

EPEQ INSTALL GUIDE Electrified Power Equipment.

EPEQ[®] Electrified Power Equipment[®]
Part No. 90204 - System Installation Guide



INSTALL GUIDE

**OPERATION MANUAL AND SERVICE PARTS LIST
KEEP THE MANUAL WITH THE VEHICLE**

NOTE: Read this manual before installing, operating or servicing this equipment. Failure to comply with the operation and maintenance instructions in this manual will VOID THE EQUIPMENT WARRANTY.

This publication contains the latest information available at the time of preparation. Every effort has been made to ensure accuracy. Vanair[®] Manufacturing, Inc. reserves the right to make design change modifications or improvements without prior notification.

Making unauthorized modification to the system components WILL VOID THE WARRANTY! Always contact Vanair[®] before beginning any changes to the EPEQ[®] System Components.

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THANK YOU.

Thank you for your purchase of the Vanair® EPEQ® System. We thank you for doing business with us and look forward to working with you again.

EPEQ® EXPLAINED

EPEQ® is a comprehensive, end-to-end, patent pending system, of zero emission and quiet Electrified Power Equipment® products. Powered by Vanair's EPEQ® Smart Controller, which communicates with a specifically developed line of ELiMENT™ Lithium Iron Phosphate (LiFePO4) batteries. EPEQ® allows you to turn off the vehicle's engine and still run the equipment you need on the job site. EPEQ® is a fully self-contained and independent system that can be mounted on, or within, combustion engine vehicles, electric vehicles, or even on trailers.

The EPEQ® series offers clean, quiet, Mobile Power Solutions® and is perfect for: all fleet industries, road construction, heavy moving equipment; mining, municipalities, oil and gas, HVAC, fire/rescue, marine, RV/recreation, crane/lifting, and light commercial service vehicles. Ideal for applications such as air, electrical, fluid transfer, charging, and welding.

INTRODUCTION

This guide is designed to provide an overview of the overall system, its components, connection diagrams and to walk users through the basics of properly setting up and connecting their EPEQ® components.

More detailed maintenance and troubleshooting information for Each piece of equipment can be found in the user manual for that component.

















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TABLE OF CONTENTS

SAFETY / WARNING SYMBOLS & MEANINGS.....	6
GENERAL SAFETY.....	7
SYSTEM OVERVIEW.....	9
INSTALLATION ENVIRONMENT.....	10
SYSTEM CONFIGURATIONS.....	10
SYSTEM BASICS.....	11
SYSTEM BATTERY & SIGNAL CABLE CONNECTION DIAGRAMS.....	12
ELIMENT™ BATTERY SETUP.....	25
SHORE POWER CHARGER SETUP.....	29
AIR20 AIR COMPRESSOR.....	31
12V - 48V DC-DC CONVERTER.....	35
48V - 12V DC-DC CONVERTER.....	37
EPEQ® EV CHARGER.....	39
EPEQ® INVERTER3000.....	43
EPEQ® INVERTER5000.....	47
INVERTER6000.....	71
WARRANTY.....	77
INSTALLATION FINAL FINISH FORM.....	PAGE 1 & 2

SAFETY / WARNING SYMBOLS & MEANINGS

	WEAR EYE PROTECTION (Flying debris or other eye hazard may be present)		EXPLOSIVE MATERIAL OR EXPLOSIVE HAZARD (Conditions or materials may exist that can cause explosion)
	WEAR HEARING PROTECTION (Harmful sound volume may be present)		HOT SURFACE WARNING (Surfaces may be hot - use caution, proper protection or allow to cool before handling)
	READ INSTRUCTIONS OR MANUAL		ROTATING OR MOVING PARTS WARNING (Moving/rotating parts present, may cause damage or physical injury)
	DISCONNECT POWER (Disconnect from power to avoid accidental start or avoid electrical current)		HAND ENTANGLEMENT WITH BELT DRIVE WARNING (Belt drive present, use caution to avoid pinch points and personal injury)
	WEAR PROTECTIVE GLOVES (Chemical, thermal or harmful conditions may exist that may be harmful to bare hands)		AUTOMATIC START UP WARNING (Equipment can start up/run automatically without warning)
	DO NOT EXTINGUISH WITH WATER (Water may spread, cause harm or further damage when used on certain types of fires)		BURST / PRESSURE RELEASE WARNING (High pressure condition may exist that can cause equipment to burst or cause bodily injury)
	GENERAL CAUTION OR WARNING (Important information regarding cautions or warnings)		BATTERY CHARGING WARNING (Beware of heat, leaks & harmful gas around certain types of batteries being charged)
	ELECTRICAL SHOCK / ELECTROCUTION HAZARD (Electricity and electrical circuits present that may cause electrical shock or sparking)		FLAMMABLE MATERIAL / FIRE HAZARD WARNING (Conditions and/or materials exist that may be flammable or cause a fire)

GENERAL SAFETY



When working with electrically powered equipment, it is always necessary to use proper cautions to avoid personal injury, equipment damage and other serious hazards. In addition to risks of shock and electrocution there are many other conditions to be aware of.

Electrical equipment can generate heat and cause sparks (electrical arcs) which can ignite flammable materials, liquids and gases in the vicinity. High heat generated normally with some equipment, can cause injury to unprotected hands. Such equipment can also cause magnetic interference with some medical devices (such as pacemakers), or cause RFI (radio frequency interference). Compressors have moving fans, belts and mechanical parts that can easily cause serious injury when warnings and safety precautions are not followed.

Many of these products are installed in vehicles as mobile service equipment – so care must also be taken to avoid being injured by the vehicle's moving parts, belts, fans, hot surfaces and electrical system as well. Most vehicle batteries are lead/acid based which can generate explosive gases and may leak acid. Wearing proper protective gear and following safety guidelines should be followed to avoid risk of death, serious injury, equipment or property damage.

Always read the separate cautions and warnings for the equipment used. The most common safety warnings are listed below:

DO NOT USE IN OR NEAR WATER OR IF EQUIPMENT BECOMES WET



This pertains especially to the ELiMENT™ battery, EPEQ® Compressors, Inverters, and Welder140. Water and other liquids can short out electrical components, battery cells, or cause adverse chemical reactions with certain battery types.

SHOCK, ARCS, SPARKS OR ELECTROCUTION HAZARD.



Units that use, distribute, generate or store electrical energy are often sources of electrical discharge – which can cause electrical shock, sparks, arcing or electrocution. This pertains to EPEQ® inverters, ELiMENT™ batteries, DC-DC converters, and EPEQ® compressors. For added safety, removing conductive metal jewelry such as rings, watches is recommended when handling electrical equipment. Use caution. Sparks may occur when wiring components and during most normal operation from electric motors, or accidentally touching conductive materials to active terminals. Short circuits can also be a cause of sparks. Sparks can lead to ignition of flammable/combustible materials in the vicinity.

DAMAGE TO EQUIPMENT IS VISIBLE, OR DAMAGE OR EXCESS WEAR OF CABLES, BELTS OR HOSES IS EVIDENT.



Evident equipment damage should be a red flag that it may have unseen damage, may be unsafe to use and/or could malfunction. This warning pertains to all EPEQ® equipment.

FIRE HAZARD



Fires can be caused by heat given off by running equipment, sparks, overheating, incorrect wiring, short circuits, using equipment near flammable/combustible materials, explosive gases, and flammable liquids. All care should be taken to avoid conditions that may lead to fire causing events. See cautions and warnings listed for each piece of equipment for additional information.

IN CASE OF FIRE - INVOLVING ELECTRICAL EQUIPMENT



Avoid using water. Be safe and have fire extinguishers nearby that include a C rating for electrical fires. This includes ABC rated extinguishers. Halon (when permitted)

is also an excellent choice. ELiMENT™ batteries use LiFePO4 chemistry, which is safer than most types during normal use, can still become damaged from accident or misuse. If a battery begins to smoke or leak, if possible, disconnect all devices and move it to a safe location outdoors – away from combustible materials. Always wear eye protection and protective gloves when handling damaged ELiMENT™ batteries.

MOVING AND ROTATING PARTS.



Compressor belts, pulleys, fans, and motors are used in EPEQ® equipment and in motor vehicles, are moving parts that can easily cause severe personal injury. Fingers and hands are at risk around moving parts. Always disconnect power from equipment before servicing, and don't use equipment with safety guards removed. Entanglement is also a concern – so avoid loose clothing such as loose sleeves, scarves and neck ties. Loose jewelry such as bracelets, and necklaces are also a concern and should be removed or put safely away from risk of any moving parts. Those with long hair should tie it back. Entanglement involving running machinery can lead to not only severe bodily injury but can also cause costly damage to equipment.

WEAR EYE PROTECTION



Certain conditions can cause vehicle batteries to leak acid or give off toxic gas. Compressors, tanks and valves can also release air under high pressure which can send debris and particles flying at high rates of speed. The wearing of eye protection is also highly recommended when working with lead-acid vehicle batteries and EPEQ® air compressors. Pertains to all EPEQ® air compressors and batteries.

WEAR PROTECTIVE GLOVES



Protective gloves give added protection to hands and fingers when working with lead-acid batteries, and can help protect hands from hot, heated surfaces.

Rubber insulated gloves can help protect against accidental electrical shock when working with EPEQ® equipment.

HOT SURFACES



Many components in the EPEQ® line will get hot to the touch during normal use. Do not handle or touch these components or surfaces while hot using bare hands. It is recommended to allow the equipment to cool before handling any equipment that may be hot. Pertains to all EPEQ® products.

AUTO START



This warning identifies equipment that may switch from a paused or sleep state into a run state on its own from an automated switch, condition, or timer. This includes chargers, inverters, converters and compressors.

DISCONNECT POWER



Unless specified otherwise, it is recommended to turn OFF and disconnect the power from any EPEQ® equipment before performing maintenance, wiring or installing components. This provides added protection from electrical discharge and accidental start up of electrical equipment.

CAUTION



We highly recommend all electrical installations to be made by qualified electricians or technicians in accordance with all applicable national and local safety codes.



SYSTEM OVERVIEW

The EPEQ® System is comprised of several main pieces of electric-powered equipment. Various components can be grouped and connected using matched Anderson-type connectors to provide various functionality to fulfill the tasks being performed. The main components in EPEQ® systems are the following:

ELIMENT™ BATTERY

- The ELIMENT™ battery is the heart of the EPEQ® powered equipment line.
- Battery chemistry utilizes Lithium Iron Phosphate composition (LiFePO4), one of the safest and most stable battery types on the market.
- It is a multi-cell, compact, and heavy-duty battery pack which delivers 48V DC
- Provides 48V DC power and rated at 100 Amp hours
- On-board battery management system (BMS) regulates electrical distribution among cells and allows the battery to communicate charge state and status with other smart components
- ELIMENT™ batteries can be fully cycled 5,000+ times (1 cycle consists of 80% depth of discharge - DOD).
- Expected life span of 5-7 years.

SHORE POWER CHARGER

- Plugs into standard 120V AC wall outlet
- Provides 48V charging output for the ELIMENT battery
- Includes numerous built-in protections for excess - voltage, current, short circuit, reverse voltage and temperature and vibrations (associated with vehicle mounted equipment)
- Up to 91% efficient

AIR20 COMPRESSOR

- Reciprocating type, electric powered compressor provides up to 20 CFM at 150 PSI
- Runs independently from the vehicle using 48V DC power

- Can be used indoors without venting, as there are no exhaust fumes
- Quieter than similar internal combustion engine powered compressors
- Duty cycle rated at 70%

AIR5 COMPRESSOR

- Portable, electric powered compressor provides up to 4.6 CFM at 150 PSI
- Includes 2 HP electric motor and twin receiver tanks (4 GAL total capacity)
- Powered by 120V AC power from standard, grounded wall outlet or an EPEQ® Inverter
- Can be used indoors without venting, as there are no exhaust fumes
- Duty cycle rated at 70%

AIR45 COMPRESSOR (COMING SOON)

- Screw type, electric powered compressor provides up to 45 CFM at 150 PSI
- Runs independently from the vehicle using 48V DC power
- Can be used indoors without venting, as there are no exhaust fumes
- Quieter than similar internal combustion engine powered compressors
- Duty cycle rated at 100%. Intermittent use is recommended to prolong battery power.

12V- 48V DC CONVERTER

- 12V DC to 48V DC voltage converter
- Converts 12V DC power from a vehicle to charge the 48V ELIMENT Battery
- Up to 95% efficient
- Strong built-in protections

48V-12V DC CONVERTER

- 48V DC to 12V DC voltage converter
- Converts 48V DC power from battery to provide power to 12 V DC accessories
- Up to 95% efficient
- Strong built-in protections

INVERTER3000

- Pure Sine wave 48V DC to 120V AC inverter
- 3000W output
- 300A maximum DC
- Up to 93.5% efficient

INVERTER5000

- Provides single-phase, 230V AC power output from 48V DC source
- Pure sine wave, 5000W output
- Built-in LCD panel with adjustable parameters
- Up to 6 units can be connected in parallel to produce 230/400V AC 3-phase output
- Built in protections against high/low - voltage, battery, temperature, short circuits and overload

INVERTER6000

- 120V/240V Split-phase power output from 48V DC source
- Pure sine wave, 6000W output
- LED function indicator panel, and built-in current selection switch
- Built in protections against high/low - voltage, battery, temperature, short circuits and overload

EPEQ® EV CHARGER

- The EPEQ® Electric Vehicle Charging System is a compact, durable, easy to use electric vehicle (EV) charging system
- When used for mobile applications, it can be powered by the 48V ELiMENT™ Battery and Inverter5000 system to provide 230V AC.

INSTALLATION ENVIRONMENT

How the EPEQ® System will be used and choosing the best location to install it, are important considerations when planning your EPEQ® System installation. Some components are more susceptible to vibration and the elements like rain, cold weather or hot temperatures, while others are better suited for adverse conditions. Regardless, all parts of the

EPEQ® system use electricity, so proper care should be taken to protect them from becoming wet and exposed to adverse environments.

The most robust components in the EPEQ® line are the DC-DC Converters and Shore Power Charger. The internal components of these converters are fully sealed, vibration and weather resistant.

Other components are not compatible with water or humid conditions and are more susceptible to the environment such as the ELiMENT™ battery, compressors and power inverters which require a clean, dry environment protected from water, humidity, and extreme temperatures – and should be installed in a more protected environments such as an enclosure, indoors or in a covered vehicle – such as a van or panel truck.

On the other hand, the Level 2 EV charger includes its own weather resistant enclosure, making it suitable for installation for both indoor or outdoor use. (Power connection from electrical service to the EV Charger needs to be properly protected from the weather, regardless.)

SYSTEM CONFIGURATIONS

All EPEQ® Systems will have at their heart the ELiMENT™ battery, which provides mobile power that is independent from running vehicles, exhaust fumes and electrical outlets. A very basic system may consist of (1) ELiMENT™ battery, (1) AIR20 Compressor and (1) Shore Power battery charger. A complex EPEQ® system may consist of multiple batteries, multiple power inverters (to run 3-phase AC power output), an on-board charger to recharge the batteries from a running vehicle electrical system, an AIR20 Compressor, 120V power, auxiliary 48V to 12V DC power converters to operate 12V tools and accessories, and a Level 2 electric vehicle charging system. Some sample system diagrams are covered later in this manual.

SYSTEM BASICS

- The EPEQ® System makes use of the Anderson-type connector wherever possible to aid in the convenient, secure connection and disconnection of EPEQ® equipment without tools. (See *Figure 1-1*)
- Connect equipment together following instructions outlined in the EPEQ® guides and manuals. While like-colored connectors may fit together, not all equipment is designed to be connected together solely based on the color of the connector. Always refer to the manual for proper connections.
- New connectors can fit very tightly together. Pressing firmly should overcome the initial fit. Rocking the connectors slightly while pressing together may ease the task of fitting new connectors together.
- Some cables arrive already attached to the equipment. Never try to move or lift the equipment using the cables. This can cause serious damage to the cables or even ruin the components they are secured to which can result in the equipment becoming inoperable.
- **REMOTE PANELS: Follow all applicable NEC (National Electrical Code) and local regulations when mounting remote panels. Ensure all circuit wire sizes are adequate and include a properly sized breaker.**
- To disengage these connections, simply reverse the process to pull them apart.



CAUTION: Never disengage the connectors by pulling on the wires or cables! This can cause damage to the cables which could result in failure, malfunction or damage to the equipment.



Figure 1-1

EPEQ® SYSTEM BATTERY AND SIGNAL CABLE CONNECTION DIAGRAMS

On the following pages, are illustrations of several EPEQ® System setups showing the basic cable and wiring connections between various components used in typical systems.

The next few pages are divided into wiring diagrams illustrating the power connections and others showing wiring diagrams for the signal cabling.

Generally, the orange cables shown on the diagrams depict the 48V DC power cables that are used between the different EPEQ® components. Many of the EPEQ® components will arrive with these orange power cables installed from the factory with Anderson-type connectors already in place.

It is strongly recommended that any additional wiring which ties the EPEQ® System into AC utility power, and the installation of any breakers or electrical circuits be done by qualified electricians or technicians in accordance with all applicable national and local safety and electrical codes.

Small wires used in the wire harness (which carry signal voltage and communications), come with small connectors that mate with the appropriate connectors on the EPEQ® equipment. When using any electrical equipment, always

exercise caution and electrical safety to avoid serious, and possibly lethal personal injury, damage to equipment and potential damage to the surrounding area (such as sparks that can ignite combustible materials or flammable gases). Both voltage and current can be dangerous - either from a DC or AC power source. Batteries and some electrical components can be sources of potential stored energy and should be treated with caution.

PROTECTIVE DEVICES AND SAFETY TIPS

- Wear safety goggles.
- Wear proper shoes for the job being performed
- Use tools with insulated handles, (or wrap handles with electrical tape).
- Wear insulated gloves.
- Use recommended fuses and circuit breakers to protect your EPEQ® equipment from short circuits, and provide an additional level of safety for users during use.
- Do not store items on top of batteries and equipment.
- Do not drop objects or tools on top of batteries to avoid potential damage to battery and short circuits.



052147 - EPEQ AIR20 SYSTEM SINGLE BATTERY - POWER CABLING DIAGRAM

- NOTES:
1. GRAYED OUT COMPONENTS INDICATE THOSE IN THE SYSTEM WITHOUT CABLE CONNECTIONS

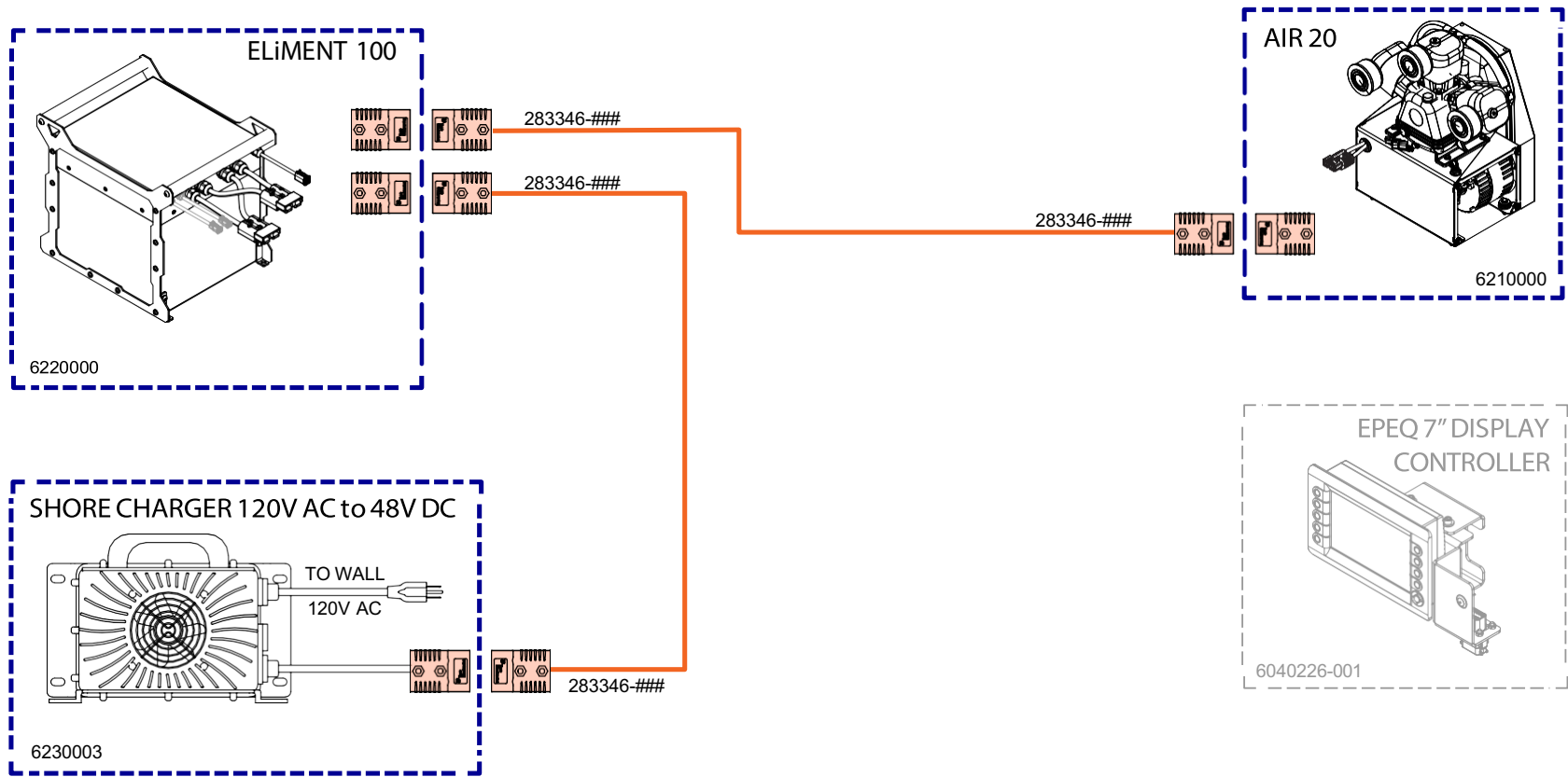


Diagram 1-1

052147 - EPEQ AIR20 SYSTEM SINGLE BATTERY SIGNAL CABLING DIAGRAM

NOTES:

1. CHARGER SAFETY IS UNUSED FOR THIS APPLICATION
2. 2873599 CAN BE REPLACED WITH 283599 AND A TOGGLE SWITCH IF DESIRED
3. GRAYED OUT COMPONENTS INDICATE THOSE IN THE SYSTEM WITHOUT HARNESS CONNECTIONS
4. SYSTEMS EQUIPPED WITH THE AIR20 USE DISPLAY 604244, SYSTEMS WITHOUT THE AIR20 USE DISPLAY 6040226-001.

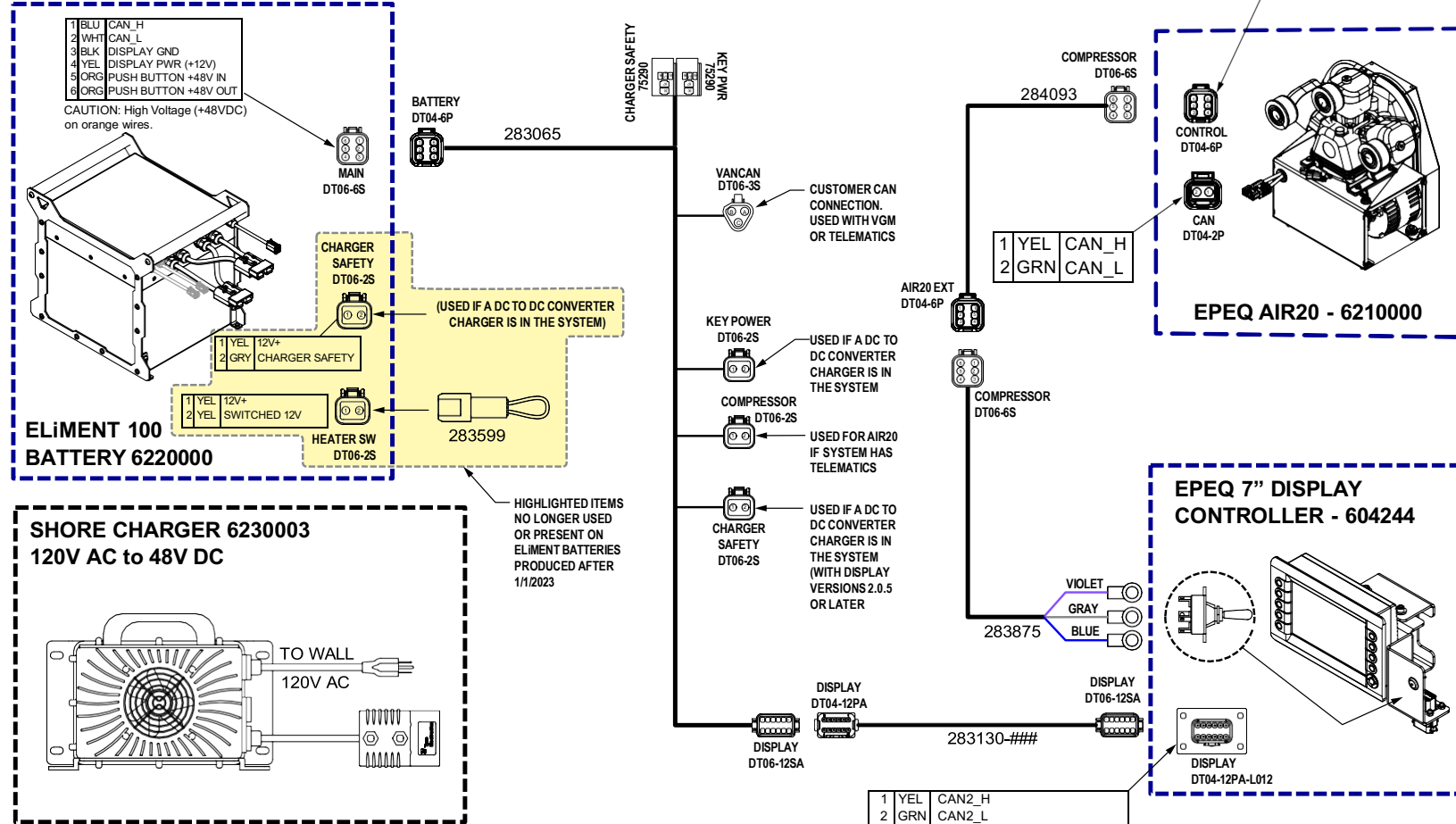


Diagram 1-2

052147 - EPEQ AIR20 SYSTEM, 6240000 - INVERTER 60000 OR, 624001 INVERTER 3000 & DC-DC CONVERTER CHARGERS - POWER CABLING DIAGRAM

Notes:

1. 282943 CAN BE USED IN PLACE OF 282942 WHERE APPLICABLE TO REDUCE THE AMOUNT OF 283346 CABLES NEEDED.
2. RECOMMENDED BREAKER SIZES:
 - 2.1. 6230000: 175A
 - 2.2. 6230004: 120A
3. 6230000 OR 6230004 TO BE INSTALLED NO FURTHER THAN 6 FT FROM THE CHASSIS BATTERY.
4. GRAYED OUT COMPONENTS INDICATES COMPONENTS IN THE SYSTEM WITHOUT CABLE CONNECTIONS.
5. FOR SYSTEMS THAT REQUIRE LESS THAN 3KW OF AC POWER AND DO NOT REQUIRE 240VAC, 6240000 CAN BE REPLACED WITH 6240001 (INVERTER,HF SCH 3KW).
6. SYSTEMS EQUIPPED WITH AIR20 USE DISPLAY 6040244; SYSTEMS WITHOUT AIR 20 USE DISPLAY 6040226-001.

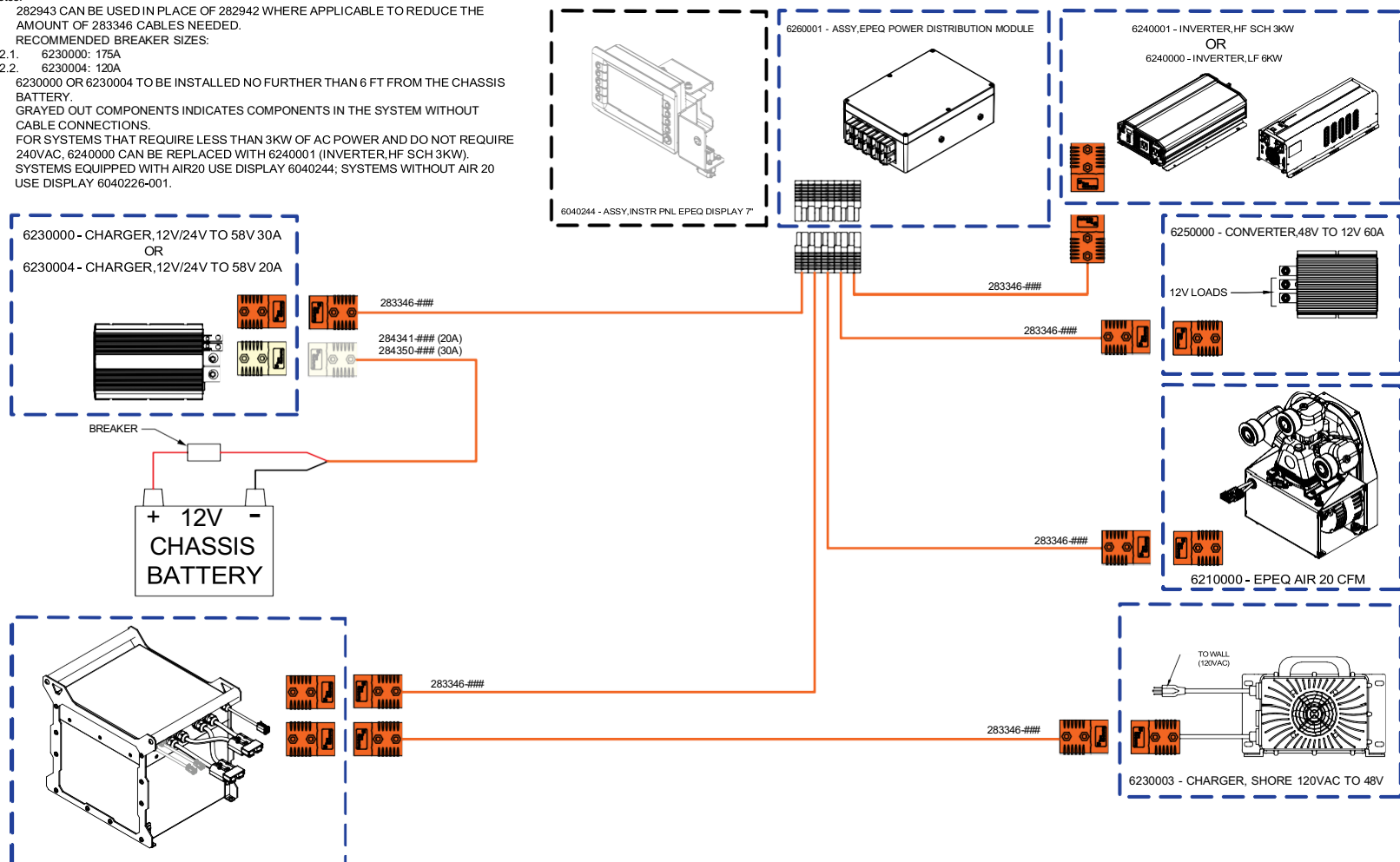


Diagram 1-3

SINGLE BATTERY WITH 6210000 AIR COMPRESSOR, 12V-48V DC-DC CONVERTER CHARGER, 7" DISPLAY - SIGNAL CABLING

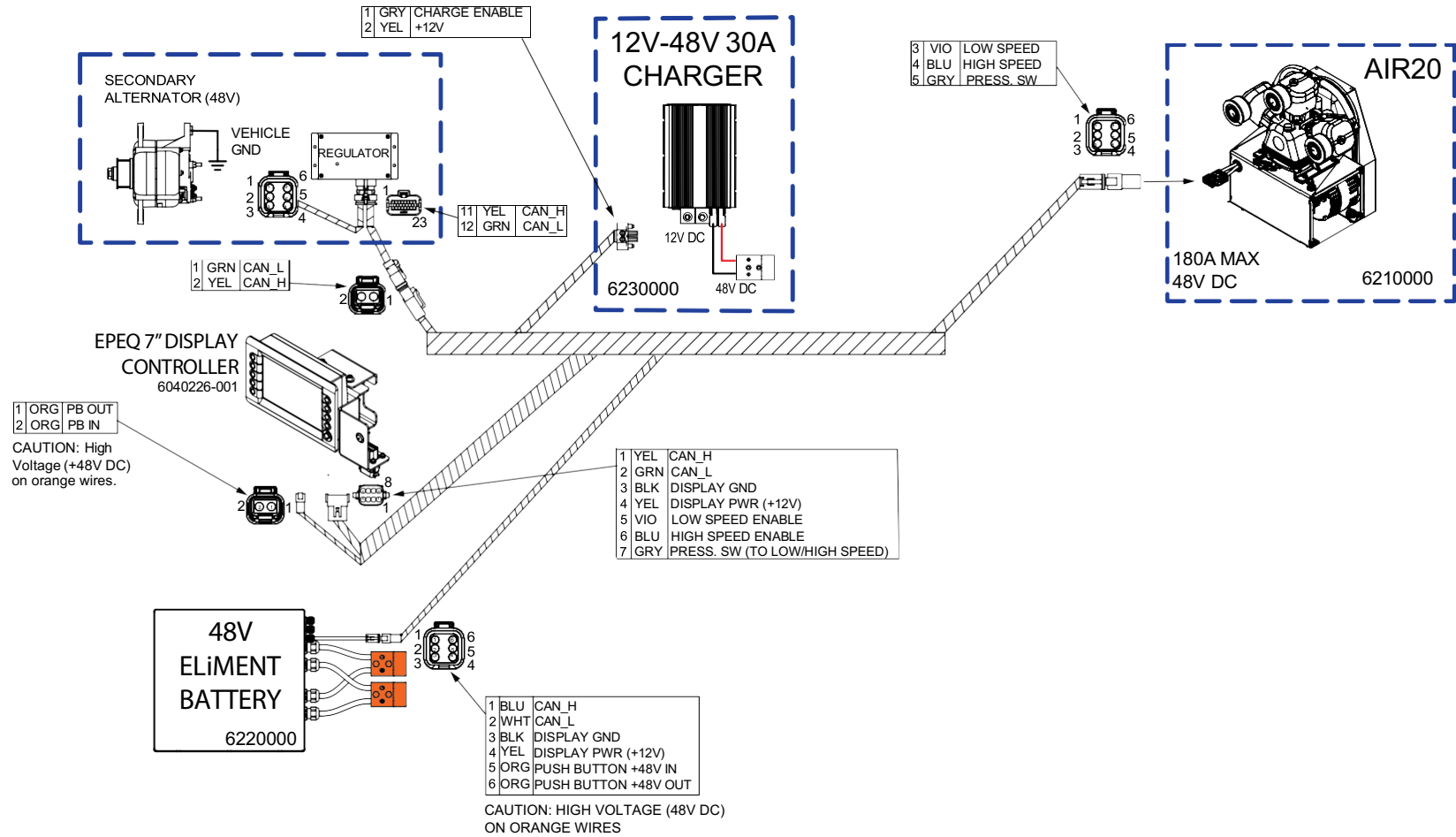
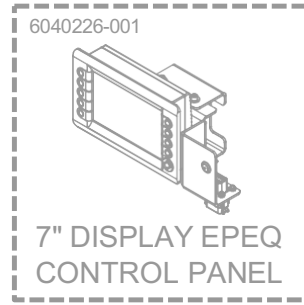


Diagram 1-4

NOTES:

1. 282943 CAN BE USED IN PLACE OF 282942 WHERE APPLICABLE TO REDUCE THE AMOUNT OF 283346 CABLES NEEDED
2. 283599 CAN BE REPLACED WITH 282932 AND A TOGGLE SWITCH IF DESIRED
3. RECOMMENDED BREAKER SIZES: 6230000: **175A**; 6230004: **120A**
4. 6230000 OR 6230004 TO BE INSTALLED NO FURTHER THAN 6 FT. FROM THE CHASSIS BATTERY
5. GRAYED OUT COMPONENTS INDICATE THOSE IN THE SYSTEM WITHOUT A HARNESS CONNECTION
6. FOR SYSTEMS THAT REQUIRE LESS THAN 240V AC, THE INVERTER6000 (PART NO. 6240000) CAN BE REPLACED WITH THE INVERTER3000 (PART NO. 6240001).



052147 - SINGLE BATTERY POWER BASIC SYSTEM, WITH 6240000 INVERTER6000, DC-DC CONVERTER CHARGERS - POWER CABLING DIAGRAM

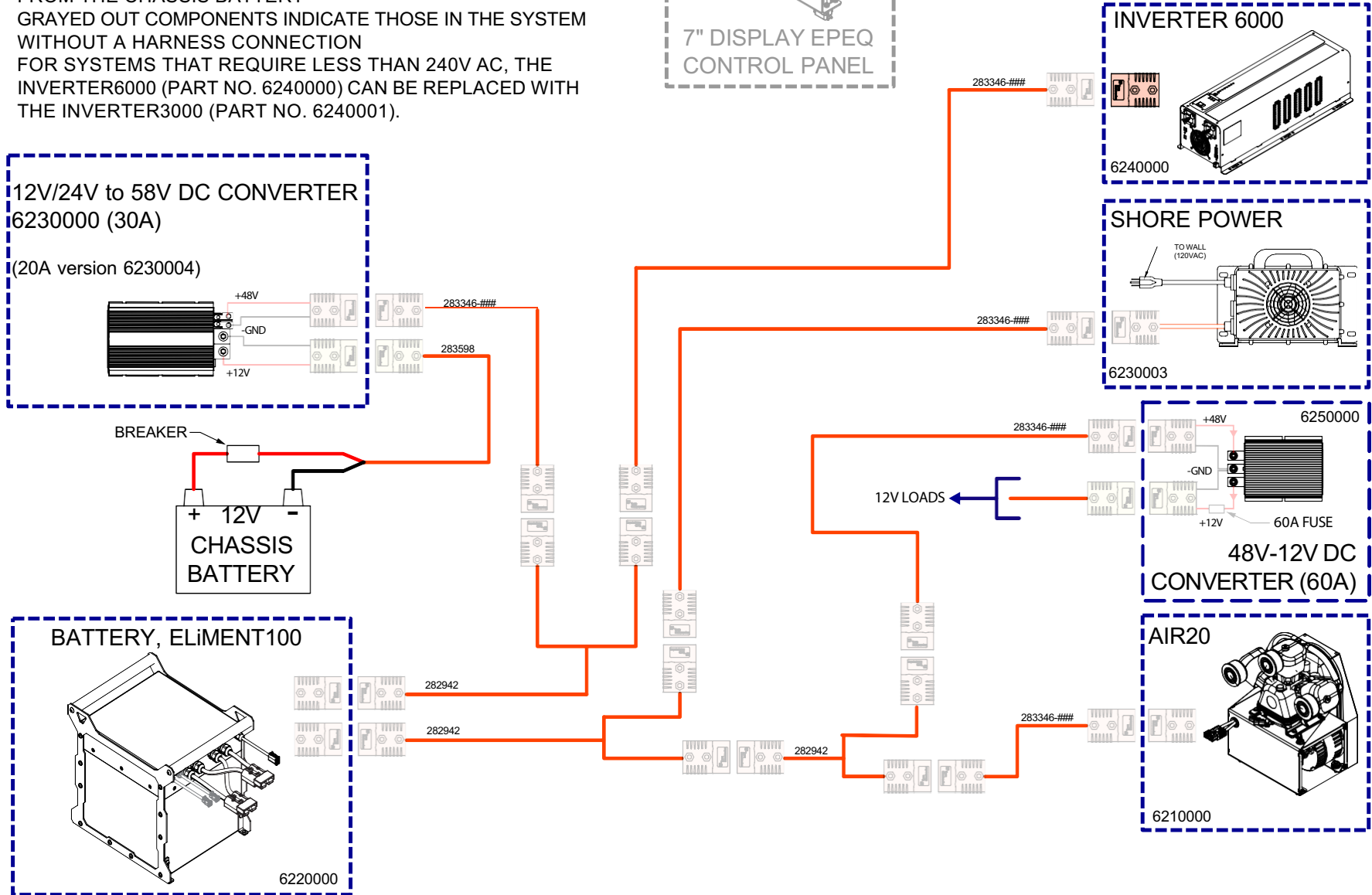
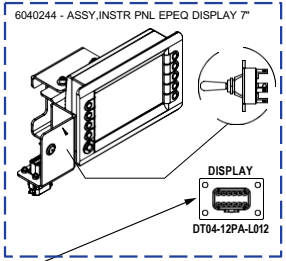
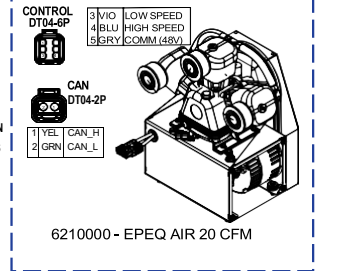
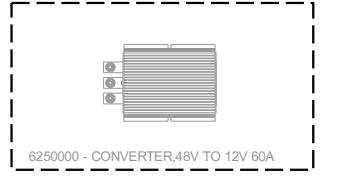
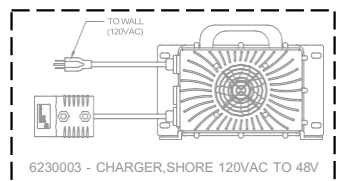
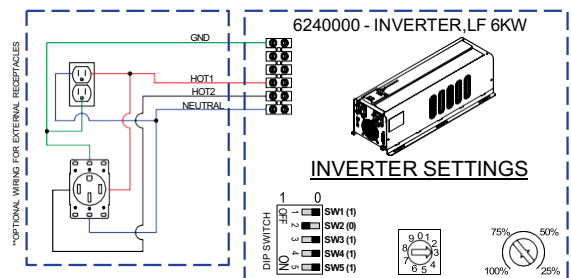


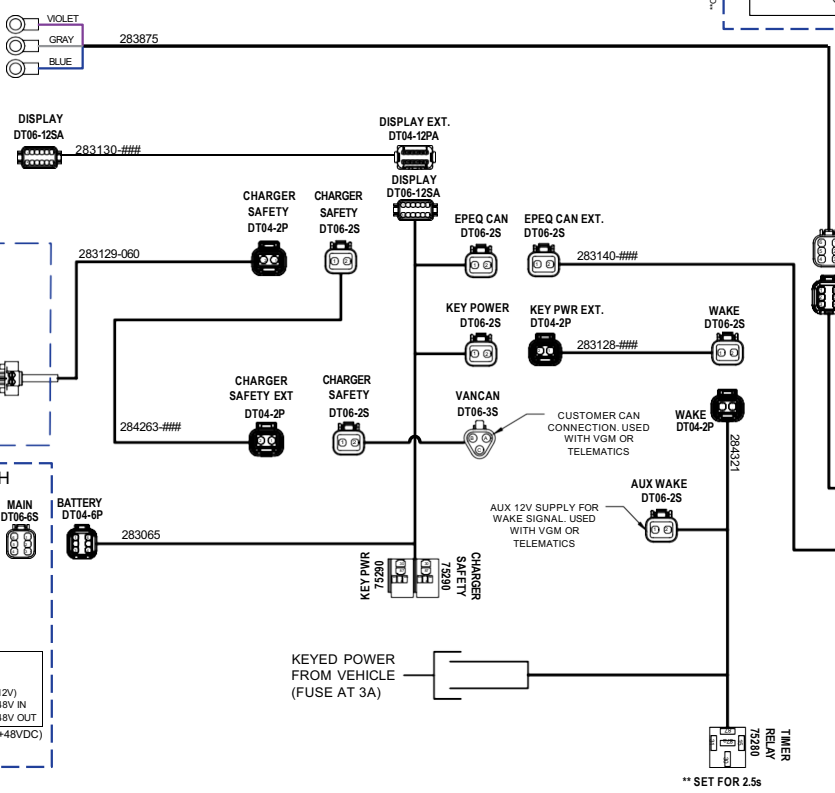
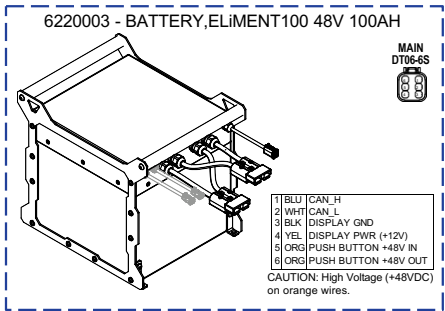
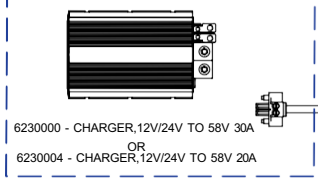
Diagram 1-5

052147 - EPEQ AIR20 SYSTEM, 6240000 - INVERTER 6000 & DC-DC CONVERTER CHARGERS - SIGNAL CABLING DIAGRAM

- Notes:
- 283599 CAN BE REPLACED WITH 282932 AND A TOGGLE SWITCH IF DESIRED.
 - GRAYED OUT COMPONENTS INDICATES COMPONENTS IN THE SYSTEM WITHOUT HARNESS CONNECTIONS.
 - FOR SYSTEMS THAT REQUIRE LESS THAN 3KW OF AC POWER AND DO NOT REQUIRE 240VAC, 6240000 CAN BE REPLACED WITH 6240001 (INVERTER,HF SCH 3KW). THERE ARE NO EXTERNAL OPTIONAL WIRING CONNECTIONS ON 6240001.
 - IF THERE ARE NO TELEMATICS OR AUXILIARY 12V WAKE SIGNALS, 284320 CAN BE USED IN PLACE OF 284321.
 - IF THERE ARE NO TELEMATICS, 283127-### IS NOT NEEDED
 - SYSTEMS EQUIPPED WITH AIR20 USE DISPLAY 6040244; SYSTEMS WITHOUT AIR 20 USE DISPLAY 6040226-001.



- | | | |
|----|-----|-----------------------|
| 1 | YEL | CAN2_H |
| 2 | GRN | CAN2_L |
| 3 | BLU | CAN1_H |
| 4 | WHT | CAN1_L |
| 5 | YEL | DISPLAY PWR (+12V) |
| 6 | BLK | DISPLAY GND |
| 8 | RED | CHARGER SAFETY OUTPUT |
| 9 | ORG | PUSH BUTTON +48V IN |
| 10 | ORG | PUSH BUTTON +48V OUT |
- *CAUTION: High Voltage (+48VDC) on orange wires.



** SET FOR 2.5s

Diagram 1-6

052147 - EPEQ AIR20 SYSTEM, 6240000 - INVERTER 6000 & DC-DC CONVERTER CHARGERS SIGNAL CABLING

NOTES:

- 283599 CAN BE REPLACED WITH 282932 AND A TOGGLE SWITCH IF DESIRED
- GRAYED OUT COMPONENTS INDICATE THOSE IN THE SYSTEM WITHOUT A HARNESS CONNECTION
- FOR SYSTEMS REQUIRING LESS THAN 240V AC, THE INVERTER6000 (PART NO. 6240000) CAN BE REPLACED WITH THE INVERTER3000 (PART NO. 6240001). THERE ARE NO EXTERNAL OPTIONAL WIRING CONNECTIONS ON THE 6240001.

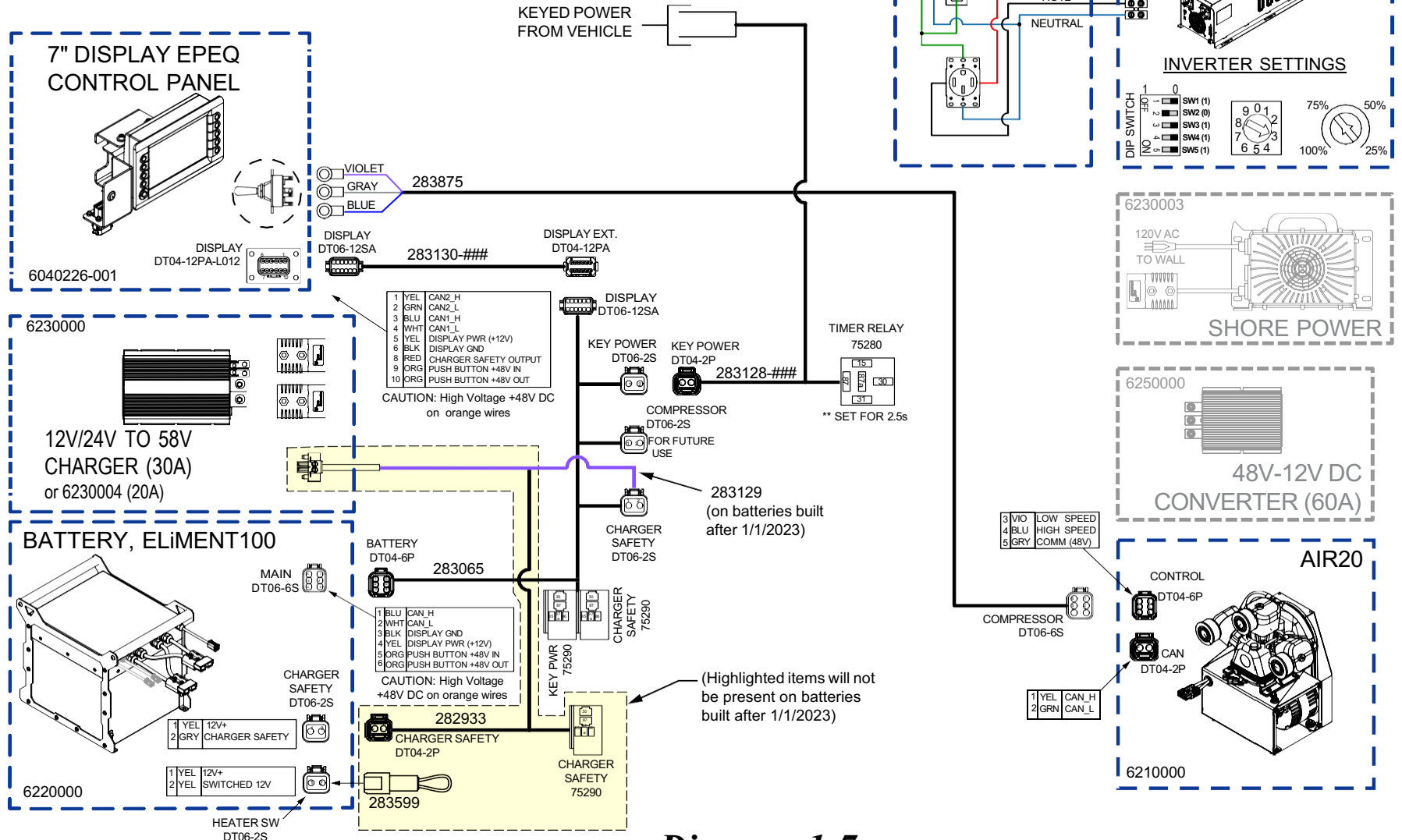
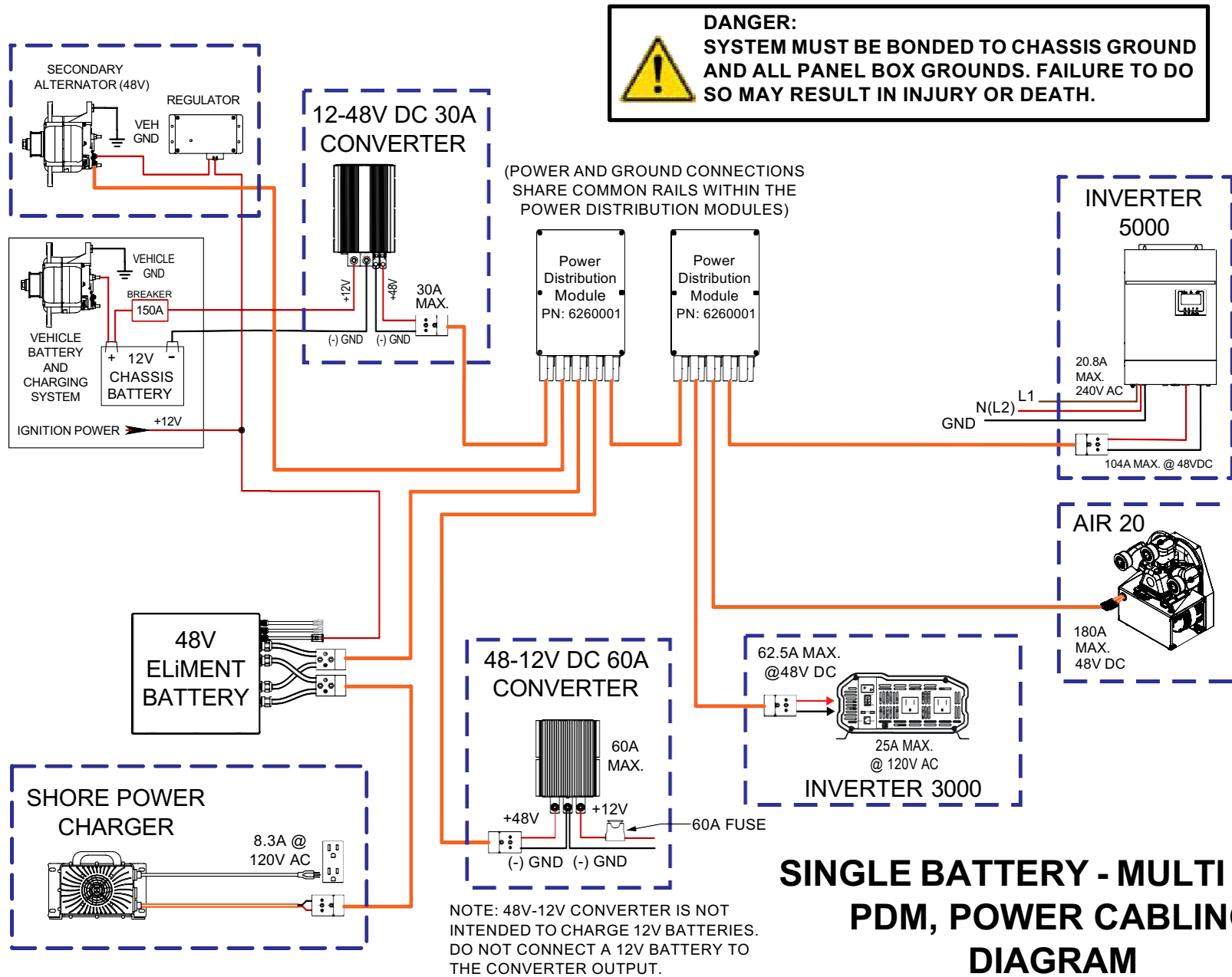


Diagram 1-7

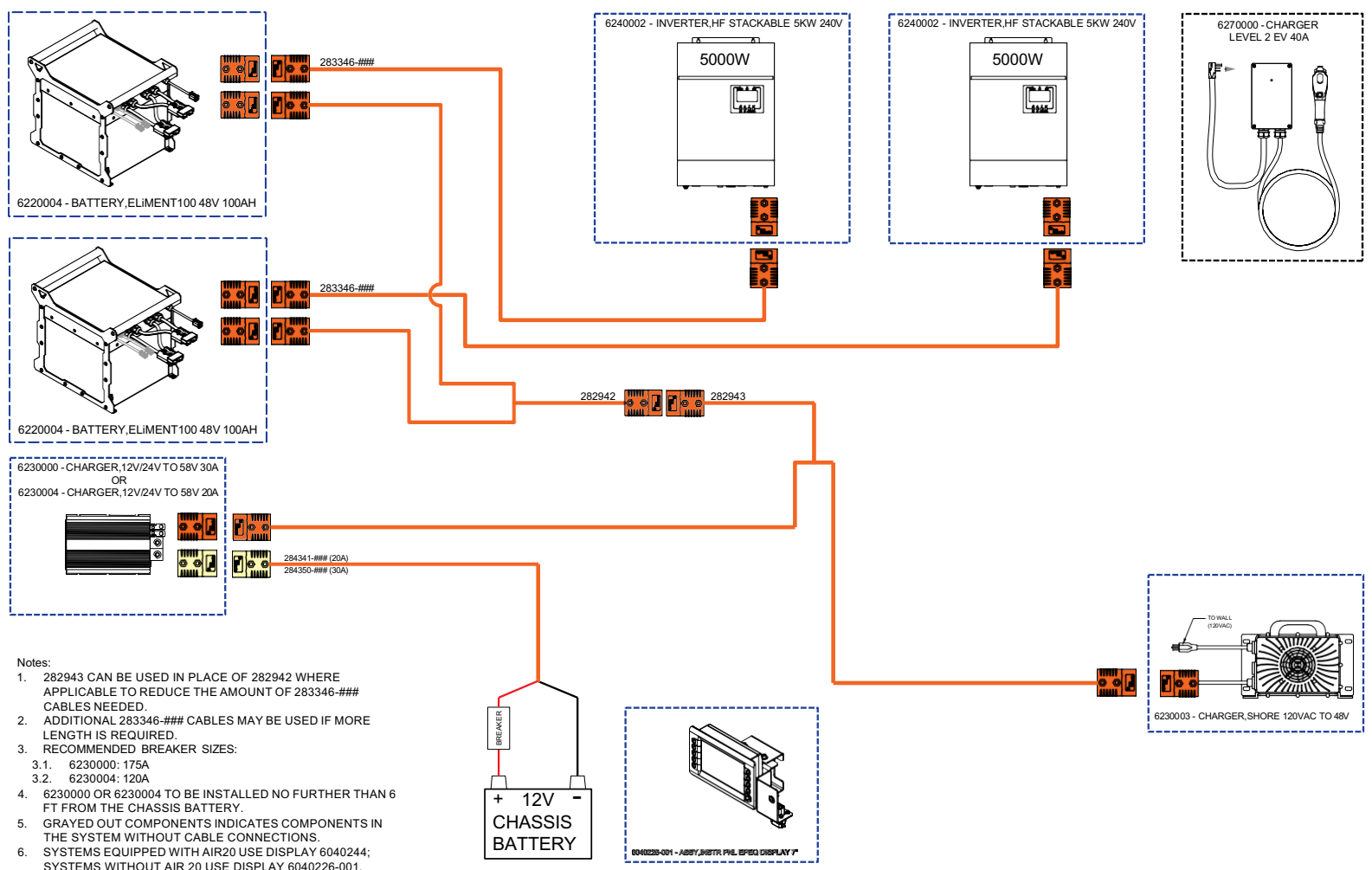
DANGER:
 SYSTEM MUST BE BONDED TO CHASSIS GROUND AND ALL PANEL BOX GROUNDS. FAILURE TO DO SO MAY RESULT IN INJURY OR DEATH.



SINGLE BATTERY - MULTI UNIT, PDM, POWER CABLING DIAGRAM

Diagram 1-8

052150 - EPEQ LEVEL 2 CHARGING SYSTEM, 10kW WITH 12V to 48V DC-DC CHARGER - POWER CABLING



- Notes:
1. 282943 CAN BE USED IN PLACE OF 282942 WHERE APPLICABLE TO REDUCE THE AMOUNT OF 283346-### CABLES NEEDED.
 2. ADDITIONAL 283346-### CABLES MAY BE USED IF MORE LENGTH IS REQUIRED.
 3. RECOMMENDED BREAKER SIZES:
 - 3.1. 6230000: 175A
 - 3.2. 6230004: 120A
 4. 6230000 OR 6230004 TO BE INSTALLED NO FURTHER THAN 6 FT FROM THE CHASSIS BATTERY.
 5. GRAYED OUT COMPONENTS INDICATES COMPONENTS IN THE SYSTEM WITHOUT CABLE CONNECTIONS.
 6. SYSTEMS EQUIPPED WITH AIR20 USE DISPLAY 6040244; SYSTEMS WITHOUT AIR 20 USE DISPLAY 6040226-001.

Diagram 1-9

052150 - EPEQ LEVEL 2 CHARGING SYSTEM, 10kW WITH 12V to 48V DC-DC CHARGER - SIGNAL CABLING

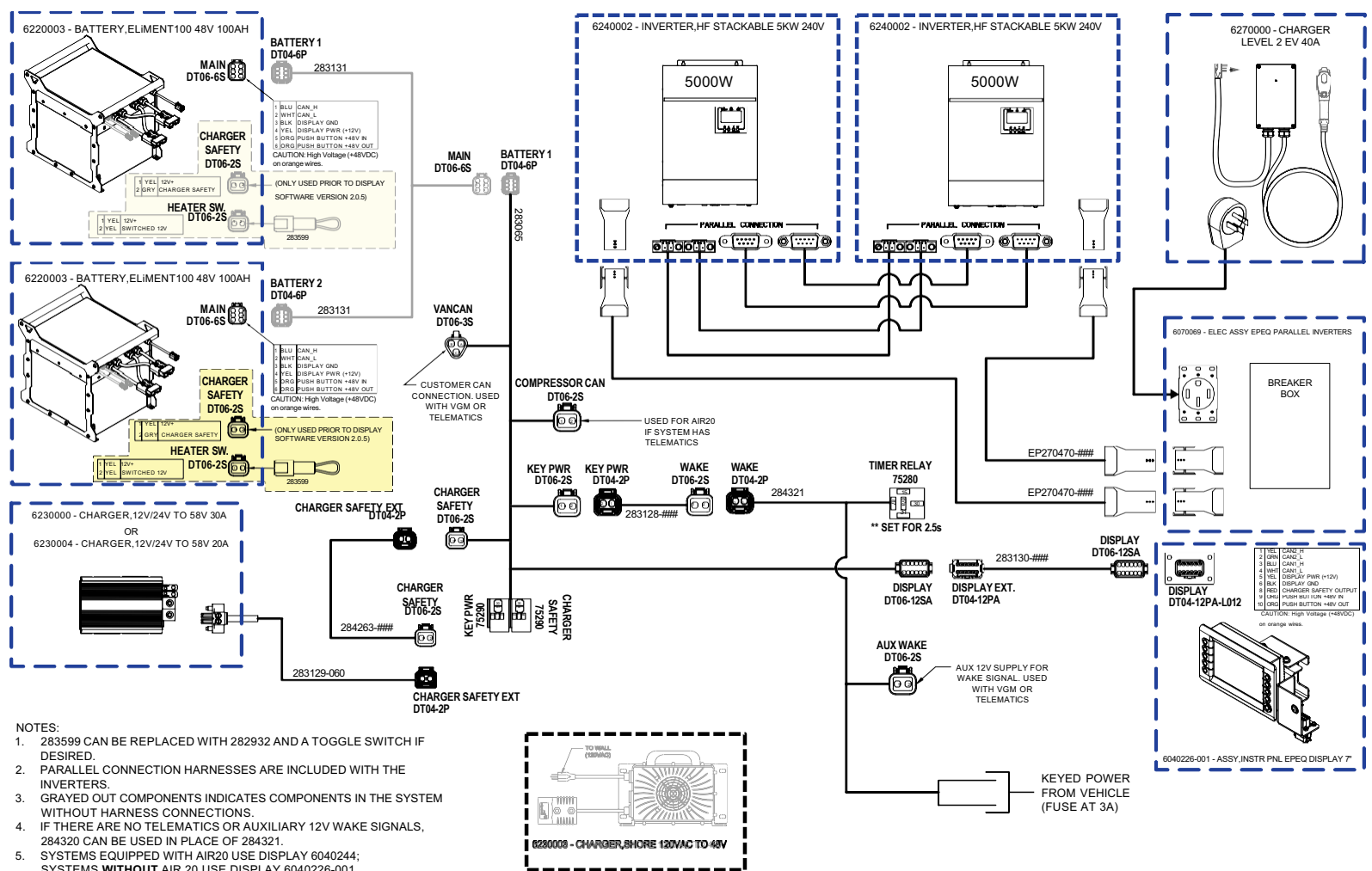


Diagram 1-10

DUAL BATTERY, MULTI-COMPONENT POWER DIAGRAM

⚠ DANGER:
 SYSTEM MUST BE BONDED TO CHASSIS GROUND
 AND ALL PANEL BOX GROUNDS. FAILURE TO DO
 SO MAY RESULT IN INJURY OR DEATH.

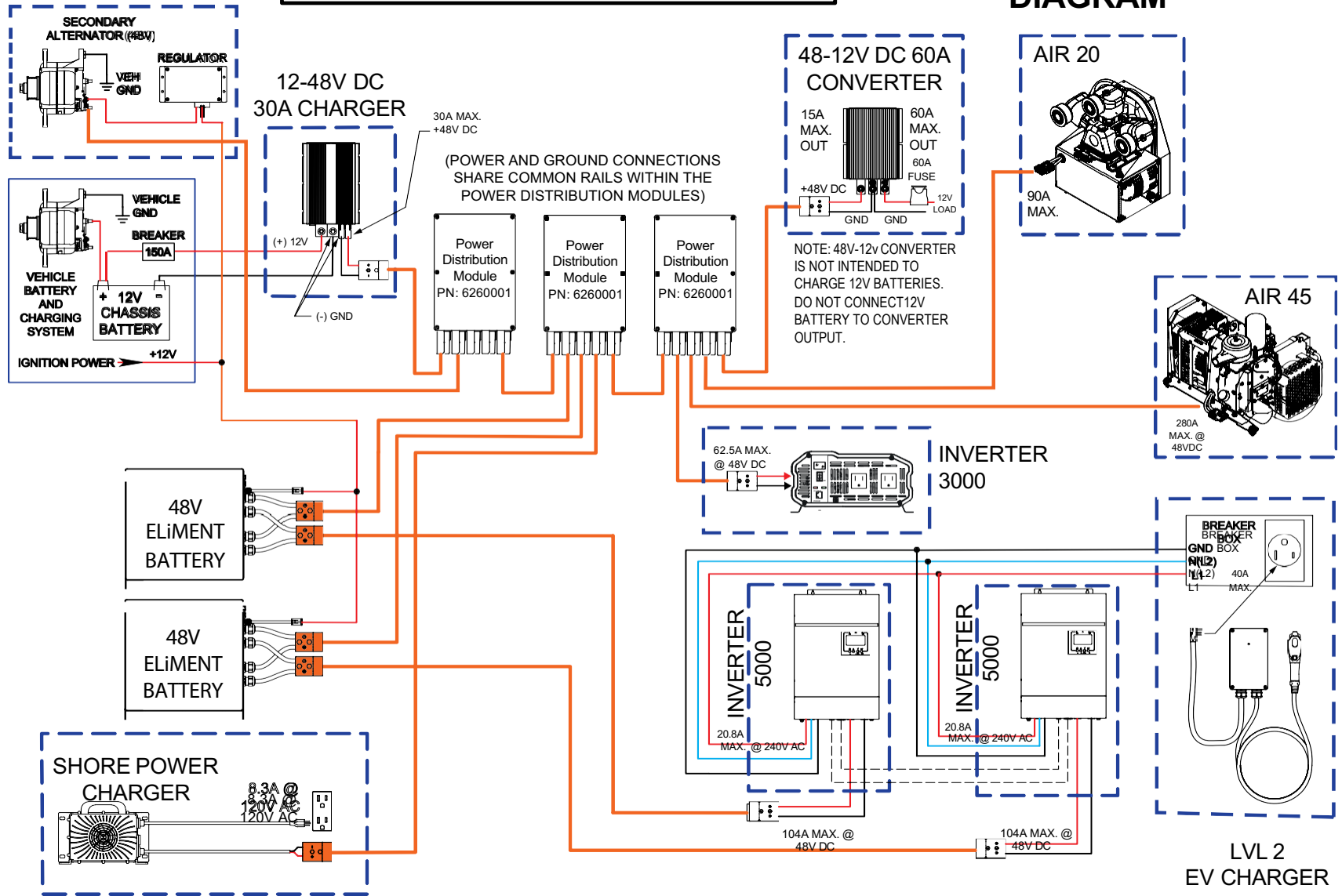


Diagram 1-11

DUAL BATTERY - SIGNAL WIRING DIAGRAM

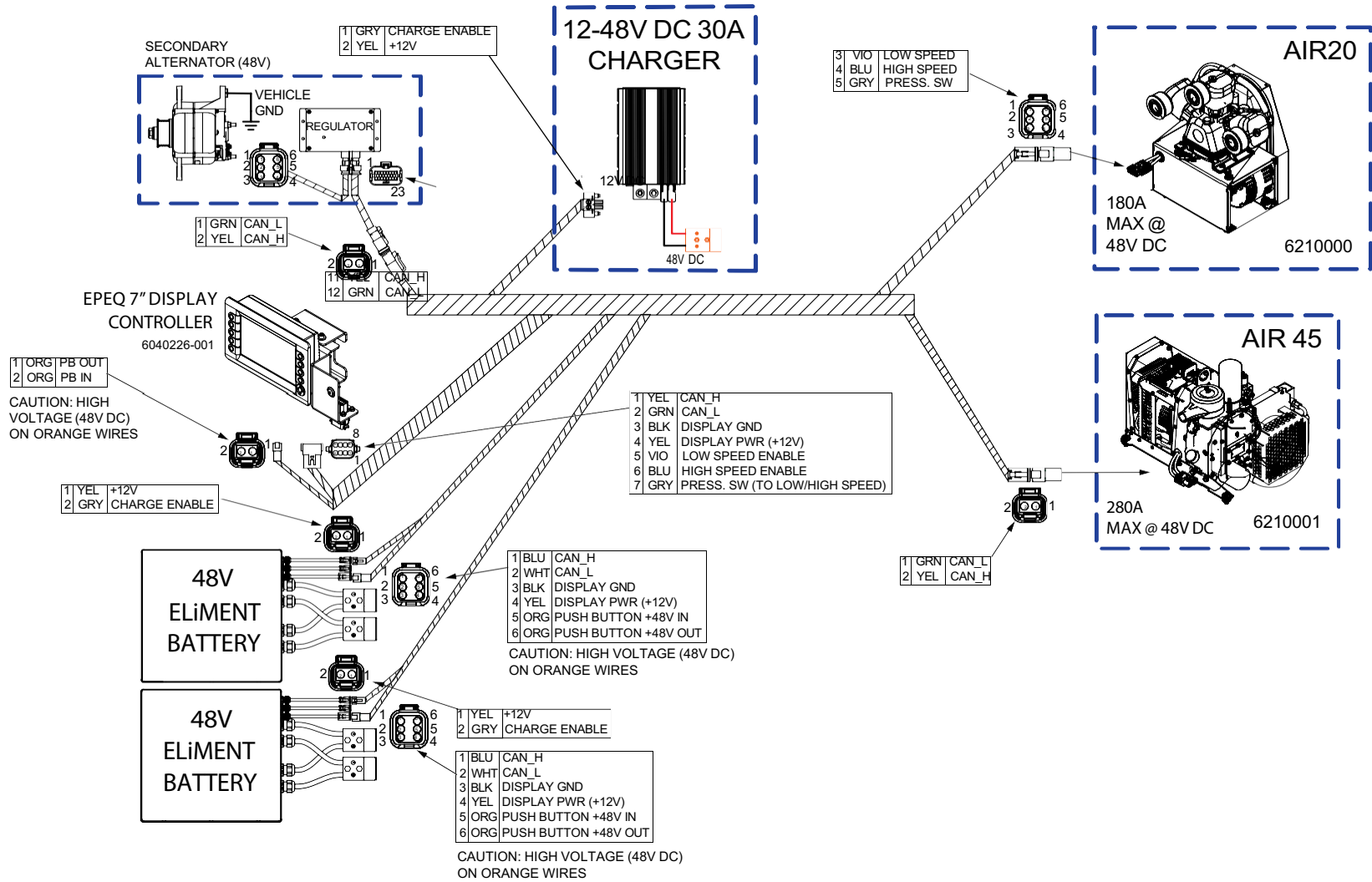


Diagram 1-12

ELiMENT™ BATTERY SETUP



The ELiMENT™ Battery is a multi-cell, compact, heavy-duty 48V DC battery pack that provides up to 100Ah. It utilizes LiFePO4 (Lithium Iron Phosphate) battery chemistry - known as one of the most stable and safest in the industry.

SAFETY



- Do not use if the battery is wet or has become immersed in water. Contact customer support for instructions.



- Never connect or touch both the positive and negative terminals simultaneously with any metal, or electrically conductive object or material at any time – including hands and fingers. This can cause personal injury, and result in a short circuit, which can ruin or cause serious damage to the battery.



- Do not use if the battery, case, or cables show signs of damage or unusual appearance such as swelling, cracks, or leaking. Leaked electrolyte is flammable. Keep away from open flame.



- If leaked electrolyte contacts water, it may generate hydrogen fluoride. *Always wear protective gloves if a battery leak is present and avoid contact with skin.*



- Turn off connected equipment and disconnect battery if you hear unusual noises, see smoke or smell odors coming from the battery.
- Do not bump, drop, hit the battery, or store anything on top of the battery. This can cause a short circuit or permanent damage to the battery.
- We recommend using only EPEQ® chargers designed for charging ELiMENT™ batteries. Unapproved chargers could result in battery failure, damage to the battery, or unexpected conditions including fire or explosion.
- Exercise safe handling and usage when working with electric batteries and electrical equipment.
- Batteries have a high short circuit current. To reduce chance of accidents we recommend removing watches, rings, or other metal objects.
- Use tools with insulated handles.
- Disconnect charging source before you connect or disconnect cables at the battery terminals.
- ELiMENT™ Batteries come pre-wired with DC power cables using Anderson-type connectors.
- Battery weighs approximately 95 lbs. Two people are recommended when carrying battery by hand.
- FIRE SAFETY:** When using electrical equipment it is a good idea to keep a Class C fire extinguisher nearby. In case of fire, use a Class C fire extinguisher designed for electrical fires. Whenever possible, avoid using water on electrical fires. Water conducts electricity and may cause electrical short circuits and fire concerns to spread to other components and electrical equipment.



INSTALLATION

- Location: The ELiMENT™ battery needs to be installed in a clean, dry environment. Choose a location protected from the elements or other harsh conditions.
- Mounting brackets are attached to the base of the battery to allow fixed and permanent installations onto sturdy, flat surfaces using (4) M8 bolts or screws.
- The ELiMENT™ battery weighs about 95 lbs. Two people are recommended when lifting or moving the battery. To help facilitate moving and relocating the battery, two lift points are integrated into the battery's frame near the handles - for use with a hoist.
- The ELiMENT™ battery is self-contained and arrives, wired with DC power cables and connectors, and ready to be charged. The ELiMENT™ battery has two sets of orange power cables with Anderson-type connectors which are installed at the factory to handle both 48V DC power in and 48V DC power out.
- The orange connectors from the battery connect to the orange connectors found on other EPEQ® equipment such as the Shore Power charger, 12V-48V DC-DC converter, inverters and compressors.
- Anderson-type connectors are color coded to match other connectors of the same size and color for easy identification. Mate the orange DC connector from the battery to the matching connector on the desired piece of equipment or charger. Align the two connectors and press together until the connection is secured.
- The battery also comes with one (1) six-pin connector used for the display and CAN Communications.

OPERATION

1. Before its **first** use, charge the battery fully to activate all cells to avoid possible deep battery level depletion - using only Vanair approved battery chargers.
2. If battery requires charging, charge the battery using matched charging equipment such as the Shore Power 120V AC Charger or the EPEQ® 12V-48V DC-DC Converter.
3. Safely charge the battery at temperatures between 0°C to 45°C (32°F to 114°F). These batteries can also be charged automatically by a vehicle using an EPEQ® Alternator and Regulator option, or planned solar option.
4. LiFePO4 batteries can safely operate between -4°F to 140°F (-20°C to 60°C).
5. ELiMENT™ Batteries feature 2 orange colored quick connect Anderson-type plugs for ease of connecting power to other equipment, and to facilitate easy disconnection and relocation.
6. Plug in the cable from the EPEQ® charging device using the orange battery connectors. Press connectors together to make sure the connection is secure, then power on the charging unit to begin charging.
7. The orange DC connectors are also used to connect power from the battery to other EPEQ® equipment (such as EPEQ® air compressors and AC Power Inverters).



Disconnecting cables should always be done by holding the connectors firmly on both sides, and carefully pulling them apart. Never disconnect or attempt to move EPEQ® equipment by pulling on the cable wires!

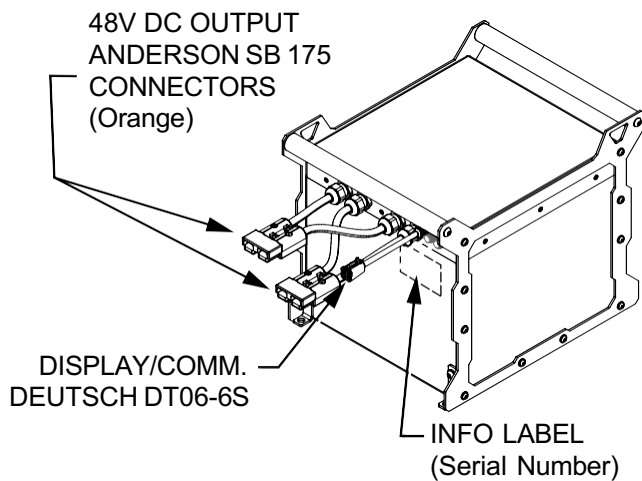


Figure 1-2

MAINTENANCE AND SERVICE:

- When cleaning or servicing the battery, always disconnect the small communications connector first.
- **WARNING:** There is a risk of high short circuit current with batteries.
- Remove rings, watches, bracelets and other metal or conductive materials when working with batteries.
- For additional safety wear eye protection when working with large batteries
- Use tools with insulated handles or are non-conductive
- Do not leave tools or conductive objects on top of batteries
- Disconnect any chargers being used when connecting or disconnecting battery terminals.
- **(FACTORY PERSONNEL ONLY)** Do not over tighten battery terminals! If cable connections are too tight, damage to the battery's electronic circuitry can occur which may cause sparks or arcing – creating a source of ignition.
- Things to do before performing maintenance on the battery:
 - Turn off any connected equipment
 - Disconnect any signal or communications wires attached to the battery
 - Disconnect any charger connected to the battery

- Battery case can be wiped clean with a slightly damp cloth. Avoid touching terminals or exposed wires while cleaning case. Do not use combustible cleaners or abrasives.

TROUBLESHOOTING

No power from Battery:

- Make sure that the battery is properly charged
- Batteries arrive with orange power cables already installed.
- Before first use, fully charge battery to ensure all energy cells in the battery case have been activated
- Do not store a fully discharged battery or the cells may become dormant and non-serviceable. Always store the battery with at least a 40% charge level.

Unusual noises, smoke, unusual odors, visual damage, leaks or bulges in the case

Battery is likely damaged. Do not use. Call Vanair® Customer Service for assistance

Battery has become soaked or immersed in water

Do not use. Water can chemically react with materials in the battery cells to create a caustic and toxic compound. Call Vanair® customer service for information.

No System Communication from Battery

Check Display/COMM connection to the battery.

(See ELiMENT™ Battery User Manual for more details.)

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SHORE POWER CHARGER SETUP



Safety: Always follow the cautions and warnings listed in each EPEQ® product's individual user manuals.

SAFETY:

The Shore Power charger provides the following built-in protections:

- Protects against over voltage
- Protects against over current.
- Protects against output short circuit.
- Protects against reverse voltage.
- High temperature protection.
- **CAUTION:** If the battery being charged ever appears to be leaking, damaged or abnormal, disconnect the charger from the battery immediately and contact the battery's manufacturer.
- **Electric Shock Hazard.** Do not open the Shore Power case. There are no user-serviceable parts inside and there is a risk of electric shock or damage to the equipment.



INSTALLATION

1. The EPEQ® Shore Power Charger is a durable, compact, 120V AC to 48V DC battery charger which operates off of a standard 120V AC grounded outlet. The unit comes with a matched power output cable and Anderson-type connector and is ready to connect to the ELiMENT™ battery for reliable charging.

2. The housing of the Shore Power charger includes mounting holes to allow the unit to be securely mounted on a flat surface.
3. Ideally, the charger's mounting plate should be fixed in a flat, horizontal position - allowing the fan and cooling fins to face upward for best heat dissipation.
4. For proper cooling allow at least 4" (~10cm) clearance around the unit. It is important that the location of the charger provides adequate ventilation for proper cooling.
5. Vents, fan and cooling fins should always remain unobstructed.
6. Do not mount in a sealed enclosure as it requires open air circulation for proper cooling. If enclosed - the heat generated by the charger would raise the temperature of the same air being used to cool the unit.
7. It is an important consideration to keep the charger free from surface dust accumulation as this can adversely affect heat dissipation.
8. Ensure the AC input voltage being provided to the charger falls within the allowed voltage requirements of 110V AC +/- 20% (88-132V AC)
9. Be sure to connect the unit to ground. A grounding wire comes with the Shore Power.
10. If an extension cord is required to reach an AC outlet - be sure to use a heavy duty cord that can handle the maximum input current of the charger. Keep any power extension cords as short as possible for best results.
11. The DC output cables are pre-wired and use the proper gauge to handle the 48V DC output voltage and current.
12. Avoid placing the wiring harness where the wires can be damaged, pinched, or compressed. If there is damage to the wiring or wiring harness, replace immediately

OPERATION

1. With the power off, plug the orange DC output connector to the matching orange DC connector on the ELiMENT™ battery.
2. Plug in the Shore Power charger to begin charging.

3. Other 48V DC powered equipment can be connected to the battery while charging. (Providing there is an adequate charge voltage on that battery.)
4. On-board protections work automatically and are programmed into the Battery Management System.

INDICATOR STATE	
Standby/ No-load	● Green on (with input, no trigger required on power up)
Standby/ No-load	●● Red & Green slow <i>flashing</i> (No output, requires trigger to power up)
Charging <80%	● Red on
Charging >80%	● Yellow on
Fully Charged	● Green on
Protection Status*	●●● Green - Red - Green <i>flashing</i> & pause for 4s

Figure 1-3

STATUS INDICATOR LIGHTS

1. Green and yellow lights flashing alternately, This indicates no output power. Unit is in standby mode.
2. Red light on. Indicates battery charge level less than 80%
3. Yellow light on. Indicates battery charge level above 80%.
4. Green light on. Indicates battery charge level at 100%. Battery is fully charged and charging is turned off.
5. Green and yellow lights flash quickly together. A fault has been detected and there is an abnormal condition.
6. See (Figure 1-3) for visual reference
7. (Refer to the Shore Power User Manual for more details and troubleshooting.)

TROUBLESHOOTING

FAULT INDICATION	SPECIFIC REASON
AC Power Anomaly	Error detected from input voltage, or gauge of power cord is too thin.
Abnormal Charger State	Shore Power charger is overheating.
Battery Abnormal	Output short-circuit; no battery detected; reverse polarity detected; low voltage of battery; or battery may be overheating

SOLUTIONS:

1. **Error input voltage:** check that AC input voltage conforms to required AC voltage.
2. **Wire gauge too thin:** Charger works best plugged directly into the electrical outlet - however if an extension cord must be used, use a cord with a wire gauge, rated for at least 10 amps.
3. **Charger overheating:** Check for proper ventilation where the charger is located. Make sure there is 4" clearance around the charger. Check that the fan and ventilation fins are all are free from any obstruction. Make sure fan is running.
4. **Output short circuit:** Check wiring from DC power output terminal to battery, to make sure no short circuit condition exists.
5. **No battery detected:** Check Anderson connectors. Make sure battery connectors are engaged and connected securely.
6. **Low battery voltage:** Make sure battery being charged matches the voltage output of the charger.
7. **Battery overheating:** Make sure there is proper ventilation for the battery and the battery is not damaged or in an abnormal state.

AIR20 AIR COMPRESSOR



The EPEQ® AIR20 is a reciprocating air compressor and is designed to provide reliable air output from a 48V DC power source. Ideal for intermittent use.

SAFETY



- This unit is designed for indoor use or within a clean, dry compartment, protected from rain, dust and the elements.

- Compressor requires adequate clearance for air circulation and cooling. Do not block ventilation openings or cooling fans.



- Make certain the compressor, all connecting cables and hoses are in good condition and of adequate size to avoid risk of fire and electric shock. Do not use damaged or undersized power cables or wiring.



- **AVOID INJURY:** When operating machinery, always be aware of moving parts, belts and rotating components. Do not operate machinery where fingers, tools, loose clothing, jewelry or long hair can be caught in the equipment.



- Wear eye protection during use as compressed air can send loose debris flying without notice



- AIR20 compressor equipped with



safety pressure valve which releases excess air pressure in the event of over pressurization

- **HOT SURFACES:** It is normal for compressors to become hot during use, and can remain hot after being shut off. Wear protective gloves when handling, or avoid touching compressor until after it cools.

- Unit is capable of producing electrical arcing or sparks. To avoid risk of fire, do not install this equipment in areas in or around combustible liquids, solids, or gas. This includes any space containing combustion engine powered vehicles or machinery, fuel tanks, fuel lines or fittings that are a part of a fuel system.



- Before doing any cleaning or maintenance, disconnect the AIR20 from DC power to reduce risk of accidental start or electric shock. Machine can auto-start.



- **NOTE: This compressor uses oil during operation. Do NOT use for health applications requiring clean, breathable air.**



INSTALLATION

1. **NOTE:** AIR20 requires a compressed air receiver tank. (Available separately)
2. Find a clean, dry, stable and level surface or equipment frame to secure the AIR20 using the 4 mounting bolts and pads found on the bottom of the compressor's base.
3. Rectangular spacing is 13.00" x 8.75" O.C. (See *Figure 1-4*)
4. Unpacking - make sure the compressor is free of any visible damage, broken or loose wires or physical obstructions.
5. The EPEQ® AIR20 Compressor receives power from the ELiMENT™ battery however, the power to the motor is controlled by a 3-way toggle switch attached next to the EPEQ® 7" Display Controller (See *Figure1-7*).

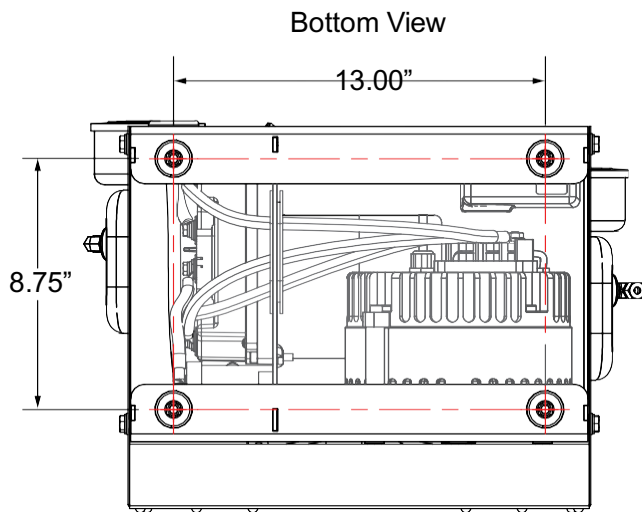


Figure 1-4

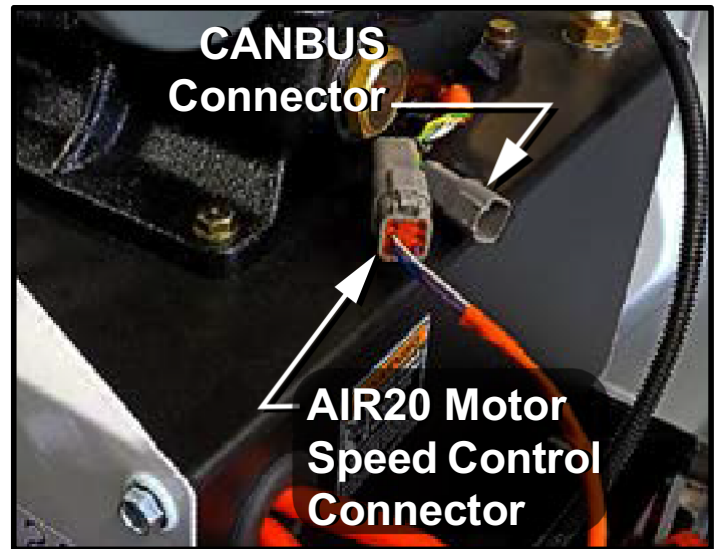


Figure 1-5

6. The 3-way toggle switch provides three positions to control the compressor's motor.
 - OFF (Center position)
 - Low Speed 10 CFM (bottom position)
 - High Speed 20 CFM (top position)
7. Signal wires from the toggle switch connect to the motor speed control plug on top of the AIR20 - near the oil level sight glass. (See *Figure 1-5*)
8. Move toggle switch to the "OFF" position before connecting signal wire connector.
9. When safe to do so, slide the matching orange Anderson-type connectors from the AIR20 compressor and the ELiMENT™ battery together between the compressor and the battery. Press firm to ensure a secure connection.
- 10. CAUTION: To avoid damaging the cables and internal parts of the equipment, do NOT attempt to lift or pull the compressor or battery using the signal or power cables.**
11. Position the battery and compressor close enough so that the cables are not strained or have undue force exerted on them.
12. If used - connect the CANBUS plug from the wire harness into the CANBUS connector ON the compressor to enable communication with the ELiMENT™ Battery. See (*Figure 1-5*)

OPERATION

1. Before each use - always check the oil level in the sight glass on a level surface. Ideally oil level should be at the halfway mark - however it is acceptable if it falls between 1/4 and 3/4 full. (See *Figure 1-5*)
2. **CAUTION:** If oil level is low - do not use, as there is a serious risk of causing damage to the air compressor. Add **Vanair® Reciprocating Compressor Oil** to halfway point on sight glass using the oil fill opening beneath the oil fill cap.

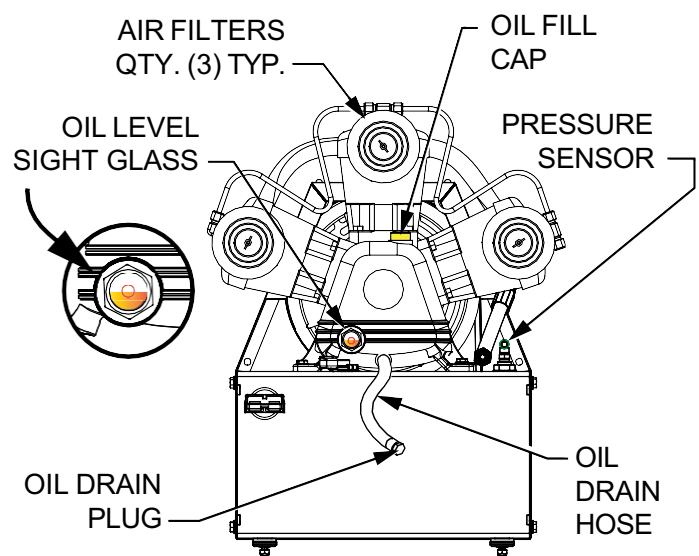
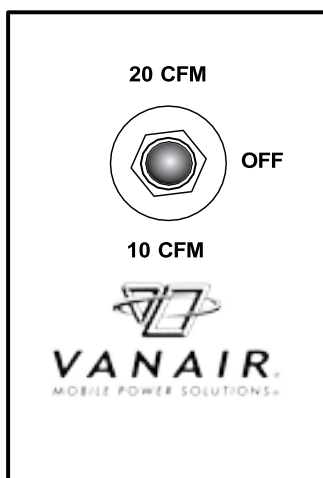


Figure 1-6

3. Visually check the unit and cables for obvious damage, improper connections or any obstruction.
4. Once connected, move the toggle switch from “OFF” to Low (10 CFM) or High (20 CFM) as desired to start the compressor. *(See Figure 1-7)*
5. Move the toggle switch to the “OFF” position to shut down.
6. For more detailed maintenance and troubleshooting, information, please refer to the AIR20 User Manual.



Toggle Switch
(Located on 7”
Display Control
Panel)

Figure 1-7

TROUBLESHOOTING

Compressor fails to run:

- Check for secure connection to battery
- Check battery charge level - recharge as needed
- Check connection to pressure sensor *(See Figure 1-6)*
- Make sure air receiver tank is not already full.

Compressor fails to build pressure, or pressure builds slowly:

- Check for air system leaks
- Check pressure relief valve and sensor
- Check that air filters are not dirty or clogged
- Check for proper tension on belts
- Battery level low - recharge battery as needed

Excess moisture in the compressed air:

- Drain receiver air tank (follow manufacturer’s directions)
- Excess compressor heat - allow unit to cool
- In the event the compressor is used in sub freezing weather, be aware that moisture collected in the receiver tank can freeze and will be unable to drain. It is recommended to bring the tank into a warmer environment so any ice within the tank can thaw and be drained normally.

RELATED ITEMS:

- **Compressor Maintenance Kit: KIT-1156**
(Includes 1 Quart Vanair® Reciprocating Oil and (3) air filter elements)
- **Drive Belt: Part No. 281908**



Vanair® Reciprocating Oil
Part No. 271856-1GAL
Part No. 271856-1QT

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12V - 48V DC-DC CONVERTER



The main purpose of the 12V-48V DC-DC Converter is to convert the standard 12V system electrical power generated by a vehicle to a 48V DC output that can be used to charge the ELiMENT™ Battery while on the road or away from an AC power outlet.

SAFETY



- The DC-DC Converter connects to the vehicle's existing battery. Most vehicle batteries are lead-acid based, always use proper caution.



- Gases given off by these batteries can be both toxic and combusive. Make sure there is good ventilation. Do not expose to any source of ignition such as sparks, lit cigarettes or open flames



- Large batteries may produce sparks or cause electrical shock. Removal of conductive metal jewelry and rings on hands and wrists during maintenance on large batteries is strongly suggested.



- Lead-acid batteries can leak and are capable of causing irritation or burns on unprotected skin.



- The use of protective gloves and eye protection is highly recommended when working with lead-acid batteries.



- Caution: It is normal during use for the converter to become warm or even hot, The case of the converter can reach temperatures of 180° F (85°C)



INSTALLATION

1. Before beginning work, turn off all power and turn off any attached devices
2. The converter should be mounted flat and facing up to permit the heat to dissipate and rise away from the converter. Do not cover. Mount in a location that allows for good air circulation.
3. Mounting holes are located in the unit's base
4. Follow all vehicle manufacturer's instructions

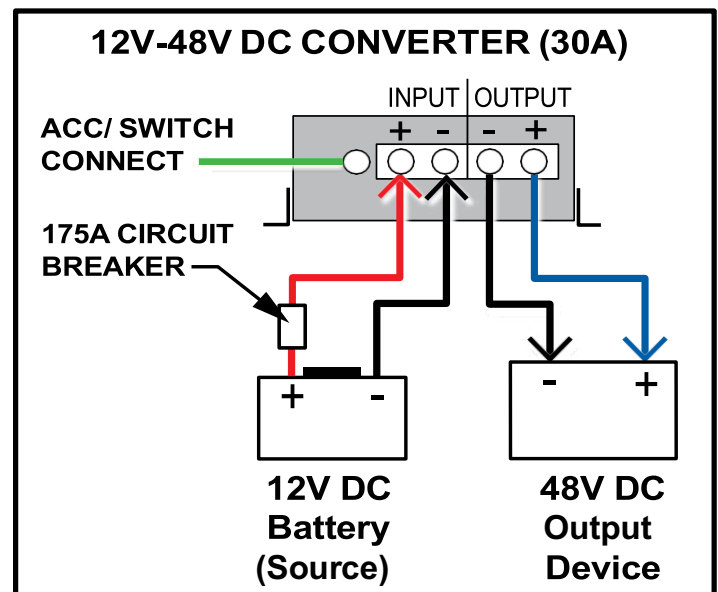


Figure 1-8

5. When wiring the converter, it is normal to notice a spark when it is initially connected to the battery. Connect battery side first.
6. Check the polarity of the wiring connections. (EPEQ® Converters will come with input cables and connectors pre-installed)
7. DC INPUT and OUTPUT cables and connectors are pre-installed on the 12V-48V DC Converter. Use these to connect your converter
8. For manual wiring the connections refer to the following steps. (*See Figure 1-8*)
 - Positive (+) connector from the 12V battery connects to the Positive (+) INPUT terminal on the converter.
 - Negative (-) connector from the 12V battery connects to the Negative (-) INPUT terminal

- of the converter.
- Connect the Negative (-) terminal of the load or output device to the Negative (-) OUTPUT terminal of the converter.
 - Finally, connect the Positive (+) connector from the load device to the Positive (+) terminal of the converter.
 - For added protection, the installation of a 175A circuit breaker (200A max) between the converter's Positive (+) INPUT terminal and the Positive terminal on the 12V battery is recommended. Follow the circuit breaker manufacturer installation instructions.
 - Do not connect Negative (-) or Ground from the converter to vehicle's case or chassis ground.
 - An optional connector for ACC (ignition accessory) or other switch is available to add ON/OFF capability to the converter. (See *Figure 1-8*)
 - Optional - Follow manufacturer's instructions to install a yellow Anderson connector to the vehicle battery (to match the yellow Anderson connector from the the Converter) This can simplify installing and removing the 12V-48V DC Converter

OPERATION

1. Once the converter is properly connected between the 12V DC vehicle battery and the 48V output device, the operation is simple.
 2. Do a quick visual check to make sure the converter, cables or wiring are connected properly and in good condition - especially the polarity. (If hardwired - be sure the polarity is correct. Positive to Positive - Negative to Negative)
3. If using the cables and Anderson-type connectors that were installed at the factory and ship with the EPEQ® System - connecting is simple. Connect the 2 yellow Anderson-type connectors from the vehicle battery to the converter and then connect the 2 orange connectors from the ELiMENT™ Battery to the converter. (**See Figure 1-1**)
 4. Running the engine or driving the vehicle while charging the ELiMENT™ Battery, will help avoid excess drain on the vehicle's own 12V battery.

TROUBLESHOOTING

- **CAUTION: It is normal for the converter to be warm or even hot during operation. The case of the converter can reach temperatures of 185°F (85°C).**
- Be sure to allow proper ventilation for the heat to dissipate from the unit.
- If unit does not seem to be working - check any fuses or circuit breakers in use. If the fuse is burned - replace. If installed circuit breaker is tripped - reset the breaker.
- If functionality does not return, check conditions for proper ventilation, damaged, pinched or loose wiring, etc.
- If unit has shut down due to a protection feature such as overload or high heat, disconnect the load and allow the unit to cool down then try again.
- The unit is sealed. Do not open the case as there are no user-serviceable parts inside.
- If unit continues to fail after checking these issues - please contact Vanair® Customer Service.

48V - 12V DC-DC CONVERTER



The main purpose of the 48V-12V DC-DC Converter is to convert the 48V DC output from the ELiMENT™ Battery to a 12V DC output that can be used by various 12V DC accessories and tools.

SAFETY



- The DC-DC Converter connects to the ELiMENT™ Battery. Always use caution when using electrical equipment.



- Large batteries are capable of producing sparks and causing electrical shock. Removal of conductive metal jewelry and rings on hands and wrists during use and maintenance of large batteries is strongly suggested.



- Caution: It is normal during use for the converter to become warm or even hot, The case of the converter can reach temperatures of 180° F (85°C)

INSTALLATION

1. Before beginning installation turn off all power and turn off any attached devices
2. The converter should be mounted flat and facing up to permit the heat to dissipate and rise away from the converter. Do not cover.
3. Locate where there is good air circulation.
4. Mounting holes are located in the unit's base

5. CAUTION: When wiring the converter it is possible to notice a small spark as it is initially connected to the battery.
6. Check the polarity of the wiring connections. (EPEQ® Converters will come with input cables and connectors pre-installed)
7. DC INPUT and OUTPUT cables and connectors are pre-installed on the 48V-12V DC Converter. Use these to connect your converter to the 48V and 12V batteries.
8. For manual wiring the connections refer to the following steps. (See *Figure 1-9*)

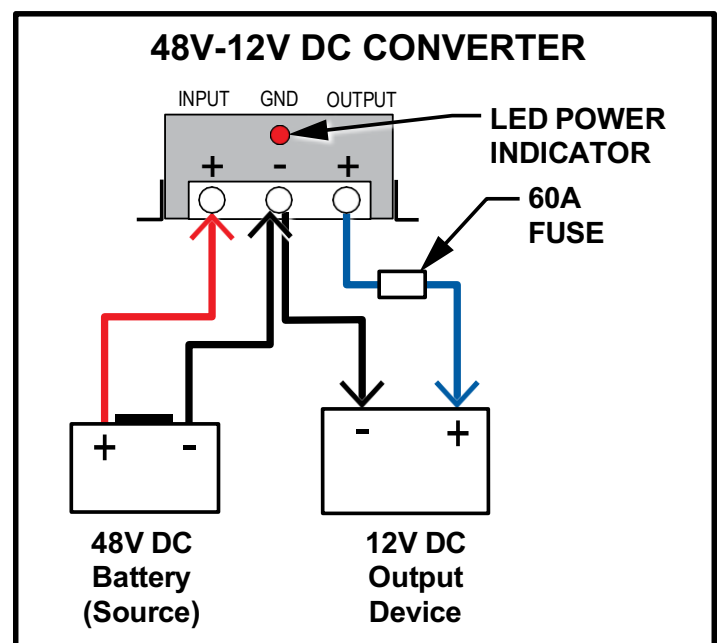


Figure 1-9

- Positive (+) connector from the 48V battery connects to the Positive (+) INPUT terminal on the converter.
- Negative (-) connector from the 48V battery connects to the Negative (-) INPUT terminal of the converter.
- Connect the Negative (-) terminal of the load or output device to the Negative (-) OUTPUT terminal of the converter.
- Finally, connect the Positive (+) connector from the load device to the Positive (+) OUTPUT terminal of the converter.

- For added protection, we recommend installing a 60A fuse between the converter's Positive (+) OUTPUT terminal and the Positive terminal of the 12V tool or appliance. Follow the installation instructions from the fuse manufacturer.

OPERATION

1. Once the converter is properly connected between the 12V DC vehicle battery and the 48V output device, the operation is simple.
2. Do a quick visual check to make sure the converter, cables (or wiring) are connected properly and in good condition - especially the polarity. (If hardwired - be sure the polarity is correct. Positive to Positive - Negative to Negative)
3. If using the cables and Anderson-type connectors that were installed at the factory and ship with the EPEQ® System - connection is simple. Connect the yellow Anderson-type connectors from the ELiMENT™ Battery to the converter and then connect the Yellow connector from the converter to the 12V DC accessory or tool.



- Check the battery level for adequate input power. If battery level is low, charge the 48V DC source battery as needed.
- If functionality does not return, check conditions for proper ventilation, damaged, pinched or loose wiring, etc.
- If unit has shut down due to a protection feature such as voltage overload or high heat, disconnect the load and allow the unit to cool down then try again.
- If protective shutdown reoccurs, it is possible the connected devices may be drawing too much voltage from the converter. Reduce the load connected to the converter and try again.
- If unit continues to fail after checking these issues - please contact Vanair® Customer Service.
- The internal components of this unit are sealed. Do not attempt to open. No user-serviceable parts inside.

TROUBLESHOOTING



- **CAUTION:** It is normal for the converter to be warm or even hot during operation. The case of the converter can reach temperatures of 185°F (85°C).
- Allow for proper ventilation for the heat to dissipate from the unit. Remove any objects on or around unit to allow for proper cooling.
- If unit suddenly stops working - check all connections, fuses or circuit breakers in use. If using a fuse, check to see if the fuse is burned. If so, replace it. If an installed circuit breaker is tripped - reset the breaker. Check again to see if the converter is now functioning.



EPEQ® EV CHARGER



The EPEQ® EV Charger is a durable, lightweight charger designed to provide a convenient and easy to use power resource to charge electric vehicles. Designed to provide a mobile 240V EV charging solution when paired with ELiMENT™ Batteries and EPEQ® inverter equipment.

SAFETY



- Disconnect power supply prior to installing, or performing maintenance on this unit. Failure to do so could result in damage to the power supply, the charger or personal injury.
- Connect only to an electrical circuit that provides the minimum branch circuit over-current protection required by National Electrical Code ANSI/NFPA 7. Consult a licensed electrician if you are unsure your intended electrical circuit meets these requirements. Failure to adhere to these requirements may result in a risk of electric shock or fire.



ELECTRICAL POWER REQUIREMENTS

1. Before installation, find an available electrical source that provides the following requirements for the EPEQ® EV Charger. (Note: output cannot exceed 80% of the circuit's rating)
 - 40A is the maximum output setting (default): Use a **dedicated circuit** for 50A; 208-240 V AC, 50-60Hz, single-phase circuit.

- For optional 32A maximum output setting: Use a **dedicated circuit** for 40A; 208-240 V AC, 50-60Hz, single-phase.
- For optional 24A maximum output setting: Use a **dedicated circuit** for 30A; 208-240 V AC, 50-60Hz, single-phase.
- For optional 16A maximum output setting: Use a **dedicated circuit** for 20A; 208-240 V AC, 50-60Hz, single-phase.

2. A double pole circuit breaker matching the circuit rating outlined above must be used.
3. A Ground Fault Circuit Interrupt (GFCI) is equipped with the EV charger. No upstream GFCI is required. In areas where an additional GFCI is required - it will have no adverse effect on the operation of the equipment.
4. The EPEQ® EV Charger can connect to a standard NEMA 6-50 or 14-50 receptacle, or if preferred can be hardwired.
5. Mobile 240V AC power can be achieved for the EPEQ® EV Charger by pairing it with two (2) EPEQ® INVERTER5000 units - powered by (2) ELiMENT™ 48V batteries.

ADJUST MAXIMUM CURRENT OUTPUT (OPTIONAL)

Unit is preset at the factory for 40A maximum output. If another setting is desired please follow these directions to adjust the output

1. Disconnect power from the charger.
2. Lay the unit face up on a flat surface.
3. Remove the 4 screws from each corner of the charger and remove the cover.
4. (CAUTION: There is an LED tube attached to the front cover. Lay cover on a flat surface when removed to avoid damaging the LED tube.)
5. With the cover removed, locate the 4-position DIP switch near the upper left corner of the circuit board. (See *Figure 1-11*)
6. (See *Figure 1-12* to set correct current for your situation.)
7. After setting the DIP switch to the proper current output setting, (see *Figure 1-10*) replace the cover and (4) cover screws. Torque = 13.88 lbs-in (16kgf-cm).

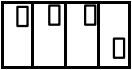
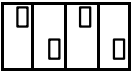
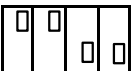
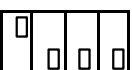
Description	DIP Settings
40A Maximum Current Output (Default)	
32A Maximum Current Output	
24A Maximum Current Output	
16A Maximum Current Output	

Figure 1-10

INSTALLATION

Parts included with product:

- Mounting Bracket (x1)
- Socket Cap Screw 5/16" (x4)
- Robertson Head Screw #14 (x2)
- Charger Holster (x1)
- #8 Wall Anchors (x8)

Tools required:

- Phillips Screwdriver PH3
- Allen Key M4
- Allen Key 3/16"

INSTALL THE CHARGING STATION

1. Mounting bracket - push down on the "U" shaped notch to separate front and back pieces of the mounting bracket.
2. Attach the front piece of the mounting bracket to the back of the charging station case using the (4) socket cap screws. The bracket's "U" shaped notch should be on the top.
3. The back plate of the bracket mounts securely to the wall or other structure, using the (2) #14 Robertson-head screws (for wood) For masonry, use M6 mechanical screws. Torque to 43.4 lbs-in (50kgf-cm).
4. Mount the charging unit on the wall by fitting the two halves of the mounting bracket together.
5. Insert either the security pin or a lock into the mounting bracket to keep it in place.
6. Plug the power cord into the proper AC power outlet.

HARDWIRE CONNECTION (OPTIONAL)

1. Choose conduit that conforms to all applicable local and electrical safety codes and standards.
2. Using the proper tool, clamp the ring wire terminal to the copper wire. If the terminal used is not insulated, cover the non-insulated part with shrink tube. Choose terminal ring with the following properties:
 - Recommended wire strip length 1/3in. (8mm)
 - Terminal block opening width .41" (10.2mm)
3. **Disconnect power from the charger.**
4. Lay the unit face up on a flat surface.
5. Remove the 4 screws from each corner of the charger and remove the cover. (See previous section: "ADJUST MAXIMUM CURRENT OUTPUT" for more information on removing cover).
6. After removing the front cover, use a Philips screwdriver to release the terminal screws of the input cable. Loosen the strain-relief fitting for the plug and remove the plug and strain relief connector.
7. Insert the end of the wire through the conduit and into the input wiring hole. Use the red wire for L1, the Black wire for L2 and the Green wire for Ground. **(See Figure 1-11)**
8. The EPEQ™ EV Charger MUST be grounded using a permanent wiring system or the use of an equipment grounding conductor. Use a AWG-8 copper cable to connect the equipment ground terminal block to the grounding conductor.
9. Tighten connection on input terminal block. Torque specification is maximum 16 lbs-in. (1.8 Nm).
10. After the input wiring and conduit have been connected - replace the front cover and tighten with the (4) cover screws. Torque = 13.88 lbs-in (16kgf-cm).

INSTALL EV CHARGER HOLSTER

1. The EV plug holster can be installed at any location near the charging station.
2. Use Philips head screws to attach directly to surface through the holes at the back of the

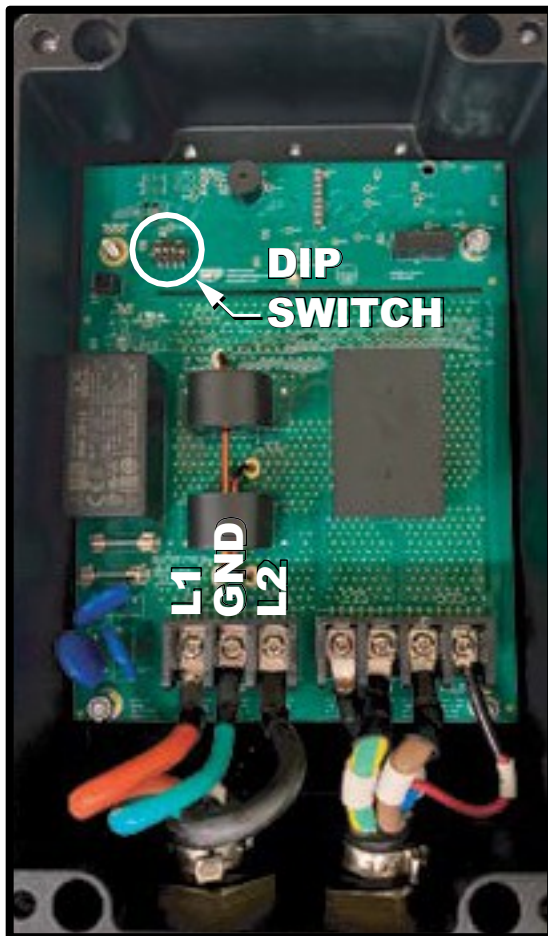


Figure 1-11

holster. (Use anchors if attaching directly to hollow surfaces.)

3. Insert the EV charging cable plug into the holster.
4. Coil the charging cable and hang over holster.

OPERATION

1. Indicator lights show the current status of the EV charger:
 - Blank - Power Off
 - Blue Steady - Ready
 - Blue Flashing - Vehicle Detected
 - Green Flashing - Charging in Progress
 - Green Steady - Charging Complete (or charging has stopped)
 - Red Flashing with Beep - Fault Detected
2. To begin charging, lift the charger connector from the holster and insert it into the EV port

of your electric vehicle making sure the plug is seated securely into place.

3. Once properly seated, charging will start and stop automatically.
4. When complete, unplug the charger from the vehicle by pressing the connector button and removing the charger connector from the EV charging port.
5. Return the charging connector to the holster.

TROUBLESHOOTING

1. If unit fails to power on - check to make sure the power cable to the charger is plugged in, to the AC outlet. Also, check that the circuit breaker to the AC outlet has not been tripped. If it has, reset the breaker.
2. In case of a charger fault refer to the descriptions under the LED indicator lights and fault indicators listed under the OPERATION heading on this page.
3. In case of a fault, a reset may be needed, *however before resetting* - count how many red flashes occur as a future troubleshooting reference. (It will be a number from 1 to 12.)
4. Unplug the charging station from the EV
5. Cut power to the EV charger by setting the attached circuit breaker to the OFF position
6. Wait 1-2 minutes. Then turn the circuit breaker back to the ON position
7. Check to see if the red fault indicator light is off or flashes on again.
8. If the fault indicator is still ON please contact Vanair™ technical support and be sure to indicate the number of flashes you counted earlier. See reference below.

RED FAULT LIGHT REFERENCE:

1. One flash - Lost Ground on AC Line 1
2. Two flashes - GFCI High leakage
3. Three flashes - Relay is stuck
4. Four flashes - GFCI Low leakage
5. Five flashes - Module temperature is high
6. Six flashes - Relay temperature is high
7. Seven flashes - Pilot state is status E
8. Eight flashes - Pilot state is status F
9. Nine flashes - Diode error

- 10. Ten flashes - Over current
- 11. N/A (Eleven flashes - not used)
- 12. Twelve flashes - Application Error

CARE AND CLEANING

The EPEQ® EV Charger is designed to be waterproof and dust proof under normal operating conditions.

- 1. Unit is NEMA 4 outdoor rated
- 2. While the EPEQ® EV Charger is designed to protect the internal electrical components during rain and snow, it is NOT intended to be submerged in water and may not remain protected against the elements if mounted upside down.
- 3. Cleaning of the exterior can be done safely by wiping with a clean, soft cloth and using soap and water as needed. Use of other cleaning solvents is not recommended.
- 4. Return the charger connector to the holster when not in use to avoid damage.
- 5. Coil and store the charging cable over the holster when not in use to protect it from damage.
- 6. Should the cable or charging plug become damaged, do not use. Turn off power to the

unit by switching off the breaker to the unit's circuit breaker. Contact Vanair® customer service for replacement parts.

- 7. When transporting this piece of equipment, lift and carry unit by the case only and do not lift using any of the cables to avoid damage to the unit.



EPEQ® INVERTER3000



The INVERTER3000 is a pure sine wave, high frequency inverter design to provide single-phase, 120V AC power output from a 48V DC source input.

NOTICE:

- All wiring must conform to National Safety Code, State, Provincial or other codes in effect at the time of installation. This inverter should be connected to a grounded wiring system. If the system ground is floating - be sure to follow the codes in effect.
- The EPEQ® INVERTER3000 ships with DC power cables and connectors pre-installed.
- When hard-wiring the unit, please confirm polarity before making final wiring connections.

**SAFETY:**

- Please read all instructions and safety information for this inverter and any equipment or tools that will be attached to the INVERTER3000.
- As with all electrical equipment and sources of electrical power – use common sense and practice common electrical safety.
- Banks of batteries are capable of delivering very high levels of current which can melt metals, cause combustion of



combustible liquids and gases, and start fires.

- This unit is designed for indoor use or within a clean, dry compartment, protected from rain, dust and the elements.
- Do not expose the inverter to rain, snow, spray/mist, dust or the elements.
- Inverter requires adequate clearance for air circulation and cooling. Do not block ventilation openings or cooling fans.
- Make certain all connecting wiring or cables are in good condition and of adequate size to avoid risk of fire and electric shock. Do not use damaged or undersized wiring.
- Components in this unit can produce electrical arcing or sparks. To avoid risk of fire, do not install this equipment in areas in or around combustible liquids, solids, or gas. This includes any space containing combustion engine powered vehicles or machinery, fuel tanks, fuel lines or fittings that are a part of a fuel system.
- The use of a fuse between the Inverter positive (+) input and the positive (+) terminal of the battery can protect batteries from DC cable short-circuits which can cause damage to LiFePO4 batteries, and can cause other battery types to explode.
- Do not disassemble the inverter. It contains no serviceable parts and there is a risk of electrical shock or fire. Capacitors inside the case remain charged after all power is disconnected. Contact Vanair® customer support for any service issues.
- Before any cleaning or maintenance, disconnect both the AC and DC power to reduce risk of electric shock.

Turning off the controls only will not reduce the risk.



• **Caution - Equipment Damage:**

The AC output side of the inverter should NEVER be connected to an AC utility power source or generator. This situation could cause permanent damage to the equipment. If the unit survives such a condition, it will shut down until the situation is corrected.



WARNING: EPEQ® AC Inverters are not intended for use with medical devices and lifesaving systems. Any such use is at your own risk.

INSTALLATION

1. Before mounting, make sure the unit is turned OFF.
2. For best operation, mount in an area with an ambient temperature between 23°F and 104°F (-5°C to 40°C).
3. It is recommended that the inverter is mounted horizontally against a non combustable surface or wall, such as metal or concrete using four (4) corrosion resistant #10 fasteners.
4. Use the six mounting holes found in the base of the inverter to connect the unit to the surface.
5. Allow proper clearance around unit to permit adequate heat dissipation. 4" (~10cm) on each side is recommended.
6. Allow a minimum airflow of 145 CFM for proper ventilation and cooling. Built-in cooling fans and vents assist with the air flow and must not be obstructed.

BATTERY WIRING

1. Make sure the inverter is turned off. (Power switch is located on the end of Inverter should be in the centered position.)
2. The orange colored DC power input cable from the INVERTER3000 will connect to the ELiMENT™ Battery using an Anderson-type connector, which is pre-installed. (If hardwiring the unit, please refer to the following.)
3. For best results, locate the battery bank as

close as possible to the inverter. Try to keep length of the DC power cable between 3'-16' (~1 to 5 meters).

4. Maximum DC Input: 300A
5. Wire Size: 1 x 2AWG
6. Install a circuit breaker, or a high-current fuse and fuse holder, in the positive line as close to the battery as possible.

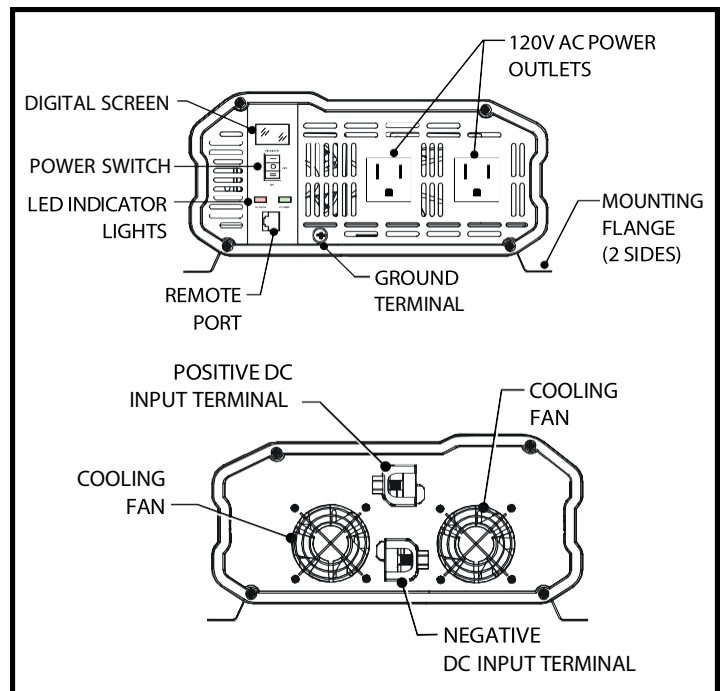


Figure 1-12

CONNECTING THE INVERTER

- Connect an AWG 8 gauge copper wire, or greater, between the grounding terminal of the inverter and the Earth ground or vehicle chassis. (See *Figure 1-12*)
- Make certain the Anderson connector from the battery is connected securely.

OPERATION

1. With the inverter power switch in the OFF position, visually check the inverter, battery, cables, and connected equipment for any damage or obstructions.
2. Verify the battery has an adequate charge level. (Starting with a fully charged battery

allows for the best performance and longest working time.)

3. Once the battery level has been verified, check the connection between the inverter and battery. Connect one of the orange DC output cable connectors from the ELiMENT™ battery to the orange DC power input connector of the inverter by sliding one into the other. Push together firmly to ensure a good connection has been made.
4. Make sure any connected AC powered tools, equipment or appliances are turned off. Once all connections are secure, turn on the inverter using the power switch ON the bottom-right of the inverter case.
5. The inverter will take a moment to run a self-diagnosis. During these few seconds, do not power on any connected devices. This may cause a surge that may result in a fault condition.
6. Once the self test is complete, turn on any connected devices **one at a time** when it is needed and is safe to do so.
7. Many electrical devices create an initial surge of power when powered on. If multiple devices are turned on simultaneously - this combined surge could cause a fault.
8. When finished using the inverter, simply power down the connected devices and switch the inverter unit OFF

TROUBLESHOOTING

Status Lights:

The inverter comes with 2 indicator lights. Green for Power. Red for Alarm. (See *Figure 1-12*)

- Normal -- GREEN -- No alarm
- Low battery – GREEN – with Alarm
- Low battery voltage shutdown – RED – with Alarm
- Over Temperature – RED – with Alarm
- Output short circuit – RED – with Alarm
- Overload shutdown – RED – with Alarm
- High battery voltage shutdown – RED – with Alarm

How to restart after AC Output AUTO-shutdown:

1. Turn OFF unit's power switch
2. Remove all AC loads (tools, appliances)
3. Allow unit to cool down for 15 minutes.
4. Press power switch to turn it back ON.

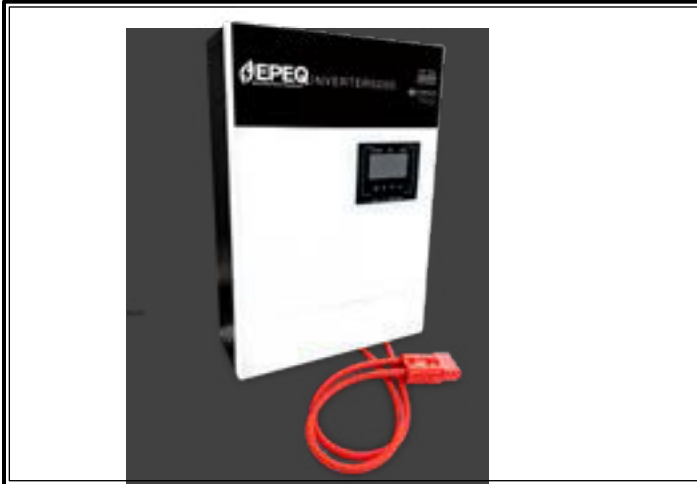
See troubleshooting table of following page.



TROUBLESHOOTING TABLE

Symptom	Possible Cause(s)	Recommended Solution(s)
Inverter will not turn on during initial power up.	Battery not connected, or loose battery connection. Low battery voltage. Power switch set to OFF or REMOTE	Check the Anderson connectors from the battery. Check any DC fuse and/or breaker in use. Check battery charge . Set Power Switch to ON position.
AC output cut off. (Red LED with Alarm)	Low battery voltage and low capacity level. Inverter is over temperature or overload. Battery voltage too high	Check battery condition and recharge if possible. Turn off inverter and allow inverter to cool. Reduce load to match inverter. Check battery voltage & ensure connection to DC power input.
Attached appliance or tool power is less than rated power. (Red LED with Alarm)	Low battery capacity cause short DC input power although the battery voltage is higher than rated voltage.	Use amp meter to check DC input amps. Recharge the battery, or contact Vanair for assistance.
Motorized appliances not operating properly.	Motorized tools and appliances require high start power that exceed inverter's rated voltage.	Choose a higher power inverter.

EPEQ® INVERTER5000



The INVERTER5000/Charger is a transformer-less DC to AC power inverter designed to provide 5kW, single-phase, high frequency, 230V AC power output from a 48V DC input source:

NOTICE:

- All wiring must conform to National Safety Code, State, Provincial or other codes in effect at the time of installation. This inverter should be connected to a grounded wiring system. If the system ground is floating - be sure to follow the codes in effect.

- The INVERTER5000 ships with DC power cables and connectors pre-installed.



- When hard-wiring the unit, take note that the INVERTER5000 has no reverse protection. Please confirm polarity before making final wiring connections.

- Avoid use of third party accessories, and communications cables with this inverter.

SAFETY:

- Please read all instructions and safety information for this inverter and any equipment or tools that will be attached to the INVERTER5000.

- This unit is designed for indoor use or within a clean, dry compartment, protected from rain, dust and the elements.

- Do not expose the inverter to rain, snow, spray/mist, dust or the elements.

- Inverter requires adequate clearance for proper air circulation and cooling. Do not block ventilation openings or cooling fans.

- Minimum air circulation required is 145 CFM.

- Installers must be certified technicians or electricians.

- Make certain all connecting wiring is in good condition and of adequate size to avoid risk of fire and electric shock. Do not use damaged or undersized wiring.

- Components in this unit can produce electrical arcing or sparks. To avoid risk of fire, do not install this equipment in areas in or around combustible liquids, solids, or gas. This includes any space containing combustion engine powered vehicles or machinery, fuel tanks, fuel lines or fittings that are a part of a fuel system.

- Do not disassemble the inverter. It contains no serviceable parts and there is a risk of electrical shock or fire. Capacitors inside the case remain charged after all power is disconnected. Contact Vanair® customer support for any service issues.

- Before any cleaning or maintenance, disconnect both the AC and DC power to reduce risk of electric shock. Turning off the controls only will not reduce the risk.

- **Caution - Equipment Damage:** The AC OUTPUT side of the inverter's wiring should NEVER be connected to the AC output of a public power source or a generator. Such a connection could cause permanent damage to the equipment. If the unit survives such



a condition, it will shut down until the situation is corrected.



- **WARNING: EPEQ® AC Inverters are not intended for use with medical devices and lifesaving systems. Any such use is at your own risk.**

INSTALLATION

- Follow all applicable and local regulations when installing the converter
- Install in a clean, dry, and cool location with good ventilation.
- Working temperature: 14°F to 131°F (-10°C to 55°C)
- Storage temperature: 5°F to 140°F (-15°C to 60°C)
- Relative humidity: 5% to 95%, non-condensing
- Cooling: forced air
- **Warning! Operating the unit in an environment where condensation is occurring will void the warranty.**

MOUNTING THE UNIT

1. Before connecting any cables or wiring, remove the terminal access panel by removing the two screws located on the bottom corners of the unit - and two additional screws on the sides of the panel.
2. Inverters produce heat during normal operation. Do not mount inverter where it may be in contact with flammable materials.
3. It is recommended that the inverter be mounted vertically against a non combustible surface or wall, such as metal or concrete using (4) M4 or M5 screws.
4. Install at eye level - so that the LCD screen can be easily seen at all times.
5. If using multiple units install all at the same level.
6. For best operation, mount in an area with an ambient temperature between 32°F and 131°F (0°C and 55°C).
7. Allow proper clearance around unit to permit adequate heat dissipation. 8" (~20cm) on each side, and 20" (~50cm) above and below. Make sure air can circulate freely around unit.

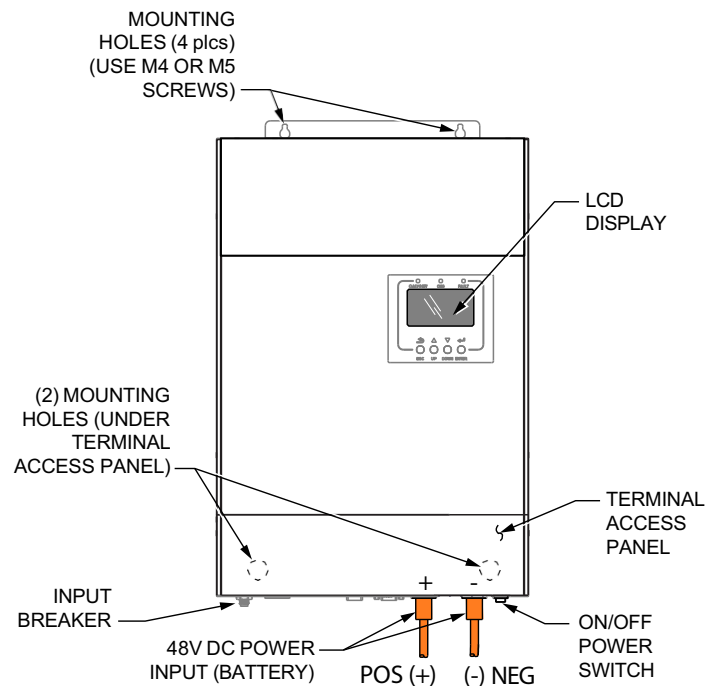


Figure 1-13

BATTERY WIRING

1. The orange colored DC power input cable with an Anderson-type connector will come pre-installed. (If hardwiring the unit, please refer to the following.)
2. Before hard wiring - remove the 4 screws to remove the DC & AC terminal panel on the front, bottom of the inverter.
3. The DC terminal bolt size is M6.
4. For best results, keep the battery bank as close as possible to the inverter. Try to keep length of the DC power cable between 3'-16' (~1 to 5 meters).
5. Battery capacity: 200AH. (2) ELiMENT™ batteries is recommended.
6. Maximum Amperage: 136A
7. Wire Size: 1 x 2AWG
8. Ring Terminal:
 - Cable: 35 mm²
 - Ring terminal dimensions: 0.25 inch Dia. x 1.5 inches L. (6.4mm D x 39.2mm L)
 - Torque Value: 17.7 to 26.5 ft-lbs (2 to 3 Nm)
9. Recommended DC circuit breaker specification **for each inverter** on the battery side: 150A / 60V DC.

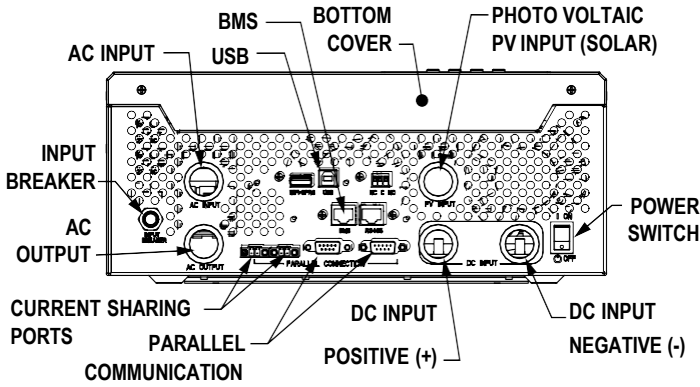


Figure 1-14

10. For multiple inverters connected in parallel, where only one breaker is used on the battery side - the breaker should be rated for “x” times the current where x equals the number of units connected (up to 6). (Example: 3 units would call for “3” x 50A or 150A. 6 units would call for “6”x 50A or 300A rating.)
11. When using only 1 unit - a 50A breaker can be used, where each inverter has a breaker at its AC input. The recommended spec of the AC breaker is 50A for one INVERTER5000.
12. When connecting multiple units in parallel, make sure the battery cables are the same length. A difference in length could result in a voltage difference between the battery and inverters which may cause the inverters to malfunction.
13. Make sure all inverters operating in parallel share the same battery bank, or the inverters will transfer to FAULT mode.



5. Torque connections at 10.6-14.1 In. Lbs. (1.2-1.6 Nm)
6. Open DC circuit breaker or disconnect unit from DC power before making any AC connections.
7. Disconnect AC power source prior to wiring the INVERTER5000 to a AC power source.
8. The first connection to make is the ground. Proper grounding can prevent electric shock for those working around electricity and electrical devices. Electricity always travels from voltage to ground. Having this dedicated connection from your electrical device to ground is a key safety concern before connecting any lines that carry voltage. (See Figure 1-15)



9. Strip insulation from (6) AC wire ends approximately 0.4” (10mm). Insert the (3) AC OUTPUT wires first according to polarities indicated on the terminal block and tighten the terminal screws. (See Figure 1-16)
10. CAUTION: Make sure the polarities of the AC wires are correct. If the L and N are reversed - it may cause a short-circuit in the AC source when the inverters are set up to operate in parallel. (See Figure 1-16)

AC WIRING



1. CAUTION: Before connecting the INVERTER5000 to AC power, a separate AC breaker (rated at 50A) should be installed between the inverter and the AC power source.
2. WARNING: All wiring must be performed by qualified personnel.
3. WARNING: Shock Hazard (Installation must be performed with care due to high battery voltage in series.)
4. Suggested AC wire size to connect the INVERTER5000 to AC power is 8 AWG.

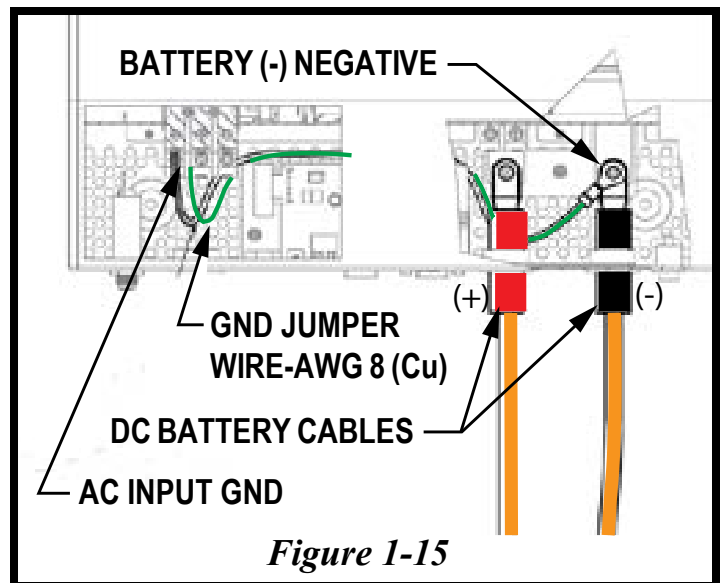


Figure 1-15

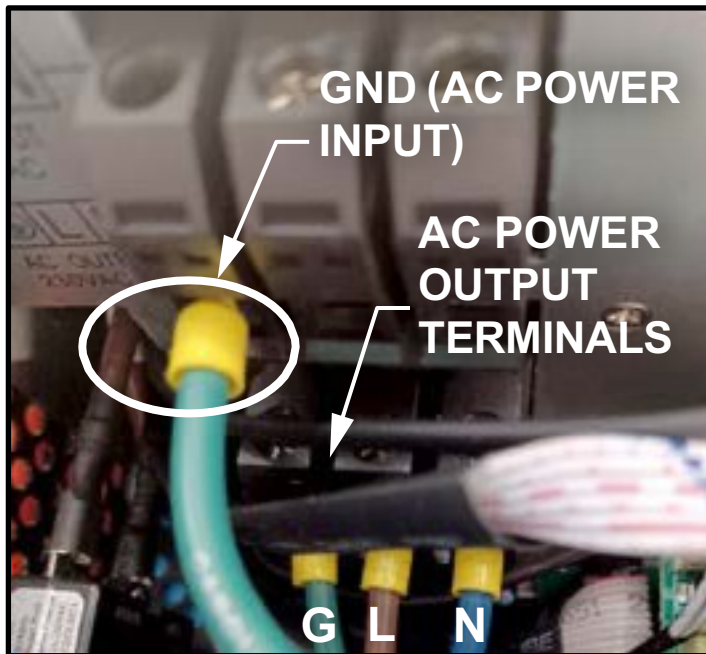


Figure 1-16

11. Special note about some appliances, such as air conditioners, that require a few minutes to restart if a power shortage occurs and quickly comes back on. This occurrence has the possibility to cause damage to these types of appliances. While the INVERTER5000 has built-in protections, some damage could still cause internal damage to these types of appliances. Consult with the appliance manufacturer about time-delay functions before using.)



12. Finally connect the (3) AC source wires to the AC INPUT, and tighten the terminal screws. Make sure the polarities match the indicators on the Inverter's terminal block.

13. **WARNING: Never connect the AC output of the Inverter to the AC output of another source such as the output from a power generator or AC utility line! This may result in dual operation of different power sources, causing the power from an AC source or generator to be fed back into the inverter causing instant damage to the inverter**



and could result in a fire or safety hazard!

14. Check for correct polarity of the new wire connections one last time before enabling the AC power and AC circuit breakers.

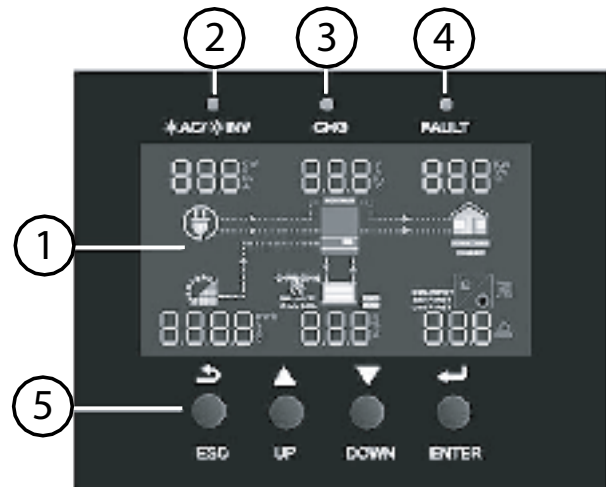


Figure 1-17

LCD PANEL LAYOUT AND SETUP

Press the ON/OFF Switch to turn on the unit. (See *Figure 1-14* for switch location.)

The display panel includes an LCD screen, four function buttons and three LED indicator lights.

(See *Figure 1-17*)

1. LCD screen (See *Figure 1-19*)
2. Status indicator (AC power or Inversion)
 - Green Solid - Powered in AC Mode
 - Green Flashing - Powered by Battery or PV
3. Charging indicator
 - Green Solid - Battery Fully Charged
 - Green Flashing - Battery Charging
4. Fault indicator
 - Red Solid - Fault occurred in the inverter
 - Red Flashing - Warning condition in the inverter
5. Function/Navigation buttons (4)
 - ESC - Exit setting mode
 - UP - Go to previous selection
 - DOWN - Go to next selection
 - ENTER - Confirm selection/Enter settings

Icon	Description
	AC input icon
	Indicates AC input power, voltage, frequency & current
	PV input icon
	Indicates PC power, PV voltage, current, etc.
	Inverter icon
	Indicates output voltage, current, frequency, temperature
	Load icon
	Indicates power of load, and power percentage of load
	overload occurred
	short circuit detected
	Indicates battery level. 0-24%, 25-49%, 50-74%, 75-100%
	Indicates battery voltage, percentage, current
	Indicate SLA battery
	Indicates Lithium battery
	Indicates charging source priority list
	Output source priority
	Warning or Fault Code
	Warning or Fault code
	Settings in progress
	Alarm disabled

Figure 1-18

USING LCD PANEL TO CHANGE SETTINGS

1. The LCD screen contains icons representing various functions. Numerical readouts near each pertain to these various functions.
2. To initialize “SETTINGS” mode, hold the ENTER button for 3 seconds. (See Figure 1-17)
3. Press “UP” or “DOWN” buttons to select the settings program - then press “ENTER” button to make the selection, or press “ESC” to escape. The UP and DOWN buttons are also used to rotate through the information being displayed. (See Figures 1-18 & 1-19 for ICON locations, references and meanings).

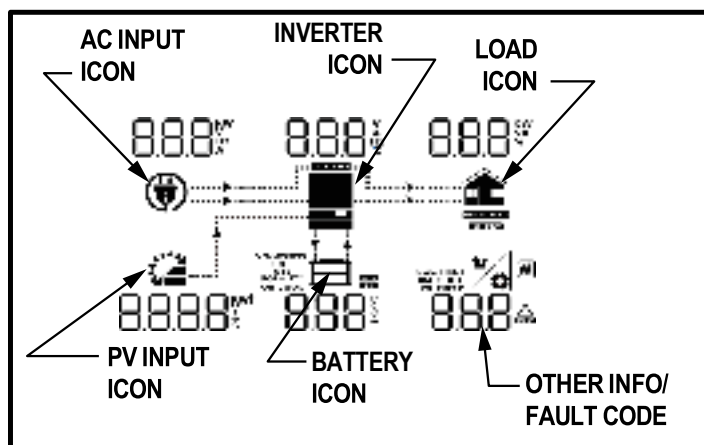


Figure 1-19

PROGRAM 01: POWER PRIORITY

01 UEI: Utility Priority (Default)

Utility setting, will use the AC input source to provide power to the loads as the first priority. Solar and battery energy will provide power to the loads only when utility power is not available.

01 SOL: Solar Priority

Solar energy provides power to the loads as first priority. If solar energy is insufficient, battery energy will be consumed. Utility power will engage when one of below conditions happens: Solar energy is not available

Battery voltage drops to either low-level warning voltage or the setting point in program 12 (Battery to Utility Transfer Voltage in “SOL Priority”).

Once the solar power is lost, the utility will have

higher priority than battery. This mode can be regarded as “SUB”(Solar>Utility>Battery).

01 Sbu: SBU Priority

As indicated by the abbreviation, the power priority comes as solar>battery>utility.

Solar energy provides power as first priority.

If solar energy is insufficient, battery energy will be consumed.

Utility provides power to the loads only when battery voltage drops to either low-level warning voltage or the setting point in program 12 (Battery to Utility Transfer Voltage in “SBU Priority”).

When solar power is gone in SBU mode, the power priority becomes battery > utility, battery priority is higher than utility priority. Thus the inverter will cycle between setting 12 and 13.

Users can change to utility priority or solar priority to stop the cycle.

01 SUB Priority

Solar energy provides power to the loads as the first priority.

If solar energy is not sufficient to power all connected loads, solar and utility will power loads at the same time.

Battery provides power to the loads only when solar energy is not sufficient and there is no utility.

Program 02: Maximum Charging Current

M5000H-48BP model: default 60A, 10A~100A Settable (If Li is selected in program 5, this program can't be set up) The MPPT charger will stop when charging is completed. To activate the charger, the battery voltage must drop at least 2 voltages below the lower value in program 19 and 20.

Program 03: AC Input Voltage Range

03 APL: Appliance Mode

In Appliance Mode, the acceptable AC input voltage range is 90~280VAC±5V.

03: UPS

In UPS Mode, the acceptable AC input voltage range: 170~280VAC±5V.

03: GEN

In Generator Mode, the acceptable AC input voltage range: 90~280VAC±5V.

Note: When the inverter is connected to a generator, the generator should be no less than 10KVA (no less than 20KVA for 3-phase parallel system), and the inverters should be no more than 2 units in one phase.

Program 04: Power Saving Mode Enable/Disable

04: SdS

When the power saver mode is disabled, the inverter will output full voltage and the idle power is about 50 watts.

04: SEN

If the power saver mode is enabled, the output of inverter will be off when connected load is low or not detected.

The threshold for load detection is 100W. The idle power in power saver mode is about 30 watts.

Program 05: Battery Type

05: AGN

AGM Battery (Default) : CV :56.4V, Float 54V.

05: FLd

Flood Battery: CV: 58.4V, Float 56V.

05: USE

User-Defined

If “User-Defined” is selected, battery charge voltage and low DC cut-off voltage can be set up in program 19, 20 and 21. This setting works for GEL batteries etc.

05: US2

User-Defined 2

(This program is suitable for a lithium battery without communicating with BMS)

If 'US2' is selected, battery charge voltage and low DC cut-off voltage can be set up in program 19, 20 and 21. In US2 mode, programs 19 & 20 should be set to the same value. If not, the inverter will only charge to the lower value. Compared with USE, the charger in US2 will immediately reduce charging current when preset voltage is reached. NOTE: The US2 will not optimally charge the lithium battery due to the lack of BMS communication. The battery capacity icon bar won't reflect the actual battery capacity; it is converted from battery voltage. For more details, please refer to "overload" warning in *(Figure X-X4)*.

When the inverter is set to US2, it cannot correctly display the accurate **SOC (State of Charge)** of the lithium batteries as there is no BMS communication.

The displayed SOC is converted from battery voltage. The SOC will change only when the battery voltage changes big enough.

Due to the ripple current from the utility charger, when "US2" is set for charging lithium batteries, it is recommended to set the max utility charging current at 30% of the nominal charge current.

05: LI

This setting refers to Lithium battery types. This setting only works when the inverter communicates with a Lithium battery utilizing a BMS built with the same protocol. When the program is set to "LI", the LCD will show a hidden program of 36 about BMS protocol types. There are many lithium battery BMS communication protocols, L01, L02 to L99.

When the battery type set as "LI", the maximum charge current can be modified by the user. Note: When the communication fails, the inverter will cut off output.

RS485 communication protocol is L01 to L49.
The CAN communication protocol is L51 to L99.

Program 06: Automatic Overload Restart**06: LFd**

Disabled.

06: LFE

When this feature is enabled, the inverter will attempt restart 3 times, if it still fails to start the load, it will transfer loads to AC input if available.

Program 07: Automatic OverTemp Restart**Program 08: AC Output Voltage**

The AC output voltage between hot and neutral can be set to 208V, 220V, 230V and 240V.

Program 09: AC Output Frequency

The AC Output Frequency can be set to 50Hz or 60Hz.

Program 10: Number of 12V Batteries Connected In Series

The default value is 4 for model # M5000H-48BP. This program is only a reminder about the 12V battery quantity.

Program 11: Maximum Utility Charging Current

Default value: 30A (Range 0-80A)

If Li is selected in program 5, this program can't be manually set up.

The solar charger has higher priority than the utility charger, if the max charging current and utility charger is set to the same value, the solar charger will still work.

If setting value in Program 02 is smaller than that in Program 11, the final charging current is set according to Program 02 for utility charger.

Program 12 Battery to AC Transfer Voltage

The setting works when program 01 is in "SBU Priority" or "Solar Priority" Mode. Default value: 46V/50%

The battery SOC will be displayed when BMS communication is established.

Program 13 AC to Battery Transfer Voltage

The setting works when program 01 is in “SBU Priority” or “Solar Priority” Mode. Default Value: 54V/95%

The battery SOC will be displayed when BMS communication is established.

Program 14 Charge Power Source Priority**14:CSO**

Solar Priority

Solar energy will charge battery as first priority. Utility will charge battery only when solar energy is not available (lost).

14:SNU

Solar and Utility (Default)

Solar energy and utility will both charge battery.

14:OSO

Solar Only

Solar energy will be the only charger source no matter utility is available or not.

But when the battery voltage drops below the setting of 21(Low DC Cut-off Voltage) , the utility power will be used to force a charging cycle to avoid battery over discharging.

If this off grid solar inverter is working in DC to AC invert mode, only solar energy can charge the battery. Solar energy will charge battery if it's available and sufficient.

Program 15 Alarm On/Off Control**Program 16 Backlight On/Off Control**

When off is set, the LCD will go dim after 60 seconds left unattended.

Program 17 Beeps once between AC and DC Transfer**Program 18 Overload Bypass**

When enabled, the unit will transfer to line mode if overload occurs in battery mode.

Program 19 C.V. (Charging Voltage)

Default Value: 56.4V

If user-defined setting (USE/US2) is selected in program 5, this program can be set up Program

20 Float Charging Voltage

Default Value: 54V

If user-defined setting (USE/US2) is selected in program 5, this program can be set up

Program 21 Low DC Cut-Off Voltage

Default Value: 42V/20%

The SOC (State of Charge), which indicates the remaining capacity of a battery, is displayed when BMS communication is established. After User-defined (USE/US2) setting is selected in program 5, this program can be set up. Low DC cut-off voltage will be fixed to the setting value regardless of load percentage. When low DC Cut-Off voltage is reached:

1. If battery is the only power source, inverter will shut down.
2. If PV energy and battery power are available, inverter will charge battery without AC output.
3. If PV energy, battery power and utility AC are all available, inverter will transfer to line mode and provide output power to loads and charge the battery at the same time.

When low battery voltage protection occurs and qualified PV or AC power inputs are present, the inverter will automatically charge and invert DC to AC when the battery voltage reaches 54V (or 10% more SOC than low battery cut off in Lithium mode). To make it work, the power switch must remain in the original “ON” position. The minimal voltage for the LCD to illuminate is 30V DC.

Program 23 AC Output Mode

This setting is only available when the inverter is in standby mode. (Switch off.)

Power saving function will be automatically disabled when in parallel operation.

23:SIG

Single Unit Operation.

When unit operates separately and is not in parallel operation.

23:PAL

Parallel in single-phase. When the units are used in parallel with single-phase

23: 3P1/3P2/3P3

3-phase: 3P1, 3P2, 3P3 (3-Phase 1, 2 & 3)

It requires at least 3 inverters to support three-phase equipment, 1 inverter in each phase.

Please select “3P1” for the inverters connected to L1 phase, “3P2” for the inverters connected to L2 phase and “3P3” for the inverters connected to L3 phase. See Diagrams

Do NOT connect current carrying wires (L1, L2 etc.) between units that are in different phases.

Program 28 Address setting

Default 001. 001-255. Settable. This is for external solar charger expansion.

Program 36 Lithium BMS Protocol

For power walls, the protocol is L01. Please refer to “05: LI” for details.

Program 37 Real time setting---Year

Default 2018, range 2018~2099

Program 38 Real time setting---Month

Default 01, range 01~12

Program 39 Real time setting---Date

Default 01, range 01~31

Program 40 Real time setting---Hour

Default 00, range 00~23

Program 41 Real time setting---Minute

Default 00, range 00~59

Program 42 Real time setting---Second

Default 00, range 00~59

Program 43 Battery Equalization

If “Flooded” or “User-Defined” is selected in program 05, this program can be set up. The Equalization is banned for AGM (Absorbed Glass Matt) batteries.

Program 44 Battery Equalization Voltage

Default Value: 58.4V

Program 45 Battery Equalized Time

Default 60min, 5min~900min Settable

Program 46 Battery Equalized Timeout

Default 120min, 5min~900min Settable

Program 47 Equalization Interval

Default 30 days, 1 day~90 days Settable

Program 48 Equalization Activated Immediately

If equalization function is enabled in program 23, this program can be set up. If “Enable” is selected in this program, it activates battery equalization immediately and LCD main page will show “Eq”.

If “Disable” is selected, it cancels the equalization function until next activated equalization time arrives based on program 27 setting. At this time, “Eq” will not be shown in LCD main page

Program 49 Utility charging time

Allows utility AC to charge the battery anytime of the day. 0000 (default)

The timer allows utility to charge the battery at preset time.

Use 4 digits to represent the time period, the upper two digits represent the time when utility start to charge the battery, setting range from 00 to 23, and the lower two digits represent the time when utility end to charge the battery, setting range from 00 to 23.

(eg: 2320 represents the time allows utility to charge the battery is from 23:00 to the next day 20:59, and the utility charging is prohibited outside of this period)

Program 50 AC output time

Allows inverter to power the load all day.
0000 (default)

The timer allows inverter to power the load at preset time. Use 4 digits to represent the time period, the upper two digits represent the hours when inverter starts to power the load, setting range from 00 to 23, and the lower two digits represent the hour when inverter stops powering the load, setting range from 00 to 23. (eg: 2320 represents the time code allows inverter to power the load is from 23:00 to the next day at 20:59, and the inverter AC output power is prohibited outside of this period).

(See Program Reference Tables on the next few pages).





PROGRAM TABLE

Program #	Description	ICON
01 Power Priority	Utility Priority	OPPR UTI 001°
01 Power Priority	Solar Priority	OPPR SOL 001°
01 Power Priority	SBU Priority	OPPR SBU 001°
01 Power Priority	SUB Priority	OPPR SUB 001°
02 Maximum Charging Current	Max PV+Utility Charging Current	CHGI 60 002°
03 AC Input Voltage Range	Appliance Mode (Default)	ACV APL 003°
03 AC Input Voltage Range	UPS Mode	ACV UPS 003°
03 AC Input Voltage Range	Generator mode	ACV GEN 003°
04: Power Saving Mode	Saving mode disable (Default)	SAVE DIS 004°
04: Power Saving Mode	Saving mode enable	SAVE ENA 004°
05 Battery Type	AGM Battery (Default)	BATT AGM 005°
05 Battery Type	Flood Battery	BATT FLD 005°
05 Battery Type	User-Defined	BATT USE 005°
05 Battery Type	User-Defined 2	BATT US2 005°
05 Battery Type	Lithium	BATT LI 005°
06 Automatic Overload Restart	Restart Disable (Default)	LDRS DIS 006°
06 Automatic Overload Restart	Restart Enable	LDRS ENA 006°
07 Automatic OverTemp Restart	Restart Disable (Default)	OTRS DIS 007°
07 Automatic OverTemp Restart	Restart Enable	OTRS ENA 007°
08 AC Output Voltage	230V (Default)	OUTV 230 008°
09 AC Output Frequency	50Hz (Default)	OUTF 50 009°
10 Number of 12V Batteries Connected In Series	The default value is 4 for 48V model, and 2 for 24Vdc model.	BATN 4 010°


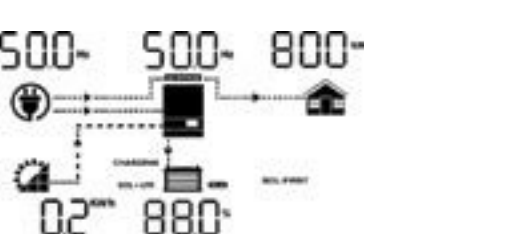
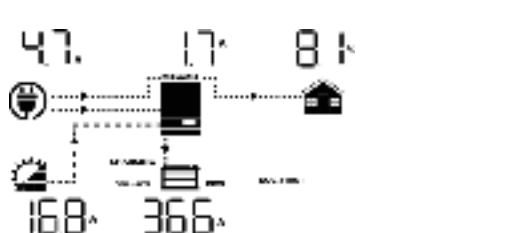

11 Maximum Utility Charging Current	10A to Max(default 30A)	AC1 30 011°
12 Battery to Utility Transfer Voltage	Default 46.0V, 44.0V~51.2V resettable,	b2AC 460° 012°
12 Battery to Utility Transfer Voltage	Lithium mode: default 40%, 5%~50% resettable	b2AC 50 012°
13 Utility to Battery Transfer Voltage	Default 54.0V, 48.0V~58.0V resettable,	AC2b 540° 013°
13 Utility to Battery Transfer Voltage	Li mode: default 80%, 60%~100% resettable	AC2b 95 013°
14 Charger Power Source Priority	Solar Priority	CG.PF 50 014°
14 Charger Power Source Priority	Solar and Utility (Default)	CG.PF 50U 014°
14 Charger Power Source Priority	Solar Only	CG.PF 050 014°
15 Alarm On/Off Control	Audible Alarm on (default)	bUZZ ON 015°
15 Alarm On/Off Control	Audible Alarm off(Mute)	bUZZ OFF 015°
16 Backlight On/Off Control	Backlight on (default)	LEdb ON 016°
16 Backlight On/Off Control	Backlight off	LEdb OFF 016°
17 Beeps once between AC and DC Transfer	Alarm on (default)	ALAR ON 017°
17 Beeps once between AC and DC Transfer	Alarm off	ALAR OFF 017°
18 Overload Bypass	Bypass Disable (default)	bYP diS 018°
18 Overload Bypass	Bypass enable	bYP ENR 018°
19 C.V. Charging Voltage	48V model: default 56.4V, 48.0V~58.4V Settable	CV 56.4° 019°
20 Float Charging Voltage		FLEV 540° 020°
21 Low DC Cut-Off Voltage	Without BMS communication	CUEV 420° 021°
21 Low DC Cut-Off Voltage	With BMS communication	CUEV 20 021°
23 AC Output Mode	Single Unit Operation	PRLL 51G 023°

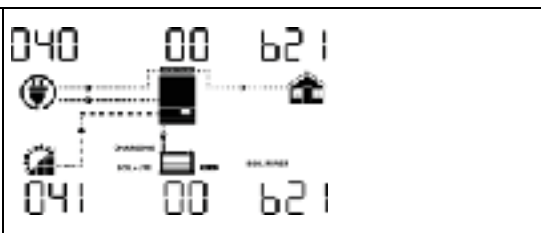
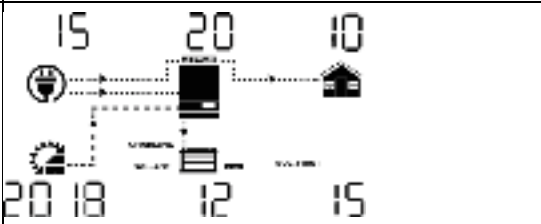
23 AC Output Mode	Parallel in Single Phase	PRLL PAR 023°
23 AC Output Mode	Three phase: 3P1, 3P2, 3P2	PRLL 3P1 023°
28 RS485 Communication Address	Default 001. 001-255 Settable. For external solar charger expansion.	Addr 1 028°
36 Lithium BMS Protocol	Default L01	
37 Real time setting---Year		2018 037°
38 Real time setting---Month		NOV 12 038°
39 Real time setting---Date		DAY 13 039°
40 Real time setting---Hour		HOUR 13 040°
41 Real time setting---Minute		MIN 50 041°
42 Real time setting---Second		SEC 50 042°
43 Battery Equalization	Disabled (Default)	EQ DIS 043°
43 Battery Equalization	Enable	EQ ENA 043°
44 Battery Equalization Voltage	Default 58.4V, 48~60V settable	EQV 58.4 044°
45 Battery Equalization Time	Setting range is from 5min to 900min. Increment of each click is 1min.	MIN EQE 60 045°
46 Battery Equalization Timeout	Setting range is from 5min to 900min. Increment of each click is 1 min.	MIN EQE0 120 046°
47 Equalization Interval	Setting range is from 1 to 90 days. Increment of each click is 1 day.	DAY EQI 30 047°
48 Equalization Activated Immediately	Disabled (Default)	EQ OFF 048°
48 Equalization Activated Immediately	Enable	EQ ON 048°

49 Utility charging time		
50 AC output time		


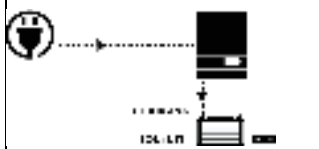


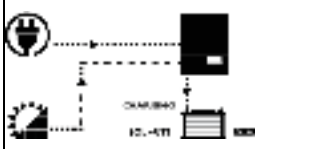

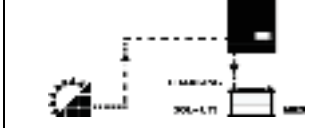


LCD DISPLAY SETTING

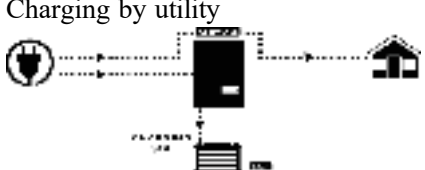
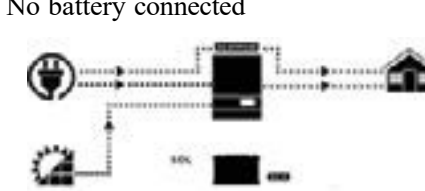
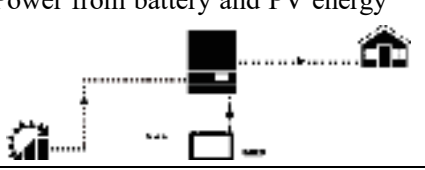
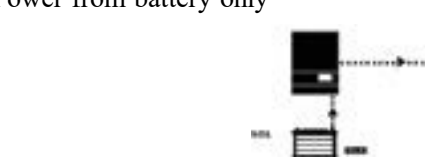
The LCD display information will be switched in turns by pressing “UP” or “DOWN” key. The selectable information is switched in below order: input voltage, output voltage, load percentage, PV input voltage, battery voltage, warning or fault code (Default Display Screen), AC input frequency, output frequency, load power in VA, PV energy sum in KWH, battery percentage, AC input current, output current, load percentage, PV input current, battery charging current, AC input power in Watts, inverter temperature, load power in Watts, PV energy sum in KWH, battery percentage, warning or fault code.

Setting Information	LCD display
① AC Input voltage ② Output voltage ③ Load percentage ④ PV input voltage ⑤ Battery voltage ⑥ Warning or Fault code (Default Display Screen)	
① AC Input frequency ② Output frequency ③ Load power in VA ④ PV energy sum in KWH ⑤ Battery percentage ⑥ Warning or Fault code	
① AC Input current ② Output current ③ Load percentage ④ PV input current ⑤ Battery charging current ⑥ Warning or Fault code	
① AC input power in Watts ② Inverter temperature ③ Load power in Watts ④ PV energy sum in KWH ⑤ Battery percentage ⑥ Warning or Fault code	

<p>Firmware version (CPU1: 040-00-b21; CPU2:041-00-b21)</p>	
<p>Time (15:20:10, December 15, 2018)</p>	

Operating Mode Description

Operation mode	Description	LCD display	
<p>Standby mode / Power saving mode</p> <p>Note: *Standby mode: The inverter is not turned on yet but at this time, the inverter can charge battery without AC output.</p> <p>*Power saving mode: If enabled, the output of inverter will be off when connected load is pretty low or not detected.</p>	<p>No output is supplied by the unit but it still can charge batteries.</p>	<p>Charging by utility and PV energy.</p> 	<p>Charging by utility</p> 
		<p>Charging by PV energy</p> 	<p>No charging</p> 
<p>Fault mode</p> <p>Note: *Fault mode: Errors are caused by inside circuit error or external reasons such as over temperature, output short circuited and so on.</p>	<p>PV energy and utility can charge batteries.</p>	<p>Charging by utility and PV energy</p> 	<p>Charging by utility</p> 
		<p>Charging by PV energy</p> 	<p>No charging</p> 
<p>Line Mode</p>	<p>The unit will provide output power from the mains. It can also charge the battery</p>	<p>Charging by PV energy</p> 	

	<p>at line mode.</p>	<p>Charging by utility</p> 
		<p>No battery connected</p> 
<p>Battery Mode</p>	<p>The unit will provide output power from battery and PV power.</p>	<p>Power from battery and PV energy</p>  <p>Power from battery only</p> 

AUDIBLE ALARM

The inverter will sound an alarm for the following conditions:

- **Warning:** Buzzer sounds 0.5s every second
- **Error:** Long beep. Sounds for 0.5s every second for 10 seconds, then shuts off and a long beep for 60 seconds.

PARALLEL - SINGLE PHASE

1. Check for proper wiring connections
2. Make sure all breakers in line wires of load side are open, and Neutral wires of each unit are connected together.
3. Turn on each unit. Set “PAL” in LCD setting program 23 for each unit.
4. Once completed, shut down ALL of the units using the unit’s power switch.
5. Turn each unit back on.
6. Switch all AC breakers connected to the AC input Lines. All inverters should connect to the utility power at the same time to avoid triggering a warning “15”.
7. Check for any fault indicators. If there is no fault, system is completely installed.

8. Switch on all AC Line breakers on the load side. The INVERTER500 will provide power to the load.

(OPTIONAL) PARALLEL - THREE PHASE

1. Check for proper wiring connections
2. Make sure all breakers in Line wires of load side are open, and Neutral wires of each unit are connected together.
3. Turn on all units and use the LCD program 23. Set each unit to “3P1” “3P2” or “3P3” in LCD setting program 23 as needed - see power wiring diagrams for reference. Example: All units in Phase 1 must be set to 3P1. All units in Phase 2 must be set to 3P2, and all units in Phase 3 must be set to 3P3. Do this for each unit in sequential order.
4. Once completed, shut down ALL of the units using the unit’s power switch.
5. Turn each unit back on in sequential order, one by one, starting with the host unit (usually first).
6. Switch on all AC breakers on the Line wires from the AC power input. If AC connection is detected and all three phases are matched

with the unit's setting, they will work normally. If not, they will trigger a warning "15/16" and will not work in the line mode.

Notes:

- If there is only one inverter in L1-phase, the LCD display will show "HS", the rest of the inverters will display "3P1"
- To avoid overload, before turning on the AC breakers on the load side, make sure the system is functioning properly.
- Transfer time exists for this operation. Power disruption may occur which could affect critical devices.

The inverter will sound an alarm for the following conditions:

- **Warning:** Buzzer sounds 0.5s every second
- **Error:** Long beep. Sounds 0.5s every second for 10 seconds, then shuts off and a long beep for 60 seconds.

FAN OPERATION

The INVERTER5000 uses two internal cooling DC fans. The DC fans adjust their speed in linear proportion depending on the load and charge wattage. Make sure air circulates freely around the inverter for proper operation.

AUTOMATIC RECOVERY

This inverter is designed for auto-recovery from:

- Overload shut off
- Over temperature shutoff
- Low battery shutoff

(Refer to Program 06, Program 07, and Program 21 in the program tables for additional information.)

Notes:

- If there is only one inverter in L1-phase, the LCD display will show "HS" (host), the rest of the inverters will display "3P1" (indicates 3-phase, phase 1)
- To avoid overload, before turning on the AC breakers on the load side, make sure the system is functioning properly.
- Transfer time exists for this operation. Power disruption may occur which could affect critical

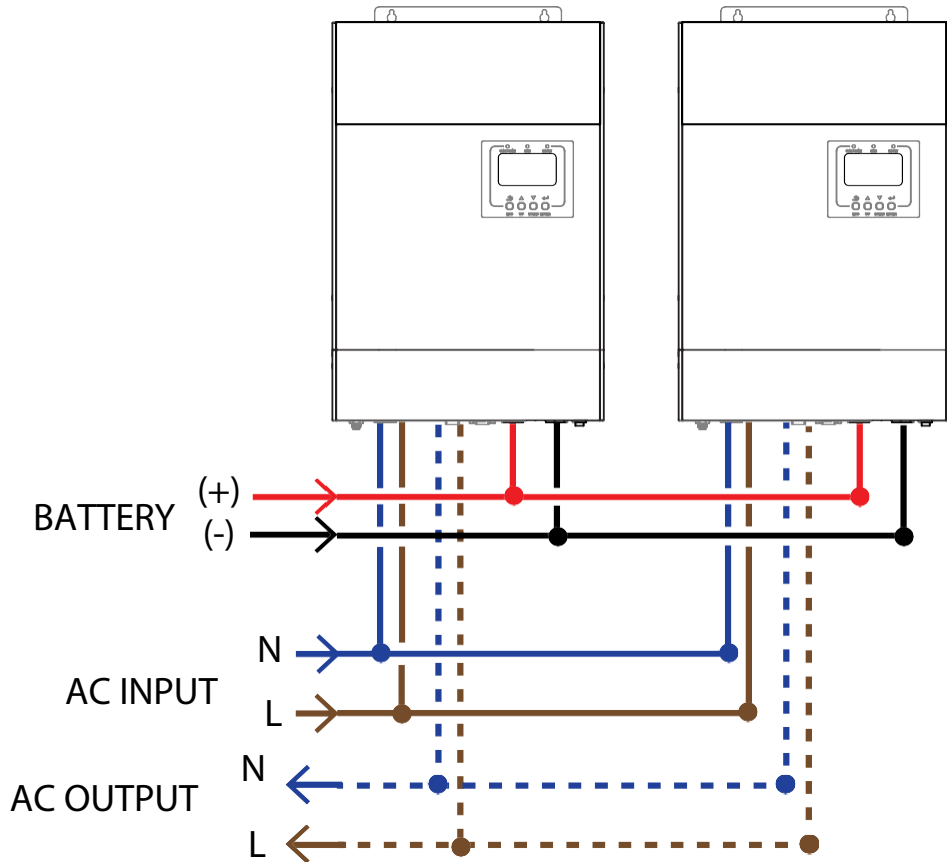
devices.

OPERATION

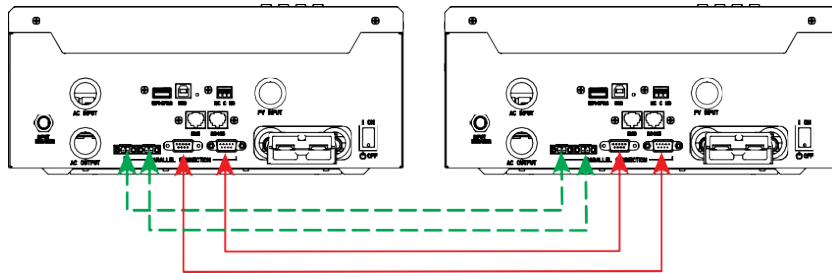
1. Once the installation and wiring is complete, the user is ready to put the inverter to use.
2. With the inverter power switch in the OFF position, visually check the inverter, battery, cables, and connected equipment for any damage or obstructions.
3. Verify the battery has an adequate charge level. (Starting with a fully charged battery allows for the best performance and longest working time.)
4. Verify battery level and check the connection between the inverter and battery. Connect an orange DC output cable connector from the ELiMENT™ Battery to the orange DC power input connector of the inverter by sliding one into the other.
5. Push firmly to ensure a good connection.
6. Make sure any connected AC powered tools, equipment or appliances are turned off. Once all connections are secure, turn "ON" the inverter using the power switch located on the bottom panel on the right of the inverter case.
7. The inverter will take a moment to run a self-diagnosis. **During these few seconds, do not power on any connected devices. This may cause a surge that could result in a fault condition.**
8. Once the self test is complete, turn on any connected devices - one at a time - when it is needed and is safe to do so.

**WIRING DIAGRAM FOR RUNNING
MULTIPLE INVERTER5000 UNITS IN
PARALLEL**

Two Inverters in Parallel



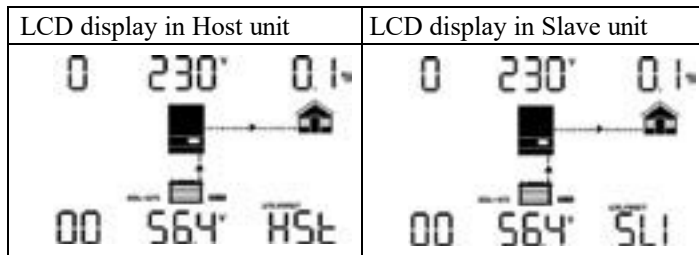
Communication Wire Connection



LCD SETTINGS FOR PARALLEL (SINGLE-PHASE) OPERATION

Setting Program: Refer to Program 23
 Initializing system set up for parallel operation:
 For parallel operation in single-phase, check the following conditions before putting the inverters into use: (See *Figure 1-15*)

1. Connect wiring according to diagrams. Ensure all breakers on the AC load side are open (power to inverters is cut off) and all Neutral wires from each unit are connected together.
2. Switch each unit "ON" and set to parallel, "PAL" in LCD setting program 23 of each unit.
3. After making these settings, turn "OFF" all units using the unit's power switch
4. Turning off the power switch allows the new LCD program settings to be in place when it reboots and to take effect



Note: Host and slave units are randomly defined.

Figure 1-15

5. Turn "ON" each of the inverters.
6. To avoid triggering a warning, make sure all inverters are wired to the AC input prior to completing the next step.
7. Switch on all AC circuit breakers from the AC line input source.

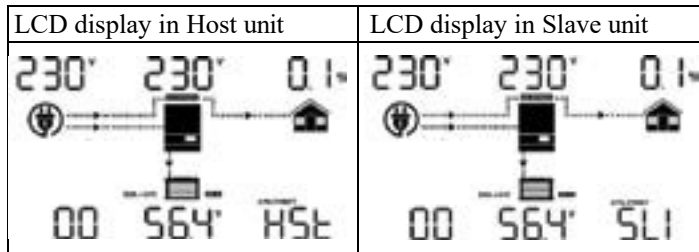


Figure 1-16

8. If there are no fault alarms, the parallel system is fully installed and operational. (*Figure 1-16*)
9. Finally, switch on the breakers on the LOAD side. The inverters will provide 230V AC power to the output.

(OPTIONAL) LCD SETTINGS FOR PARALLEL (3-PHASE) OPERATION

For parallel operation in three phase, check the following conditions before putting the inverters into use:

1. Connect wiring according to diagrams. Ensure all breakers on the AC load side are open and all Neutral wires from each unit are connected together.
2. Turn on all the units, set the LCD program 23 to 3P1 (Host), 3P2 and 3P3 on the units in sequential order. (See *Figure 1-17*)
3. After making these settings, turn "OFF" all units using the unit's power switch.

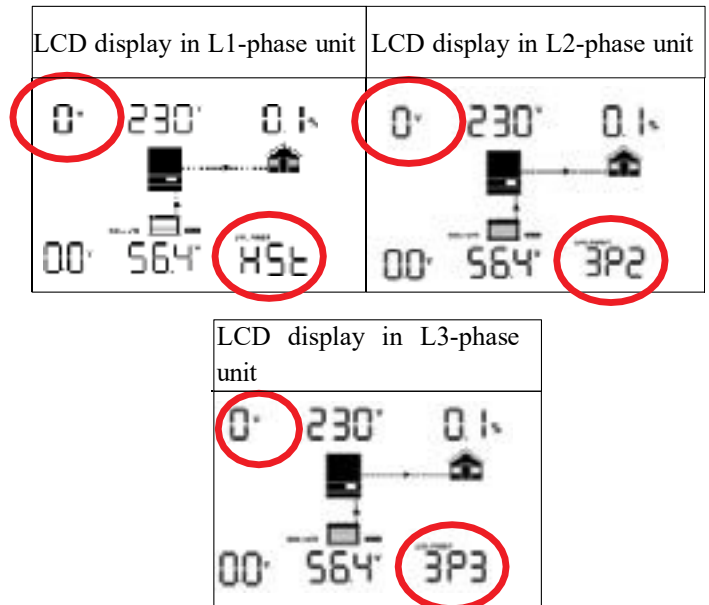


Figure 1-17

4. Turn on all the units in successive order - starting with the HOST unit first, followed by the others.
5. Switch ON all the AC breakers from the AC line input source.
6. Once the AC connection is recognized and the 3-phases are matched with the inverter's settings, they will work normally. (*Figure 1-8*)
7. NOTE: If there is only one inverter in L-1 phase, the LCD screen will show "HS". If there is more than one inverter in L1-phase, only one will indicate "HS" the other L1-phase inverters will show "3P1".

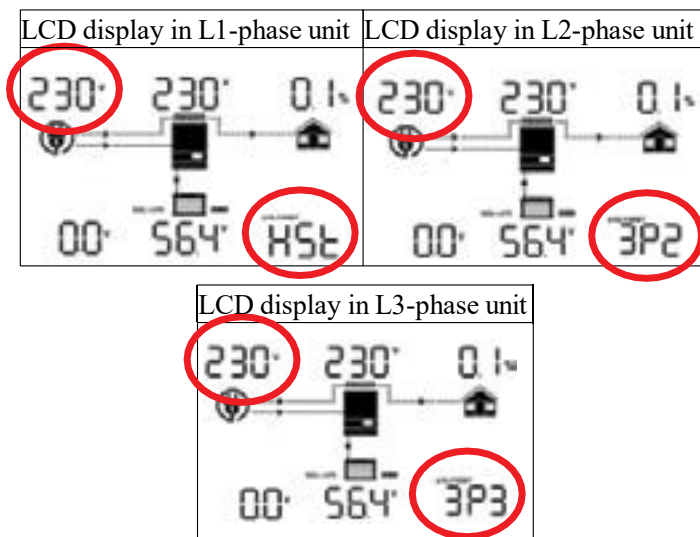


Figure 1-18

8. Before turning on the breakers on the load side, it's best to have the entire system up and operational first to avoid overload.
9. Transfer time (slight delay) will be present when inverters are set up in this manner as the system power initializes during power up. Power interruption can occur with some critical connected devices that are not designed to handle transfer time.

GROUNDING



Connect the Inverter5000 system to ground using AWG 8 gauge copper wire, or greater between the grounding terminal on each inverter and the earth grounding system or vehicle chassis.

Once the Inverter5000 has been successfully installed and setup operation is straightforward.

1. Check that inverter and wiring are in good condition without damage.
2. Check that Battery level is adequate for the job, or that an alternate input is available and connected.
3. Make sure connected tools or appliances are turned off and those near them are aware they are about to be energized.
4. When safe to do so, turn on the inverter using the power switch.

5. After the inverter boots up, the inverter will produce the configured AC output.

FINAL NOTES:

When multiple inverters are set up in parallel with multiple lithium batteries, please follow the below setup.

- Out of the lithium batteries, set one unit as the host and the rest as slave as per the lithium DIP switches.
- Connect the host unit with the inverter which shows "Host".
- If the user mistakenly connects the host battery to one of the rest the slave inverters in the group, the inverter will automatically work as a host unit, but the communication will be slower.

NOTE: When stacked - the inverters will share the loads evenly among all of them. Each are able to output the full 5000W - and none of them will go into power saver mode. This is designed so the stacked system will always be ready to handle any sudden fluctuations in power demands from turning on attached tools or appliances.

For additional maintenance and troubleshooting, please refer to the INVERTER5000 user manual.



For Maintenance and Troubleshooting, see the following pages.



MAINTENANCE & TROUBLESHOOTING

The following tables list fault codes, warnings and audible alarms that may arise during use of the INVERTER5000 and the most likely reasons for these conditions to aid during troubleshooting.

FAULT CODE	POSSIBLE REASON	DISPLAY
01	Fan is locked	01-
02	Over temperature	02-
03	Battery voltage is too high	03-
04	Battery voltage is too low	04-
05	Output short circuited	05-
06	Output voltage is too high.	06-
07	Overload time out	07-
08	Bus voltage is too high	08-
09	Bus soft start failed	09-
51	Over current or surge	51-
52	Bus voltage is too low	52-
53	Inverter soft start failed	53-
55	Over DC voltage in AC output	55-
56	Battery connection is open	56-
57	Current sensor failed	57-
58	Output voltage is too low	58-
60	Negative power fault	60-
61	PV voltage is too high	61-
62	Internal communication error	62-

80	CAN fault	
81	Host loss	

WARNING INDICATOR

CODE	DESCRIPTION	BUZZER ALARM	FLASHES
01	Fan is locked	Beep 3 times every second	01 [△]
02	Over temperature	Beep once every second	02 [△]
03	Battery is over-charged	Beep once every second	03 [△]
04	Low battery	Beep once every second	04 [△]
07	Overload	Beep once every 0.5 second	07 [△]
10	Output power derating	Beep twice every 3 seconds	10 [△]
12	Solar charger stops due to low battery	Beep once every second	12 [△]
13	Solar charger stops due to high PV voltage	Beep once every second	13 [△]
14	Solar charger stops due to overload	Beep once every second	14 [△]
15	Parallel input utility grid different	Beep once every second	15 [△]
16	Parallel input phase error	Beep once every second	16 [△]
17	Parallel output phase loss	Beep once every second	17 [△]
18	Buck over current	Beep once every second	18 [△]
19	Battery disconnect	No beep	19 [△]
20	BMS communication error	Beep once every second	20 [△]
21	PV power insufficient	Beep once every second	21 [△]
22	Parallel forbidden without battery	Beep once every second	22 [△]
25	Parallel inverters' capacity different	Beep once every second	25 [△]
33	BMS communication loss	Beep once every second	33 [△]

34	Cell over voltage	Beep once every second	34 [△]
35	Cell under voltage	Beep once every second	35 [△]
36	Total over voltage	Beep once every second	36 [△]
37	Total under voltage	Beep once every second	37 [△]
38	Discharge over current	Beep once every second	38 [△]
39	Charge over current	Beep once every second	39 [△]
40	Discharge over temperature	Beep once every second	40 [△]
41	Charge over temperature	Beep once every second	41 [△]
42	Mosfet over temperature	Beep once every second	42 [△]
43	Battery over temperature	Beep once every second	43 [△]
44	Battery under temperature	Beep once every second	44 [△]
45	System shut down	Beep once every second	45 [△]

ISSUE	LIGHTS/BUZZER	REASON	POSSIBLE REMEDY
Unit shuts down automatically during startup process.	LCD/LEDs and buzzer will be active for 3 seconds and then complete off.	The battery voltage is too low . (<1.91V/Cell)	1. Re-charge battery. 2. Replace battery.
No response after power on.	No indication.	1. The battery voltage is far too low. (<1.4V/Cell) 2. Battery polarity is connected reversed.	1. Check if batteries and the wiring are connected well. 2.Re-charge battery. 3.Replace battery.
Mains exist but the unit works in battery mode.	Input voltage is 0 on the LCD and green LED is flashing.	Input protector is tripped.	Check if AC breaker is tripped and AC wiring is connected well.
	Green LED is flashing.	Insufficient quality of AC power. (Shore or Generator)	1. Check if AC wires are too thin and/or too long. 2. Check if generator (if applied) is working well or if input voltage range setting is correct. (UPS→Appliance)
	Green LED is flashing.	Set “Battery First” or “Solar First” as the priority of output source.	Change output source priority to Utility first.
When it’s turned on, internal relay is switching on and off repeatedly.	LCD display and LEDs are flashing	Battery is disconnected.	Check if battery wires are connected well.
Buzzer beeps	Fault code 01	Fan fault.	1. Check whether all fans are working properly.

continuously and red LED is on.(Fault code) Buzzer beeps once every second, and red LED is flashing. (Warning code)			2.Replace the fan.
	Fault code 02	Internal temperature of component is over 100C.	1. Check whether the air flow of the unit is blocked or whether the ambient temperature is too high. 2. Check whether the thermistor plug is loose.
	Fault code 03	Battery is over-charged.	Restart the unit, if the error happens again, please return to repair center.
		The battery voltage is too high.	Check if spec and quantity of batteries are meet requirements.
	Warning code 04	The battery voltage/SOC is too low.	1. Measure battery voltage in DC input. 2. Check battery SOC in LCD when use Li battery. 3.Recharge the battery.
	Fault code 05	Output short circuited.	Check if wiring is connected well and remove abnormal load.
	Fault code 06/58	Output abnormal (Inverter voltage is over 150Vac or below 40Vac).	1. Reduce the connected load. 2. Restart the unit, if the error happens again, please return to repair center.
	Fault code 07	The inverter is overload 110% and time is up.	Reduce the connected load by switching off some equipment.
	Fault code 08	Bus voltage is too high.	1. If you connect to a lithium battery without communication, check whether the voltage points of the program 19 and 21 are too high for the lithium battery. 2. Restart the unit, if the error happens again, please return to repair center.
	Fault code 09/53/57	Internal components failed.	Restart the unit, if the error happens again, please return to repair center.
	Warning code 15	The input status is different in parallel system.	Check if AC input wires of all inverters are connected well.
	Warning code 16	Input phase is not correct.	Change the input phase S and T wiring.
	Warning code 17	The output phase not correct in parallel.	1. Make sure the parallel setting are the same system(single or parallel; 3P1,3P2,3P3). 2. Make sure all phases inverters are power on.
	Warning code 20	Li battery can't communicate to the inverter.	1. Check whether communication line is correct connection between inverter and battery. 2. Check whether BMS protocol type is correct setting.
	Fault code 51	Over current or surge.	Restart the unit, if the error happens again, please return to repair center.
	Fault code 52	Bus voltage is too low.	
	Fault code 55	Output voltage is unbalanced	
	Fault code 56	Battery is not connected well or fuse is burnt.	If the battery is connected well, please return to repair center.
	Fault code 60	Negative power fault	1. Check whether the AC output connected to the grid input. 2. Check whether Program 8 settings are the same for all parallel inverters 3. Check whether the current sharing cables are connected well in the same parallel phases. 4. Check whether all neutral wires of all parallel units are connected together. 5. If problem still exists, contact repair center.
	Fault code 80	CAN fault	1. Check whether the parallel communication cables are connected well.
Fault code 81	Host loss	2. Check whether Program 23 settings are right for the parallel system. 3. If problem still exists, contact repair center	

NOTE: To restart the inverter, disconnect all power sources. Once LCD display is off, restart the inverter using only the battery.

INVERTER6000



The INVERTER6000 is a low frequency DC to AC power inverter designed to provide 120/240V AC split-phase power output from a 48V DC input source.

SAFETY:



- This unit is designed for indoor use or within a clean, dry compartment, protected from rain, dust and the elements.



- Inverter requires adequate clearance for air circulation and cooling. Do not block ventilation openings or cooling fans.



- Minimum air circulation required is 145 CFM.



- Installers must be certified technicians or licensed electricians.



- Make certain all connecting wiring is in good condition and of adequate size to avoid risk of fire and electric shock. Do not use damaged or undersized wiring.

- Components in this unit can produce electrical arcing or sparks. To avoid risk of fire, do not install this equipment in areas in or around combustible liquids, solids, or gas. This includes any space containing combustion engine powered vehicles or machinery, fuel tanks, fuel lines or fittings that are a part of a fuel system.

- Do not over tighten DC terminals. Torque rated at 17NM or 12.6 ft.lbs.



- Inverter is **NOT** reverse polarity protected. Check before making connections to inverter. Reverse polarity may cause permanent damage.

- Turn inverter OFF before disconnecting battery cables.



- **Do not disassemble the inverter. It contains no serviceable parts and there is a risk of electrical shock or fire. Capacitors inside the case remain charged after all power is disconnected. Contact Vanair customer support for any service issues.**



- Before any cleaning or maintenance, disconnect both the AC and DC power to reduce risk of electric shock. **Turning off the controls alone, will not reduce the risk.**



- Caution - Equipment Damage: The AC output side of the inverter's AC wiring should NEVER be connected to the AC output of a public power source or a generator. This situation could cause permanent damage to the equipment. If the unit survives such a condition, it will shut down until the situation is corrected.



- **WARNING: EPEQ® AC Inverters not intended for use with medical devices and lifesaving systems. Any such use is at your own risk.**



INSTALLATION

- DC Input Source Wiring: It is suggested to keep the inverter as close to the battery as possible. 3.3 ft. - 16.4 ft. (1m - 5m max.)
- Wiring should be properly gauged by the installer. For the 6kW inverter operating from 48V DC, use copper wire AWG gauge 1 for lengths up to 3'- 4" (~1m), and AWG 0 for lengths from 3'-4" up to 16'-5" (1m to 5m). Lengths longer than 5m are not recommended. NOTE: Unit comes pre-wired for connection to 48V DC power source utilizing Anderson

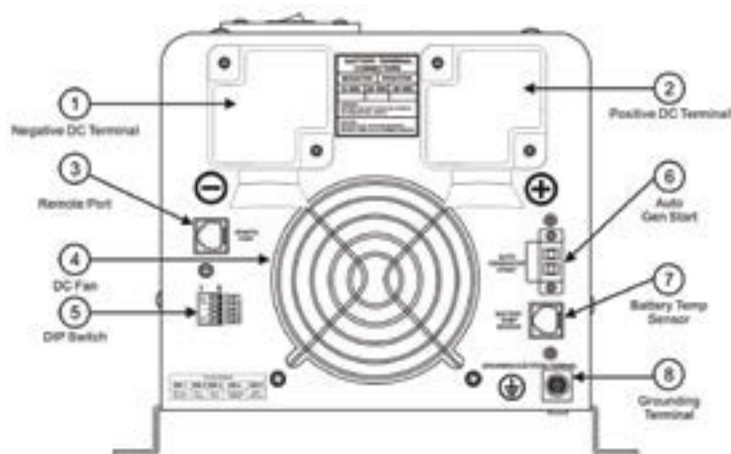


Figure 1-20

DC SIDE END PANEL

1. Negative DC Terminal
2. Positive DC Terminal
3. RJ11 Port for Remote Panel
4. DC Cooling Fan
5. DIP Switches
6. Auto Generator Start Connection
7. Battery Temp. Sensor Port
8. Grounding Terminal
9. Inverter Output Protection Circuit Breaker
10. Charger Input Protection Circuit Breaker
11. AC Terminal Wiring Block
12. AC Fan

AC SIDE END PANEL

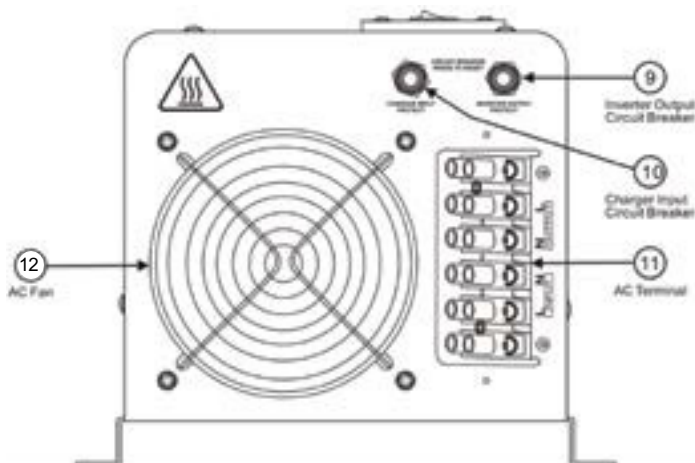


Figure 1-21

connectors.

- Terminal lug surface should mate flush with the surface of the inverter terminal – with no washers or spacers in between.
- AC Terminal Wiring: 10 to 5 AWG wire suggested for AC wiring terminal block connections. (See *Figure 1-21*) Consult a licensed electrician for your specific hardwiring situation.
- Install in dry, clean, cool area with good ventilation.
- AC input neutral not required for split phase models. **Never connect Input Neutral to Ground or to Output Neutral! Damage will result not covered under warranty.**
- Output voltage must never be connected to its input AC terminal - overload or damage may result.
- Switch on inverter BEFORE plugging in any appliances.
- **Damage due to AC wiring mistakes are NOT covered by Warranty.**
- **DO NOT connect the AC outputs of the INVERTER6000 in parallel to increase power. This model has no stacking capability.**

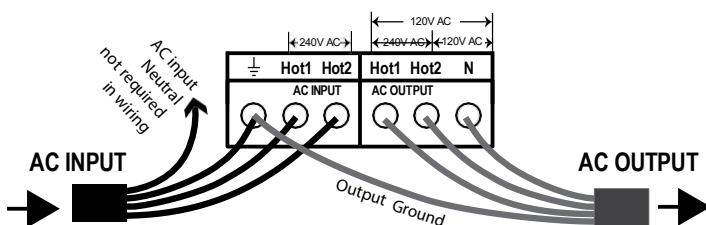


Figure 1-22

INVERTER SETTINGS

1. DIP switch settings (Refer to *Figure 1-23* and the *DIP Switch Table 1-1*)

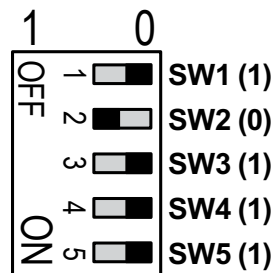


Figure 1-23

2. **Battery Type Selector:** Set to “3”
3. **Charge Current Control:** Should be set to a “10 o’clock” position. Use a small flathead screwdriver to rotate selector switch as needed. Be cautious not to break the plastic selector. (See *Figure 1-24*)

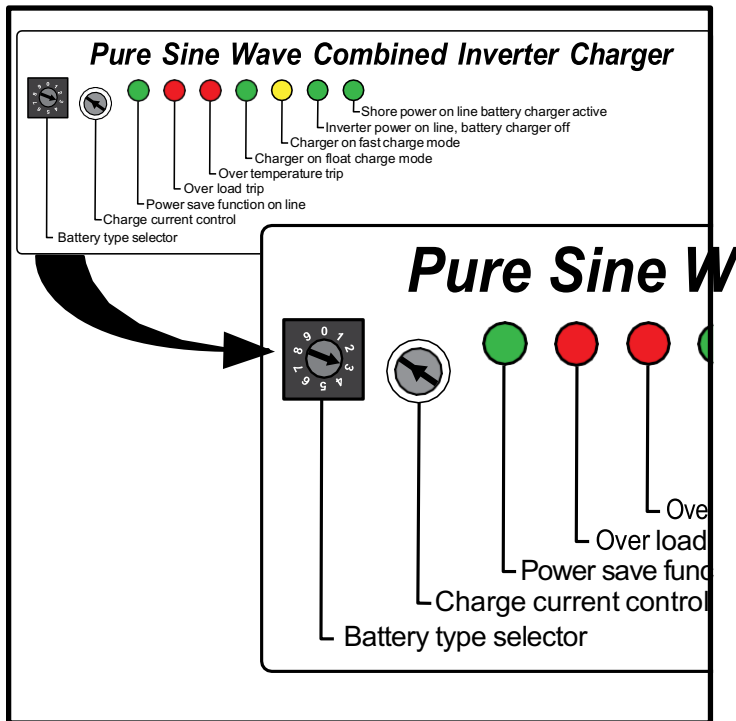


Figure 1-24

BATTERY TYPE SELECTOR

Please refer to *Tables 1-1*, and *Table 1-2* to set the proper battery type for 48V DC.

When using the ELiMENT™ Battery, as a battery source, please select Battery Type “3”, for Lithium type.



Switch#	Function	Position 0	Position 1
SW1 (AC Priority)	Low Battery Trip	10V DC	10.5V DC
SW1 (Battery Priority)		10.5V DC	11.5V DC
SW2 (230V)	AC Input Range	176-242V AC +/-4%	160-264V AC 40Hz +/-4%
SW2 (120V)	AC Input Range	100-135V AC +/-4%	90-135V AC 40Hz +/-4%
SW3	Power Save Override ON/OFF	Inverter OFF	Power Saver On (3 sec.)
SW4	Frequency Switch	50Hz	60Hz
SW5	Battery/AC Priority	AC Priority	Battery Priority

DIP Switch Table 1-1

Battery Type Selector			
Switch Setting	Description	Boost V DC	Float V DC
0	Charger Off	-	-
1	Gel USA	56.0	54.8
2	AGM 1	56.4	53.6
3	AGM 2/ Lithium	58.4	54.8
4	Sealed Lead Acid	57.6	54.4
5	Gel Euro	57.6	55.2
6	Open Lead Acid	59.2	53.2
7	Calcium	60.4	54.4
8	De-Sulphation	62.0 (4hrs then off)	
9	(Not Used)	-	-

Battery Type Selector Table 1-2

OPERATION

Once the inverter is setup and installed properly - using the INVERTER6000 is simple.

1. To begin, the inverter's power switch (located on the top of the inverter case) should be in the "UNIT OFF" position. (See *Figure 1-25*)
2. Do a quick safety check to make sure there are no tools or devices that are connected and may be in the "powered on" condition.
3. Verify the connected battery source is properly charged and will provide proper voltage for the inverter's use.
4. Move the switch on top of the inverter from the "Unit Off" position to the "Power Saver Off" (ON) position.
5. The inverter will run a quick self-diagnostic test. Wait a moment for this to complete before turning on any attached devices.
6. When powering on any connected devices or tools - do so *one at a time* - to prevent a combined initial surge, which could potentially result in a FAULT condition.
7. When finished - the inverter can be shut down in reverse order.
8. Power off the connected AC tools or devices.
9. Move the inverter's power switch back to the "UNIT OFF" position.
10. For more detailed information, maintenance and troubleshooting, please refer to the INVERTER6000 user manual.

See following pages for Troubleshooting

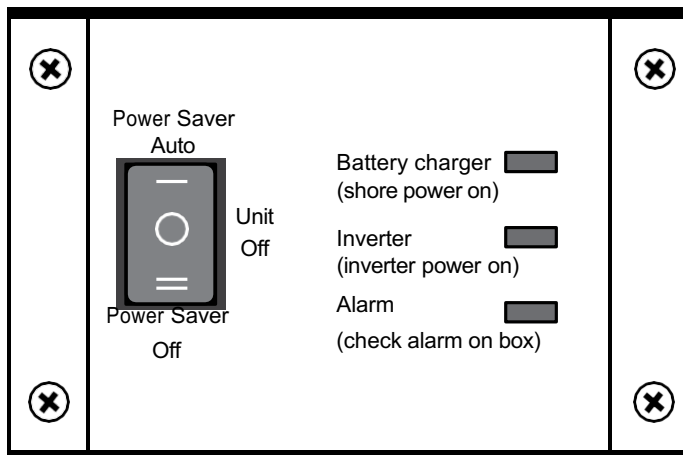


Figure 1-25

TROUBLESHOOTING STATUS

The following table is designed to help you quickly identify the most common inverter failures.

Status	Item	INDICATOR ON TOP COVER							AUDIBLE ALARM
		SHORE POWER ON	INVERTER ON	FAST CHARGE	FLOAT CHARGE	OVER TEMP TRIP	OVER LOAD TRIP	POWER SAVER ON	
Line Mode	CC	X		X					
	CV	X		X					
	Float	X			X				
	Standby	X							
Inverter Mode	Inverter On		X						
	Power Saver							X	
Inverter Mode	Battery Low		X						Beep 0.5s every 5s
	Battery High		X						Beep 0.5s every 1s
	Overload On Invert Mode		X				X		Refer to audible alarm
	Over Temp On Invert Mode		X			X			Beep 0.5s every 1s
	Over Temp On Line Mode	X		X		X			Beep 0.5s every 1s
	Over Charge	X		X					Beep 0.5s every 1s
Fault Mode	Fan Lock								Continuous beep
	Battery High		X						Continuous beep
	Inverter Mode Overload						X		Continuous beep
	Output Short						X		Continuous beep
	Over-Temp					X			Continuous beep
	Over-Charge			X					Continuous beep
	Back Feed Short								Continuous beep

TROUBLESHOOTING SYMPTOMS AND CAUSES

The following table is designed to help you resolve the most common operating symptoms.

Symptom	Possible Cause(s)	Recommended Solution(s)
Inverter will not turn on during initial power up.	Batteries are not connected, or loose battery connection. Low battery voltage.	Check the batteries and cable connections. Check DC fuse and breaker,
No AC output voltage and no indicator lights ON.	Inverter has been manually transitioned to OFF mode.	Press the switch to Power Saver on or Power Saver OFF position.
Inverter overload indicator on.	Excessive AC output load or AC output short. Defective inverter.	Check AC output loads and wiring.
Inverter high temperature indicator on.	Excessive ambient temperature or AC output load.	Check AC output loads, increase ventilation, reduce AC load on the inverter if ambient temperature is excessive.
AC output voltage is low and the inverter turns loads OFF in a short time.	Low battery.	Check the condition of the batteries and recharge if possible.
Charger is inoperative and unit will not accept AC.	AC voltage has dropped out of tolerance.	Check the AC voltage for proper voltage and frequency.
Charger is supplying a lower charge rate.	Charger controls are improperly set. Low AC input voltage. Loose battery or AC input connections.	Refer to the section on adjusting the Charger Rate Use qualified AC power source. Check all DC/AC connections.
Charger turns OFF while charging from a generator.	High AC input voltages from the generator.	Load the generator down with a heavy load. Turn the generator output voltage down.
Sensitive loads turn off temporarily when transferring between grid and inverting.	Inverter's low voltage trip voltage may be too low to sustain certain loads.	Choose narrow AC voltage in the DIP switch, or install a UPS if possible.
Noise from Transformer/case.	Applying specific loads such as a hair dryer.	Remove the loads.

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PARTS@VANAIR.COM****10896 W. 300 N.
MICHIGAN CITY, IN 46360****(800) 526-8817****EPEQ.COM****EFFECTIVE: MAY 20, 2022****VANAIR® VANTAGE
WARRANTY**

This limited warranty supersedes all previous Vanair® warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY—Subject to the expressed terms and conditions set forth below, Vanair® Mfg., Inc. ("Vanair"), of Michigan City, Indiana (USA), warrants to the original retail purchaser of new Vanair® equipment that such equipment is free from defects in materials and workmanship when shipped by Vanair®.

For warranty claims received by Vanair® within the applicable warranty periods described below, Vanair® will repair or replace any warranted equipment, parts or components that fail due to defects in material or workmanship or refund the purchase price for the equipment, at Vanair's discretion. Vanair® is not responsible for time or labor to gain access to the machine to perform work. **WARRANTY WILL BE VOID IF GENUINE VANAIR PARTS AND FLUIDS ARE NOT USED.**

Vanair® must be notified in writing within thirty (30) days of any such defect or failure. All warranty or returns must be pre-authorized in writing prior to performing warranty work. Call Vanair® for process and forms. Vanair® will provide instructions on the warranty claim procedures to be followed.

Warranty will commence upon receipt of the Warranty Registration Card. If the Warranty Registration Card is not received within six (6) months of shipment from Vanair®, the warranty commencement date shall be thirty (30) days from the date of shipment from Vanair®. Records of warranty adherence are the responsibility of the end user.

1. Inverters: 1 Year Parts / 1 Year Labor
2. Converters: 1 Year Parts / 1 Year Labor
3. Chargers: 1 Year Parts / 1 Year Labor
4. Electric Motors: 1 Year Parts / 1 Year Labor
5. EPEQ™ Lithium Welder: 1 Year Parts / 1 Year Labor
6. Alternators: 1 Year Parts / 1 Year Labor
7. Compressor Air End:
 - Rotary Screw: Lifetime with Vanair® Authorized Service Kits and Lubricants : 3 Years Labor
 - Reciprocating: 3 Years Parts / 1 Year Labor
 - Scroll: 1 Year Parts / 1 Year Labor
8. Hydraulic Pumps/Motors: 2 Years Parts / 1 Year Labor
9. 1 Year Parts/Labor on the following:
 - All electronics and controls including, but not limited to:
 - (i) I/O Boards
 - (ii) Modules
 - (iii) Panel Boxes
 - (iv) Instrumentation
 - (v) Clutches
 - (vi) Solenoids
 - (vii) Running Gear/Trailers
 - (viii) Cooler Cores and Fans
 - (ix) Battery Management Systems and Controllers

This Limited Warranty shall not apply to:

1. Consumable components, such as: shaft seals, valves, belts, filters, capacitors, contactors, relays, brushes, wire or parts that fail due to normal wear and use.
2. Items furnished by Vanair®, but manufactured by others, such as engines and trade accessories (these items are covered by the manufacturer's warranty, if any).
3. Equipment that has been modified by any party other than Vanair® or equipment which has not been used and maintained in accordance with Vanair's specifications.

4. Equipment which has been improperly installed and/or improperly operated, based upon Vanair's specifications for the equipment or industry standards.

5. Equipment installed by non-authorized or third party personnel. Vanair® products are intended for purchase and use by commercial/industrial users and persons trained and experienced in the use and maintenance of industrial equipment.

In the event of a warranty claim covered by this Limited Warranty, the exclusive remedies shall be, at Vanair's sole discretion: (i) repair; or (ii) replacement; (iii) where authorized in writing by Vanair® in appropriate cases, the reasonable cost of repair or replacement at an authorized Vanair® service facility; or (iv) payment of (or credit for) the purchase price (less reasonable depreciation based upon actual use) upon return of the equipment at the warranty claimant's risk and expense. Vanair® will pay standard ground freight for any warranty item shipped to and from Vanair® or (Vanair® designated facility) within the first year of the applicable warranty period. Any additional expedited freight cost is the responsibility of the purchaser.

TO THE GREAT EXTENT PERMITTED BY APPLICABLE LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES APPLICABLE TO THE VANAIR® EQUIPMENT. IN NO EVENT SHALL VANAIR® BECOME LIABLE FOR DIRECT, INDIRECT, SPECIAL, PUNITIVE, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT OR LOST BUSINESS OPPORTUNITY), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY. IN NO EVENT SHALL VANAIR® BECOME OBLIGATED TO PAY MORE ON ANY WARRANTY CLAIM THAN THE PURCHASE PRICE ACTUALLY PAID BY THE ORIGINAL RETAIL PURCHASER.

THIS LIMITED WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE, OR ANY OTHER WARRANTY OR GUARANTY ARISING BY OPERATION OF LAW. ANY WARRANTY NOT EXPRESSLY PROVIDED HEREIN, IMPLIED WARRANTY, GUARANTY AND ANY REPRESENTATION REGARDING THE PERFORMANCE OF THE EQUIPMENT, AND ANY REMEDY FOR BREACH OF CONTRACT, IN TORT, OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE, OR COURSE OF DEALING ARE EXCLUDED AND DISCLAIMED BY VANAIR®.

Some states in the United States of America do not allow limitations of how long an implied warranty lasts, or the exclusion of incidental, indirect, special or consequential damages, and as such, the above limitations and exclusions may not apply to you. This warranty provides specific legal rights. Other rights may be available to you, but may vary from state to state.

In Canada, legislation in some provinces provides for certain additional warranties or remedies other than as stated herein, and to the extent that they may not be saved, the limitations and exclusions set out forth above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary from province to province.

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**ELiMENT™ LITHIUM IRON
PHOSPHATE BATTERY**

This limited warranty supersedes all previous Vanair® warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY—Subject to the expressed terms and conditions set forth below, Vanair® Mfg., Inc. ("Vanair"), of Michigan City, Indiana (USA), warrants to the original retail purchaser of new Vanair® equipment that such equipment is free from defects in materials and workmanship when shipped by Vanair®.

For warranty claims received by Vanair® within the applicable warranty periods described below, Vanair® will repair or replace any warranted equipment, parts, or components that fail due to defects in material or workmanship or refund the purchase price for the equipment at Vanair®'s discretion. Vanair® is not responsible for time or labor to gain access to the machine to perform work.

TO BE ELIGIBLE FOR WARRANTY, THE CUSTOMER MUST REGISTER THE PRODUCT ONLINE AT <https://vanair.com/support/registration.html> AND RETAIN PROOF OF PURCHASE RECEIPT. All returns must receive a Return Material Authorization (RMA) number from the factory and be returned directly postage or freight prepaid. See RMA for instructions regarding the shipping of products containing Lithium Batteries. **DO NOT SHIP LITHIUM BATTERIES VIA AIR.**

Warranty will commence upon receipt of the Warranty Registration online. If the Warranty Registration is not received within sixty (6) days of shipment from Vanair®, the warranty commencement date shall be thirty (30) days from the date of shipment from Vanair®. Records of warranty adherence are the responsibility of the end user.

Vanair® must be notified in writing within thirty (30) days of any such defect or failure. All warranty or returns must be pre-authorized in writing prior to performing warranty work. Call Vanair® for process and forms. Vanair® will provide instructions on the warranty claim procedures to be followed.

STANDARD WARRANTY TERMS

ELiMENT™ 48V Lithium Iron Phosphate Battery Pack: thirty-six (36) Months, or 3.0 Adjusted Discharge Megawatt-hours (whichever comes first)

This Limited Warranty shall not apply to:

1. Items furnished by Vanair®, but manufactured by others, such as engines and trade accessories (these items are covered by the manufacturer's warranty, if any).
2. Equipment that has been modified by any party other than Vanair® or equipment which has not been used and maintained in accordance with Vanair®'s specifications.
3. Equipment which has been improperly installed and/or improperly operated, based upon Vanair®'s specifications for the equipment or industry standards.
4. Equipment installed by a non-authorized or third-party personnel. Vanair® products are intended for purchase and use by commercial/industrial users and persons.

In the event of a warranty claim covered by this Limited Warranty, the exclusive remedies shall be, at Vanair®'s sole discretion: (i) repair; or (ii) replacement; (iii) where authorized in writing by Vanair® in appropriate cases, the reasonable cost of repair or replacement at an authorized Vanair® service facility; or (iv) payment of (or credit for) the purchase price (less reasonable depreciation based upon actual use) upon return of the equipment at the warranty claimant's risk and expense. Vanair® will pay standard ground freight for any warranty item shipped to and from Vanair® or (Vanair® designated facility) within the first year of the applicable warranty period. Any additional expedited freight cost is the responsibility of the purchaser.

TO THE GREAT EXTENT PERMITTED BY APPLICABLE LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES APPLICABLE TO THE VANAIR® EQUIPMENT. IN NO EVENT SHALL VANAIR® BECOME LIABLE FOR DIRECT, INDIRECT, SPECIAL, PUNITIVE, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT OR LOST BUSINESS OPPORTUNITY), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY. IN NO EVENT SHALL VANAIR® BECOME OBLIGATED TO PAY MORE ON ANY WARRANTY CLAIM THAN THE PURCHASE PRICE ACTUALLY PAID BY THE ORIGINAL RETAIL PURCHASER.

THIS LIMITED WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR PURPOSE, OR ANY OTHER WARRANTY OR GUARANTY ARISING BY OPERATION OF LAW. ANY WARRANTY NOT EXPRESSLY PROVIDED HEREIN, IMPLIED WARRANTY, GUARANTY AND ANY REPRESENTATION REGARDING THE PERFORMANCE OF THE EQUIPMENT, AND ANY REMEDY FOR BREACH OF CONTRACT, IN TORT, OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE, OR COURSE OF DEALING ARE EXCLUDED AND DISCLAIMED BY VANAIR®.

Some states in the United States of America do not allow limitations of how long an implied warranty lasts, or the exclusion of incidental, indirect, special or consequential damages, and as such, the above limitations and exclusions may not apply to you. This warranty provides specific legal rights. Other rights may be available to you, but may vary from state to state.

In Canada, legislation in some provinces provides for certain additional warranties or remedies other than as stated herein, and to the extent that they may not be saved, the limitations and exclusions set out forth above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary from province to province.

ALL WARRANTY OR RETURNS MUST BE PRE-AUTHORIZED PRIOR TO PERFORMING ANY WARRANTY WORK.

(844) VAN - SERV

SERVICE@VANAIR.COM

PARTS@VANAIR.COM

**10896 W. 300 N.
MICHIGAN CITY, IN 46360**

(800) 526-8817

EPEQ.COM

EFFECTIVE: JULY 15, 2022



071922NML



EPEQ® Installation Final Finish Test Form

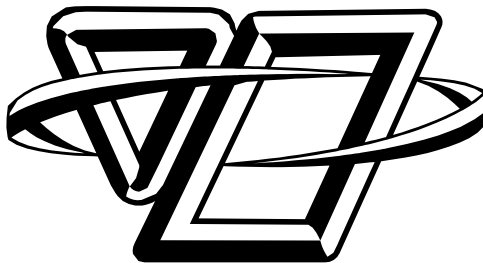
INSTALLER INFORMATION			
Upfitter Truck Builder			
Upfitter Contact Info			
End Customer			
Type of Vehicle Installed		OEM Alternator	
IDENTIFYING NUMBERS			
Vanair: 30-	Truck #		
Battery S/N	VIN:		
Section A: Pre-Start Inspection: <i>(Follow all start-up and running instructions provided)</i>			
1.) All Connections are Correct and Secure	Pass	<input type="checkbox"/>	Fail <input type="checkbox"/>
2.) Oil Level in Sight Glass is Above Halfway Mark at Level	Pass	<input type="checkbox"/>	Fail <input type="checkbox"/>
3.) Hoses and Wiring Routed Away from Heat Sources; Pinch Points with Strain Relief	Pass	<input type="checkbox"/>	Fail <input type="checkbox"/>
	Pass	<input type="checkbox"/>	Fail <input type="checkbox"/>
Section B: Checks with Vehicle OFF: <i>(Conduct all checks with EPEQ only)</i>			
1.) When the Button is Pressed the Display Comes On	Pass	<input type="checkbox"/>	Fail <input type="checkbox"/>
2.) Check Battery SOC. Press Info & Check All Cells. All Cells within 3V of each other.	Pass	<input type="checkbox"/>	Fail <input type="checkbox"/>
3.) Air 20 Cycles ON and OFF at 10 CFM	Pass	<input type="checkbox"/>	Fail <input type="checkbox"/>
4.) No Air Leaks in the System	Pass	<input type="checkbox"/>	Fail <input type="checkbox"/>
5.) Air 20 Cycles ON and OFF at 20 CFM	Pass	<input type="checkbox"/>	Fail <input type="checkbox"/>
6.) System Charges when Shore Power is Plugged Into 120V AC	Display Amp Value: _____ Amps	Pass	<input type="checkbox"/>
7.) "Y" Cable is Correct and Both Batteries are Charging (2-Battery System)	Pass	<input type="checkbox"/>	Fail <input type="checkbox"/>
8.) Inverters Turn ON and Operate	Pass	<input type="checkbox"/>	Fail <input type="checkbox"/>
9.) Level 2 Charger Turns ON & Operates (if Equipped)	LED Status	Circle One: Blue / Red	Pass <input type="checkbox"/>
10.) 48V to 12V DC-DC Converter Operates and Supplies 12V DC Out	Pass	<input type="checkbox"/>	Fail <input type="checkbox"/>
Section C: Checks with Vehicle ON: <i>(Conduct these checks with a 12V to 48V Converter Charger)</i>			
1.) EPEQ Display Turns ON When Vehicle Key is ON	Pass	<input type="checkbox"/>	Fail <input type="checkbox"/>
2.) With Key ON, Vehicle ON, You Can Turn the EPEQ Display OFF at the Display	Pass	<input type="checkbox"/>	Fail <input type="checkbox"/>
3.) The 12V to 48V Converter Charger is Operating and Charging the ELiMENT Battery(s)	Pass	<input type="checkbox"/>	Fail <input type="checkbox"/>
Tested By: <i>(print name)</i>	Pass <input type="checkbox"/>	Retest Needed <input type="checkbox"/>	Date Passed
Mileage:	Decal w/ Serial Number Placed on Driver's Side Door		Completed <input type="checkbox"/>
Send Completed Test Sheet to: Warranty@Vanair.com along with Warranty Card			

EPEQ® Installation Final Finish Test Form

Test Sheet Explanation

INSTALLER INFORMATION				
Upfitter Truck Builder	Who built / installed the system?			
Upfitter Contact Info	Point of contact and email / phone number			
End Customer	Who was this built for?			
Type of Vehicle Installed	Who was this built for? Ford Sprinter, F550, Cabover, etc. / What size alternator? (usually pertains to the size of the onboard charger to use with the vehicle. 20A or 30A)			
IDENTIFYING NUMBERS				
Vanair: 30- Vanair S/N on Air Compressor & Battery	Truck # Is there a truck number that identifies this vehicle?			
Battery S/N (Find under cables on battery)	VIN: Vehicle ID number, or last 6 digits of the VIN number works.			
Section A: Pre-Start Inspection: (Follow all start-up and running instructions provided)				
1.) Make sure all connections made per the wiring diagram provided.				
2.) Check the compressor oil level				
3.) Make sure there are no wires routed along sharp edges or any pinched wires.				
Section B: Checks with Vehicle OFF: (Conduct all checks with EPEQ only)				
1.) Check harnessing from 6-pin connector at battery to pushbutton on display bracket. If dual battery turns off when releasing pushbutton, check 6-pin Y harness is connected to batteries in correct order.				
2.) All cells should be close, if not identical. Once charged - cells should balance. If difference > 0.3V call Vanair.				
3.) Turn Air 20 on low speed (10 CFM). Compressor turns on and fills tank with air. Turns off when tank is full. Cycle 2 times.				
4.) Check system pressure and hoses for leaks. No leaks should be present.				
5.) With an empty air tank, turn Air 20 on high speed (20 CFM). Compressor turns on and fills tank with air. Turns off when tank is full.				
6.) When plugged in, display should read "charging" under battery icon. Should see negative (-) amperage in upper Right Hand corner.				
7.) Ensure the Inverters turn on and are working. Plug an item in to ensure they are outputting power				
8.) Ensure the Inverters turn on and are working. Plug an item in to ensure they are outputting power				
9.) Make sure the breakers are on and the Level 2 Charger is plugged in. The light should illuminate. If available, attempt to charge a vehicle to test.				
10.) Ensure that the lights or equipment hooked to the 48V to 12V converter turn on and operate with system on. Turn on and test all components.				
Section C: Checks with Vehicle ON: (Conduct these checks with a 12V to 48V Converter Charger)				
1.) Ensure display is off before testing. Display should be tied to keyed ignition with the wake harness and turns on when the key is on.				
2.) Press power button on EPEQ display. The display should turn off. If display does not turn off or gives an error banner, the wake harness is installed backwards.				
3.) With the vehicle on, there should be negative amperage at the top right of the display. amperage may fluctuate, and dome lights may dim and brighten at low idle due to the way the charger works. Amperage will even out at high idle.				
Tested By: <small>(print name)</small>	Who tested this masterful example of engineering?	Pass <input type="checkbox"/>	Retest Needed <input type="checkbox"/>	Date Passed When did this happen?
Mileage:	Vehicle mileage at time of test.	Decal w/ Serial Number Placed on Driver's Side Door		Completed <input type="checkbox"/>
Send Completed Test Sheet to: Warranty@Vanair.com along with Warranty Card				Ensure sticker with the Serial Number is in the driver's side door jamb.

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VANAIR®

MOBILE POWER SOLUTIONS®

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vanair.com



Effective Date: 08/01/2023