



## **G VX BATTERY CABINET**

**Installation documents**

**for**

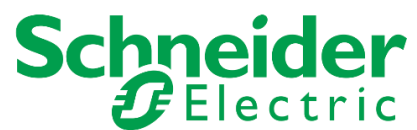
**Electrical integration**

**Battery installation**

**Shipping and onsite installation**

Termaco TCR-CS-410RB-S02 CABINETS

Schneider G VX CBC CABINETS



I.D. V5.0 31/05/2016

## TABLE OF CONTENT

1. INTRODUCTION.....	3
2. PRECAUTIONS .....	3
3. INSPECTION UPON RECEIPT OF GOODS.....	4
4. SYSTEM OVERVIEW .....	5
5. GENERAL SYSTEM SPECIFICATIONS .....	5
6. INSTALLATION PROCEDURES .....	7
7. ELECTRICAL COMPONENTS INSTALLATION.....	8
8. BATTERY INSTALLATION.....	17
9. TEST AND INSPECTION INSTRUCTIONS.....	23
10. ON SITE INSTALLATION.....	26
11. SYSTEM MAINTENANCE.....	28



## 1. INTRODUCTION

TERMACO TCR Battery Cabinets are shipped partially assembled and internally pre-wired. They come standard with a circuit breaker. Each cabinet is designed to accommodate various battery sizes and configurations.

These systems are Hi-Pot tested to UL 1778 standards prior to shipment. All system settings are also adjusted to the specification sheet attached to the unit or per customer requirements.

The following guide will offer electrical integration instructions, shipping instructions and onsite instructions.

This document provides instructions regarding safety and installation of all the electrical components (batteries, breaker, PCB and wiring). Failure to observe the precautions as presented may result in major damage or serious injury.

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 **Make sure to follow attentively those instructions**


## 2. PRECAUTIONS

This document contains instructions and warnings that must be followed during the installation of the components inside the battery cabinet.


### **READ AND OBSERVE ALL INSTRUCTIONS AND SAFETY PRECAUTIONS**

All electrical and grounding connections should be done in accordance with the NEC or the local electric code. Failure to comply may invalidate the warranty, cause property damage and/or personal injury.

 **Battery cabinet are very heavy. Be extremely careful when moving or lifting the unit. Use qualified personnel equipped with adequate equipment when unloading and setting cabinet in place.**

 **Installation of batteries should be performed or supervised by qualified personnel knowledgeable about batteries and all the required precautions taken.**

 **CAUTION: Avoid any sparks or flames near batteries to prevent an explosion.**

 **CAUTION: Do not open or damage batteries. Damaged batteries should be discarded.**

 **CAUTION: Batteries are to be disposed according to federal and local regulation.**



**CAUTION: A battery system can present a risk of electrical shock or severe burning if a short circuit occurs. The following precautions should be observed when working on batteries:**

- **Remove watches, rings, or other metal objects.**
- **Delineate an appropriate workspace free of any objects that could interfere.**
- **Disconnect charging source prior to connecting or disconnecting battery terminals.**
- **Use tools with insulated handles.**
- **Wear rubber gloves and boots in addition to using a rubber mat.**
- **Do not lay tools or metal parts on top of batteries.**
- **Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance (applicable to equipment and remote batteries supplies not having a grounded supply circuit).**
- **See page 28 for lockout system**

### **3. INSPECTION UPON RECEIPT OF GOODS**

#### **3.1. GENERAL**

3.1.1. Precautions and care have been taken to ensure the system arrives safely and undamaged.

Upon receipt, inspect the entire shipment, including the crate and any boxes for evidence of damage that may have occurred during transit. Compare identification plate to receipt and validate the model number and serial of the product.

#### **3.2. VISIBLE DAMAGE**

3.2.1. It is the responsibility of the person receiving the shipment to inventory and fully inspect all materials while the carrier representative is present. Insure that all items are accounted for, including number of skids and quantity of boxes. Also note any visible external damage that may have occurred during transit on the delivery receipt before signing. File a damage report with the carrier if needed.

## 4. SYSTEM OVERVIEW

4.1.1. The enclosed cabinet systems provide the necessary DC backup power required in UPS applications. Over-current breaker protection is supplied. Both DC connections and AC are front or top accessible and made via terminal blocks and/or mechanical lugs. Refer to the picture, drawings or schematic along these instructions for these connections.

4.1.2. If power would fail, the batteries will discharge in order to provide the necessary backup power. It is the responsibility of the battery installer to make sure the batteries are not discharged below manufacturer's recommendations.

4.1.3. Always recharge batteries as soon as possible. Batteries will be damaged if not recharged right away.

## 5. GENERAL SYSTEM SPECIFICATIONS

### 5.1. COMPONENTS MATRIX FOR A GVX TYPE

5.1.1. The data contained in the table below are typical components that should be provided in the TCR battery cabinet depending on the configuration ordered. Please refer to the part number on the nameplate on the document holder inside the cabinet to see if all the components were provided within the empty battery cabinets.

**Table 1 : Components for the cabinet**

GVX Cabinet	400A	600A
Battery Qty	40	40
Battery Type	EnerSys or C&D	EnerSys or C&D
Circuit Breaker, BB1	400A	600A
UVR pcb	1	1
Fuseholders F1, F2,	2	2
Fuses, F1, F2	2	2
Temperature sensor	1	1



**CAUTION! FIRE HAZARD WARNING :**

**Replace only with same type and rating of fuses supplied with the systems.**

## 5.2. DC OUTPUT CHARACTERISTICS

- **Voltage** : 480 VDC Nominal
- **Breaker** : SQUARE D, Powerpact L-Frame (400A and 600A)
- **Auxiliaries**: One 24Vdc UVR and one 2=1A/1B aux contact shall be wired per schematic diagram.
- **Wire size and Type**: Per NEC and most of local electrical codes.

## 5.3. BATTERIES

- **Type**: Valve Regulated Lead Acid (VRLA), sealed, non-spillable.
- **Voltage**: 12 volts DC nominal.
- **Only cabinets with batteries having FLAME RETARDANT (V-2, V-1 or V-0) case**



**CAUTION! EXPLOSION / FIRE HAZARD WARNING :**

**Batteries can generate potentially explosive gas (Hydrogen). Never enclose batteries or battery cabinets in a sealed, airtight room.**

## 6. INSTALLATION PROCEDURES

### 6.1. EQUIPMENT INSPECTIONS

- 6.1.1. Remove the packaging material from the cabinet and inspect for any hidden shipping damage that may have been overlooked upon receipt of goods. Use the packing list and part list (BOM) to verify the system has all components and cables for installation.
- 6.1.2. While inspecting wires, clean lugs with nylon abrasive cleaning pad

### 6.2. NECESSARY EQUIPMENT AND TOOLS

- Rigging tools for moving cabinets. Narrow pallet jack and forklift of 5500 lbs capacity.
- Assortment of hand tools.

### 6.3. SAFETY PRECAUTIONS

#### **BEFORE PROCEEDING WITH INSTALLATION READ THE FOLLOWING:**



#### **DC VOLTAGE WARNING!**

Hazardous DC voltages are present in the battery cabinet. This hazard will always be present, even when the battery system is off-line. Accidental short circuit of the positive and negative terminals will cause tremendous currents to flow resulting in severe burns, fire and possibly death. **USE EXTREME CAUTION!**



All disconnecting means should be in the open/off position before servicing.



All installation drawings and schematics should be reviewed and clearly understood before hooking up this system.



Only qualified DC power technicians or electricians should attempt to work on and install this equipment.



All jewelry and watches are to be removed when working on this equipment.



All tool handles and shafts must be properly insulated.



Do not rest any tools or loose cables on top of batteries.



Torque and secure all connections properly.



Do not smoke or present flames near or around any battery system.



Always wear safety glasses and gloves and use insulating mats to stand on when working on this system.



Do not allow bare skin to come into contact with battery cabinet, as this could result in an electrical shock.



Do not install any cable termination until it has been verified that such a termination will not create a short circuit.



## 7. ÉLECTRICAL COMPONENTS INSTALLATION

### 7.1. PREPARING FOR THE COMPONENT INSTALLATION

7.1.1. Install the cabinet on a PAL076 pallet and use provided lag screw to fix cabinet in place.

7.1.2. Inspect the cabinet to see any unexpected damage.



Figure 1 : Assembled cabinet

7.1.3. Open the right door. The key should be attached inside the right door of the battery cabinet.


7.1.4. Unscrew the left door and the dead front panels.



Figure 2 : Removal of dead front

7.1.5. Remove all covers to gain better access to the area

- Remove the front part of the top cover; be careful the rear part is fixed to the cabinet frame.
- Remove the side panels to have a full access to the battery area.

 **Both side and back panels are grounded with a green wire. Disconnect the green wire that is attached to the frame to remove the panel.**



**Figure 3 : Removal of side and back panels**

7.1.6. Remove the 4 battery retainers that are bolted to the frame.



**Figure 4 : Battery retainers**

7.1.7. Place *Santoprene* strips (black rubber strips) provided with the battery cabinets on the battery supports.

7.1.8. Install rubber edge protection on all the cable cut-outs edges.



Figure 5 : Placement of Santoprene strip

7.1.9. Install the provided circuit breaker on the breaker plate ensuring that the trip settings are to the right.

7.1.10. Make sure the breaker is in the off position.



Figure 6 : Circuit breaker with trip settings to the right

7.1.11. Mount the fuses block on the DIN rail and the PCB on the left bracket using small standoff insulators (6x).



**Figure 7 : PCB mount**

7.1.12. Connect the PCB to the breaker using the provided harness following the diagram of figure 9



**Figure 8 : PCB connection**

7.1.13. Connect circuit breaker to bus bars following the diagram in figure 9. Use provided ferules for connection in breaker. The load side is to be situated on the right side of the circuit breaker.

7.1.14. Note that the bus bars will be connected to the right side of the circuit breaker. All the cables needed for the installation come with the cabinet in specified boxes. Take only the needed cables and ship the rest of the wires in the same box for traceability purposes. All cables are identified by a label mentioning the connections points.

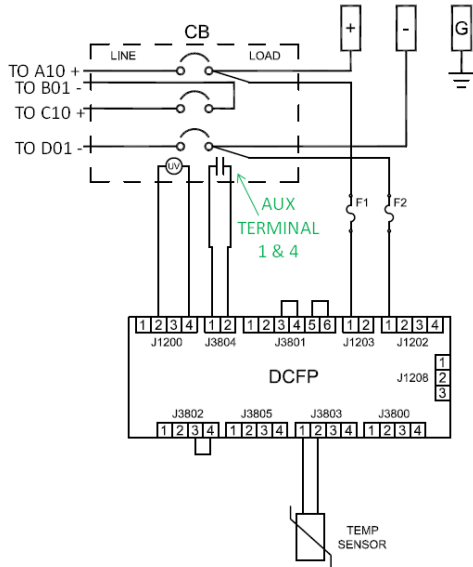


Figure 9 : Circuit breaker and pcb diagram



Figure 10 : Bus bar connections

7.1.15. Connect thermal sensor to the PCB, pass the probe through the cut-out under the PCB and place the probe in the push mounts directly under the top shelf. The probe head should exceed 4 inches of the last push mount as seen in figure 12 : thermal sensor location.



Figure 11 : Thermal sensor connection



Figure 12 : Thermal sensor location

7.1.16. Adjust the breaker trip to the specified value in table 2.

Table 2 : Circuit breaker trip settings

CB Ratings	Im
250A	850
400A	2000
600A	3000

7.1.17. Torque all the bolts to the breakers and bus bars to their specified values on the equipment.  
If torque isn't specified refer to the manufacturer components specification.

7.1.18. Install provided *Lexan* cover over the bus bars.



Figure 13 : Lexan Cover

7.1.19. Reinstall and secured the 4 battery retainer that were removed at step 7.1.6

## 7.2. LABEL PLACEMENT

7.2.1. Apply all the labels to their described location. Labels are supplied with the cabinets.

7.2.2. There are 9 “risk of electric shock labels”. These labels are on all removable panels represented in the following figures.

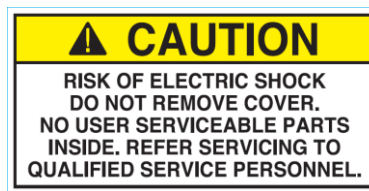


Figure 14 : Risk of electric shock label

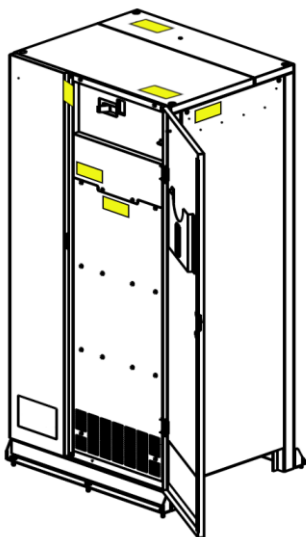


Figure 15 : Front of CBC (Door open)

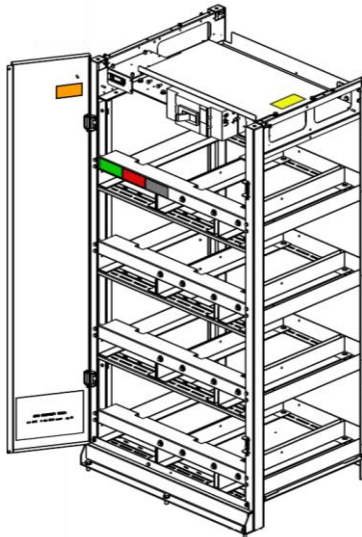


Figure 16: Front of CBC (Panels removed)

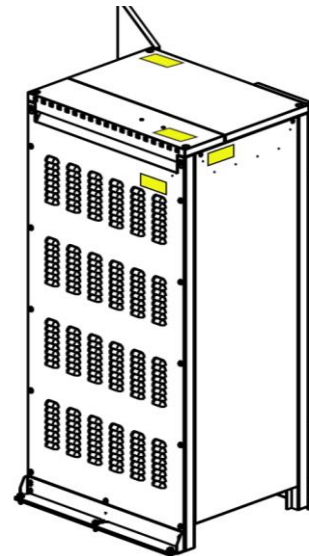


Figure 17 : Back of CBC

7.2.3. Place the battery hazards labels on the battery retainer (third shelf) to be in clear view as per figure 19



Figure 18 : Battery hazards labels



Figure 19 : Label placement on the battery retainer

7.2.4. Place de fuse label over the ground stud in the left door.



Figure 20 : Fuse warning label



Figure 21 : Placement of fuse warning label

7.2.5. Place the Notice and the battery connection schematic on the back of the right door, on each side of the identification plate on the document holder as per figure 25. Leave a place under the notice label for the UL label that will be placed after battery installation.



Figure 22 : Notice and UL label

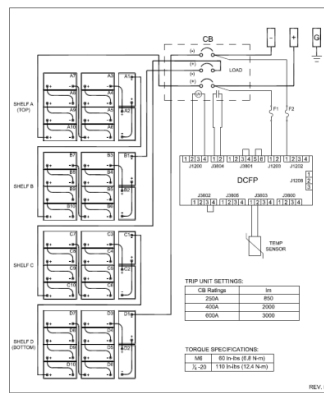


Figure 23 : Battery connection schematic label

Customer Name: _____		
Contract # _____ Type: _____		
Warranty Eff. Date: _____		
Warranty Exp. Date: _____		
Contract Eff. Date: _____		
Contract Exp. Date: _____		
PM DATES	FSB NUMBER	INSTALL DATE

Figure 24 : Maintenance label



Figure 25 : Label placement on the back of the right door

7.2.6. Label the red wire fuse holder as “Fuse 1” and the black wire fuse holder as “Fuse 2”

7.2.7. Place a pair of forklift label on each side and the back of the cabinet. If cabinet has side panels, place fork lift labels only on panels



Figure 26 : One pair of forklift label



Figure 27 : Forklift label on side without panel



Figure 28 : Forklift labels on side with panel



Figure 29 : Forklift labels on the back

7.2.8. Place either a positive or negative label on each breaker terminal. Identify each bus bar either by polarity or ground. Identify all grounding electrode with ground labels



Figure 30 : Positive, negative and ground label

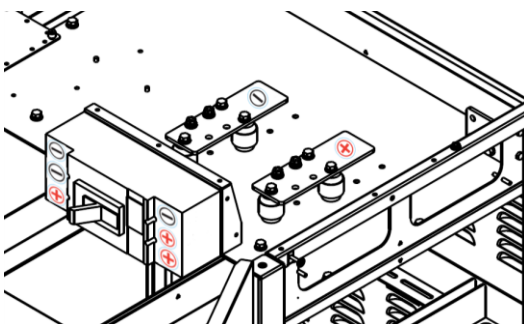


Figure 31 : Breaker and bus bars label positions

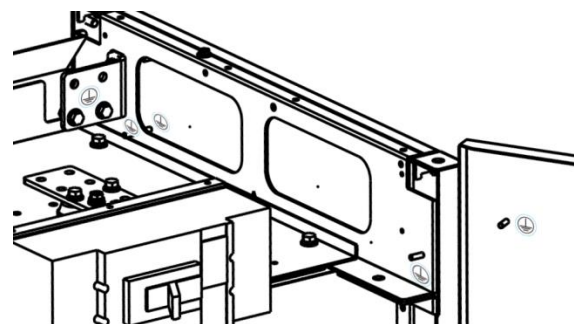


Figure 32 : Ground label positions



### **7.3. VISUAL INSPECTION**

7.3.1. Perform the initial visual inspection attached with these instructions. If the cabinet passes the inspection, place a green dot label on the front of the cabinet over the handle.

### **7.4. INTER-FACILITY SHIPPING**

7.4.1. Read all 7.4 instructions.

7.4.2. Place all test sheets, installation documents, the label sheet and the cabinet joining hardware in the document holder.

7.4.3. Close the cabinet and proceed to wrapping.

7.4.4. Wrap the UL ready sheet at eye level in-between the wrapping plastic on the front of the cabinet.

7.4.5. Place the 3 multi-cabinet bolt assembly in plastic bag in the document holder.

## 8. BATTERY INSTALLATION

### 8.1. INTEGRITY OF BATTERIES

8.1.1. Check the battery for damage. If the battery is damaged, please contact a supervisor.

8.1.2. Record model number of the batteries and amp hours on check list, compare model number to serial plate.

Provider	Battery model
P = EnerSys	540 = 12HX540
E = C&D	540 = UPS12-540MR

Example: GVXCBC600P540

Prefix : GVXCBC      Amperage: 600      Provider : P      Battery model : 540

8.1.3. Clean all battery terminals with a nylon scrubbing pad. Make sure no tarnish is left.

8.1.4. Ensure that the nominal voltage is over 12.8 Vdc for each unit. Charge the battery, if the nominal voltage is below that value. Let the battery charge until the cycle is complete.

8.1.5. If the battery is under 11.5 Vdc, return battery to the supplier.

### 8.2. OPENING THE CABINET

8.2.1. Inspect the cabinet and open it to see any unexpected damage. The key should be attached inside the right door of the battery cabinet.

8.2.2. Verify that a green dot label is present over the handle. If not present, contact supervisor.

8.2.3. Verify that the serial plate and circuit breaker have the same amperage rating.

8.2.4. Unscrew the right door and the dead front panels.



Figure 33 : Removal of dead front

8.2.5. Remove all covers to gain better access to the area

- Remove the front part of the top cover; be careful the rear part is fixed to the cabinet frame.
- Remove the side panels and doors to have a full access to the battery area.


 Both side and back panels are grounded with a green wire. Disconnect the green wire that is attached to the frame to remove the panel from the frame.



Figure 34 : Removal of covers


8.2.6. Remove the 4 battery retainers that are bolted to the frame.



Figure 35 : Battery retainer

8.2.7. Verify that all the required equipment shipped inside the cabinet ex: wiring, UL label, copper spacers, etc.

### 8.3. BATTERY PLACEMENT

 **Be careful, batteries are heavy. Use qualified personnel equipped with adequate equipment when loading and setting batteries in place.**

8.3.1. Verify that all Santoprene strips are present. If some are missing refer to instruction 7.1.7.

8.3.2. Lift the cabinet with adequate equipment onto the lower shelf assembly platform.

8.3.3. Place in 3 loose polyester straps in the bottom rows for easier access

8.3.4. Place a plastic cap on the positive (+) terminal of the batteries during battery handling.

8.3.5. Integrate the first 10 batteries in the lowest shelf following the placement shown in figure 40.

The poles of the two main rows batteries should be placed nearest to door.

8.3.6. Push battery as far as possible during installation.

8.3.7. Cut the Santoprene strips to be flush with the front of battery.



**Figure 36 : Exemple of strips pre and after cut**

8.3.8. Replace the battery retainers inside the cabinets to secure and protect the batteries.

8.3.9. Once the batteries are installed inside the cabinet, secure the batteries with a polyester strap.



**Figure 37 : Cabinet with batteries integrated**

8.3.10. All the cables needed for the installation come with the cabinet in specified boxes. Keep the boxes until cabinet is shipped for traceability purposes. All cables are identified by a label mentioning the connections points. See the figure 40 for the annotated schematic of a typical shelf. See table 4 for the complete list of wire for each type of installation.

- 8.3.11. Apply a small layer of approved conductive grease on each side of wire lugs.
- 8.3.12. Starting by the center batteries, install all the shelf wiring.
- 8.3.13. Make sure all the tab washers are easily accessible after installation.
- 8.3.14. Starting by the exterior batteries, ratchet all the bolts until the lock washer start to bend flat.
- 8.3.15. Torque all the bolts starting from exterior according to table 3. **If the torque wrench triggers before making a 1/3 turn, unscrew the bolt and torque it again.**

**Table 3 : Torques values**

Battery	Battery bolt	Torque
EnerSys	M6	84 in.lbs, 7 ft.lbs, 9.5 Nm
C&D	1/4-20	110 in.lbs, 9.1 ft.lbs, 12.4 Nm

- 8.3.16. After each bolt is torqued, mark the whole bolt joint with a vertical line.



**Use only plastic markers as to not short system**

- 8.3.17. Once the shelf is complete, repeat steps 8.3.4 through 8.3.16. Adjust height of the assembly platform as needed.



**Please proceed one shelf at the time and only connect the inter-shelf and breaker cables at the end. This will limit the voltage to only 120 VDC instead of 480 VDC for a complete unit.**



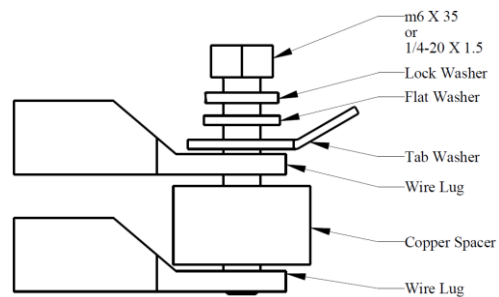
**Use correctly insulated tools, do not leave tools in the cabinet while working.**



**For high ampacity configurations (600 Amps), wire quantity doubles due to a “double run” configuration using a tin plated copper shim as shown in figure 38.**



Double run configuration with copper spacer



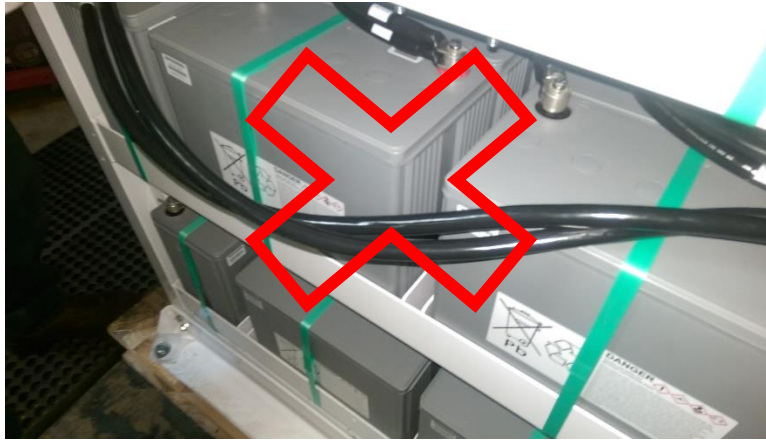
**Figure 38 : Example of a double run configuration**

- 8.3.18. Bind all the intershelf cables with cable ties. Protect the cables at the junction with a rubber where needed.



Figure 39 : Intershelf cable tied to frame

8.3.19. Make sure double run cabling does not braid.



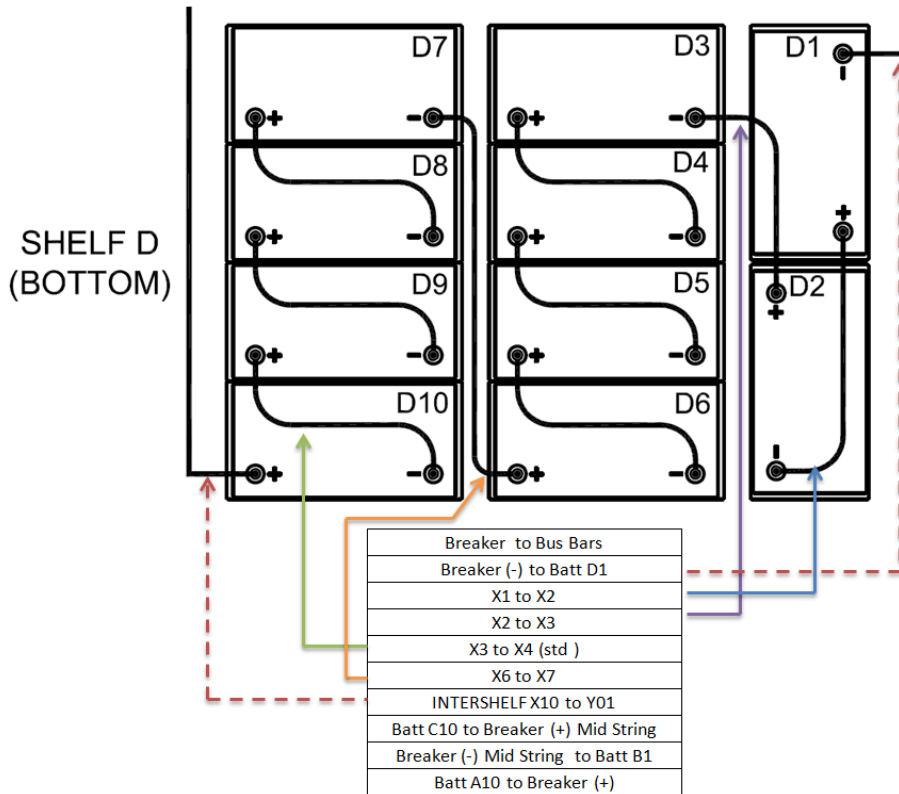


Figure 40 : Typical shelf connection and wire labelling

Table 4 : List of wire for each installation

Cabinet	Circuit Breaker Size	Batt Type	BATT SIZE	QTY Wire / Harness	Name of wire	Length of wire without lugs	(AWG)
HARNES-GVX400-480VDC	350 A	12HX540	A	2	Breaker to Bus Bars	30	4/0
		12HX505	A	1	Breaker (-) to Batt D1	105	4/0
	400 A	12HX400	A	4	X1 to X2	14	4/0
		UPS12-540MR	A	4	X2 to X3	11	4/0
		UPS12-490MR	A	24	X3 to X4 (std )	12	4/0
		UPS12-400MR	A	4	X6 to X7	20	4/0
				2	INTERSHELF X10 to Y01	70	4/0
				1	Batt C10 to Breaker (+) Mid String	82	4/0
				1	Breaker (-) Mid String to Batt B1	70	4/0
				1	Batt A10 to Breaker (+)	35	4/0
HARNES-GVX600-480VDC	600 A	12HX540	A	4	Breaker to Bus Bars	30	2/0
		12HX505	A	2	Breaker (-) to Batt D1	105	2/0
		12HX400	A	8	X1 to X2	14	2/0
		UPS12-540MR	A	8	X2 to X3	11	2/0
		UPS12-490MR	A	48	X3 to X4 (std )	12	2/0
		UPS12-400MR	A	8	X6 to X7	20	2/0
				4	INTERSHELF X10 to Y01	70	2/0
				2	Batt C10 to Breaker (+) Mid String	82	2/0
				2	Breaker (-) Mid String to Batt B1	70	2/0
				2	Batt A10 to Breaker (+)	35	2/0

8.3.20. Have qualified personnel inspect and approve the installation up to this point.

## 9. TEST AND INSPECTION INSTRUCTIONS

### 9.1. ELECTRICAL TESTS

#### 9.1.1. Test the voltage on the breaker:

Place the positive on the middle right cable and the common on the top left cable



Place the positive on the bottom left cable and the common on the middle left cable



Both test should show between 245 and 275 V.

9.1.2. Proceed to the Continuity test as requested by UL 1778. Please refer to the test procedure annexed at the end to perform this test.

- Form number: FM-054 2016-03-21 page 1

9.1.3. Proceed to the Hi-Pot test as requested by UL 1778. Please refer to the test procedure annexed at the end to perform this test.

- Form number: FM-054 2016-03-21 page 2

9.1.4. Please complete the Schneider test procedure specified by Schneider.

- Schneider Electric Test Procedure TEOP00562.
- Test Data Sheet GVMCBCWUA.xls
- Test Data Sheet GVMCBCWUB.xls
-





To be able to perform that test, reinstall all the panels that were removed at step 7.1.3



Figure 41 : Reattachment of the green ground wires



Removable side and back panels are grounded with a green wire, make sure to reconnect all the ground wires before replacing the panels.

## 9.2. TEST AND INSPECTION TRACEABILITY

9.2.1. Scan all tests results and place them in corresponding order folder on the Termaco Network.

### 9.3. SHIPPING

9.3.1. Remove the cable of battery X5 to X6 from each shelf (see figure 40), place them in a large fabric bag and close it with a cable tie.

9.3.2. Cable tie the bag under the fuse box as seen in figure 42.

9.3.3. Place a sheet of card board on each shelf on batteries as seen in figure 43.



Figure 42 : Bagged cables placement



Figure 43 : Cardboard on each shelf

9.3.4. Replace all installation documents and test results in the document holder

9.3.5. Close the cabinet

9.3.6. Proceed to wrapping; add a “danger high voltage” label on each side of the wrapping.



Figure 44 : Danger high voltage label

### 9.4. FINAL VISUAL INSPECTION

9.4.1. Close the cabinet and perform the final visual inspection

9.4.2. Place de UL label found in the document holder under the blue notice label

## 10. ON SITE INSTALLATION



Battery cabinet are very heavy. Be extremely careful when moving or lifting the unit. Use qualified personnel equipped with adequate equipment when unloading and setting cabinet in place.



Removing battery cables will void UL certification and Termaco warranty.



Removing and not replacing strapping will void seismic certification.

### 10.1. MOVING THE CABINET

10.1.1. When using a fork lift, always use forks as wide as possible in the designated space.

### 10.2. PLACING THE CABINET

10.2.1. Remove the cabinets from the pallets and place them in their intended position.

10.2.2. Once all cabinet in place, mark on the ground the location of the front seismic bracket holes,

10.2.3. Remove the cabinets and trace hole pattern according to each cabinets hole location.

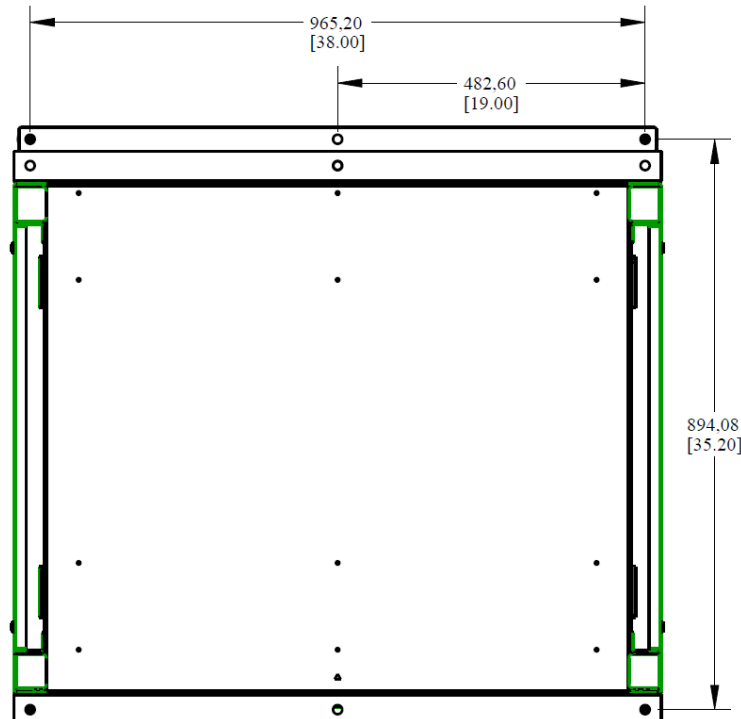
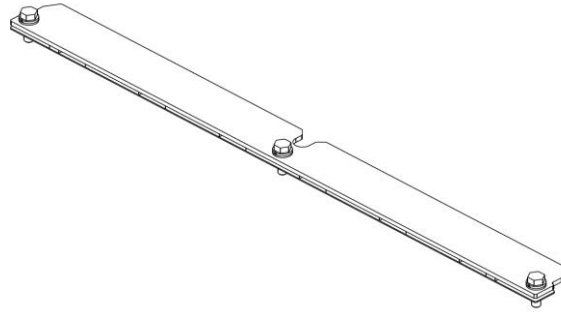


Figure 45 : Typical cabinet hole pattern

10.2.4. Pierce all the holes.

10.2.5. Remove the seismic kit of each cabinet (metal parts on the back of the cabinets figure 46).



**Figure 46 : Back brace of the seismic kit**

10.2.6. Bolt the cabinet's seismic kits according to the configuration agreed upon with your representative.



**Figure 47 : Bolted seismic kit**

10.2.7. Carefully move the cabinet and slide the back brace under the kit.

10.2.8. Bolt down the cabinet in the front.

10.2.9. Follow the instructions provided for the configuration to link the equipment together.

## 11.SYSTEM MAINTENANCE



### CAUTION!

Please read all safety precautions before proceeding.

The maintenance should only be done by a qualified technician. Please review the following instructions in their entirety before attempting to do a fuse replacement or a battery replacement.

### 11.1. LOCKOUT SYSTEM

11.1.1. A lockout padlock attachment with instructions is available in the document holder for all maintenance, servicing and general needs. It is recommended to use this device as part of a complete Lockout-Tagout (LOTO) system. Failure to use a complete LOTO system may lead to unexpected release of stored energy which could potentially cause injury to personnel and damage to equipment.



Figure 48 : Lockout attachment installation


### 11.2. BLOWN FUSE REPLACEMENT

11.2.1. If a fuse has blown in the system, determine the cause prior to installing another fuse. Refer to the appropriate wiring diagram provided with the cabinet before starting to disconnect components and remove wires.

### 11.3. BATTERY REPLACEMENT STEPS




11.3.1. When removing and replacing batteries, be careful to not let metal tools or wire connectors touch any other connections. Refer to the appropriate wiring diagram provided with the cabinet before starting removing batteries and read carefully the precautions listed at page 7.

 **Installation of batteries should be performed or supervised by personnel knowledgeable about batteries and the required precautions.**

 **Failure to replace strapping will void all seismic certification.**

- 11.3.1. Check to make sure the battery is the same type as last installation.
- 11.3.2. Measure the battery voltage to make sure it is 12.8V or above.
- 11.3.3. Use a nylon scrubbing pad to clean the terminals.
- 11.3.4. Apply No-ox grease to the terminal to avoid corrosion.
- 11.3.5. Disconnect the battery cabinet from the UPS by opening the breaker.
- 11.3.6. Open or remove the front door and dead front panels of the battery cabinet to get better access to battery connections.
- 11.3.7. Isolate the battery shelf where if located the damaged battery by disconnecting the DC input and output. Completely remove the wire(s) from the negative terminal of battery X1 and the wire(s) from the positive terminal of battery X10. Refer to wiring diagram.

 **Warning, touching battery terminals or wiring may cause short circuit. Make sure loose end of wiring cannot touch any metal parts while removing other end.**

- 11.3.8. Once the shelf is isolated, begin to disconnect batteries by starting from the outside of the shelf to the center in order to avoid accidental contacts that could results in electrical short circuit.
- 11.3.9. Once all batteries are disconnected and all wires are removed, remove nylon strapping.

**It is recommended to staple the new strap to the old strap so it replaces itself when it is pulled out.**

- 11.3.10. Replace the damage battery.

11.3.11. Replace the nylon strapping either using a buckle and tension tool or an automatic tensioning and welding tool.

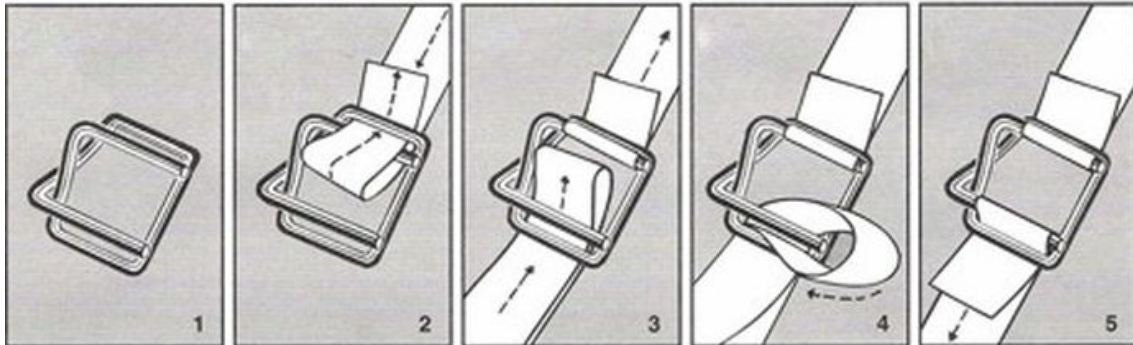


Figure 49 : Buckle instruction

11.3.12. Begin to connect batteries by starting from the middle and continue until the outside of the shelf.

11.3.13. Once all batteries of the shelf are connected, reconnect the DC input and output by connecting batteries terminals that were removed at step 4.

11.3.14. Recheck all wires and make sure that they are connected according to the appropriate wiring diagram.

11.3.15. Make sure all batteries connections are tight.

11.3.16. Replace all panels that were removed at step 11.3.6 and closed the front door.

11.3.17. Reconnect the battery cabinet to the UPS by closing the breaker.



**During maintenance, if a wire has to be changed, replace only with the same type and the same size (AWG).**

## 11.4. REQUIRED MAINTENANCE

11.4.1. All electrical connections should be re-torqued **every year** or after **two deep discharges**.



**Failure to torque all electrical connection may lead to components breaking and/or melting**