



Installation Instructions and User Manual For

SYNCHRON

***Inverter
Power
Systems
400 to 2100 VA***



READ AND FOLLOW ALL SAFETY INSTRUCTIONS

IMPORTANT SAFEGUARDS

When using electrical equipment, you should always follow basic safety precautions, including the following:

- 1. Read and follow all safety instructions.*
- 2. Do not install the Synchron system outdoors.*
- 3. Do not install near gas or electric heaters or in other high-temperature locations.*
- 4. Use caution when servicing batteries. Battery acid can cause burns to skin and eyes. If acid is spilled on skin or in the eyes, flush with fresh water and contact a physician immediately.*
- 5. Equipment should be mounted in locations where it will not be readily subjected to tampering by unauthorized personnel.*
- 6. The use of accessory equipment not recommended by the manufacturer may cause an unsafe condition and may void the warranty.*
- 7. Do not use this equipment for other than intended use.*
- 8. All servicing of this equipment must be performed by qualified service personnel.*

SAVE THESE INSTRUCTIONS IMPORTANT SAFETY INSTRUCTIONS

The installation and use of this product must comply with all national, federal, state, municipal, or local codes that apply.

For technical assistance, contact Dual-Life's Systems Technical Support Center at 1-800-848-6439.

Technicians are available during normal working hours (EST).

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Section 100 System Installation Instructions

101. Specifications

Input

- Input voltage: 120 or 277VAC.
- Synchronizing slew rate: 1 Hz per second nominal
- Input surge protection: Meets ANSI 62.41 and UL 924

Output

- Output voltage: 120 or 277VAC
- Output regulation: (static) $\pm 5\%$ based on a 0% - 100% resistive load
- Minimum loading: none required
- Output distortion: Less than 5% THD linear load
- Load power factor: .75 lag to .8 lead
- Output frequency: Normally, synchronized to utility, $\pm .05$ Hz during emergency
- Overload: 115% momentary
- Time to transfer to inverter after a utility power failure: No break

Battery

- Battery charger: Fully automatic and temperature compensated with internal diagnostic indicators
- Recharge time: 60 hours
- Battery protection: Automatic low-battery voltage disconnect.
Automatic restart upon utility return
- Battery switch: Also used as battery isolator
- Standard battery: Sealed lead-calcium: 10-year life
- Battery voltage: 36, 72 or 96VDC (system dependent)
- Runtimes: 90 minutes standard.
- Operating temperature: 20°C to 30°C (68°F to 86°F)
- Relative humidity: 95% non-condensing

Note: Battery performance rated at 25°C (77°F)

Table 1.

Synchron Sizing Chart						
VA/Watts	400	525	750	1000	1500	2100
Power Factor Range	.75 Lag to .8 Lead					
Input/Output Voltage	120/120 or 277/277					
AC Input Circuit Breaker Rating - 120/277VAC	6A/3A	7A/3A	10A/5A	13A/6A	20A/8A	25A/10A
Charger Size	2 Amps					
System DC Voltage	36	36	72	72	72	96
Cabinet Size	22"W x 23"H x 10"D (55.9cm W x 58.4cm H x 25.4cm D)		32"W x 36.5"H x 12"D (81.3cm W x 92.7cm H x 30.5cm D)			
BTU/Hour - Line/Inverter	70/260	92/341	131/382	175/510	263/765	368/886
Weight [lbs. (kg) - including batteries]	143 (65.1)	173 (78.8)	281 (128)	346 (157.6)	400 (182.2)	480 (218.7)

102. Receiving, Moving and Storing Systems and Batteries

102.1 Shipping Damage

Synchron inverter systems and batteries are shipped separately.

Carefully inspect all cartons upon receipt for evidence of shipping damage.

Notify carrier immediately of leaking or damaged cartons for possible concealed damage.

102.2 Moving Units and Batteries

CAUTION: Batteries and Synchron Electronics cabinets are very heavy. Proper equipment should always be used to move batteries and units to avoid damage and personal injury.

WARNINGS:

- ***ALWAYS WEAR PERSONAL EYE PROTECTION WHEN WORKING WITH BATTERIES - SEE PAGE 10***
- ***Batteries contain liquid caustic or acid electrolytes which CAN CAUSE SEVERE BURNS. Care must be taken when moving batteries to avoid tipping and spillage of electrolyte material.***

In case of accidental spill.

FIRST AID:

- ***EYES: Flush immediately with flowing water for at least 15 minutes. Seek medical attention.***
- ***EXTERNAL: Flush immediately with water. Seek medical attention.***

102.3 Temporary Storage of Units and Batteries

For temporary storage of Synchron inverter systems and batteries prior to installation, select a clean, cool, dry location with normal ventilation for human habitation and level floors.

CAUTION: Batteries and Synchron Electronics cabinets are very heavy. Check to assure that the floor in the temporary storage area is capable of safely bearing the load.

IMPORTANT:

Lengthy storage of batteries will cause irreversible damage to the cells.

Failure to connect Synchron inverter system batteries to an energized charging circuit within 90 days from the date of shipment will void the battery warranty.

Storage Temperature:

Store all batteries at 10° to +30° C (50° to +86° F). Batteries will have a longer shelf life if stored at 10° to +30° C (50° to +86° F). The Synchron electronics and battery cabinets may be stored at -20° to +60° C (-4° to +140° F).

Ventilation:

The air around the unit must be clean, dust-free, and free of corrosive chemicals or other contaminants. Do not place the Synchron inverter system or batteries in a sealed room or container.

DANGER: EXPLOSIVE - CAN CAUSE BLINDNESS OR OTHER SEVERE INJURIES.

Every type of battery can produce hydrogen gas, even sealed, maintenance-free batteries. The gas is vented through the vent caps and into the air.

Do not allow smoking, sparks, or flames in battery storage location because hydrogen is concentrated under the vent cap of each cell of the battery. Hydrogen is highly explosive, and is hard to detect because it is colorless, odorless, and lighter than air.

103. Installation Requirements

103.1 Operating Environment

Install the Synchron inverter system in a clean, cool, dry place with normal ventilation for human habitation and level floors.

CAUTION: Batteries and Synchron Electronics cabinets are very heavy. Check to assure that the floor is capable of safely bearing the load.

Operating Temperature:

Synchron inverter Systems are UL Listed for 20° to 30° C (+ 68° to +86° F) operation.

The Synchron Inverter System has a designed operating range of 0° to +40° C (+32° to +104° F) at up to 95% relative humidity. Installation in environments at the temperature extremes of the designed operating range may effect unit performance or reduce service life.

Battery performance and service life is maximized if the operating temperature is maintained at 25° C (77° F) .

Ventilation:

The air around the unit must be clean, dust-free, and free of corrosive chemicals or other contaminants. Do not place the Synchron inverter system or batteries in a sealed room or container.

Batteries:

The temperature should be near 25° C (77° F) for optimum battery performance.

Temperature Effect On Performance:

Batteries will be less efficient at temperatures below 18° C (65° F), and high temperatures will reduce battery life.

Typically, at 35° C (95° F), battery life will be half of what it would be at normal temperature of 25° C (77° F). At 45° C (113° F), battery life will be one-fourth of normal.

WARNING: Every type of battery can produce hydrogen gas, even sealed, maintenance-free batteries. The gas is vented through the vent caps and into the air, mainly when the unit is charging the batteries. The batteries produce the most hydrogen when maximum voltage is present in fully charged batteries. The amount of current that the charger supplies to the batteries (not the battery ampere-hour) determines how much hydrogen is produced.

Do not allow smoking, sparks, or flames in battery storage location because hydrogen is concentrated under the vent cap of each cell of the battery. Hydrogen is highly explosive, and is hard to detect because it is colorless, odorless, and lighter than air.



IMPORTANT:

Lengthy storage of batteries will cause irreversible damage to the cells.

Failure to connect Synchron inverter system batteries to an energized charging circuit within 90 days from the date of shipment will void the battery warranty.

103.2 High Altitude Operation:

The maximum operating temperature drops 1° Celsius per 300 meters (2° F per 1000 feet) above sea level. Maximum elevation is 3000 meters (10,000 feet).

104. Cabinet Mounting

The Synchron 400 and 525 VA models are supplied with two full length brackets for wall mounting; while the 750 VA and up models are designed for floor mounting. These are also supplied with side mount stabilizing brackets to secure the cabinet to the wall.

Dual-Lite supplies the hardware to attach the brackets to the cabinet. Necessary hardware to fasten the cabinet to the wall is to be supplied by the installing contractor. Please refer to the following illustrations.

Fig. 1
400 and 525 VA units - Small cabinet

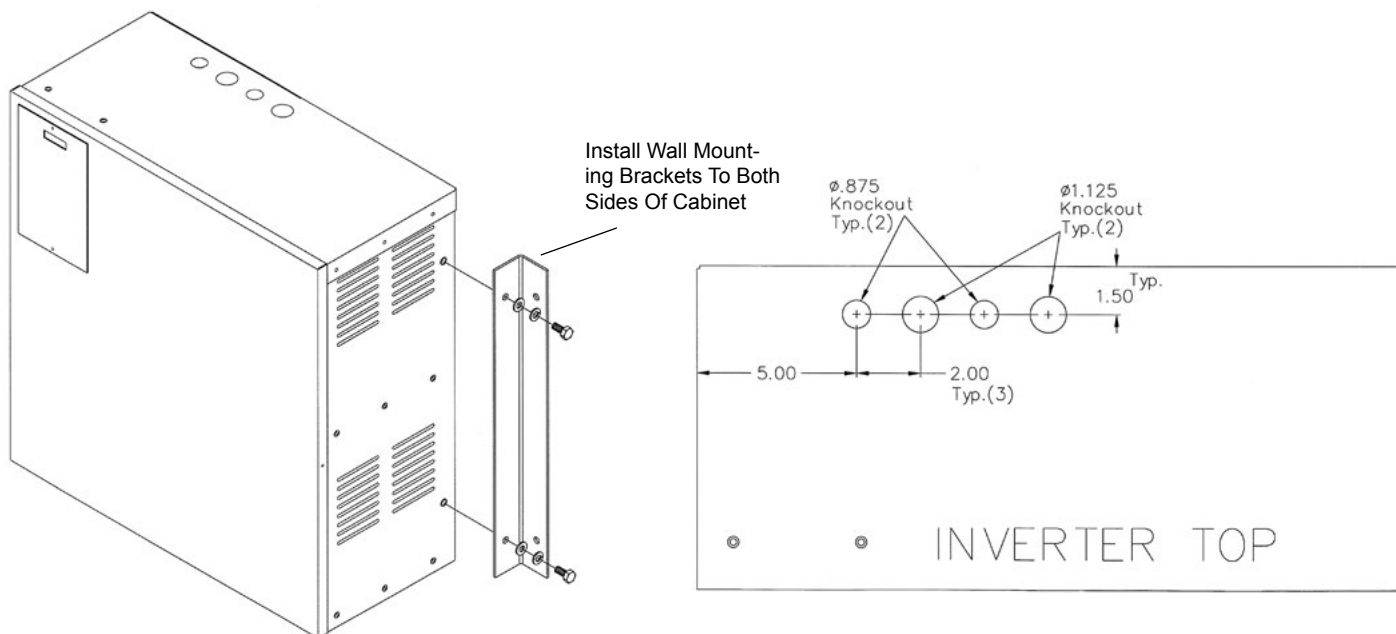
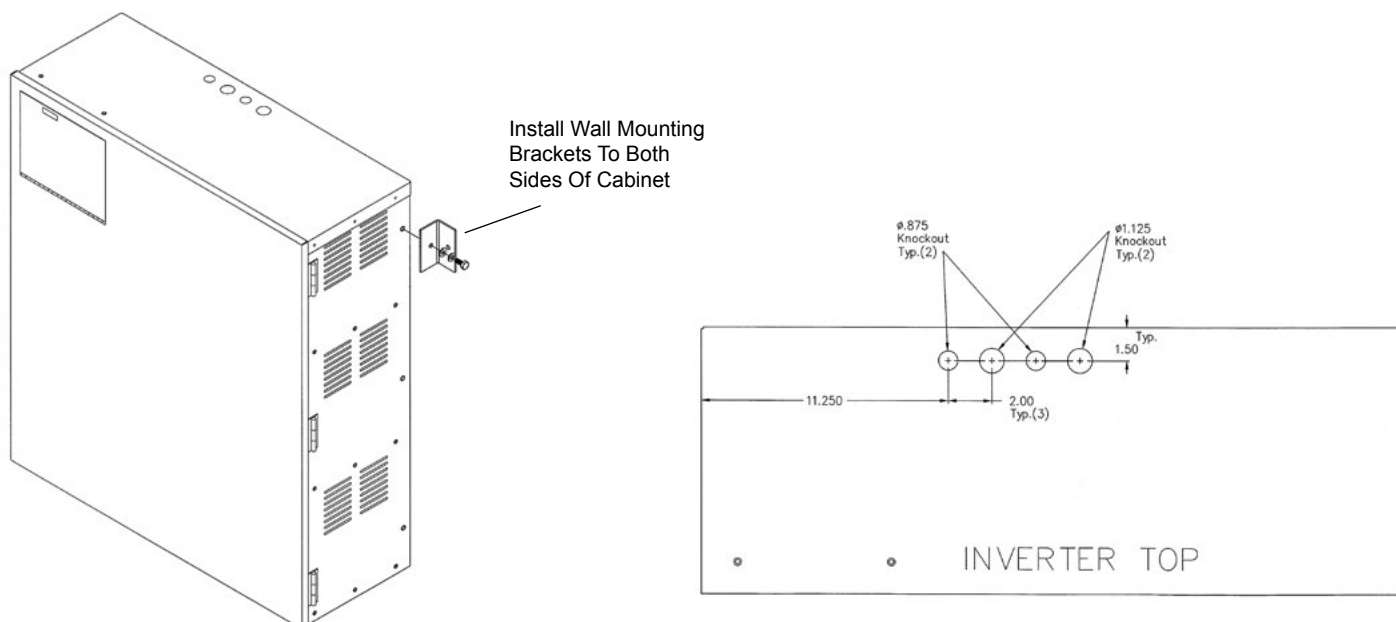


Fig. 2
750 to 2100 VA units - Large cabinet



Once the cabinet is securely fastened to the wall, run and attach conduit using the provided knock outs on the top of the unit. If you need additional entry points, please use a metal punch. Do not drill into the cabinet as metal filings can cause short circuits and damage the equipment.

Be sure to follow all federal, state, and local codes as it pertains to emergency circuit raceways.

105. Battery Installation and Connection

Installing the Batteries and DC Wiring

Important Safety Precautions

The installer must take these precautions:

1. Wear protective clothing, eye-wear, rubber gloves and boots. Batteries contain corrosive acids or caustic alkalis and toxic materials and can rupture or leak if mistreated. Remove rings and metal wristwatches or other metal objects and jewelry. Don't carry metal objects in pockets where the objects can fall onto the batteries or into the Synchron inverter system.
2. Tools must have insulated handles so that they will not short battery terminals. Do not allow a tool to short a battery terminal to another battery terminal or to the cabinet at any time. Do not lay tools or metal parts on top of the batteries, and do not lay any objects where they could fall onto the batteries or into the cabinet.
3. Install the batteries as shown on the battery wiring diagram provided in this manual or with the battery cable kit. When connecting cables, never allow a cable to short across a battery's terminals, the string of batteries, or to the cabinet.
4. Align the cables on the battery terminals so that the cable lug will not contact any part of the cabinet even if the battery is moved. Keep the cable away from any sharp metal edges.
5. Install the battery cables so they cannot be pinched by the Synchron inverter system cover/door.
6. Where conductors may be exposed to physical damage, protect conductors in accordance with NEC requirements.
7. Full voltage and current are always present at the battery terminals. The batteries used in this system can produce dangerous voltages, extremely high currents, and possible risk of electric shock. Batteries may cause severe injury if the terminals are shorted together or to ground (earth). Be extremely careful to avoid electric shock and burns caused by contacting battery terminals or shorting terminals during battery installation. Do not touch uninsulated battery terminals.
8. A qualified electrician who is familiar with battery systems and required precautions must install and service the batteries. Any battery used with this unit shall comply with the applicable requirements for batteries in the standard for emergency lighting and power equipment, UL 924. Cabinets are designed to be used with, and batteries must be replaced by identical cells or a Dual-Lite approved equivalent. If using substitute batteries not supplied by Dual-Lite, the unit's UL listing will be void, and the equipment may fail to perform properly. The installation must conform to national and local codes as well. Keep unauthorized personnel away from batteries.

105.1 Tools

The following tools are required to install the system batteries. Other tools may be necessary if optional batteries have been ordered.

CAUTION: Always use insulated tools for battery installation. Always torque to the manufacturer's recommendations.

- Socket Set
- Slotted Screwdriver
- Electrical Tape
- Safety Glasses with Side Shields
- Safety Equipment Required by Local Codes
- Torque Wrench Calibrated in Inch-pounds or Newton-meters
- Digital Volt-Ohm Meter

105.2 Installation Considerations

This section explains how to install the Synchron system's batteries, fuses, and cables. A qualified electrician who is familiar with battery installations and applicable building and electrical codes should install the batteries.

105.3 Battery Installation Procedure

Battery Voltage: Select which wiring diagram to use from this table:

VA/Watts	400	525	750	1000	1500	2100
System DC Voltage	36	36	72	72	72	96
Battery P/N	0120935	0120936	0120937	0120935	93012368	93012368
Number of Batteries	3	3	6	6	6	8
Battery Fuse Rating (Amps)	60	60	60	60	60	60
Wiring Diagram Fig.	1	1	2	2	2	3

IMPORTANT: Be careful to observe correct polarity on the battery terminals. Illustrations are given as a guide only, polarity markings may vary from battery to battery.

Figure 1

**36 Volt Battery Connection Diagram
400 and 525 VA Model**

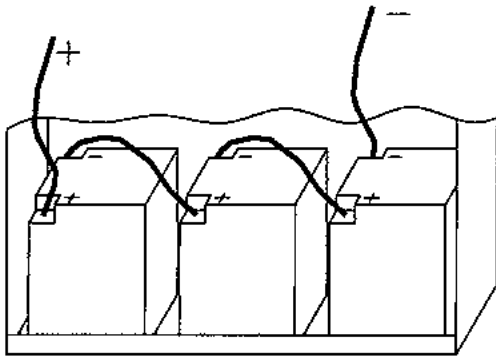


Figure 2

**72 Volt Battery Connection Diagram
750, 1000 and 1500 VA Model**

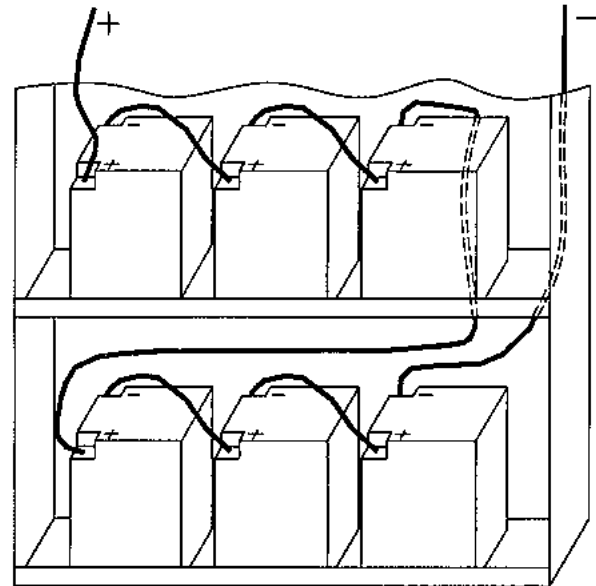
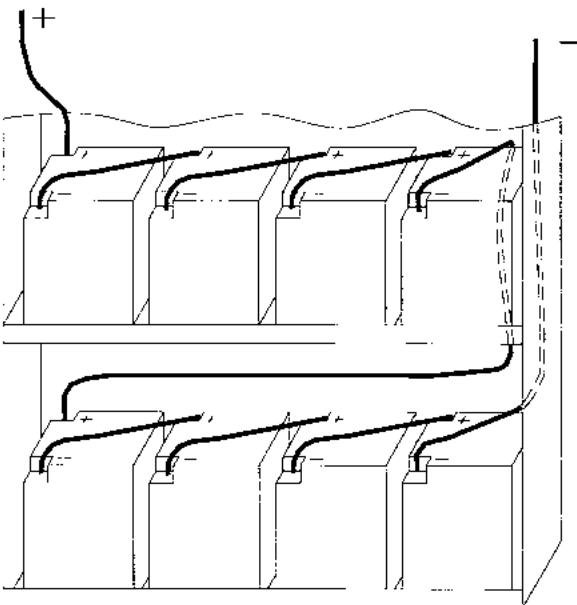


Figure 3

**96 Volt Battery Connection Diagram
2100 VA Model**



IMPORTANT

Once batteries have been wired as shown, the system's DC fuse must be installed.

MAKE SURE THE DC BREAKER IS IN THE OFF POSITION BEFORE PROCEEDING.

The DC fuse is shipped separately inside the cabinet and needs to be installed in its fuse block holder located on the underside of the electronics shelf. **Use insulated tools to perform this task, full battery voltage will be present at the fuse block.**

DO NOT TURN ON THE DC BREAKER AT THIS TIME AS SIGNIFICANT DAMAGE TO THE SYSTEM WILL OCCUR.

See Section 108 for proper system start-up procedure.

105.4 Electronics Cabinet Voltage Check

Using a digital volt-ohm meter, check for correct nominal battery voltage between electronics cabinet DC Input NEG and POS wires. Refer to table in section 105.3 for proper system DC voltage. Voltage reading should be $\pm 10\%$ of system DC voltage.

Caution: *Torque all connections in accordance with the following tables. Failure to do so may create an unsafe condition or fire hazard.*

Battery Terminal Torque Specifications
Lead-Calcium Batteries

Manufacturer's Part Number	Dual-Lite Part Number	Torque
GP12260	0120937	2.2 ft.-lbs.
GP12340	0120935	6.0 ft.-lbs.
GP12400	0120936	2.2 ft.-lbs.
-	93012368	2.5 ft.-lbs.

Battery Fuse Block
275 inch-lbs.

Battery Fuse
120 inch-lbs.

106. AC Connections

CAUTION

- All Synchron inverter system units contain hazardous AC and DC voltages. Because of these voltages, a qualified electrician must install the Synchron inverter system, AC line service, and batteries. The electrician must install the AC line service according to local, state and NEC codes and must be familiar with batteries and battery installation.
- Before installing, maintaining, or servicing the unit, always remove or shut off all sources of AC and DC power and shut off the Synchron inverter system. Disconnect AC line input at the service panel and turn off the Main DC Switch and the Main AC Switch to make sure the unit will not supply output voltage.
- Whenever AC and/or DC voltage is applied, there will be AC voltage inside the Synchron inverter system unit; the unit can supply power from AC line or from its batteries. To avoid equipment damage or personal injury, always assume that there may be voltage inside the Synchron inverter system.
- Remove rings, watches, and other jewelry before installing the AC wiring. Always wear protective clothing and eye protection and use insulated tools when working near batteries. Whenever servicing an energized unit with the inside panel open, electric shock is possible; follow all local safety codes. TEST BEFORE TOUCHING!
- To reduce the risk of fire or electric shock, install the Synchron inverter system and the batteries in a temperature-controlled and humidity-controlled indoor area free of conductive contaminants. See Section 103 for operating environment specifications.

106.1 AC Wiring Preparations

- Open or remove the system's front cover/door. Make sure all breakers are in the off position.
- Make sure the Synchron inverter system input and output voltages are correct for the particular application. Remember that the Synchron system provides single-phase power only.
- The input circuit breaker in the input service panel provides the means for disconnecting AC to the Synchron inverter system. Only authorized persons shall be able to disconnect AC to the unit. (See NEC 700-20 and 700-21.)

CAUTION : To prevent electrical shock or equipment damage, for all units, the Main AC Switch, the Main DC Switch, all output circuit breakers, and the AC input at the service panel are all off before making AC connections to the Synchron inverter system.

4. If not previously done, remove knockouts for AC Input and AC Output in the top of the Synchron inverter system (See Figure 1 in Section 104.1).

CAUTION: Do not drill the cabinet; drill filings may damage the unit and prevent it from operating. If larger knockouts are needed, use a chassis punch to enlarge the appropriate knockout. Do not add additional or unnecessary knockouts.

5. Install the input and output conduits.
6. Run the AC Input service conductors and AC Output conductors through separate conduits. Synchron inverter system emergency output circuits shall be installed in dedicated conduit systems and not shared with other electrical circuits as described in NEC 700-9(b).

106.2 AC Input and AC Output Connections

Make all AC input and output connections to the Synchron inverter system as indicated on the labels within the cabinet. If system was supplied with internal output circuit breaker distribution option, make output wiring connections directly to the circuit breakers.

Caution: Torque all connections in accordance with the following tables. Failure to do so may create an unsafe condition or fire hazard.

Terminals

Terminal Width		Torque
Inches	mm	inch-lbs.
31/64	12.2	16
19/32	15.2	32
25/32	20	64

"C" Breakers

Rating	Torque
amps	inch-lbs.
10-30	25

107. Final Installation Checklist

Important: Before proceeding to the System Start-Up Procedure (Section 108) complete the Final Installation Checklist below.

1. Insure the Synchron Inverter cabinet is securely fastened to a wall or other structure.
2. Insure that the input circuit breaker in the building service panel serving as the AC disconnect to the Synchron system is in the OFF position.
3. Check for proper ground connections in the Synchron Inverter cabinet, the building service panel, and the external load distribution panel.
4. Check for any loose wiring connections in the Synchron Inverter cabinet, the building service panel, and the external load distribution panel.
5. Check that correct nominal battery voltage (36, 72 or 96VDC) is present in the Synchron Inverter cabinet between the DC Input NEG and POS. Refer to Section 105.2 for proper system DC voltage.
6. On the Synchron Inverter insure that the Pre-charge Switch, the Main DC Switch, and the Main AC Switch are all in the OFF position.

108. System Start-Up Procedure

IMPORTANT: *The Synchron inverter system is a sophisticated electronic backup power supply. Care must be taken to follow the steps below in their exact sequence. Failure to do so will result in erroneous alarm messages and possible equipment failure.*

CAUTION: *Familiarize yourself with the shut down procedure in section 300.1 before proceeding with the Start Up.*

1. Make sure the front cover/door is installed and secured shut.
2. Turn on the input circuit breaker in the building service panel serving as the AC disconnect to the Synchron system.
3. Open the front access panel so that the input/output circuit breakers within the Synchron unit are accessible.
4. Turn on all output circuit breakers located within the Synchron system, and/or in the external Load Distribution Panel (if any).
5. Hold the Pre-charge Switch in the "ON" position for 30 seconds.
6. Release the Pre-charge Switch and immediately turn ON the Main DC Switch.
7. Turn on the Main AC switch.
8. After approximately five seconds, the system should turn on, the lighting loads should be energized, the front panel green "AC-ON" and "LOAD" LEDs should illuminate.

109. System Verification

At this point, the connected load should be energized, the "Load" and "AC On" LEDs should be lit. Depending on the state of charge of the batteries the inverter may or may not come on when the test switch is depressed. Allow a 24 hour charge period before testing the inverter system. If you need assistance, call Dual-Lite's Technical Support Center at 800-848-6439.

To simulate a power failure, simply press the test switch for a momentary test, or by opening the AC input circuit breaker for a prolonged test. The inverter and the cooling fans (if any) will begin operating, the "AC On" LED will go off and the "Load" LED will remain lit. All connected loads should be energized and operational, HID fixtures should not "wink-out".

Allow the inverter to run for several minutes or until satisfied with its operation. Close the AC input breaker to end the test and return the unit to standby mode.

Note: *It will take a few seconds for the unit to re-synchronize with the input line. The inverter will turn off when synchronization is achieved.*

200. STATUS INDICATORS

The Synchron system is equipped with 3 LED indicators, and an audible alarm, showing the operating mode of the inverter, and also to alert you of any possible abnormal conditions. Depending on which of the LEDs are On, Off, or Blinking, will indicate a very specific condition. The following table is used to illustrate as to what these conditions may be:



Audible Alarm	AC Input/ Charging	Load On	Alarm	Symptom	Mode	Explanation
O	I	I	O	Normal Mode	LINE	NORMAL
O	O	X	O	Inverter ON	INV	Load current < 5%
I	O	O	I	System Shutdown	OFF	Shutdown - overload, heatsink overtemp, or battery failure possible
X	O	X	X	Inverter On - System Malfunction	INV	Load current < 5% and either probe failure or output breaker tripped
O	O	I	O	Inverter On	INV	NORMAL
X	O	I	X	Inverter On - System Malfunction	INV	Probe failure or output breaker tripped
O	I	O	O	Line - No Load	LINE	Load current < 5%
I	I	O	I	System Shutdown	OFF	Shutdown - overload, heatsink overtemp, or severely discharged batteries
X	I	O	X	Line - System Malfunction	LINE	Load current < 5% and either charger or probe failure, output breaker tripped, or low battery voltage
X	I	I	X	Line - System Malfunction	LINE	Charger or probe failure, output breaker tripped, or low battery voltage
O	O	O	O	Off, no output	OFF	LVD or OFF

I = Active, X = Flashing, O = Off

Once an abnormal condition has been detected, please contact your local Factory Authorized service center, or call 800-848-6439 for assistance. Do not attempt to make any repairs yourself, the system is fed from more than one power source and extreme care must be taken before servicing

300. Maintenance

300.1 Safe Shut Down Procedure

CAUTION

To avoid possible equipment damage or personal injury, assume that there is AC voltage present inside the Synchron inverter system unit any time AC input power or DC battery voltage is applied. The inverter is capable of providing output voltage from the batteries even when there is no AC input line voltage. When AC input voltage is present, the unit can provide output voltage even when the batteries are disconnected.

AC AND DC VOLTAGES WILL BE PRESENT INSIDE THE UNIT UNTIL LINE AC IS DISCONNECTED AND ALL INTERNAL SWITCHES ARE TURNED OFF.

Do not touch components inside the unit. DC voltage is always present at the batteries and battery cables.

B. Final Shut Down Procedure

1. Open the unit's front access panel.
2. Turn off the Main DC Switch, the Main AC Switch and any Output Circuit Breakers.

CAUTION: HAZARDOUS ENERGY IS STORED IN CAPACITORS INSIDE THE SYNCHRON UNIT. AFTER TURNING OFF SWITCHES, ALLOW 5 MINUTES FOR CAPACITORS TO DISCHARGE BEFORE ATTEMPTING ANY SERVICE PROCEDURES.

3. If the service technician does not need to access the inside of the unit, keep the unit's front cover/door closed.
4. If the unit will be shut off for an extended period of time, recharge the batteries every 60 to 90 days.

CAUTION: The batteries will be damaged and the warranty voided if not routinely recharged.

NOTE: To turn power back on, follow the "System Start-up Procedure" outlined in Section 109. Be sure to complete all of the steps to assure the unit will operate properly.

300.2 Routine System Maintenance

The Synchron inverter system unit is designed to provide years of trouble-free operation. Its self-monitoring features and manually-initiated diagnostic cycles are designed to ensure proper operation of the unit's batteries and inverter.

The unit does require some routine attention to assure peak performance. Dual-Lite recommends a Preventative Maintenance check be performed by a qualified service technician at least every six months. The technician must observe important safety precautions while performing the following recommended tasks:

- **Inspect and clean the unit interiors**
- **Inspect all batteries for leaks, case swelling or terminal corrosion**
- **Check the AC and DC meter functions and recalibrate if necessary**
- **Perform an emergency operation test to check operation of all critical connected loads;**

300.3 Manual Routine Inverter Tests

NFPA101 requires that Emergency Lighting Equipment be tested on a monthly basis for a period of at least 5 seconds, and a minimum of 90 minutes once a year. We strongly recommend these guidelines be followed to insure system readiness, and to prolong battery life. The Synchron system was designed with a front panel test switch to facilitate monthly testing. Simply depress the button and hold to test the inverter at anytime. Once released, the Synchron will revert back to standby operation; this may take a few seconds to allow the unit to synchronize back to the line. For annual 90-minute discharge or other prolonged tests, simply turn off the AC Input breaker.

300.4 Battery Maintenance and Replacement

This section provides precautions for qualified service personnel working with unit batteries.

Important Safety Precautions

The service technician must take these precautions:

1. **Wear protective clothing, eye-wear, rubber gloves and boots. Batteries contain corrosive acids or caustic alkalis and toxic materials and can rupture or leak if mistreated. Remove rings and metal wristwatches or other metal objects and jewelry. Don't carry metal objects in pockets where the objects can fall onto the batteries or into the Synchron inverter system or battery cabinet.**
2. **Tools must have insulated handles so that they will not short battery terminals. Do not allow a tool to short a battery terminal to another battery terminal or to the cabinet at any time. Do not lay tools or metal parts on top of the batteries, and do not lay any objects where they could fall onto the batteries or into the cabinet.**
3. **Install the batteries as shown on the battery wiring diagram provided in this manual or with the battery cable kit. When connecting cables, never allow a cable to short across a battery's terminals, the string of batteries, or to the cabinet.**
4. **Align the cables on the battery terminals so that the cable lug will not contact any part of the cabinet even if the battery is moved. Keep the cable away from any sharp metal edges.**
5. **Install the battery cables so they cannot be pinched by the battery cabinet or the Synchron inverter system cover/doors.**
6. **External battery cabinet chassis ground (or earth) must be connected to the Synchron inverter system unit's chassis ground (or earth). The ground conductor must be insulated. If you use conduit, this ground conductor must be routed in the same conduit as the battery conductors.**
7. **Where conductors may be exposed to physical damage, protect conductors in accordance with NEC requirements.**
8. **If replacing batteries or repairing battery connections, follow the procedure in this manual to shut down the Synchron inverter system and remove both AC and DC input power.**
9. **Full voltage and current are always present at the battery terminals. The batteries used in this system can produce dangerous voltages, extremely high currents, and possible risk of electric shock. Batteries may cause severe injury if the terminals are shorted together or to ground (earth). Be extremely careful to avoid electric shock and burns caused by contacting battery terminals or shorting terminals during battery installation. Do not touch uninsulated battery terminals.**
10. **A qualified electrician who is familiar with battery systems and required precautions must install and service the batteries. Any battery used with this unit shall comply with the applicable requirements for batteries in the standard for emergency lighting and power equipment, UL 924. Cabinets are designed to be used with, and batteries must be replaced by identical cells or a Dual-Lite approved equivalent. If using substitute batteries not supplied by Dual-Lite, the unit's UL listing will be void, and the equipment may fail to perform properly. The installation must conform to national and local codes as well. Keep unauthorized personnel away from batteries**

CAUTION:

A battery can present a risk of electrical shock and high short circuit current. Battery replacement should only be performed by qualified service personnel familiar with battery systems. All safety precautions outlined at the beginning of this section must be observed when servicing, maintaining or replacing batteries

Routine Battery Inspection and Maintenance

Sealed Lead-Calcium Batteries

Lead-Calcium cells are the most common type of battery used today in standby equipment. By design it is as maintenance free as a battery can be. Coupled with the diagnostic and self-testing capabilities of the Synchron system, these batteries provide one of the most reliable and carefree inverter systems available today. It is recommended, however, that some simple steps be taken to increase system life and maximize reliability:

- If system is installed in a remote area where the system's alarms may not be heard, it is recommended that the system be checked weekly for alarm conditions,
- A quarterly visual check of the batteries should be conducted to look for deformities in the cases and terminal corrosion. Any defective batteries should be replaced. All corroded terminals, regardless how slight, are to be cleaned and retightened at once to prevent failure of the entire battery bank.
- Once a year, all battery connections should be checked for tightness and re-torqued if necessary. Torque specifications can be found on the battery label, or in this manual.

Battery Replacement Procedure

WARNING: Always use the same quantity and type of battery as replacements.

Substituting batteries not supplied by Dual-Lite will void the UL listing of the system and may cause equipment failure. To ensure the superior performance of your Synchron inverter system and to maintain proper charger operation, replace spent batteries only with Dual-Lite cells having the same part number, voltage and ampere-hour rating as the original batteries.

1. Follow the proper shut down procedure as described in Section 300.1.
2. Remove battery cabinet fuses and test them for continuity. Faulty fuses will prevent batteries from charging and render the battery bank useless during a power outage.
3. Break down the battery bank beginning with the intercell connectors. These cables tie the batteries installed on the same shelf together.
4. Next remove the inter-tier cables. These cables connect the batteries located on different shelves together.
5. Remove the batteries from the cabinet. Batteries can be very heavy, use proper lifting methods when removing battery.
6. Install new batteries following the instructions outlined in Section 105.3.

Battery Disposal

WARNINGS:

Do not dispose of batteries in a fire, the batteries could explode.

Do not open or mutilate batteries.

Released electrolyte is highly toxic and harmful to the skin and eyes.

CAUTION:

Batteries contain lead. Many state and local governments have regulations about used battery disposal. Please dispose of the batteries properly. For help, contact the Dual-Lite Technical Support Center.

301. Warranty Information

For up-to-date warranty information, please visit <http://www.hubbelllighting.com/resources/warranty/>.

IMPORTANT:

Lengthy storage of batteries will cause irreversible damage to the cells.

Failure to connect Synchron inverter system batteries to an energized charging circuit within 90 days from the date of shipment will void the battery warranty.

302. Technical Service and Support

During or after installation, Dual-Lite's Systems Technical Support Center is available to provide expert assistance. Our service representatives are available to answer customers' questions or solve their problems.

Toll-Free Number

A toll-free phone has been set up for Synchron technical assistance. The number is: **1-800-848-6439**.

Service representatives are available during normal working hours (EST).

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