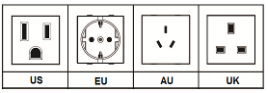
Sinewave Inverter with Transfer Switch

120V Model
1000W (SWXFR1210)
2000W (SWXFR1220)
3000W (SWXFR1230)

230V Model
1000W (SWXFR1210i)
2000W (SWXFR1220i)
3000W (SWXFR1230i)

Owner's Manual
Preliminary Updated Version

Rev: 3.2



For safe and optimum performance, the **KISAE Sinewave Inverter with Transfer Switch** must be used properly. Carefully read and follow all instructions and guidelines in this manual and give special attention to the **CAUTION** and **WARNING** statements.

PLEASE KEEP THIS MANUAL FOR FUTURE REFERENCE

Disclaimer

While every precaution has been taken to ensure the accuracy of the contents of this guide, **KISAE Technology** assumes no responsibility for errors or omissions. Note as well that specifications and product functionality may change without notice.

Important

Please be sure to read and save the entire manual before using your **KISAE Sinewave Inverter with Transfer Switch** unit**.** Misuse may result in damage to the unit and/or cause harm or serious injury.

Product Numbers:

120V model:

SWXFR1210 Sinewave Inverter 1000W with Transfer Switch (US Socket - NEMA 5-15)
SWXFR1220 Sinewave Inverter 2000W with Transfer Switch (US Socket - NEMA 5-20)
SWXFR1230 Sinewave Inverter 3000W with Transfer Switch (US Socket - NEMA 5-20)

230V model:

SWXFR1210i-UK Sinewave Inverter 1000W with Transfer Switch (British Socket-BS1363)
SWXFR1210i-EU Sinewave Inverter 1000W with Transfer Switch (Schuko Socket-CEE 7/4)
SWXFR1210i-AU Sinewave Inverter 1000W with Transfer Switch (Australia Socket-NS/NZS 3112)
SWXFR1220i-UK Sinewave Inverter 2000W with Transfer Switch (British Socket-BS1363)
SWXFR1220i-EU Sinewave Inverter 2000W with Transfer Switch (Schuko Socket-CEE 7/4)
SWXFR1220i-AU Sinewave Inverter 2000W with Transfer Switch (Australia Socket-NS/NZS 3112)
SWXFR1230i-UK Sinewave Inverter 3000W with Transfer Switch (British Socket-BS1363)
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SWXFR1230i-AU Sinewave Inverter 3000W with Transfer Switch (Australia Socket-NS/NZS 3112)

Original Document Part Number

MUXFR 1210 Rev D

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INTERCHANGEABLE TERMS

The following interchangeable terms are used in this manual and in the inverter argot to mention the operating mode of an inverter with a built-in transfer switch.

Operating Mode	Description
Utility / Bypass / Pass-Through / Pass-Thru	The inverter is in standby mode and its AC-Outputs come from its corresponding AC-Input sources (e.g. shore/utility/gas generator). The inverter is working as a power bar.
Inverter / Battery / Backup	The inverter is active and supplying power to its AC-Output, using the battery energy. The unit pass automatically to this mode as soon as the absence of its AC-Input is detected (e.g. blackout, shore power disconnection, etc.) and as long as it is enabled in the setting.

1. INTRODUCTION

Thank you for purchasing the **KISAE Sinewave Inverter with Transfer Switch unit**. With our state of the art, easy-to-use design, this product will offer you reliable service by providing AC power and 5V USB power for your home, cabin, boat, RV, Caravan or Trailer using battery power. The Sinewave Inverter can run many AC-powered appliances when you need AC power from a battery source. The 5V USB power can charge many USB-powered devices. The inverter also will automatically switch to utility AC power when it is available at your home, dock, or campsite.
This manual will explain how to use this unit safely and effectively. Please read and follow these instructions and precautions carefully.

IMPORTANT SAFETY INFORMATION

This section contains important safety information for the Sinewave Inverter. Before using the unit, READ ALL instructions and cautionary markings on or provided with the unit, and all appropriate sections of this guide.
The Sinewave Inverter contains no user-serviceable parts. See Warranty section for how to handle product issues.

DANGER: Fire and/or Chemical Burn Hazard.

- Do not cover or obstruct any air vent openings and/or install in a zero-clearance compartment.

DANGER: Failure to follow these instructions can result in death or serious injury.

- When working with electrical equipment or lead acid batteries, have someone nearby in case of an emergency.
- Study and follow all the battery manufacturer's specific precautions when installing, using and servicing the battery connected to the inverter.
- Wear eye protection and gloves.
- Avoid touching your eyes while using this unit.
- Keep fresh water and soap on hand in the event battery acid comes in contact with eyes. If this occurs, cleanse right away with soap and water for a minimum of 15 minutes and seek medical attention.
- Batteries produce explosive gasses. **DO NOT** smoke or have an open spark or fire near the system.
- Keep the unit away from moist or damp areas.
- Avoid dropping any metal tool or object on the battery. Doing so could create a spark or short circuit which goes through the battery or another electrical tool that may create an explosion.

DANGER: Shock Hazard. Keep away from children!

- Avoid moisture. Never expose the unit to snow, water etc.
- The unit provides household AC output; treat the AC output socket the same as regular wall AC sockets at home.

DANGER: Explosion hazard!

- DO NOT use the unit in the vicinity of flammable fumes or gasses (such as propane tanks or large engines).
- AVOID covering the ventilation openings. Always operate the unit in an open area.
- Prolonged contact with high heat or freezing temperatures will decrease the working life of the unit.
- DO NOT connect AC power source like utility power or generator to the AC outputs of the unit. It will damage the unit and may cause a fire. Feeding AC to the AC output of the unit is not covered by warranty.

FCC and CE EMC INFORMATION

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules on 120V model and comply with the limits for CE EMC Standard on 230V model. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate

radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

LIMITATIONS ON USE

Do not use in connection with life support systems or other medical equipment or devices.

2. PRODUCT DESCRIPTION

The Sinewave Inverter includes the items list below.

- Inverter with transfer switch base unit with detachable Remote Panel
- Remote Panel Cable
- Owner's Manual

Series	Model No.	Rating		AC Output Types
		Inverter	Transfer Switch	
120 VAC	SWXFR1210	1000W	30A	15A GFCI, Hardwired
	SWXFR1220	2000W		20A GFCI, Hardwired
	SWXFR1230	3000W		2 x 20A NEMA 5-20, Hardwired
230 VAC	SWXFR1210i	1000W	16A	16A(EU-Schuko), Hardwired
	SWXFR1220i	2000W		13A(UK-British), Hardwired
	SWXFR1230i	3000W		10A(AU-Australia), Hardwired

3. INSTALLATION

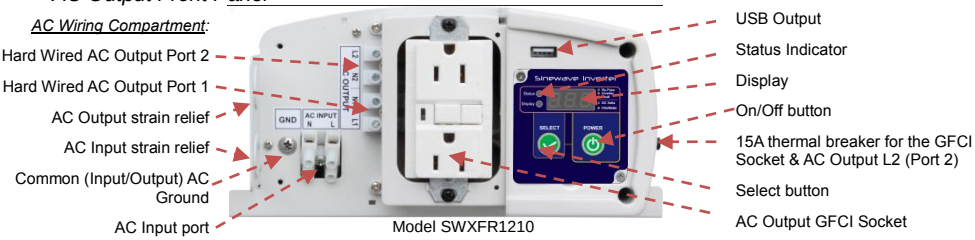
<u>WARNING</u>: All wiring should be done by a certified technician or electrician to ensure adherence to the applicable electrical safety wiring regulations and installation codes. Failure to follow these instructions can damage the unit and could also result in personal injury or loss of life.

<u>CAUTION</u>: Before beginning unit installation, please consider the following:

- The unit should be used or stored in an indoor area away from direct sunlight, heat, moisture or conductive contaminants.
- When placing the unit, allow a minimum of three inches of space around the unit for optimal ventilation.

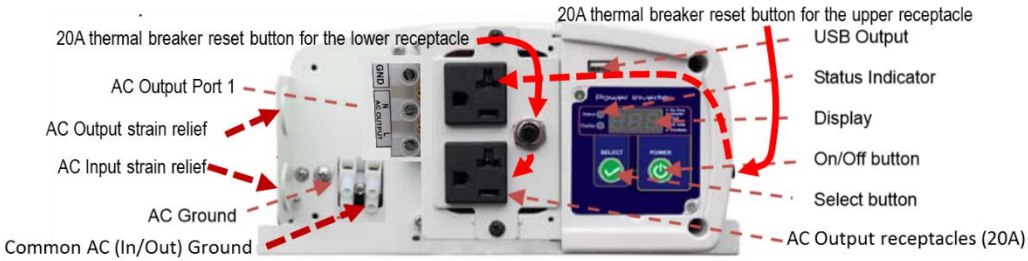
<u>Understanding the unit features</u>

AC Output Front Panel

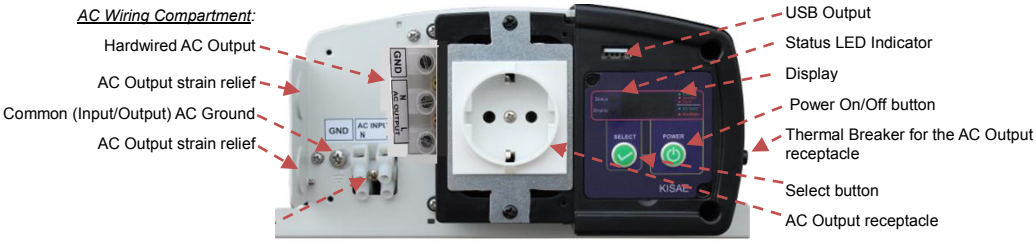


Model SWXFR1210

Model SWXFR1220



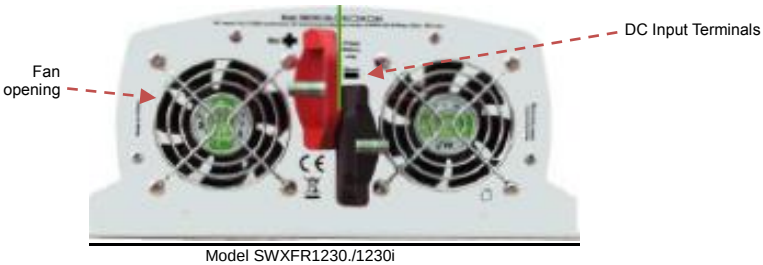
Model SWXFR1230



Model SWXFR1210i-EU, SWXFR1220i-EU, SWXFR1230i-EU

DC Input Rear Panel

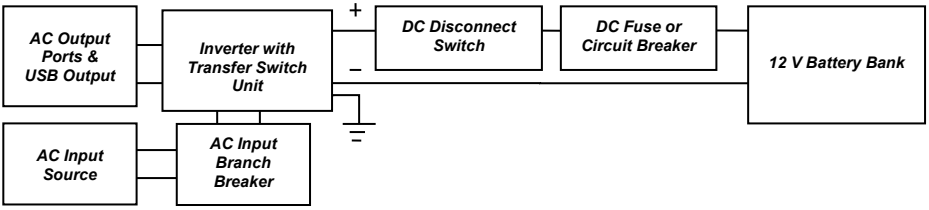
Model SWXFR1210/1220/1210i/1220i



Model SWXFR1230./1230i

Preparing for Installation

Typical Wiring block diagram of the Power Inverter:



12V Battery Bank:

- The use of a deep cycle battery is highly recommended for power inverter application
- For battery sizing, you need to identify what you wish to operate, and for how long. It is recommended that you purchase as much battery capacity as possible. See more on Battery Run Time in Section 4.

DC Fuse or Circuit Breaker:

- DC-rated fuse or DC-rated circuit breaker connected along the DC positive line is required.

	1000W model	2000W model	3000W model
DC Fuse/Circuit Breaker Rating	150Adc	300Adc	350Adc

- Based on the size of your 12V Battery Bank, determine the overall short circuit current rating of the battery bank from the battery manufacturer. The fuse or circuit breaker chosen has to be able to withstand the short circuit current that may be generated by the battery bank. Typically an ANL/Class-T fuse & holder is used for battery bank capacity lower/over 500Ah respectively
- For Marine application, the over-current protective device needs to be installed within 7 inches (17.8cm) from the battery positive terminals.

DC Disconnect Switch:

- Use a DC Disconnect Switch with the same or higher rating of the selected DC fuse or DC circuit breaker. Use ignition protected switches when required by local codes.
- The DC Disconnect Switch is used to disconnect the DC power between the unit and the battery bank positive during service, maintenance or troubleshooting.

DC Input Cable Size:

- All DC cables require insulated multi-strand low resistance cable.
- The DC cables must be copper and rated to 105℃ minimum.

Model	Minimum Wire Size	Recommended Cable Length
1000W unit	AWG # 2	< 5 feet
2000W unit	AWG # 2/0	< 5 feet
3000W unit	AWG # 4/0	< 5 feet

Caution: Use of a wire with a thinner gauge or a longer length, may cause the inverter to shut down under heavy load due to under-voltage shutdown, and may also melt the cable insulation and catch fire and can result in death or serious injury. The proper cable gauge should also match the rating of the DC fuse used (i.e. never use a fuse with a current rating higher than the maximum continuous one of the cable).

Important: The recommended cable length is limited to 5 feet or less. This is due to the consideration of voltage drop between the battery and the unit. For longer cables, a thicker gauge is required to compensate for additional voltage drop (see the following table)

Grounding Cable Size:

Important: The unit has to be grounded properly before use. There are two ground (GND) terminals bonded to the same metal chassis, one for the AC safety GND and another for the DC GND (which is thicker due to the very high DC currents involved). The former is a Phillips screw located beside the AC-Input terminal, and the latter is a stud terminal with a 10mm nut and lock washer located close to the back panel.

- For Marine application, the DC grounding cable size may be one size thinner than the minimum size conductor required for the DC current-carrying conductors (i.e. the positive and negative wires).
- For Recreational Vehicle or Caravan application, the unit has to be grounded to the vehicle chassis with a minimum AWG #8 copper conductor.

Inverter Battery Wires and Fuse

Model #	Inverter Nominal Power <Watts>	Maximum Length (one way distance; not round trip) <feet>	AWG Gauge # (copper)	Number of wires per each polarity	DC Fuse (ANL or Class-T)**
	3000W	5 (recommended)	4/0 (0000)	1	350A
		5	1/0 (0)	2	
SWXFR1230		5	2	3	
SWXFR1230i *		7.5	1/0 (0)	3	
		10	4/0 (0000)	2	
		10	2/0 (00)	3	
	2000W	5 (recommended)	2/0 (00)	1	300A
		5	2	2	
SWXFR1220		7.5	4/0 (0000)	1	
SWXFR1220i *		10	2/0 (00)	2	
		12	3/0 (000)	2	
		15	4/0 (0000)	2	
		5 (recommended)	2	1	150A
		6	4	2	
SWXFR1210		7.5	1/0 (0)	1	
SWXFR1210i *	1000W	10	2/0 (00)	1	
		10	2	2	
		12	1	2	
		15	1/0 (0)	2	

Notes: * The suffix "i" stands for International units (@ 230Vac, single-phase, 50Hz) with different outlets as per the specific country. **For battery banks with total capacity under 500Ah the most affordable ANL fuse type can be used with its corresponding fuse holder; otherwise, use Class-T type.

AC Input Source and AC Branch Breaker:

- Standard AC-Input wire is required for all the AC connections between the AC source & the AC Input port, and the AC Output ports to load.
- For 120V model and maximum Bypass power rating, a minimum of #10 AWG AC wire is required. An external 30A branch circuit breaker is also required in between the AC Input source and the unit AC Input port.
- For 230V model and maximum Bypass power rating, a minimum of #14 AWG AC wire is required. An external 16A branch circuit breaker is also required in between the AC Input source and the unit AC Input port.

Important: Follow the local electrical code when you connect the unit to any AC source.

Installing the Inverter System

WARNING: Electrical Shock Hazard

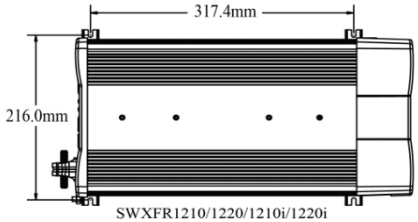
The unit 'On/Off' switch does not disconnect the DC power from the battery. Use the DC Disconnect Switch or disconnect the DC input cables to disconnect the DC power from the battery before working on any circuits connected to the unit. Failure to follow these instructions can result in death or serious injury.

Installation:

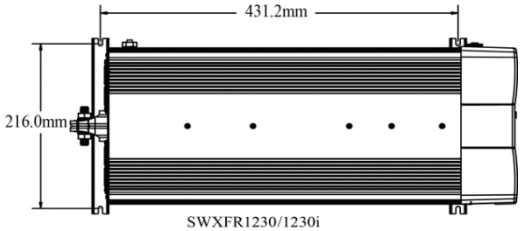
- Choose an appropriate mounting location.
- For indoor use, the unit can be mounted in any direction except with the fans (DC-Input) panel facing downwards (when mounted vertically). This is required for a better thermal dissipation and to avoid any potential fire hazard in the improbable case a melted material passes through the fan holes reaching the floor if something goes wrong inside the inverter. This is mandatory by the standard bodies.

- Use the mounting template below to mark the positions of the mounting screws.
- Drill the 4 mounting holes and place the Inverter in position and fasten the unit to the mounting surface.

Important: Field wiring DC terminals tightening torque 12-13 Nm



SWXFR1210/1220/1210i/1220i



SWXFR1230/1230i

Chassis Grounding Connection:

DANGER: The unit chassis has to be grounded properly. Never operate the Inverter without proper grounding. Failure to do so will result in death or serious injury.

- Connect the grounding cable ring terminal to the unit ground screw.
- Connect the other side of the cable to the common grounding point.

DC Input Connection:

CAUTION: Reversing the DC Input terminal will damage the unit and it cannot be repaired. Damage caused by reverse polarity connection is not covered by the warranty.

- Connect the negative DC input cable between the Inverter DC negative terminal and battery negative terminal.
- Make sure the Disconnect Switch is in the OFF position.
- Connect a positive DC input cable between the inverter DC positive terminal and one terminal of the Disconnect Switch.
- Connect another DC input cable between the other terminals of the Disconnect Switch to one side of the terminal of the fuse holder.
- Connect another DC input cable between the other terminal of the fuse holder and the battery positive terminal.
- Install the selected fuse to the fuse holder.

AC Input Connections:

Warning: Please double check the location of the AC input port located inside the wiring compartment. Misconnecting to the AC output port inside the same compartment will blow the unit and may catch fire. Before making any AC Input connection, please be sure the AC Input source is not energized and the DC disconnect switch is OFF.

Important: A Branch Breaker (not provided) is required in between the AC source and the AC Input Port of the unit.

Model	AC Input Branch Breaker	AC Input wire
120VAC unit	30A (maximum)	#10 AWG (minimum)
230VAC unit	16A (maximum)	#14 AWG (minimum)

- Remove the plastic white AC compartment cover by unscrewing the corresponding four screws.
- Connect the AC Input ‘L’ (hot) wire between the unit AC Input Port and the Branch Breaker terminal.

- Connect the AC Input ‘N’ (Neutral) wire between the unit AC Input Port and the AC source ‘N’ terminal.
- Connect the AC Input ground wire to the Common AC Ground connection on the unit. If a solid ground wire is used, the wire can be connected directly under the bolt head. If stranded, ring terminals must be used.

AC Output Connections:

CAUTION: Please be sure that the AC Input source is not energized before making any Output connection and that the DC disconnect switch is turned OFF.

For 120V model:

The AC Output has three types of AC load connections:

1) The provided AC Output GFCI receptacles (except for the SWXFR1230 which does not have GFCI but regular NEMA 5-20 receptacles instead):
   This configuration does not require any AC Output wiring installation. Just plug the AC loads into the provided AC Output receptacles. During the Bypass mode, the AC output is limited to the rating of the receptacle being used and its corresponding thermal breaker protection (15A for 1000W model, and 20A for both 2000W and 3000W models).
2) The provided hardwired AC Output terminal (Port 2) with GFCI protection (except for the SWXFR1230 which does not have GFCI outlet):
   To access Port 2, remove the plastic white AC compartment cover located on the front panel of the unit. Hardwire the AC load (outlet, distribution panel, etc.) to the AC Output port 2. Please verify the LIVE ‘L’ and NEUTRAL ‘N’ connection on the AC Output port.
   Note: This AC Output Port 2 is connected directly to the output (load side) of the GFCI outlet, having the same power rating. This hardwired port is under the influence of the GFCI socket’s “Test” and “Reset” buttons.
3) The provided hardwired AC Output terminal (Port 1) – with no GFCI Protection:
   To access Port 1, remove the plastic white AC compartment cover located on the front panel of the unit. Hardwire the AC load (outlet, distribution panel, etc.) to the AC Output Port 1. Please verify the LIVE ‘L’ and NEUTRAL ‘N’ connection on the AC Output port.
4) Connect the AC Output Ground wire(s) to the Common AC Ground terminal inside the wiring compartment.

Note: During Battery Power (Inverter) mode, the total AC Output is limited to 8.3A / 16.7A / 25A of continuous current for the 1000W / 2000W / 3000W model respectively.

For 230V model (SWXFR1230i):

The AC Output has two types of AC connections:

1) The provided AC Output receptacle for AC load connection:
   This configuration does not require any AC Output wiring installation. Just plug the AC loads into the provided AC Output receptacles. During the Bypass mode, the AC output is limited to the rating of the receptacle being used and its corresponding thermal breaker protection (16A on EU model, 13A on UK model and 10A on AU model).
2) The provided hardwired AC Output terminal:
   To access it, remove the plastic white AC compartment cover located on the front panel of the unit. Hardwire the AC load (outlet, distribution panel, etc.) to the AC Output terminal. Please verify the LIVE ‘L’ and NEUTRAL ‘N’ connection on the AC Output terminal.
   Important: If an RCD (Residual Current Detector) is used for the AC Output connection, an AWG #14 jumper wire is required to connect GP1 and GP2. This is used to ground the Neutral pin of the inverter to the chassis.
3) Connect the AC output Ground wire to the Common AC Ground terminal inside the wiring compartment.

Note: During Battery Power (Inverter) mode, the total AC Output is limited to 4.3A / 8.7A / 13A of continuous current for the 1000W / 2000W / 3000W model respectively.

Remote Display Connection:

- The display panel is detachable. To install it remotely in a different location use the provided 25 feet long 6 pins RJ12 “rollover” cable.
- Remove the 2 screws at the front of the Display Panel and disconnect the short RJ12 cable from the unit.

- Install the 6-pin RJ12 cable in your desired location and connect the RJ12 cable to the unit and the other end of the cable to the Display Panel. See appendix II for more details.

Test the Inverter Connection:

- Turn the DC disconnect switch ON to provide battery power to the unit.
- Turn the external AC Branch Breaker ON to provide AC Input power to the unit. The display on the panel should turn on automatically showing “888” briefly, then the software revision number of the detachable panel and the main unit (e.g. “r0.4” and “u1.6” respectively), before finally passing from the initiation routine to normal operation showing the battery voltage and providing AC-Output power.
- Once the display starts showing the battery voltage (with AC-Input power available) the ‘Status’ LED will turn green to indicate that the unit is in Bypass mode, which means the AC output is running from the AC input source. If the unit is set to “PS1 (”factory default) it will take about 20 sec for entering Bypass mode. In that case, meantime the “Status” LED remains flashing amber to indicate the unit is running in Battery (Inverter) mode and is going to pass to Bypass soon (within a 20 sec period). If the unit is set to “PS4”, it has to be turned on manually by pushing the “Power” button (see Feature Setting section for more details).
- Once the “Status” LED goes solid green, disconnect the AC input source by turning the external AC Input Branch Breaker OFF. Doing so, the ‘Status’ LED on the display changes immediately from solid green to solid amber, to indicate the unit is running in Battery (Inverter) mode.
- Both AC output and 5V USB are now available and the unit is running on battery power.
- Plug in a small AC load like a 40W table lamp or small appliance to the AC socket to verify AC is available.
- The unit is successfully installed and functioning properly.

Test the GFCI monthly: (120V model only)

- Use the following instruction to perform a monthly test of the AC Output GFCI Socket to ensure the GFCI is functioning properly.
- Turn the unit on and plug a small AC load (e.g. a light bulb) to the AC Output GFCI Socket.
- Check that the AC load is ON.
- Press ‘***TEST***’ button and observe a clicking sound. Check that the AC load is turned off.
- Press ‘***RESET***’ button and check that the AC load is back ON again.

4. UNIT OPERATION

Auto Backup Mode (whatever “PS” setting except “PS0”):

The unit is fully automatic. When utility power is available, the unit is running in AC Bypass mode. AC output is supplied from the utility. When there is a power failure from the utility or an AC source is not available, the unit will run on battery power and the inverter will generate sinewave AC output to maintain and operate the load continuously (With *‘PS2’* setting, there is a minimum of 10W AC-Load sense threshold for the inverter to fully turn on).

Non-Backup Mode (with “PS0” setting)

Same as Auto Backup Mode but when there is a power failure from the utility or the AC input source is not available; the inverter will not turn ON automatically. To turn the inverter on, you have to get into the setting mode and change the ”PS” setting from “PS0” to “PS1” or others. See more details on Inverter Setting.

Understanding the Display Function:

Status LED	Display LED	Display	Function/Status
Green (solid)	Green	e.g. '12.5'	Bypass Mode. Display shows battery voltage in DC volts
Amber (solid)	Green	e.g. '12.5'	Battery/Inverter Mode. Inverter is running. Display shows battery voltage in DC volts
	Amber	e.g. '0.80'	Battery/Inverter Mode. Inverter is running, Display shows output power in kW (800W as shown). The "✓" button has to be pressed.
Amber (flashing)	AC Input is detected being in Battery (Inverter) mode and the unit will switch to Bypass mode soon (after around 20 seconds).		
Red (solid)	OFF	E01-E12	The unit has shut down. Display shows error code (See error code reference chart below)

Note:

'***Status***' LED is used to indicate the status of the unit.

Green: Bypass Mode

Amber: Flashing/Solid will-pass-to/in Battery (Inverter) mode respectively

'***Display***' LED is used to indicate the digital display function.

Green: Display is showing Battery voltage in volts.

Amber: Display is showing Output power in KW.

Understanding the 'Power' and 'Select' push button functions during normal operation

A beep sound will occur every time when the '***Power***' or '***Select***' button is triggered.

'***Power***' button function:

- Turns the inverter On/Off during Battery Mode. Press and hold it for about 1 second to turn the unit either ON or OFF.

Note: The '***Power***' button can be used to turn the AC Output OFF during AC Bypass mode with 'PS4' setting without the need to disconnect the AC-Input as per "PS1" setting. See more details on the "Understanding the Unit Setting" section of this manual.

'***Select***' button function:

- Check the unit settings: Press it several times to scroll through the setting parameters.

Understanding the Error Code

Code	Condition	Corrective Action
E01	Input battery voltage is too low. **If in bypass mode, the unit continues supplying AC-Output power. Otherwise, the** AC-Output shutdown	Recharge the battery immediately and restart the unit. Make sure the battery is connected to the unit.
E02	Input battery voltage is too high and unit has shut down	Check the battery voltage by using a multimeter, and confirm there is not a defective/unregulated 12V source connected to the battery bank
E03	AC output is overloaded or short-circuited and unit has shut down	Check the loads connected to any AC-Output terminal. Reduce/disconnect the AC loads and restart the unit.
E04	Internal temperature is too high and unit has shut down	Turn the unit off and wait for 15 minutes before restarting. Check if any object has blocked the air flow of the unit
E05 (warning)	Input battery voltage is low and warning occurs	Just a warning to recharge the battery, as the unit will shut down shortly.
E06 (warning)	In Battery Mode, a connected AC output load has been sensed high and is close to shutdown limit	Just a warning to reduce the AC loads, as the unit could shut down otherwise
E07 (warning)	Internal temperature is high and is close to shutdown limit	Just a warning to reduce the AC-loads and check for any poor/blocked ventilation
E08-11	Not used	
E12	Internal transfer switch temperature is high and shutdown occurs	Keep battery connected (the 12Vdc fans require battery power). Reduce the AC-loads. Check ventilation fresh air flow

AC Load on Inverter

Although the Power Inverter can provide high surge power up to two times the rated (continuous) output power, some high surge loads like sump-pumps, heavy duty motors etc. may still trigger the inverter protection system even though the load falls within the power rating of the inverter. A higher power Inverter is required for these appliances.

Important: For the SWXFR1230 (120VAC model) unit, a single appliance that requires more than 20A (>2400W) of AC power, has to be hardwired directly to the AC Output Port 1. Both AC-Output receptacles are limited to 20A of maximum continuous current.

Estimated Run Time

Following run times are estimates for reference, based on using different battery bank sizes. Actual run times may vary.

Important: Power Drain from DC Battery Bank**.**

When the SWXFR1230 and SWXFR1230i are running in AC Bypass mode, there is a DC current drain from the battery bank around 700mA. In order to avoid draining the battery bank down, a battery charger with sufficient power is required to maintain the battery bank voltage.

AC Load	Estimated run time on different 12V Battery Bank Size				
	60AH	**120AH**	**180AH**	**240AH**	**300AH**
50 W	11 hrs.	22 hrs.	33 hrs.	44 hrs.	55 hrs.
100 W	5 hrs.	11.5 hrs.	17 hrs.	23 hrs.	29 hrs.
200 W	2.5 hrs.	5 hrs.	8 hrs.	11 hrs.	13.5 hrs.
500 W	49 mins	2 hrs.	3 hrs.	4 hrs.	5 hrs.
1000 W	15 mins	49 mins	1.5 hrs.	2 hrs.	2.5 hrs.
1500 W	8 mins	27 mins	49 mins	1 hr	1.5 hrs
2000 W	N.R.	15 mins	34 mins	49 mins	1 hrs
2500 W	N.R.	11 mins	25 mins	37 mins	49 mins
3000 W	N.R.	N.R.	17 mins	27 mins	37 mins
Note: N.R. - Not Recommended					

5. FEATURE SETTING

To understand more about the unit features, read the following section and follow the instructions to make changes to the desired setting.

Default Factory Setting:

PS (Power Sources): PS1 - inverter enabled in standby mode with load sense off
AL (Alarm beeper): AL1 - alarm enabled
Sd (UV shutdown): SdL - Under voltage shutdown set to low setting

Understanding the Unit Settings

Inverter Setting	
PS0	The inverter is disabled and the AC-Input shore power passes through the internal transfer switch to the AC-Output. When the shore power is disconnected, the unit does not provide AC backup function, and the display automatically turns off in about 30 seconds. Use this mode when a manual backup start is desired.
Note: For enabling the inverter, the PS0 setting has to be changed to another different one.	
PS1	*The inverter is enabled and provides AC backup when utility power is not available*
PS2	The inverter is set to standby mode with power save (load sense) mode ON. The unit will provide AC backup function only when utility power is not available AND the load connected to the output is >10W. Once the unit is ON, it will automatically return to power save (load sense) mode when the connected AC load drops below 3W (there is an hysteresis of about 7W)
Note: During the power save "PS2" mode, the Inverter will turn ON every few seconds briefly (for a few AC cycles) to check if there is a load drawing more than 10W of power. Therefore, any load >10W will start getting power within a random period in between 0 to 10 sec.	
PS3	Not Available

Note: In PS0, PS1, and PS2 settings, the unit turns on automatically when getting shore power. Once having shore power, the unit cannot be turned off. To do so, you have to first disconnect the shore power (forcing Inverter mode) and then push the Power button.	
PS4	Same function as PS1 and the '*Power*' button can be used to turn the AC Output ON and OFF, even with the AC-Input power being present in Bypass mode. When the unit is manually turned off in Bypass mode using the 'Power' button, the display remains ON showing the battery voltage and the 'Status' LED turns off.
Note: In the PS4 setting, the AC-Output always can be turned On/Off manually using the Power button. However, for a complete shutdown (including the lights and display), you have to first disconnect the external AC-Input power and then push the Power button. When the AC-Output is turned off, the condition remains memorized, even after a blackout and blackout-recovery. This is done to be consequent with the last power On/Off action the user did manually on purpose	
PS7	Reserved for the manufacturing process, and should not be available. Otherwise, change it to another setting to start working and to avoid its appearance anymore.
Battery Under Voltage Setting	
SdL	Battery under-voltage setting is set to LOW (setting used for normal operation) Under-voltage alarm: 11.0 Vdc Under-voltage alarm recovery: 11.3 Vdc Under-voltage shutdown: 10.5 Vdc Under-voltage shutdown recovery: 12.0 Vdc
SdH	Battery under-voltage setting is set to HIGH (setting to avoid battery getting over discharged when connected to a car start/crank battery) Under-voltage alarm: 12.1 Vdc Under-voltage alarm recovery: 12.3 Vdc Under-voltage shutdown: 11.8 Vdc Under-voltage shutdown recovery: 12.6 Vdc
Alarm Setting	
AL0	Fault and the warning audible alarm is disabled. The display panel only shows error code and the audible alarm will not sound.
AL1	Audible alarm will sound when fault or warning occurs.
Manufacturing Default	
Fd	Shortcut to reset all the settings to the manufacturing default settings (PS1, SdL, AL1)

Enter the Function Menu for unit setting:

To enter the unit Function Menu, press and hold "***Power***" and "***Select***" buttons together for about 5 seconds until a beep is sounded.

When you are in Function Menu:

- Press the '***Power***' button for 1 second to toggle between different Functions Menu like 'In', 'Sd', 'AL', and 'Fd' etc.
- Press the '***Select***' button for 1 second to enter Individual Function Set Menu and you can make changes to the settings.
- The unit will EXIT the Main Menu automatically if '***Power***' and '***Select***' buttons are not triggered for more than 5 seconds.

When you are in Individual Function Set Menu:

- Press the '***Select***' button for 1 second to toggle between different setting values.
- Press the '***Select***' button for 5 seconds to set selected setting and exit to next Main Menu.

See more details on the flow chart in Appendix I.

6. TROUBLESHOOTING

To troubleshoot the unit, please note the error code displayed on the main unit and review "Understanding the Error Codes" in section 4.

Problem	Possible Cause/Condition	Solution
AC Output turns ON and OFF briefly (pulses)	Power Safe mode ("PS2") enabled and AC load <10W	The load connected should be below the AC load sense threshold of 10+/-2.5W, so power will be pulsed every few sec. for checking the load power.

No AC Output. All the LEDs and the display are off.	The unit is off **Note:** The power button On/Off action takes place at its release moment and after a “beep” is heard	If the unit is set to “PS4”, turn the unit ON by pressing the “Power” button. In all other “PS” settings, the unit should always turn on automatically after the AC-Input power is connected and the initiation routine finished (about 6 sec later)
	No power coming into the unit	Check the battery DC fuse, the Disconnect Switch (if installed), the AC Input Source, and the AC Input Breaker being perhaps tripped or turned OFF
No AC output at the AC GFCI outlet and Port 2 (120V models except SWXFR1230) or at the AC Output outlet (230V model). Status LED is Green or Amber ①	The GFCI on 120V models is tripped	Check load for Ground Fault and reset the GFCI. Make sure the loads do not have the Neutral and Ground bonded as explained in ③
		If no load plugged into the GFCI, there could be humidity inside it. The GFCIs, in general, are very sensitive to humidity. Try drying it with a hairdryer and make sure to use the unit indoors /dry-environ.
	Note: GFCIs contain a lockout feature that will prevent RESET if there is no power being supplied to it. Therefore, make sure to force Bypass mode or do not have either PS0 or PS2 setting when in Battery (Inverter) mode, before resetting	
	The unit thermal breaker tripped	Check AC loads and reset the thermal breaker or breakers
No AC Output. Status LED is red	The unit shut down; check error code shown on display.	Verify the error condition and make correction. See the corresponding error meaning table
During AC Input Power Outage, there is no AC Output power when battery power is available.	The unit is set to “Non-Backup” mode (“PS0”) and AC Input Power is not available.	Change the “PS0” setting to a different setting if you want to turn the inverter ON. With “PS0” setting, the inverter is completely OFF. When the AC Input Power is not available and the “Power” button is press once, the display and LEDs stay working for about 30 sec only. With this setting, the unit will provide AC Output Power only when the AC-Input Power is available.
AC Output only in Hardwired Port 1 (120V model) or Hardwired Port 2 (230V model)	Same as in ①	AC Output Port 1 on 120V models or Port 2 on 230V models is connected directly to the inverter output. This Port is not under the tripping influence of either the GFCI on 120V models (except SWXFR1230) or any thermal breaker on the unit.
The unit cannot be turned off using the power button when in “Bypass” mode	This is normal. The unit has “PS1’ (factory default) setting. Use the procedure on the right to turn the unit Off. **Note**: The power button On/Off action takes place at its release moment and after a “beep” is heard	To turn the unit off while in Bypass (pass-through) mode, first of all, disconnect the AC-Input that feeds the unit to force entering into Battery (Inverter) mode. Then push and hold the power button for 1 sec. (after hearing a beep) to turn the unit off.
		Set unit to PS4, so the Power button can be used to turn the unit Off during Bypass or Inverter mode, without the need of turning Off the shore power first.
“E01” or “E05” alarm in Bypass (pass-through) mode (SWXFR1210 /1220/1210i /1220i only) ②	The alarms indicate the battery voltage is low or the battery is not connected at all. However, the unit continues supplying AC-Output power in spite of those alarms (you may need to wait up to 20 sec. for the Bypass mode to start).	Charge and/or connect the battery bank or disable all the audible alarms with the “AL0” setting. Note: The unit has a small DC power supply to keep its control electronics working even after disconnecting the battery. However, do NOT use the unit without the battery connected; otherwise it can get hot (perhaps triggering the “E12” error,message). This is because the 12Vdc fans of the unit are fed by the battery.

DC voltage is measured at the DC terminals without the battery being connected (SWXFR1210 /1220 /1210i /1220i only)	This is normal. The voltage is supplied by a little built-in power supply with current limiting protection.	If the DC-Input terminals of the unit are connected to a common DC bus being shared by other DC loads, a 12V back feeding to those DC loads can occur when the DC bus is disconnected from the common battery bank. In that case, the corresponding drawing current may trigger the “E01” or “E05” alarms as per the problem ②. In cases where that back feeding is not desirable, consider using a separate battery bank with a disconnect switch. Do NOT use the unit with the battery disconnected to prevent the unit getting hot. The 12Vdc fans of the unit are fed by the battery
No AC Output. All the LEDs and the display are off even in Bypass mode (SWXFR1230 and SWXFR1230i only)	SWXFR1230 requires a battery connected to the DC input terminals to maintaining the unit working properly.	Keep the battery connected to allow the unit working properly. On the other hand and as a consequence of that, there is a power drain of about 700mA from the battery bank when the SWXFR1230 is running in AC Bypass mode. In order to avoid draining down the battery bank in the medium-long term, a battery charger or trickle charger with a minimum of 1A is required to maintain the battery bank voltage.
The thermal breaker trips even when the unit is out of an overload condition	This happens mainly in Bypass mode when the maximum rating of the thermal breaker on the unit is exceeded. In the SWXFR1230 unit, that rating can be exceeded in Battery (Inverter) mode as well.	On 120V models except SWXFR1230: For maximum capacity use the AC Output Port 1 which is out of the tripping influence of the GFCI Outlet and the unit thermal breaker. Otherwise, do not exceed the following current ratings on the receptacles: 15A/ 20A for the SWXFR1210/1220 models respectively. On the SWXFR1230 and 230V models: for maximum capacity use the AC-Output Port 1 which is out of the tripping influence of the unit thermal breaker. Otherwise do not exceed 16A/13A/10A on the AC outlets in the EU/UK/AU models respectively or 20A in the case of SWXFR1230 120V model.
The display doesn’t work as expected, e.g. death or showing steady either “888”, or “rx.x” message (where x = any number), and the operability of the unit may be affected	Some loosed contact or pin-out problems in the RJ12 detachable display panel cable	A short (7”) RJ12 cable is used when the detachable display panel is mounted on the unit (factory default). Alternatively, a long RJ12 cable is provided for installing the display panel up to 25 ft. away. Swap the cable you are using with the other one and check if it makes some difference.
		Check the pin-to-pin conductivity of the cable and the corresponding pin-out as shown in “Appendix II”
	Excessive EMI/RFI interfer-ence (electromagnetic induction or electromagnetic radiation) emitted from an external source	Avoid running the cable very close to motors, power contactors/relays, ballasts, transformers, or high voltage devices. In high noisy environments consider using metal conduits or a shielded cable grounded at one end and/or reduce cable length
The GFCI outlet trips as soon as the load is connected to either Port 2 or into the outlet. (120V models) ③	There is a Neutral to Ground bonding in the load side or in between the shore power (e.g. grid or generator) and the Inverter AC-Output	Locate and remove the Neutral to GND bonding on the load side. If the output of the inverter is connected to an existing distribution panel/box, make sure the Neutral and GND connections inside the panel/box use separate bus bars, being the Neutral one isolated from the chassis ground. Otherwise, consider using the AC-Output port 1

“PS” setting different to PS0, PS1, PS2, or PS4	Undefined value reserved for manufacturing process only. Someone there forgot to change it to the PS1 default	Get into the setting mode and set the “PS” parameter to any of the defined ones, so the unit starts working and the undefined value will never appear anymore.
Heavy spark when connecting the battery power	This is a normal condition that occurs when having the internal DC-Input capacitors (filter) discharged after the battery was disconnected for at least 30-40 sec.	This is due to a sudden high DC surge (inrush) current that charges the internal big capacitors and disappears almost instantly (milliseconds) as soon as the capacitors get charged. Virtually it does not represent any drawing current from the battery.
The battery input under-voltage warning (“E05”) and/or shutdown alarm (“E01”) occurs in advance even when the battery voltage seems to be OK	Make sure you are measuring the voltage directly at the DC-Input terminals of the unit, to include any possible voltage drop from the battery to the unit	Excessive voltage drop in between the battery bank and the inverter, due to the high resistance of the DC wires, battery disconnect switch, fuse, or DC breaker (if any). Make sure to use the recommended wire’s gauge and length. Try using fuses (or DC breakers) with very low voltage drop (e.g. ANL/Class-T type fuses, etc.)
	The battery bank has a high internal resistance, resulting in a voltage drop proportional to the DC current being drawn by the unit.	Too much battery voltage drop due to excessive drawing current in relation to the battery bank capacity. Increase the battery bank capacity (i.e. adding more batteries in parallel) and/or reduce the AC loads being fed by the inverter
		Battery damaged and not able to keep a good state of charge. Replace the battery (or batteries)
	The battery bank is getting discharged.	This is normal. The E05 warning (followed by the E01 shutdown) occurs when the battery bank is getting discharged. Charge the battery bank.
	Make sure to measure the battery voltage just before the “E01” battery under-voltage shutdown occurs in Battery (Inverter) mode. Then, compare it with the corresponding voltage threshold in the specifications table. (allow +/- 5% of tolerance)	Just after the E01 occurs, the battery voltage increases rapidly because the battery is not under load condition because the inverter is already shutdown. This is normal in all the battery banks and can confuse the user thinking the under-voltage shutdown that triggers the E01 alarm occurs in advance at higher voltage thresholds than the ones specified.
	The E05 warning and E01 shutdown alarms occur well in advance due to the “SdH” setting	If you do not use the same battery bank for both the inverter and engine cranking purposes, you would not need to keep enough battery state of charge. If so, make sure to set the under-voltage shutdown threshold to the low and factory default “SdL” setting (other than the “SdH)” for maximum battery operating range.

6. SPECIFICATIONS

Note: The specifications are subject to change without notice.

Specification	120V model			230V model		
	SWXFR 1210 (1000W)	***SWXFR 1220 (2000W)***	***SWXFR 1230 (3000W)***	***SWXFR 1210i Series (1000W)***	***SWXFR 1220i Series (2000W)***	***SWXFR 1230i Series (3000W)***
Inverter						
AC Output Power	1000W	2000W	3000W	1000W	2000W	3000W
AC Output Current	8.3A	16.6A	25.0A	4.3A	8.7A	13A
AC Surge Power (Peak)	2000W	4000W	6000W	2000W	4000W	6000W
AC Output Voltage/Frequency	120VAC / 60 Hz			230 VAC / 50 Hz		
AC Output Waveform	Sinewave (<3% THD)					
Nominal DC Input Voltage	12.5 VDC					
No Load battery draw	< 1.5 ADC					
DC Input Voltage operating range	10.5 – 15.5 VDC					
Under Voltage Alarm	11.0/12.1 VDC					
Under Voltage Alarm Recovery	11.3/12.3 VDC					
Under Voltage Shutdown	10.5/11.8 VDC					
Under Voltage Shutdown Recovery	12.0/12.6 VDC					
Over Voltage Shutdown	15.5 VDC					
Over Voltage Shutdown Recovery	15.3 VDC					
USB						
USB Port	5V, 750 mA					
AC Transfer Switch						
Transfer Time	< 30 ms					
Transfer Relay Rating	30A (resistive load)			16A (resistive load)		
AC Output Port 1 (Hardwired)	30A max	30A max	30A max	Not Applicable		
AC Output Port 2 (Hardwired)	15A max	20A max	NA	16A max		
AC Output Receptacles	15A max	20A max	20A max	16A(EU), 13A(UK), 10A(AU) max		
Display						
Display Panel Port	RJ12 (6 pins)					
Inverter Mode	Input Voltage, Output Power					
Safety and Environmental						
Conformance	UL 458, CSA C22.2 No. 107.2-01			CE LVD: EN/IEC 62040-1& IEC61558-2-16		
EMI / EMC	FCC Part 15 Class B			CE EMC: EN/IEC 62040-2 category C1		
Agency Markings	cETLus			CE		
Operating Temperature	0°C to 40°C (32°F to 104°F)					
Storage Temperature	-20°C to 60°C (-4°F to 140°F)					
Relative Humidity	5-90% noncondensing					
Operating Altitude	Up to 9,843ft (3000m) above sea level					
Weights and Dimensions						
Weights	5 kg	5.9 kg	7.0 kg	5 kg	5.9 kg	7.0 kg
Dimensions (cm)	43.5x23x11.5		54x23x11.5	43.5x23x11.5		54x23x11.5

7. WARRANTY

<u>One Year Limited Warranty</u>:

The limited warranty program is the only one that applies to this unit, and it sets forth all the responsibilities of KISAE Technology. There is no other warranty, other than those described herein. Any implied warranty of merchantability of fitness for a particular purpose on this unit is limited in duration to the duration of this warranty.

This unit is warranted, to the original purchaser only, to be free of defects in materials and workmanship for one year from the date of purchase without additional charge. The warranty does not extend to subsequent purchasers or users.

The manufacturer will not be responsible for any amount of damage in excess of the retail purchase price of the unit under any circumstances. Incidental and consequential damages are specifically excluded from coverage under this warranty.

This unit is not intended for commercial use. This warranty does not apply to damage to units from misuse or incorrect installation/connection. Misuse includes wiring or connecting to improper polarity power sources.

<u>Return/Repair Policy</u>:

If you are experiencing any problems with your unit, please contact our customer service department at <u>info@kisaetechnology.com</u> or Phone 1-877-897-5778 before returning the product to the retail store. After speaking to a customer service representative, if products are deemed non-working or malfunctioning, the product may be returned to the purchasing store within 30 days of original purchase.

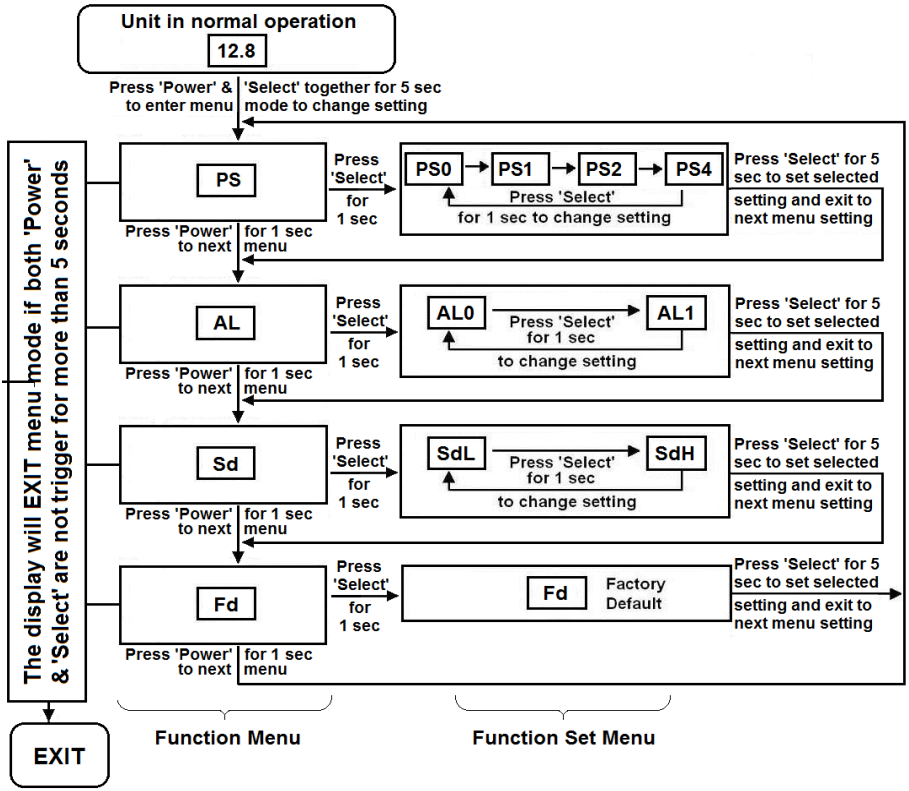
Any defective unit that is returned to the manufacturer within 30 days of the date of purchase will be replaced free of charge.
If such a unit is returned more than 30 days but less than one year from the purchase date, the manufacturer will repair the unit or, at its option, replace it, free of charge. If the unit is repaired, new or reconditioned replacement parts may be used, at manufacturer's option. A unit may be replaced with a new or reconditioned unit of the same or comparable design. The repaired or replaced unit will then be warranted under these terms for the remainder of the warranty period. The customer is responsible for the shipping charges on all returned items.

Limitations:

This warranty does not cover accessories, such as adapters and batteries, damage or defects result from normal wear and tear (including chips, scratches, abrasions, discoloration or fading due to usage or exposure to sunlight), accidents, damage during shipping to our service facility, alterations, unauthorized use or repair, neglect, misuse, abuse, failure to follow instructions for care and maintenance, fire and flood.
For more details, please contact our CS department: info@kisaetechnology.com or 1-877-897-5778

APPENDIX I

Setting Mode Flow:

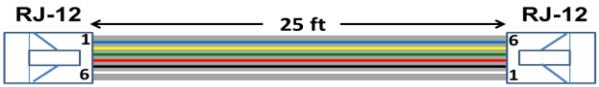


APPENDIX II

Detachable Display Panel Cable:

The display panel can be installed away from the unit, using the included 25' RJ12 cable. You would need to remove the two screws indicated below. Even though the unit can operate with the cable plugged in whatever direction, we suggest plugging the end with the ferrite bead EMI/RFI filter into the main unit.

The RJ12 "rollover" cable have 6 wires with the following pin-out:



RJ-12 (6 wires) Rolled Over cable (also called Rollover)