed in a location that meets the following requirements:

- a) Dry - Do not allow water to drip or splash on the inverter.
- b) Cool - Ambient air temperature should be between 32 and 104 °F (0 and 40 °C); the cooler the better.
- c) Ventilated - Allow at least 2 inches (5.08 cm) of clearance around the inverter for air flow. Ensure the ventilation openings on the rear of the unit are not obstructed.
- d) Safe - Do not install the inverter in the same compartment as batteries or in any compartment capable of igniting flammable liquids such as gasoline.
- e) The inverter location should not exceed 10 feet (3.05 m) from the batteries.

4.2 Installation and testing

The following procedure describes how to install and test the PXIR-TH

1. Unpack and inspect your AirEL™ Inverter. Ensure that the power switch is in the OFF position.
2. Connect power: Plug in the J-PXIR-TH-IN
3. Securely connect the negative cable (black) to the negative terminal of the battery.



Loose connections result in excessive voltage drop and may cause overheated wires and melted insulation.



A reverse polarity connection will blow a fuse in the inverter and will permanently damage the inverter. Damage caused by reverse polarity connection is not covered by the warranty.

4. Before proceeding further, carefully check to ensure that the cable connects from the negative DC input of the inverter to the negative terminal of the battery.



You may observe a spark when you make the positive connection since current may flow to charge capacitors in the inverter. Do not make this connection in the presence of flammable fumes, as explosion or fire may result.

5. Install the recommended inverter fuse in the positive lead; see section 4.3 Cables. The fuse should be located as close to the battery as possible. Ensure all connections are tight and secure.
6. Securely connect the positive cable (red) to the positive terminal of the battery.

7. Set the power switch to the ON position. Check the indicator LED on the front panel of the inverter to ensure that it is green.
8. Set the inverter switch to the OFF position. The indicator light may blink and the internal alarm may sound momentarily. This is normal. Plug the test load into the AC receptacle on the front panel of the inverter.
9. Set the inverter switch to the ON position and turn on the test load; the inverter should supply power to the load. If you plan to measure the output voltage of the inverter, a true RMS meter must be used for accurate readings.

4.3 Cables

4.3.1 J-PXIR-TH-IN

Attach a 30 A min fuse in line with the positive conductor as close to the battery as possible. If necessary, use minimum 10 AWG wire to extend input cable. Do not exceed 10 feet (3.05 m) total cable length. See section 5.0

4.3.2 J-PXIR-TH-OUT

Connect the J-PXIR-TH-OUT output cable to the AirEL Alphanumeric input cable using minimum 18 AWG wire. See section 5.0.

4.4 Grounding

The inverter has a chassis ground lug on the rear panel allowing you to connect the chassis of the inverter to ground. The ground terminals in the AC outlets on the front panel of the inverter are internally connected to the chassis ground. If available, the chassis ground lug should be connected to a grounding point, which will vary depending on where the inverter is installed. In a vehicle, connect the chassis ground to the chassis of the vehicle. In a boat, connect the chassis ground lug to the boat's grounding system. In a fixed location, connect the chassis ground lug to an earth ground.

The neutral (common) conductor of the inverter AC output circuit is connected (bonded) to the chassis ground inside the inverter. Therefore, when the chassis is connected to a ground, the neutral conductor is also grounded. These grounding connections conform to national electrical code requirements which state that separately derived AC sources (such as inverters and generators) have their neutral tied (bonded) to ground in the same way that the neutral conductor from the utility line is tied (bonded) to ground in the AC breaker panel of a non-mobile dwelling.

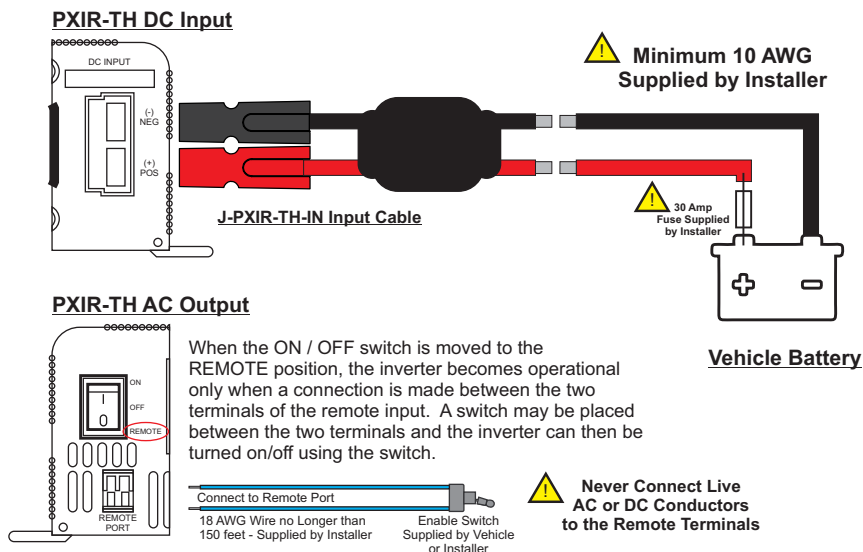


The negative DC input of the inverter is connected to the chassis. Do not install the inverter in a positive ground DC system. A positive ground DC system has the positive terminal of the battery connected to the chassis of the vehicle or to the grounding point.

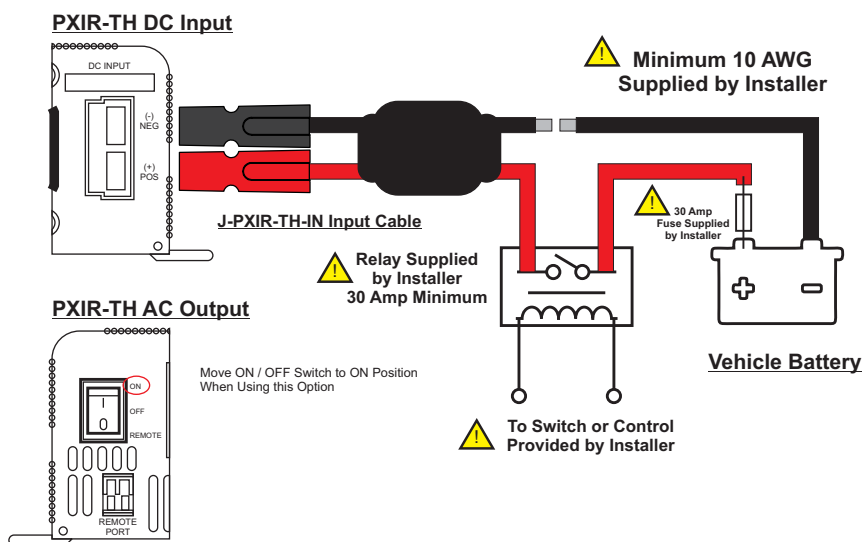
5.0 Operation

PXIR-TH DC Input

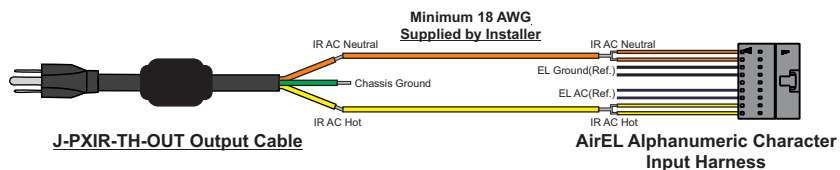
Option 1



Option 2



PXIR-TH AC Output



5.1 Operating On / Off Switch

The ON / OFF switch turns the control circuit in the inverter ON and OFF. It does not disconnect power from the inverter. When the switch is in the OFF position, the inverter draws no current from the battery. When the switch is in the ON position, but with no load, the inverter draws 0.26 A from the battery.

5.2 Power Status

The power status LED indicates the operating state of the inverter. If the LED is green, then the inverter is in operational mode and producing approximately 115 V AC. If the LED is red or flashing red, then the inverter is in fault mode and there is no AC output.

Table 1: Inverter Power States

| State | LED | Description |
|-----------------------------|---------------------------------|--|
| Over voltage protection | Red LED blinking fast | Over voltage protection indicates that the inverter has shut itself down because its input voltage is over 15.0 ~ 16.0 V DC |
| Under voltage protection | Red LED blinking slowly | Under voltage protection indicates that the inverter has shut itself down because its input voltage is below 10.0 ~ 10.5 V DC |
| Over temperature protection | Red LED blinking intermittently | Over temperature protection indicates that the inverter has shut itself down because it has become overheated. The inverter may overheat if it has been operated at power levels above its rating or if it has been installed in a location which does not allow it to properly dissipate heat. The inverter automatically restarts once it has cooled down. |
| Overload protection | Red LED solid | Overload protection indicates that the inverter has shut itself down because its output circuit has been short circuited or drastically overloaded. Switch the ON / OFF switch to OFF, correct the fault condition, and then switch the ON / OFF switch back to ON. |

5.3 Resetting Faults

Any of the inverter protection faults can be re-set by turning the inverter off for 5 seconds and then turning the inverter on again. The PXIR-TH inverter can also re-set any protection faults using the optional remote on/off switch (2 wire switch supplied by customer) to turn the inverter off and then on again.

6.0 Troubleshooting

The PXIR-TH contains no user serviceable parts. Opening the unit will void the warranty.

Table 2: Common Problems

| Problem and Symptoms | Possible Cause | Solution |
|---|---|---|
| No output voltage, red LED blinking fast | High input voltage | Ensure that inverter is connected to a 12 V battery. Check the regulation of charging system. |
| No output voltage, red LED blinking slowly | Poor DC wiring, poor battery condition | Use the proper cable and make secure connections. Use a new battery. |
| No output voltage, load in excess of 150 W, red LED blinking intermittently | Thermal shutdown | Allow the inverter to cool off. Reduce the load if continuous operation required. |
| No output voltage, load less than 150 W, red LED blinking intermittently | Thermal shutdown | Improve ventilation; ensure that the inverter ventilation openings are not obstructed. Reduce the ambient temperature. |
| No output voltage, red LED solid | Overload | Reduce the load. |
| No output voltage, red LED blinking slowly | Low input voltage | Recharge the battery. Check the connections and cable. |
| No output voltage, previous solutions are not working | Inverter switched off No power to inverter | Turn the inverter ON. Check wiring to the inverter. Make sure inverter is connected directly to the vehicle battery. Most communication systems do not provide enough current to properly power the inverter. |
| No output voltage, overload indicator ON | Short circuit or wiring error | Check the AC wiring for a short circuit or improper polarity (hot and neutral reversed). |

7.0 Maintenance

Clean the exterior of the unit periodically with a damp cloth to prevent accumulation of dust and dirt and check all connections between the battery and inverter.

Getting Technical Support and Service

For technical support and service, please contact:

Service Department
Federal Signal Corporation
Phone: 1-800-433-9132
Fax: 1-800-343-9706
Email: empserviceinfo@fedsig.com

Returning a Product to Federal Signal

Before returning a product to Federal Signal, call 800-264-3578, 800-433-9132, or 800-824-0254 to obtain a Returned Merchandise Authorization number (RMA number) (7 AM to 5 PM, Monday through Friday, Central Time). To expedite the process, please be prepared with the following information:

- Your Federal Signal customer or account number.
- The purchase order number under which the items were purchased.
- The shipping method.
- The model or part number of the product being returned.
- The quantity of products being returned.
- Drop ship information as needed.
- Any estimate required.

When you receive your RMA Number:

- Write the RMA number on the outside of the box of returned items.
- Reference the RMA number on your paperwork inside of the box.
- Write the RMA number down, so that you can easily check on status of the returned equipment.

Send all material with the issued RMA Number to:

Federal Signal Corporation
2645 Federal Signal Drive
University Park, IL 60484-3167
Attn: Service Department
RMA: # _____