

BATTERY AND RACK SYSTEMS FOR TFA-SERIES BATTERIES

1. General:

These instructions detail the proper procedure for installing accessories, batteries and racks for C&D True Front Access UPS Battery Systems. The following describes how to locate, assemble and load the rack systems for C&D TFA Series Battery applications. Proper attention to these instructions will help ensure safe, trouble-free performance.

The C&D True Front Access UPS Battery Systems consists of racks, batteries and accessories, each ordered separately. Refer to C&D True Front Access UPS Battery Systems Connection Diagrams or contact your local C&D representative for more details and ordering information.

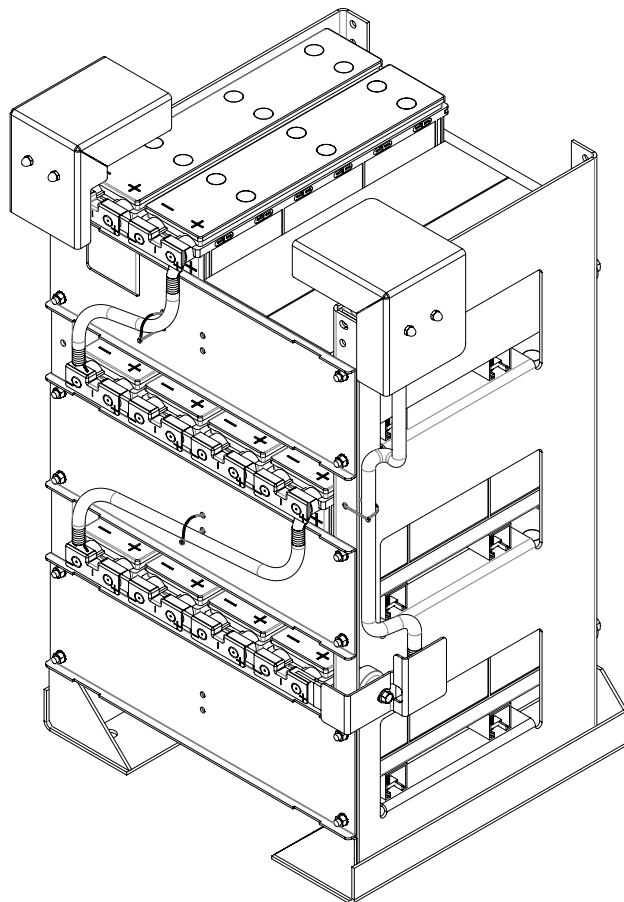


FIGURE 1

2. Safety:

CAUTION:

Only authorized and trained personnel familiar with standby battery installation, preparation, charging and maintenance should be permitted access to the rack and battery installation

Assembly and installation of the TFA Rack series, and the subsequent loading of TFA Series units onto them require lifting and placement of individual components which range in weight up to 131 lbs. Further, lifting heights may be as high as 70 inches. Appropriate handling practices, including safety shoes, must be followed.

This manual is not designed to be a training manual and it is intended for use only by authorized and trained personnel. C&D Battery Manual RS02124 covers Installation and Operation of C&D True Front Access UPS series batteries, including appropriate safety cautions. Both manuals should be read before installation.

3. System Configurations

Standard C&D True Front Access UPS Battery Systems are available in 120V through 480V systems and AMP services of 200 amp through 800 amp. See Table 1 for system availability.

TABLE 1

Standard System Availability						
System Voltage	Number of Batteries	Number of Racks	Amp Service	UPS12-355MRF	UPS12-615MRF	UPS12-700MRF
120	10	1	200	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			400	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			600	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			800	n/a		
240	20	1	200	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			400	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			600	n/a	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			800	n/a		
360	30	2	200	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			400	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			600		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			800	n/a		
384	32	2	200	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			400	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			600	n/a	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			800	n/a	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
480	40	2	200	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			400	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			600	n/a	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
			800	n/a	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

See **Figure 2** for front views of the standard systems. Connection diagrams are available for these standard systems. Contact C&D or your local C&D representative's office for more information.

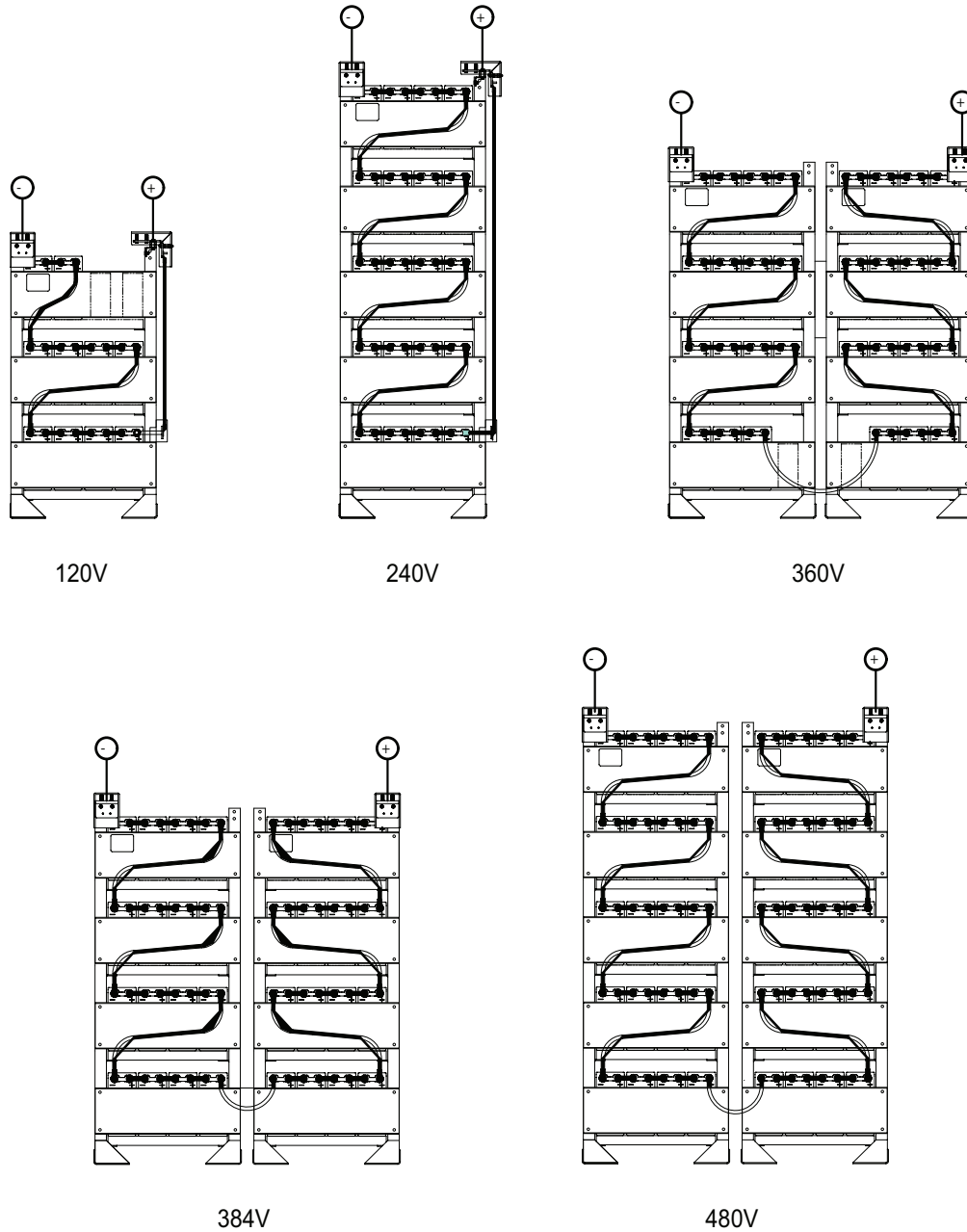


FIGURE 2

4. Seismic Certifications

The C&D True Front Access UPS Battery Systems are seismically certified to IBC 2006 for 300% mapped maximum considered earthquake spectral response acceleration at short periods at 100% building heights, essential facilities, site class D. They are also seismically certified for 1997 UBC Zone 4, essential facilities, all floor installations for soil profile type D and 1994 UBC seismic zone 4, essential facilities, all floor installations. Contact C&D for more information.

It is required that the systems are installed properly using appropriate anchoring devices to function as intended.

5. Rack Configurations:

The racks for C&D TFA UPS series batteries come in two family sizes – for UPS12-355MRF and UPS12-615MRF/UPS12-700MRF - and are available from one (1) tier to five (5) tiers high with a maximum of 4 batteries per tier. Racks are ordered by part number, in which the number of tiers in a given rack are indicated in the part number suffix. (See **Tables 2A** and **2B**). The racks are shipped flat and unassembled.

TABLE 2A
Racks for UPS12-355MRF Batteries

Number tiers high	Height* (inches)	Part Number
One high	14.40"	RD05122-1TEP2
Two high	26.17"	RD05122-2TEP2
Three high	37.94"	RD05122-3TEP2
Four high	49.71"	RD05122-4TEP2
Five high	61.48"	RD05122-5TEP2

TABLE 2B
Racks for UPS12-615 and 700MRF Batteries

Number tiers high	Height* (inches)	Part Number
One high	15.44"	RD05120-1TEP2
Two high	30.44"	RD05120-2TEP2
Three high	45.44"	RD05120-3TEP2
Four high	60.44"	RD05120-4TEP2
Five high	77.6"	RD05120-5TEP2

* Rack height only, not including customer terminations

6. Material Verification

Battery racks are shipped unassembled with a complete set of related drawings and documentation. Check received parts and quantities against the rack's bill of materials on provided drawings and/or packing list. Do not assemble rack if parts are missing or quantities are incomplete.

In case of shortage, contact C&D Customer Service, 1-215-619-2700. Alternately, you may send the marked up packing list to your local servicing C&D representative's office. Claims for shortages must be made within 30 days from date of shipment from C&D.

7. Required Tools for rack assembly:

- 0-300 inch pound Torque wrench with 9/16" and 3/4" Hex sockets.
- 9/16" and 3/4" box wrenches (or adjustable wrench)
- Tape measure
- Marking Chalk
- Square
- Level

Note: Consult anchor bolt manufacturer's instructions for tools required to install floor-mounting hardware.

8. Rack Location:

Locate racks indoors in a clean, cool, dry place so that the final battery and rack assembly is not affected by gradient variations of heat such as sunshine, heating units, radiators, steam heat, or air-conditioning vents. Always provide adequate ceiling clearance for ventilation and maintenance.

9. Arrangement Plan:

Custom arrangement plans are available as an extra cost option from C&D. Also, an arrangement plan for the racks and battery system can be made using the following:

- Connection diagram or Rack drawing, packed with the rack
- **Figure 3**, Rack Placement and Clearances
- Measuring tape and marking chalk

NOTE: When determining the rack location (para. 10) and floor mounting locations (para. 11), refer to connection diagrams or custom battery arrangement drawings (when applicable) for specific considerations.

10. Rack Placement and Clearances

When determining rack location and floor anchoring pattern, use applicable rack assembly and connection diagram drawings provided with rack shipment. The optional arrangement drawing, if ordered, should also be reviewed for rack placement.

Locate rack's general position, considering boundary and aisle clearances. 2 inches are required between racks of two rack systems (i.e. 360V, 384V and 480V) placed side by side. 2 inches are required from the back of the rack to a wall. A clearance of 3 inches is required at the sides of the rack. 6 inches is required at the right side of single stack systems. See **Figure 3**.

A minimum aisle clearance is recommended by NEC 2011 Handbook to allow the installation and/or maintenance of the batteries. **See Table 3.**

TABLE 3

System Voltage	Aisle Clearance	Comments
0-150	3 ft	
151-600	3 ft	Across from effectively insulated surface
151-600	3.5 ft	Across from grounded surface
151-600	4 ft	Across from exposed live parts

Refer to the NEC handbook for more details. Other local or state codes may require more clearance.

NOTE: When determining the floor location of racks and floor mounting locations, refer to the standard connection diagrams or custom battery arrangement drawings (when applicable) for specific considerations

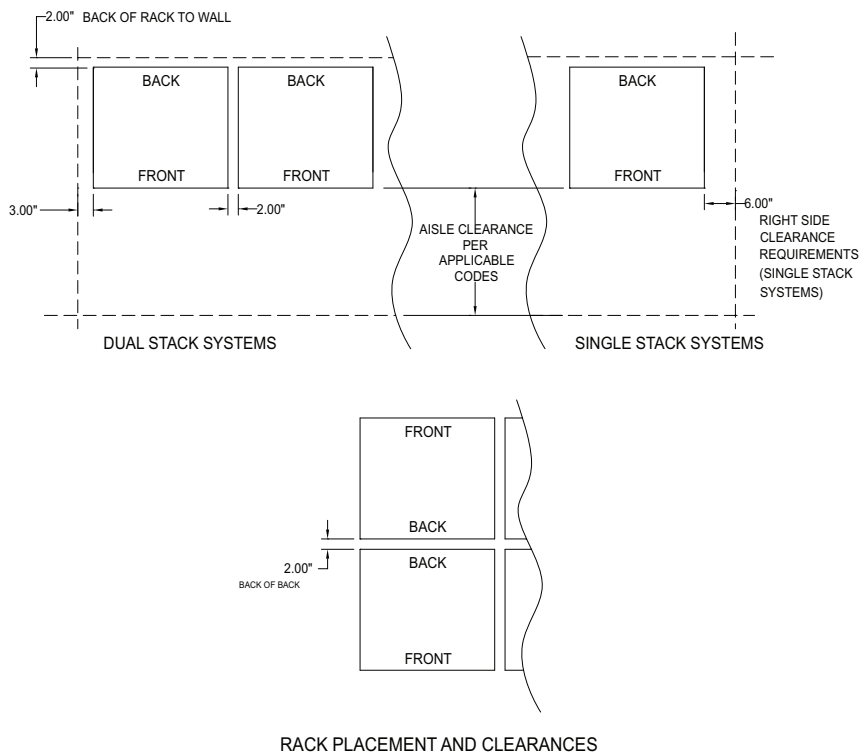


FIGURE 3

11. Floor Mounting Hole Locations:

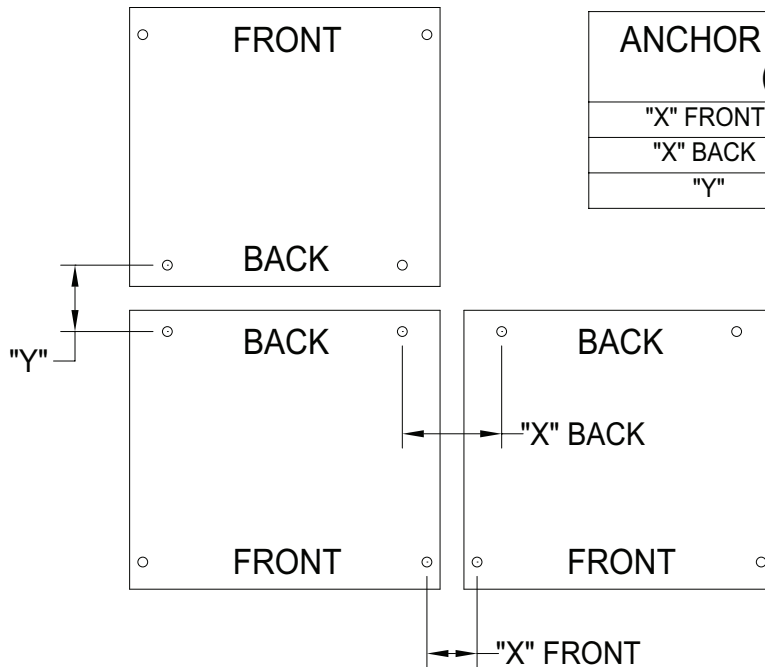
All C&D TFA racks are provided with 0.81" diameter (20.6mm) mounting holes for floor mounting hardware in each of the four corners of the assembled rack. Refer to the appropriate connection diagram or rack assembly drawing for dimension details.

For racks side by side or back to back, see **Figure 4** for floor mounting patterns. The distance between the floor mounting hole locations when the racks are placed back to back is shown in **Table 4** and **Figure 4**.

Note: There may be a de-rating of anchor bolt load ratings due to the proximity of holes. Reference anchor bolt manufacturer's data for information.

TABLE 4

ANCHOR BOLT DISTANCES (INCHES)	
"X" FRONT	4.20
"X" BACK	8.20
"Y"	5.75



ANCHOR BOLT DISTANCES
(RACKS AT 2.00" SPACING SIDE TO SIDE AND BACK TO BACK)

FIGURE 4

12. Anchoring:

All racks regardless of height must be securely anchored to the floor to provide stability, safety and seismic integrity. Do not attach rack to walls.

Important:

Adequate access for tools requires that there are no batteries on the bottom tier during final installation and torquing of the anchor bolts.

Note: Anchor bolt calculation and selection is dependent on the building specification and applicable state and local codes. C&D does not provide the anchor bolt calculations nor does it provide anchor bolts. The information listed in **Table 5** can be used in calculating anchor bolt requirements – all weights assume that each tier holds the maximum number of the heaviest units. All anchor bolt holes must be used to achieve the seismic rating.

TABLE 5

Number Of Tiers High	UPS12-355MRF			UPS12-615/700MRF		
	Total Weight* (lbs)	Tension Load (psi)	Shear Load (psi)	Total Weight* (lbs)	Tension Load (psi)	Shear Load (psi)
1	357	31	92	634	69	163
2	765	190	197	1213	356	312
3	1130	459	291	1792	857	461
4	1495	844	385	2371	1560	610
5	1860	1345	478	2950	2443	751

* Weights with four (4) of the heaviest batteries per tier and accessories. Refer to Connection diagrams for complete system weights.

13. Rack Assembly

Refer to C&D Rack assembly drawings M15096 (p/n RD05122 series for the racks for UPS12-355MRF batteries) and M16200 (p/n RD05120 series for the racks for the UPS12-615/700MRF batteries) for assembly details, component parts, etc. Follow the assembly directions as noted.

Important:

Racks, batteries and accessories must be assembled as ordered. Otherwise, battery assembly hardware (solid and cable connectors) will not accommodate the completed battery and rack system.

14. Leveling:

When the rack is placed in the final location over the floor mounting hardware, check that the rack is level. Where applicable, torque down the anchor bolts to manufacturer's recommended value.

15. Installing Batteries:

When the racks are leveled and securely attached to the floor, the batteries can be installed on the racks. The batteries are to be installed starting at the lowest tier. Slide the batteries onto the rails, terminals facing out the front, until the rear surface reaches the rear support rail and then outwards to the side frame. Place the batteries with approximately ½" spacing to allow for attachment of the inter-unit bus bars (connectors). See **para 16**.

NOTE: Do not lift or handle batteries by the terminal or the top cover. Use handles provided for lifting batteries.

NOTE: Do not use oil or grease as lubricants to assist in sliding the batteries along the bottom rails. Instead a small amount of water or unscented talcum may be applied to the rails to help reduce friction. Pay attention to polarities and terminal placement.

There is a maximum of four (4) batteries per tier. Foam spacers are used in tiers that have less than four (4) batteries (for example the 120V and 360V systems). The height of the foam spacer is below the height of the front restraint. Refer to the appropriate connection diagram for the location of the foam spacers. See **Figure 5**.

Note: The metal bracket of the top terminations (supplied with termination assemblies) must be attached prior to the batteries of that tier being installed. The high voltage insulated standoffs of the side termination must be attached prior to the batteries of that tier being installed. See Section 18 and the appropriate termination assembly drawing for more details on termination attachment.

Attach the front retainer as noted on the rack assembly drawing. There is one (1) retainer per stack with a cut-out that allows clear viewing of the information on the battery label. The front retainer with the cut-out is always to be placed on the top tier only. See **Figure 5**.

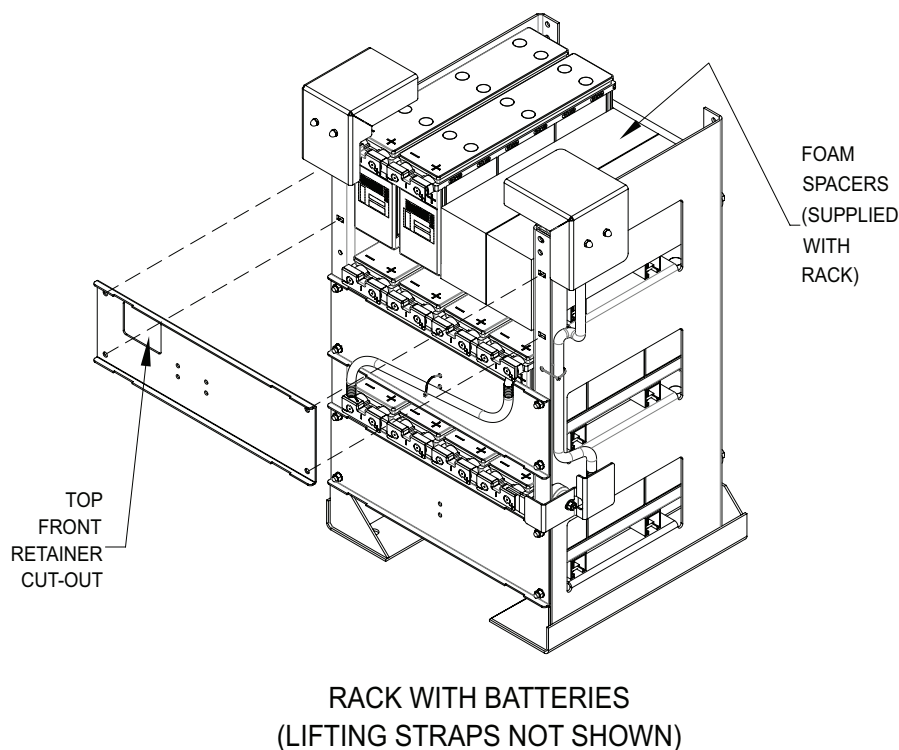


FIGURE 5

The terminal plate on the top right termination prevents the direct front installation of the top right battery on the top tier. This is the first battery that is installed on this tier (after attachment of the termination assembly). It is installed in the center of the tier onto the support rails and then slid to the right behind the terminal plate. The connection to the terminal plate is made at the time of the battery connections. See **Figure 6**.

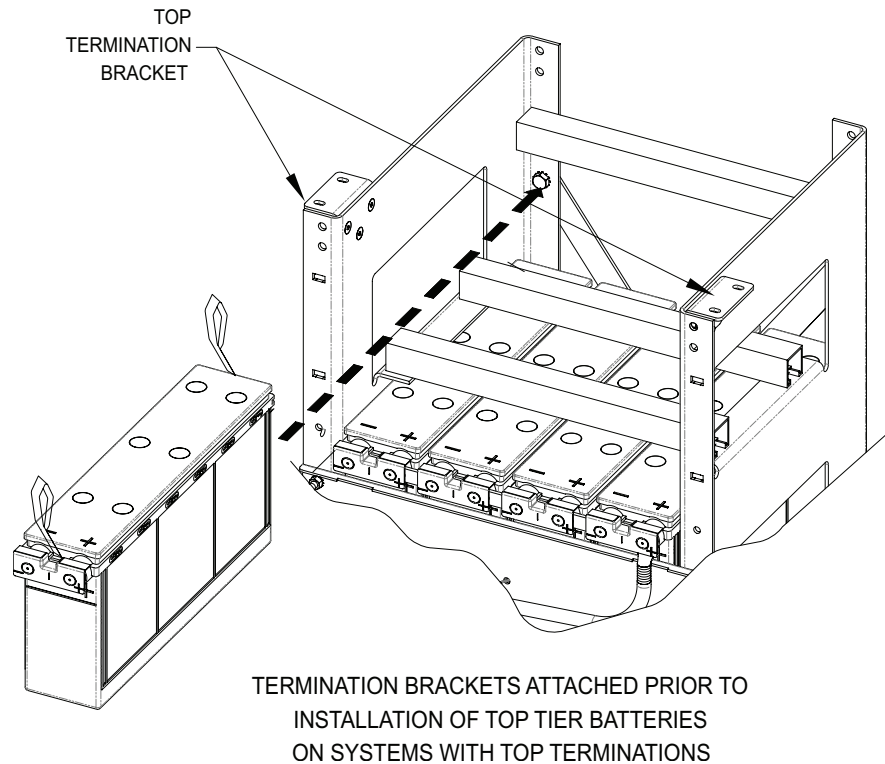


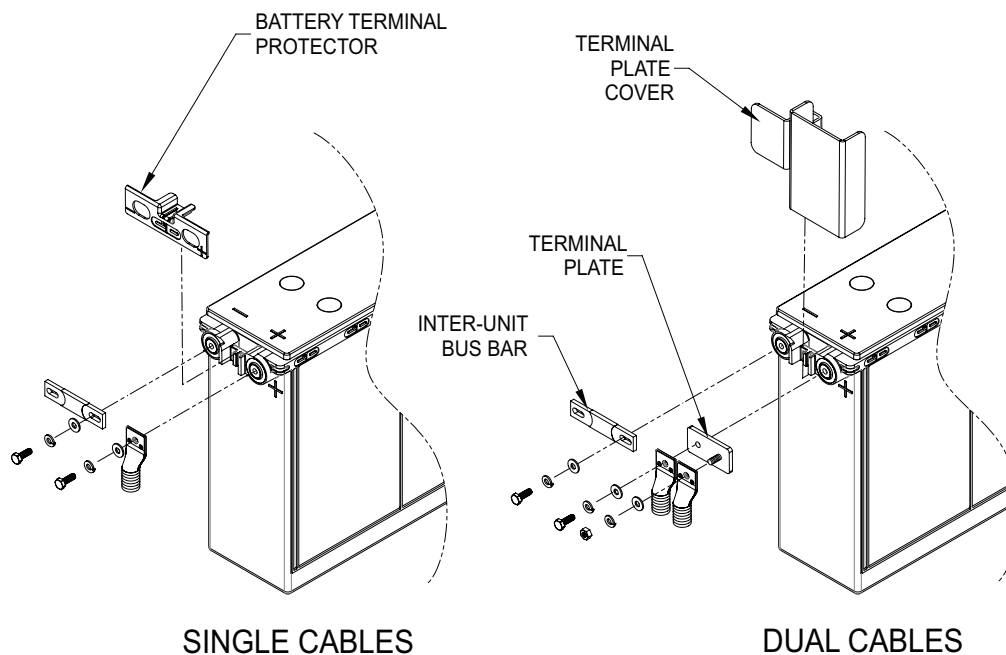
FIGURE 6

16. Battery Connections:

Refer to the Installation and Connection instructions provided in RS02124 Manual and as detailed in Connection Diagram drawings for details on assembling inter-unit bus-bars (connectors).

The 200 amp and 400 amp service systems use only one (1) cable per inter-tier, inter-rack, and battery to system termination assembly. The compression lug is attached directly to the battery post. The battery terminal protector cover is placed back in place over this connection. (See **para. 17** for more information on cables)

The 600 and 800 amp service systems use two (2) cables per connection. A terminal plate supplied with the accessory kit is attached to the battery post along with a cable. The second cable is also attached to this terminal plate with a bolt, nut and washer. The battery terminal protector cover supplied with the battery is replaced with the terminal cover supplied with the accessory kit. See Figure 7.

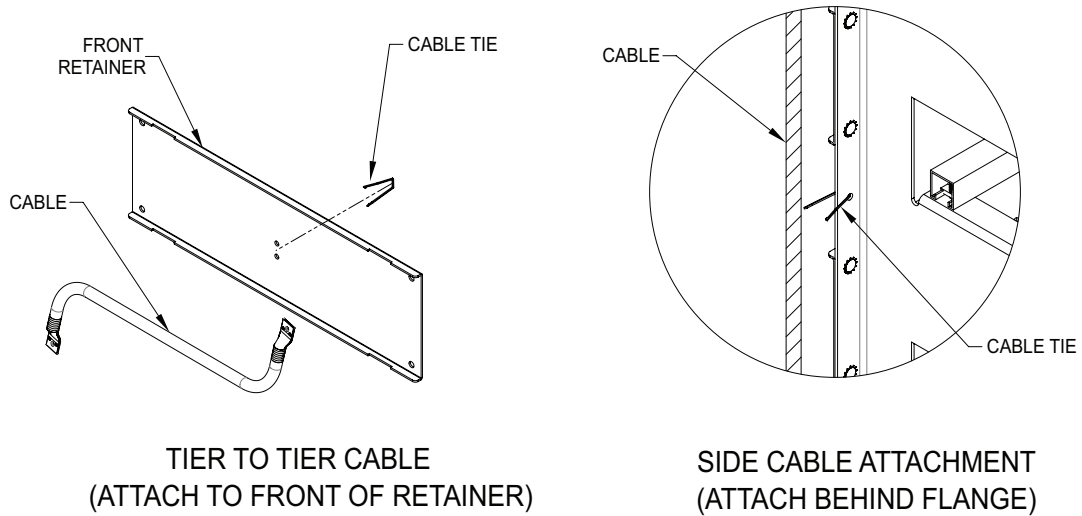


BUS BAR (CONNECTOR) AND CABLE CONNECTIONS
(LIFTING HANDLES NOT SHOWN)

FIGURE 7

17. Cables

Provisions are provided on the front retainers for the incorporation of strain relief with the use of cable ties of tier to tier cables and battery to system termination assembly cable(s). Provisions are also provided on the front flange on the right side of the side frame for single stack systems for the bottom side termination to system termination assembly cable(s). See **Figure 8**.



CABLE ATTACHMENT

FIGURE 8

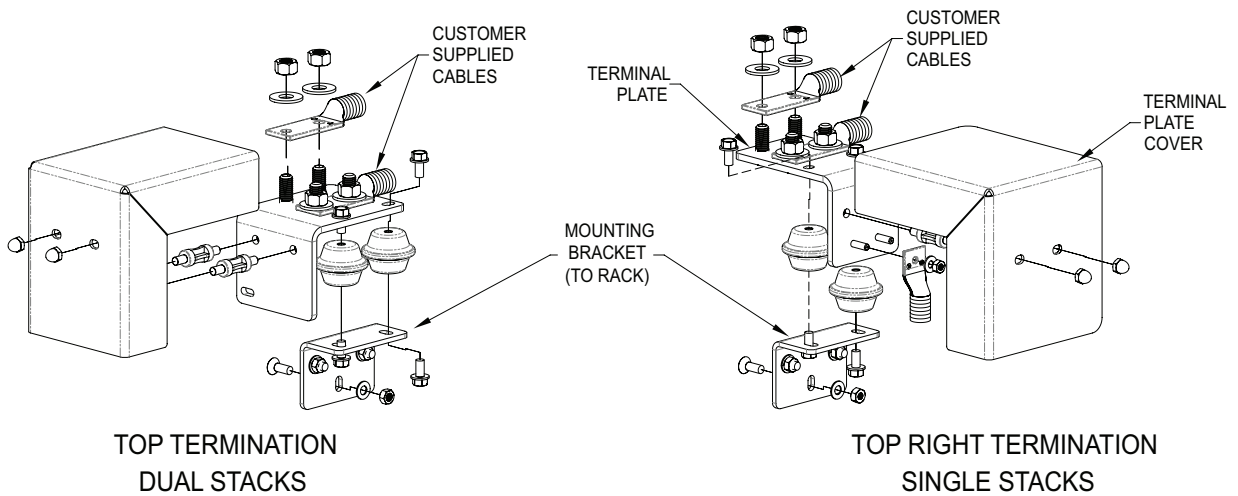
18. System Termination Location

The System terminations (customer connection points) will be at the top of the rack or racks (see **Figure 2**). The negative will be at the top left and the positive will be at the top right. For systems on single racks, the positive termination on the top right is accomplished with one (1) cable (200 and 400 AMP service) or two (2) cables (600 and 800 AMP) systems attached to the positive terminal of the lower right battery dressed up the right side of the side frame.

Customer connections are made on the terminal plate. The terminal plate is horizontal with $\frac{1}{2}$ -13 mounting studs on a 1.75" square pattern to allow cables to be dressed in from the back or side. See the Connection diagrams for more details.

19. Termination Assemblies

The System termination assemblies are attached to the side frames of the rack at the top tier location. These must be attached prior to the batteries being installation on the top tier. Attachment is achieved with the use of a steel mounting bracket and hardware supplied in the accessory kit. See **Figure 9**.



TOP TERMINATION ASSEMBLIES FOR CUSTOMER CONNECTIONS

FIGURE 9

The side termination is attached on the right side of single rack systems at the first tier location. The high voltage insulated standoffs of the side termination assembly must be attached prior to the batteries of that tier being installed. See **Figure 10**.

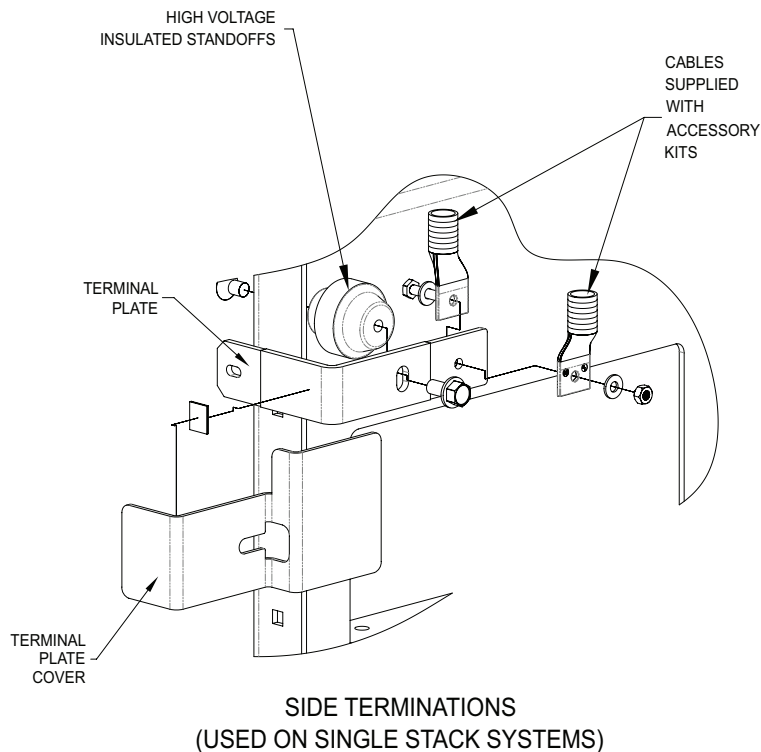


FIGURE 10

20. Connections

Complete all connections using the cables supplied – battery to system termination, side termination to system termination, etc. Observe proper polarity. With all connections made, recheck the electrical circuit, then torque all connector and terminal bolts to initial torque values given in RS02124 and install battery terminal protector covers. Battery installation is now complete.

21. Grounding

Rack grounding provisions are integrated into the frames. Two through holes are located at the top of both the front and rear flange of both the right and left frames and may be used to secure a standard NEMA lug. These holes are 0.44” in diameter and 1.0” between centers. Frame to frame grounding integrity is accomplished via the front retainers, attached to each frame with external “star” washers.

22. Touch-up Paint

Touch up Paint (C&D Part number RH00289) is available through separate purchase. Contact your local C&D representative for more details

23. Additional Resources

Along with C&D Battery Manual RS02124 Installation and Operation for C&D True Front Access UPS Series Batteries, C&D has many pertinent technical manuals on the operation, maintenance and application of batteries. Please visit the C&D Website at www.cdtechno.com for more information.