

FRONT TERMINAL BATTERY RACKS

EFR52, EFR54 AND EFR51 SERIES

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL



This manual provides instructions regarding safety, storage, installation, operation and maintenance. Failure to observe the precautions as presented may result in injury or loss of life.

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1. INTRODUCTION

ESS Front Terminal Battery Racks are shipped partially assembled, internally pre-wired and come with an optional over current breaker. Refer to the battery rack's layout drawings and schematics at the end of this manual. Consult the battery manufacturer's battery operation and maintenance manual for complete instructions.

These battery systems are Hi-Pot tested to UL 1778 standards at the factory prior to shipment. All system settings are also adjusted at this time according to the specification sheet. Sales support for future equipment or upgrades is provided by our sales staff and qualified representatives. All technical questions and service issues should be directed to our office 972-272-2468.

2. PRECAUTIONS

-  **It is very important to read, understand and follow the instructions in this manual. Also note all SAFETY PRECAUTIONS before beginning the installation of this system.**
-  **Consult the Battery Manufacturer's Operation and Maintenance Manual for important battery information.**
-  **Battery rack systems are very heavy. Total weight of a loaded rack can exceed 6000 lbs depending on the system. Use at least 3 people when unloading and setting equipment in place.**
-  **It is imperative that only qualified personnel work on this system and installation, maintenance or upgrades be performed with insulated tools and equipment.**
-  **When installing this battery system, follow all applicable federal, state and local regulations and industry guidelines to insure a proper installation.**
-  **DC power and battery supplies are dangerous and have extremely high short circuit currents. Severe burns or death can result from a system short. They also can leak potentially explosive gas (hydrogen). Never enclose batteries or battery racks in a sealed air tight room.**
-  **All jewelry and watches must be removed prior to installing or servicing this system.**
-  **Do not smoke or present flame near or around any battery rack system.**
-  **Never leave a panel off or door open and unattended.**

3. INSPECTION UPON RECEIPT OF GOODS

3.1 General

Special precautions and care have been taken to ensure the rack system arrives safe and undamaged. However, upon receipt, you should inspect the entire shipment, including the crate and any boxes for evidence of damage that may have occurred during transit.



3.2 Visible Damage

It is the responsibility of the person receiving the shipment to inventory and fully inspect all materials against the bill of lading or way bill IMMEDIATELY, while the carrier representative is still present. Ensure 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. Make all applicable notations on the delivery receipt before signing and file a damage report with the carrier.

3.3 Concealed Damage

Within 30 days of receipt, unpack the rack system and check for any concealed damage. Check the materials received against the detailed packing list to verify the quantity and the condition as complete and satisfactory.

Note any damage to the internal packaging, then request an inspection by the carrier and file a concealed damage claim. If there is a material shortage, contact ESS at the number listed at the end of this manual.

Please contact your shipping company for all shipping damage. ESS is not responsible for any shipping damage.

3.4 Return of Damaged Goods

A RMA number must be obtained before returning equipment to ESS. Please contact an ESS representative or call the corporate number listed at the end of this manual.

4. SYSTEM OVERVIEW

The enclosed rack systems provide the necessary DC backup power required in UPS applications. Over-current breaker/fuse protection is supplied. DC connections are front accessible and made via terminal blocks and/or mechanical lugs. Refer to the drawings and schematics at the end of this manual for these connections. Racks are equipped with 3-pole breakers. There are 2 holes per polarity on 300 Amp to 600 Amp breakers. Breakers 30 Amps to 250 Amps have a single hole per polarity. **See table below for standard output lug sizes of breakers.**

BREAKER SIZING						
BREAKER SIZE AMPS	30A	40A	50A	75A	100A	125A
A.I.C. RATING, 500DC	20,000 A.I.C	20,000 A.I.C	20,000 A.I.C	20,000 A.I.C	20,000 A.I.C	20,000 A.I.C
OUTPUT LUG SIZE	(1)#14-3/0	(1)#14-3/0	(1)#14-3/0	(1)#14-3/0	(1)#14-3/0	(1)#4-3/0
BREAKER SIZE AMPS	150A	175A	200A	225A	250A	300A
A.I.C. RATING, 500DC	20,000 A.I.C	20,000 A.I.C	20,000 A.I.C	20,000 A.I.C	20,000 A.I.C	20,000 A.I.C
OUTPUT LUG SIZE	(1)#4-4/0	(1)#4-4/0	(1)3/0-350	(1)3/0-350	(1)3/0-350	(2) 2/0-500
BREAKER SIZE AMPS	350A	400A	450A	500A	600	
A.I.C. RATING, 500DC	20,000 A.I.C	20,000 A.I.C	20,000 A.I.C	20,000 A.I.C	20,000 A.I.C	
OUTPUT LUG SIZE	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	

During normal conditions the UPS supplies the load power and the necessary power required to keep the batteries at the proper float voltage. Verify that the charger is set to charge parameters within the approved float voltage range of the batteries, refer to manufacturer's battery operation and maintenance manual.

When AC fails, the batteries discharge in order to provide the necessary backup power. It is the responsibility of the customer to make sure the batteries are not discharged below the battery manufacturer's recommendations. Always recharge batteries per manufacturer's battery operation and maintenance manual. Batteries will be damaged if not recharged right away. See the UPS or DC system manual for more information.



5. GENERAL SYSTEM SPECIFICATIONS

5.1 DC Output Characteristics

- **Voltage:** (UPS Application) 48 to 480 VDC Nominal
- **Breaker:** Standard
- **Fuse Type:** Not standard, consult factory. If a fuse is provided, it is only to be replaced by a factory service technician.

CAUTION! Fire Hazard Warning:
Replace only with same type and rating of fuses supplied with the system.

- **Wire Size and Type:** Per NEC and/or local building and electrical codes.
- **Disconnect:** If a fuse has been provided in lieu of a breaker inside the rack, a disconnecting method must be provided per NEC code. This may be a fuse switch or circuit breaker. Size accordingly.

5.2 Batteries

- **Type:** Valve Regulated Lead Acid (VRLA), sealed, non-spillable.
- **Voltage:** 12 Volt DC Nominal, Front Terminal Design.

5.3 Grounding

- All grounding should be derived from the main building ground source.
- **Note:** All rack systems require grounding.

5.4 Environmental Conditions

Breakers are located at the top of the Battery Rack. EFR5x racks have a maximum battery configuration of 8 wide by 5 tiers high. EFR4x racks have a maximum battery configuration of 8 wide by 4 tiers high.

Rack Dimensions:

EFR52, Top Breaker is 45.50" W x 28.5" D* x 84.0" H
EFR42, Top Breaker is 45.50" W x 28.5" D* x 72.0" H
EFR54, Top Breaker is 45.50" W x 30.5" D* x 84.0" H
EFR44, Top Breaker is 45.50" W x 30.5" D* x 72.0" H

For mounting hole dimensions, please refer to the rack layout drawing at the end of this manual.



Max Rack Weights: (Assembled)

Reference the drawings in this manual for weights of racks.

- **Temperature:** Normal operating temperatures are between 68°F -77°F. **Note:** Batteries typically should be at 77°F for optimum battery life and performance.
- **Clearance:** A minimum of four inches is required in both the front and the rear of the Battery Rack. This refers to obstruction of ventilation only. Clearance around rack sides is suggested by NEC and local codes.

CAUTION! Explosion/Fire Hazard Warning:
Batteries can generate potentially explosive gas (hydrogen).
Never enclose batteries or battery racks in a sealed, airtight room.

6. INSTALLATION PRODEDURES

BEFORE PROCEEDING WITH INSTALLATION READ THE FOLLOWING:

6.1 Preparation

6.1.1 Necessary Equipment and Tools

- Rigging tools for moving Racks. Narrow pallet jack and forklift of 8,500 lbs. minimum capacity when moving fully loaded racks.
- Heavily insulated assortment of hand tools.
- Digital Voltmeter

6.1.2 Equipment Inspection

Remove the packaging material from the rack and inspect for any concealed shipping damage that may have been overlooked upon receipt of goods. Use the packing list to verify the system has all components and cables for installation.

6.1.3 Safety Precautions

DC VOLTAGE WARNING!
Hazardous DC Voltages are present in the battery rack. 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 possible death. Use extreme caution!

IMPORTANT SAFETY INSTRUCTIONS. SAVE THESE INSTRUCTIONS!!



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, rings and watches should be removed when working on this equipment.
- ⚠ All tool handles and shafts must be heavily insulated.
- ⚠ Do not rest any tools or loose cables on top of batteries.
- ⚠ Make sure all connections are properly torqued and secure. Torque values are provided on battery label.
- ⚠ 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 rack, as this could result in an electrical shock.
- ⚠ Do not install any cable terminations until it has been verified that such a termination will not create a short circuit.

7. INSTALLATION STEPS

7.1 Rack Location

Prior to installation, verify floor loading requirements and all applicable codes pertaining to the related equipment. Environmental conditions should also be reviewed. Proper ventilation and cooling must be adequate for optimum battery life and performance. A clearance of 4" is recommended at the front and rear of the rack. This refers to obstruction of ventilation only. Clearance around the rack sides should be as suggested by NEC and local codes. Ambient temperature should be between 68°F -77°F.

7.2 Rack Mounting

1. Remove any remaining packaging materials (cardboard, plastic).
2. Remove the kick plate from the base of the rack. Save this kick plate for re-installation later.
3. Unbolt the rack from the pallet. Remove the rack from the pallet using a forklift rated for at least 8,500 lbs.
4. The battery rack is equipped with narrow pallet jack or forklift access openings in the front and rear of the rack. Move the equipment into the desired location and set in place.
5. In order to meet Zone 4 requirements, refer to the Zone 4 ANCHORING drawings included with this manual. The following steps detail the necessary actions needed to meet Zone 4 mounting requirements. Check applicable building codes for length and style of anchors to be used with the flooring substrate. Install anchors per manufacturer's instructions.
6. On the floor, mark the location of the 6 mounting holes found at the bottom of the rack legs.
7. Use the floor template or hole location drawing provided with each shipment to mark holes for anchors. Use ½" or 12mm anchors. Install anchors per manufacturer's instructions.
8. Move the rack into place, align holes, check levelness, and tighten hardware. **Note:** Should any drilling be performed on this equipment, make sure all exposed batteries and connections are completely covered using insulated type mats. Prevent dust from entering racks and clear any debris that has collected.
9. Re-install the front kick plate on the rack.
10. If multiple battery racks are installed, repeat above steps. Check height and levelness with adjoining racks.



7.3 DC Connections

CAUTION!
PLEASE READ ALL SAFETY INSTRUCTIONS BEFORE PROCEEDING.

1. Remove the cardboard box from the rack. Use the packing list to verify all bus bars, cables, battery covers and hardware required for assembly is available.
2. Review the installation drawing and schematic diagram included in this manual. Cables and bus bars have been left off in the battery string for safety and will need to be installed later.
3. Connect main cables to the circuit breaker, when applicable, inside the rack from the UPS or charger source. All cables should be sized per NEC and any other local codes pertaining to this equipment. Refer to the UPS or charger manual for wiring external batteries. **Note:** Make sure charging source is disconnected before making these connections; also verify the battery rack breaker is turned off.
4. Connect the battery interconnect bus bars that were left off during shipment and install as shown on the installation drawing included in this manual. Torque connections properly. Torque values are provided on battery label.
5. Install plastic covers onto batteries. Some covers may need to be notched for locations with bus bars and/or cables in upward orientation.

7.4 Grounding

Ground the battery rack to the main building ground. A ground stud inside the breaker enclosure is provided for this.

7.5 System Operation

Refer to the UPS or charger manual for start up and operation of system.



8. SYSTEM MAINTENANCE

CAUTION!
PLEASE READ ALL SAFETY PRECAUTIONS BEFORE PROCEEDING

8.1 Blown Fuse Replacement

If a fuse has blown in the system, contact an authorized factory technician to replace it.

CAUTION! Fire Hazard Warning:
Replace only with same type and rating of fuses supplied with the system.

8.2 Battery Replacement Steps

Servicing of batteries should be performed or supervised by personnel knowledgeable about batteries and the required precautions. When replacing batteries, replace with the same type and number of batteries.

CAUTION!
Do not dispose of batteries in a fire. The batteries may explode.
Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes.
It may be toxic.

A battery can present a risk of electrical shock and high short-circuit current. The following precautions should be observed when working on batteries:

- Remove jewelry, rings, watches or other metal objects.
 - Use tools with insulated handles.
 - Wear rubber gloves and boots. Wear safety glasses.
 - Do not lay tools or metal parts on top of batteries.
 - Disconnect charging source prior to connecting or disconnecting battery terminals.
 - Determine if the battery is inadvertently grounded. Remove string from buss and check voltages to 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 battery supplies not having a grounded supply circuit).
1. Prepare the new battery for installation. Check to make sure the battery is the same type and power rating. Use a non-metallic brush or scotch brite pad to clean the terminals. Apply a light coat of No-ox grease to the terminal to avoid corrosion "per battery manufacturer's recommendation".
 2. Disconnect the charger or UPS from the battery string by opening the breaker.
 3. Remove the center jumper on the battery string to reduce the voltage. If replacing all batteries, continue reducing the voltage in this manner.
 4. Disconnect the interconnect bus bars and/or cables from the battery to be replaced.
 5. Remove the old battery.
 6. Install the new battery. Make sure the new battery is installed the same way regarding polarity orientation and verify with drawing.

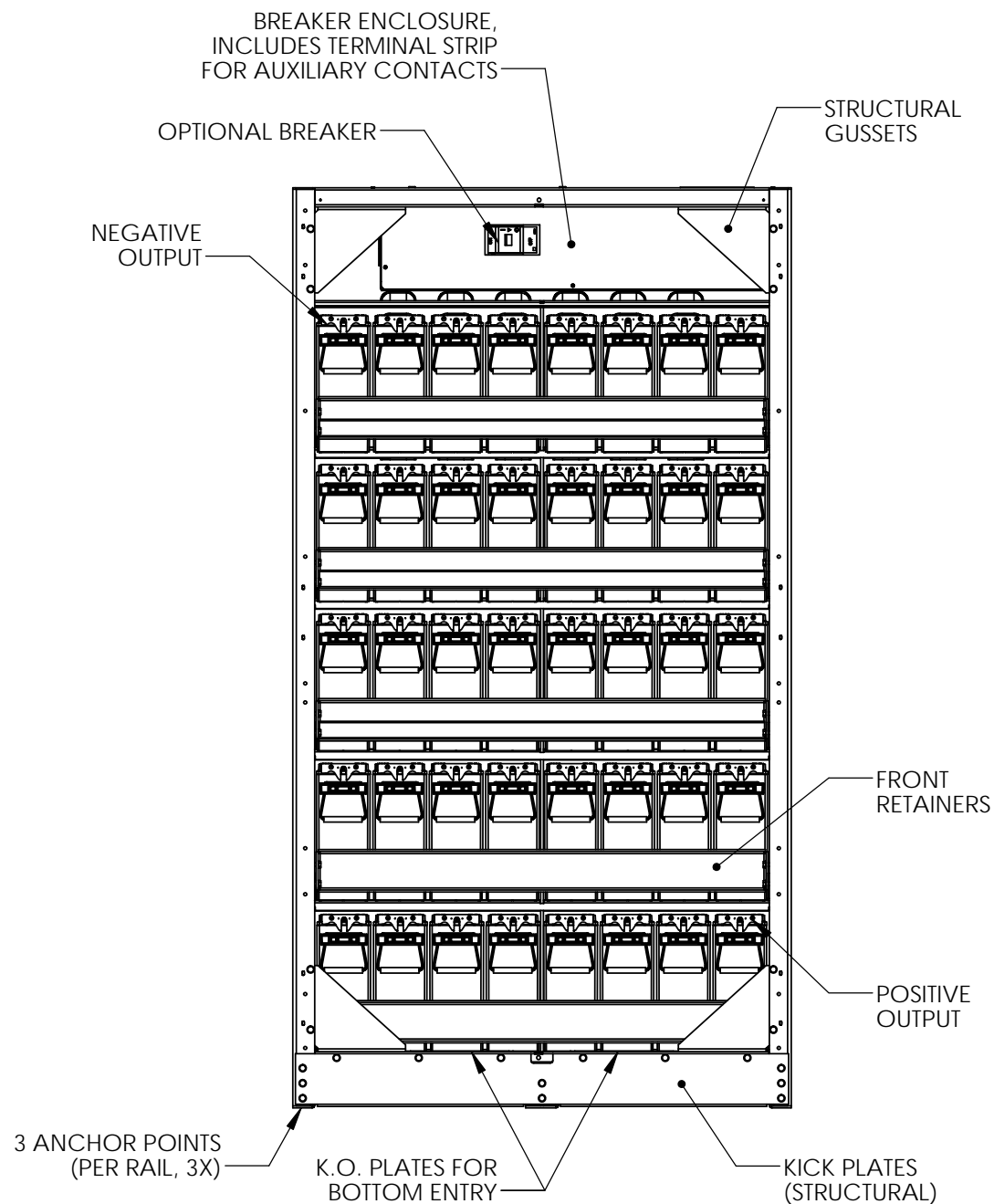


7. Reconnect bus bars and/or cables to the battery. Make sure connections are properly torqued. Torque values are provided on the battery label.
8. Reconnect the center jumper. Make sure connections are properly torqued. Torque values are provided on the battery label.
9. Check voltage at terminal block.
10. Close breaker when ready.

9. WARRANTY RELATED MAINTENANCE

1. The purchaser (user) shall give freshening charges to the battery a minimum of every six (6) months for Lead-Calcium batteries after shipment from the factory and until final installation. Refer to the installation and maintenance instructions for maximum storage intervals at different environmental situations. Extreme heat could cause more frequent freshening charges.
2. At least once every twelve (12) months, purchaser (user) must take readings and record information per battery manufacturer's installation/maintenance instructions. These records must be maintained for warranty claim purposes. If warranty records are not kept, the warranty shall be null and void.
3. Parallel strings should be limited to five (5) strings
4. Movement of batteries from original point of installation shall immediately void the product warranty, except with the expressed written consent from ESS.
5. Any storage shall be in a dry area having ambient temperature of 77° F (25° C), or less, and in accordance with battery manufacturer published installation, operation and maintenance instructions. Failure to follow the battery manufacturer's published guidelines and/or instructions may invalidate the product warranty, at the sole discretion of ESS.
6. During service or extended storage, a battery system monitor is recommended to be used to record temperatures, voltages, AC ripple, Float currents, Discharge and more to provide more accurate battery and environmental data for warranty with battery manufacturer's claims.

10. DRAWINGS / SCHEMATICS



TITLE: MANUAL DRAWING, GENERAL FRONT TERMINAL BATTERY RACK DETIAL, EFR52/54/51

DWG. NO.

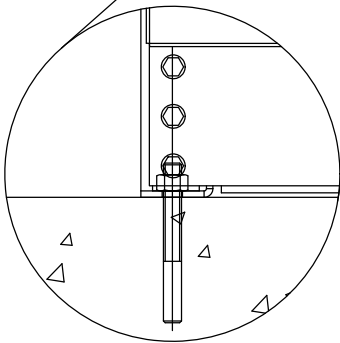
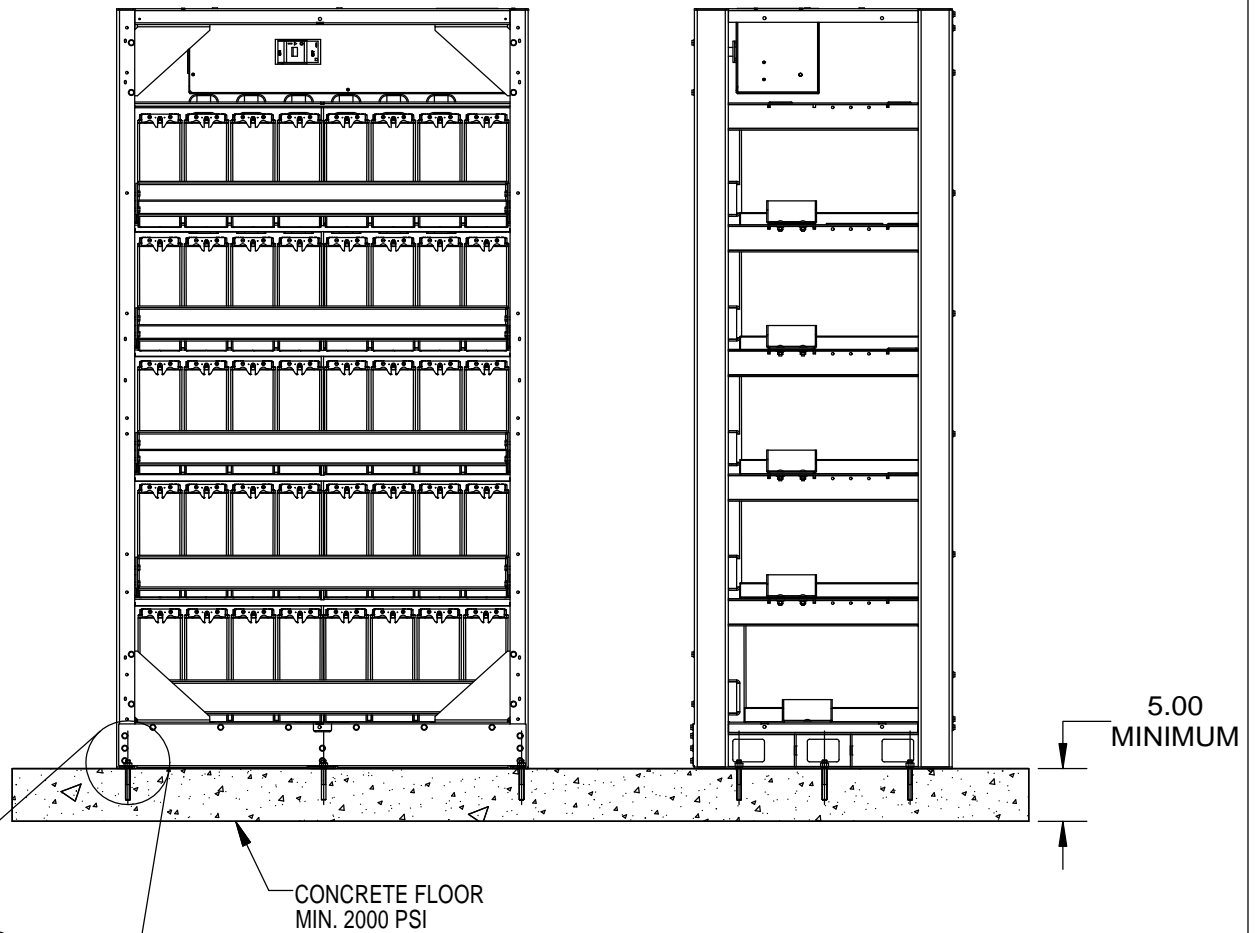
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A



RACK FRONT VIEW

RACK SIDE VIEW



1/2' DIA. HILTI KB-TZ EXPANSION ANCHORS
PER ESR-1917

THE BATTERY CABINETS HAVE BEEN CERTIFIED TO THE IBC 2012, SECTION 1621 & 1622. CABINET MUST BE ANCHORED WITH 6 HILTI KB-TZ EXPANSION BOLTS OR EQUIVALENT. CHECK APPLICABLE BUILDING CODES FOR LENGTH AND STYLE OF ANCHORS TO BE USED WITH FLOORING SUBSTRATE. INSTALL ANCHORS PER MANUFACTURER'S INSTRUCTIONS. THIS DRAWING IS A STANDARD REPRESENTATION. CABINET CONFIGURATIONS WILL VARY.



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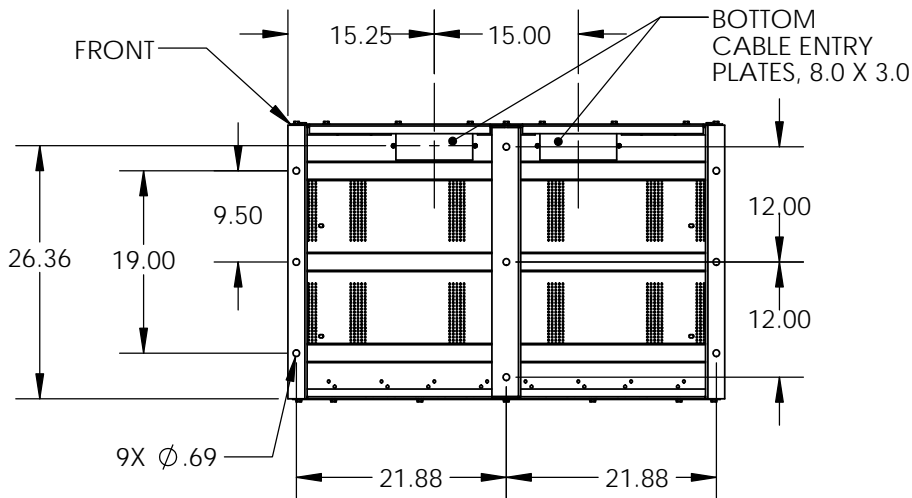
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DRAWN	RNA	11-20-17
APPR.		
SHEET 1 OF 2		

TITLE:
FRONT TERMINAL BATTERY RACKS,
EFR52/EFR54/EFR51 SEISMIC ANCHORING

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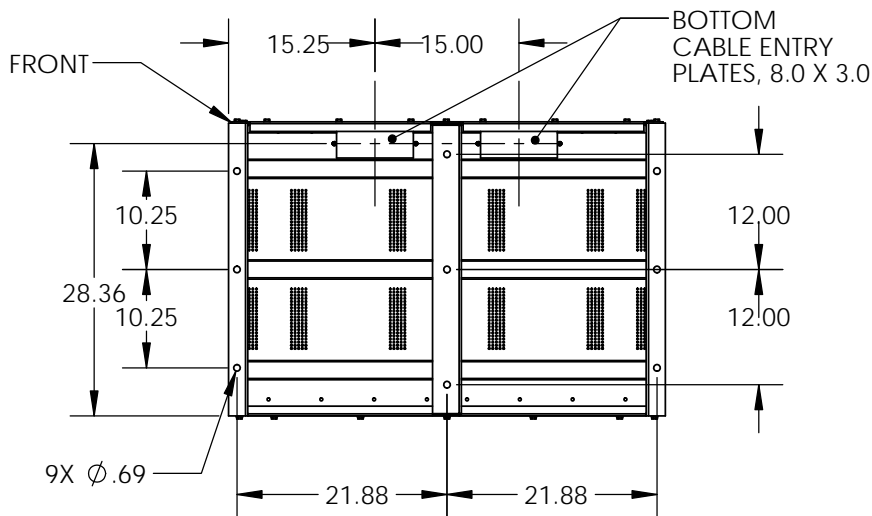


EFR52 FOOT PRINT

40 BLOCKS, 480V
32 BLOCKS, 384V

EFR42 FOOT PRINT

32 BLOCKS, 384V

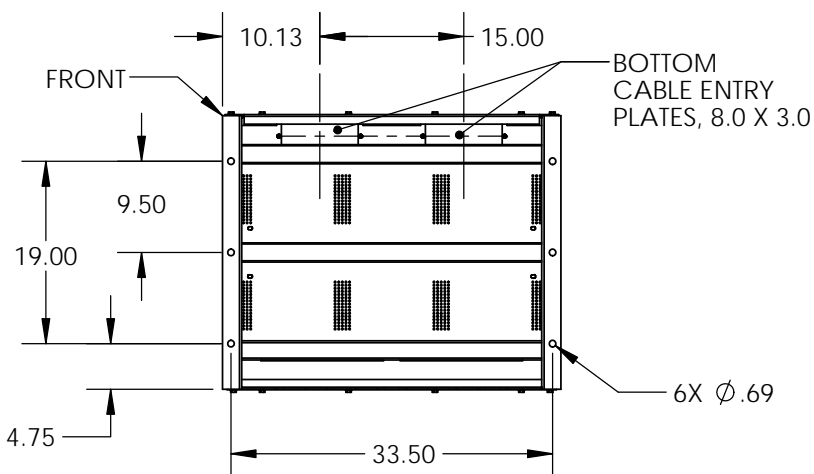


EFR54 FOOT PRINT

40 BLOCKS, 480V
32 BLOCKS, 384V

EFR44 FOOT PRINT

32 BLOCKS, 384V



EFR51 FOOT PRINT

30 BLOCKS, 360V



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	NAME	DATE
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TITLE:

FRONT TERMINAL BATTERY RACKS,
EFR52/EFR54/EFR51 SEISMIC ANCHORING

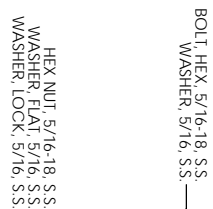
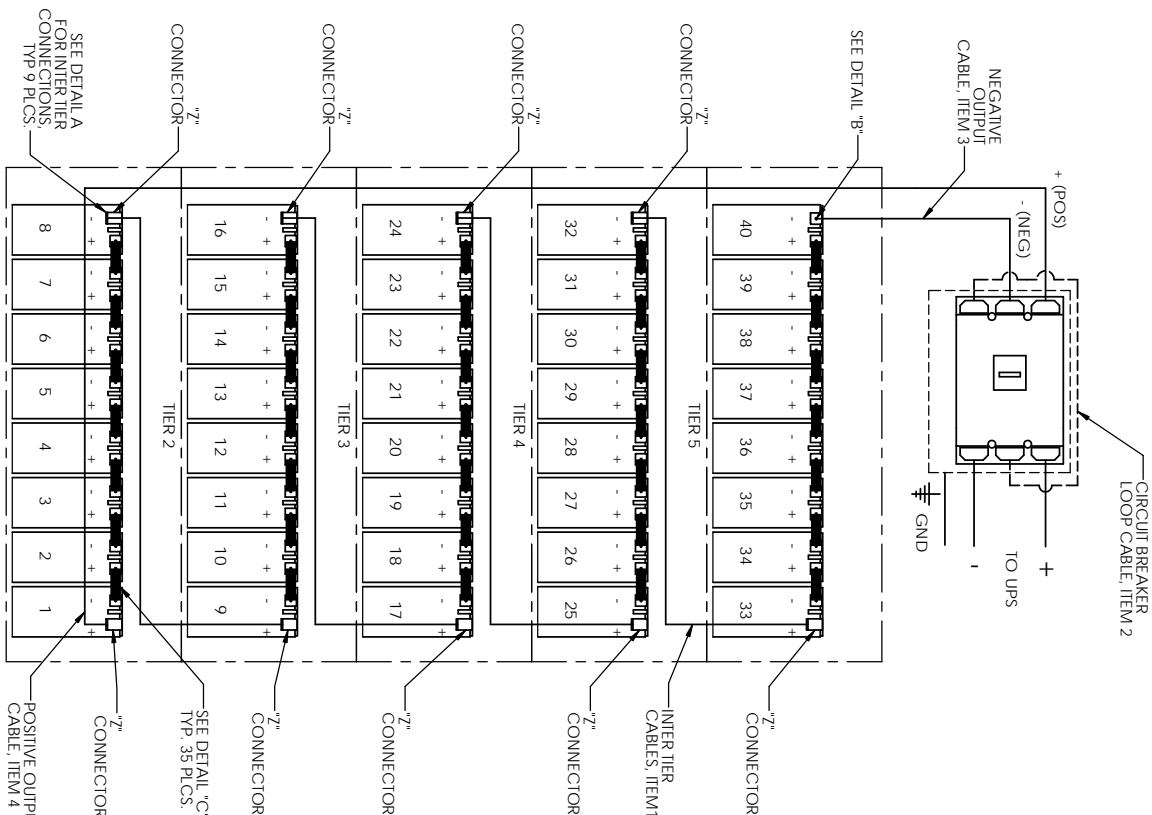
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NOTES:

1. THIS DRAWING IS A REPRESENTATION OF TYPICAL CONNECTIONS FOR THE ESS FRONT TERMINAL BATTERY RACKS.
2. FOR CABLE WIRING DIAGRAMS, REFERENCE THE INDIVIDUAL DRAWINGS IN THE CABINET MANUAL.
3. VIEW A IS SHOWING THE INTER-TIER CONNECTIONS. A "7" CONNECTOR OR "1" CONNECTOR IS PROVIDED CORRESPONDING TO THE CABINET STRING VOLTAGE.
4. VIEW B IS SHOWING THE INTER-TIER CONNECTIONS. A "7" CONNECTOR OR "1" CONNECTOR IS PROVIDED CORRESPONDING TO THE CABINET STRING VOLTAGE.
5. VIEW C IS SHOWING THE TYPICAL CONNECTIONS BETWEEN BATTERIES.

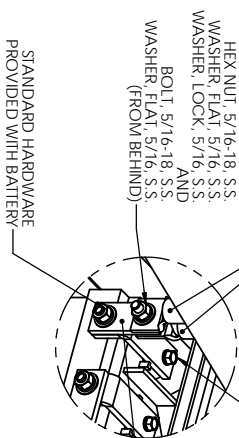


DETAIL A
SCALE 1 : 3

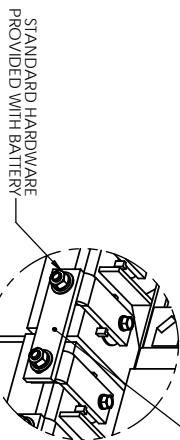
FASTEN "7" OR "1" CONNECTORS TO BATTERIES PRIOR TO LOADING BATTERIES IN CABINET. REFERENCE DIAGRAM FOR "7" OR "1" CONNECTOR LOCATIONS. USE BATTERY HARDWARE PROVIDED.

INTER TIER CABLES. THERE WILL BE SINGLE OR DOUBLE CABLES DEPENDING ON AMPERAGE OF BREAKER. IF SINGLE CABLE, PLACE ON TOP OF THE COPPER CONNECTOR. SEE TABLE FOR CABLE CONFIGURATIONS.

OUTPUT CABLES, TO BREAKER. FASTEN "7" CONNECTORS OR "1" CONNECTORS TO BATTERY TERMINALS USING BATTERY HARDWARE AND TORQUE PER BATTERY SPECIFICATIONS.



DETAIL B
SCALE 1 : 3



DETAIL C
SCALE 1 : 3

125 * CABLE AMPACITY TABLE	
AWG	AMPS
DBL 2/0	600
DBL 3/0	500
DBL 4/0	450
4/0	400
4/0	350
2/0	300
1/0	250
1/0	225
2	200
2	175
4	150
4	125
1	100
1	75
1	50
1	40
1	30

TYP 480V WIRING

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

PROPRIETARY AND CONFIDENTIAL

THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF ESS. NO PART OF THIS DRAWING IS TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, WITHOUT THE WRITTEN PERMISSION OF ESS.

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FAX: 972-276-9844

TITLE: MANUAL DRAWING, GENERAL CONNECTIONS, FRONT TERMINAL BATTERY RACKS

SIZE: DWG. NO. DOC-016100

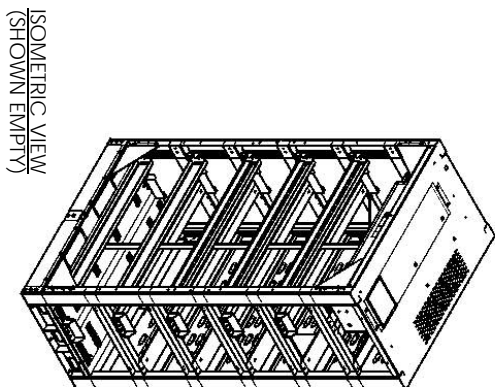
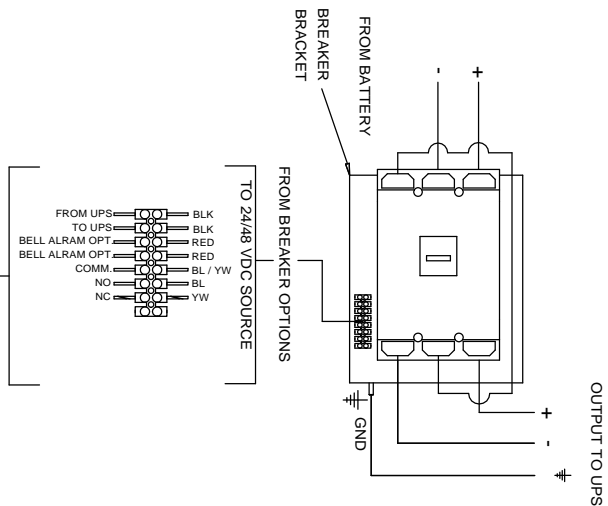
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SHEET 1 OF 1

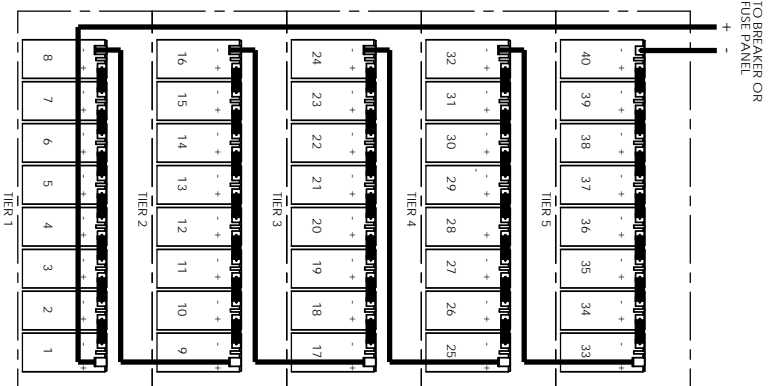
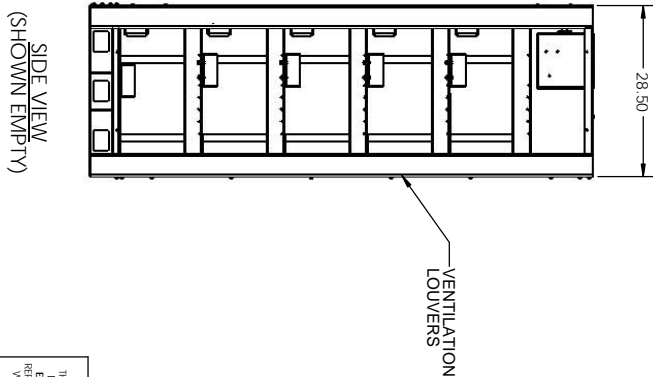
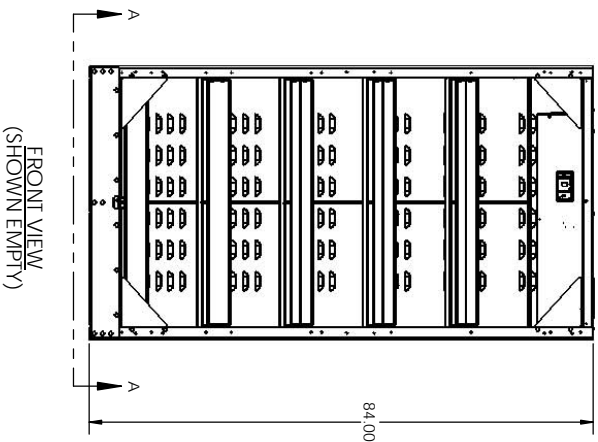
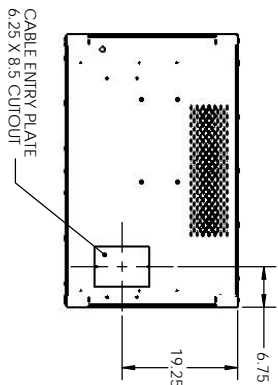
1. EMPTY RACK WEIGHT: 668 LBS. (303 KG)
2. SEE TABLE FOR LOADED WEIGHTS.

BATTERY MODEL	WEIGHT (LBS)
ENERSYS - 12XE1010F-FR	5064
ENERSYS - 12XE110F-FR	5328
ENERSYS - 12XE1150F-FR	5936
EAST PENN. - HR3500ET	3968
EAST PENN. - HR5500ET	5568
C&D - UPS12-355MARF	3968
C&D - UPS12-615MARF	5368
C&D - UPS12-700MARF	6008
C&D - UPS12-410MARF	4040
C&D - UPS12-1000MARF	8288
NORTHSTAR - NSB12-450RT	4248
NORTHSTAR - NSB12-650RT	5488
NORTHSTAR - NSB12-750RT	6248
NORTHSTAR - NSB155FT	5608
NORTHSTAR - NSB170FT	6048
NORTHSTAR - NSB190FT	6248
NORTHSTAR - NSB210FT	6848
GNB - S12V645FT	5688
GNB - S12V735FT	6328

BREAKER DETAIL



ISOMETRIC VIEW
(SHOWN EMPTY)



UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES

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ESS Electronic Systems Support

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Garland, Texas 75041
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FAX: 972-276-9844

PROJECT: EFRS2 BATTERY RACK

DATE: 11/17/17

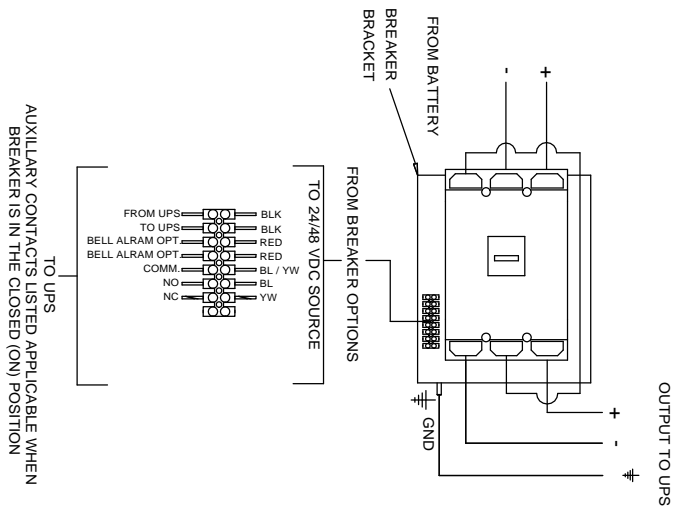
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SHEET 1 OF 1

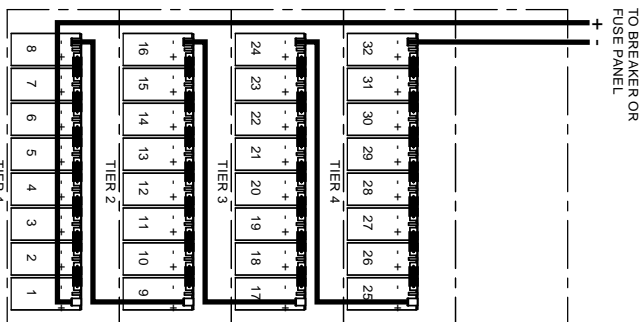
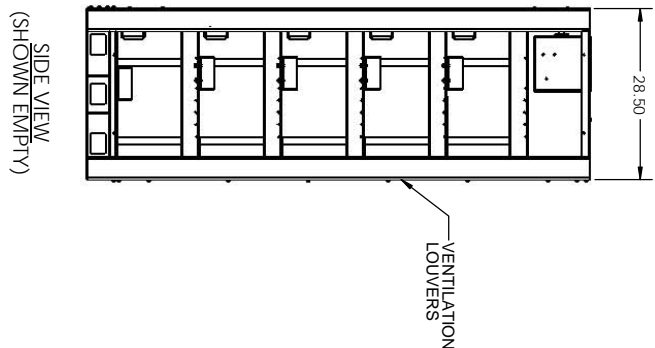
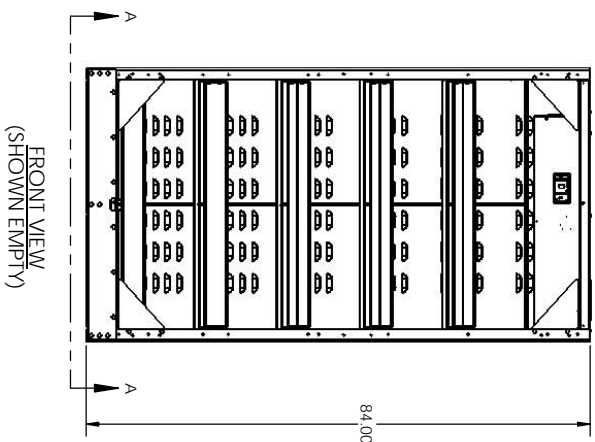
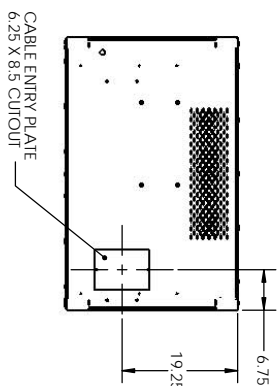
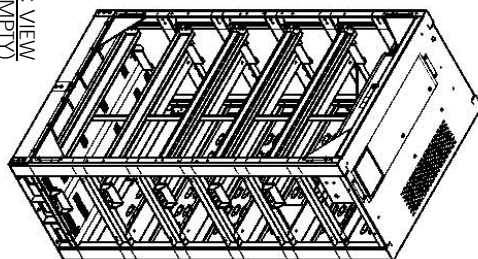
1. EMPTY RACK WEIGHT: 668 LBS. (303 KG)
2. SEE TABLE FOR LOADED WEIGHTS.

BATTERY MODEL	WEIGHT (LBS)
ENERSYS - 12XE1010F-FR	4192
ENERSYS - 12XE1101F-FR	4416
ENERSYS - 12XE1150F-FR	4896
EAST PENN. - HR5300ET	3328
EAST PENN. - HR5500ET	4608
C&D - UP512-355WAF	3328
C&D - UP512-615WAF	4448
C&D - UP512-700WAF	4960
C&D - UP512-410WAF	3360
C&D - UP512-1000WAF	6784
NORTHSTAR - NSB12-450RT	3362
NORTHSTAR - NSB12-650RT	4544
NORTHSTAR - NSB12-730RT	5152
NORTHSTAR - NSB1515FT	4640
NORTHSTAR - NSB170FT	4992
NORTHSTAR - NSB190FT	5152
NORTHSTAR - NSB210FT	5632
GNB - S12V645FT	4704
GNB - S12V735FT	5216

BREAKER DETAIL



ISOMETRIC VIEW (SHOWN EMPTY)



TYP 384V WIRING

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TITLE:	PROJECTION:	SIZE:	DWG. NO.:	REV:	
ESS2 BATTERY RACK	384V, 32 BLOCKS	C	DOC-015500	A	
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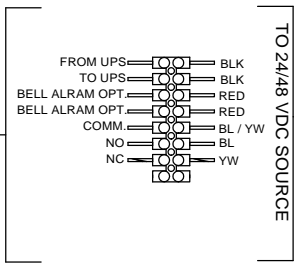
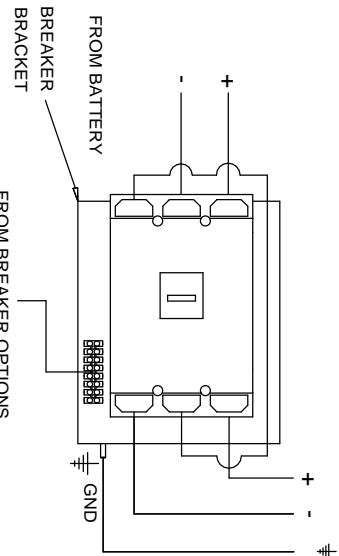


- CABINET NOTES:
1. NEMA 1 DESIGN.
 2. EMPTY CABINET WEIGHT: 681 LBS. (308 KG)
 3. SEE TABLE FOR LOADED WEIGHTS.

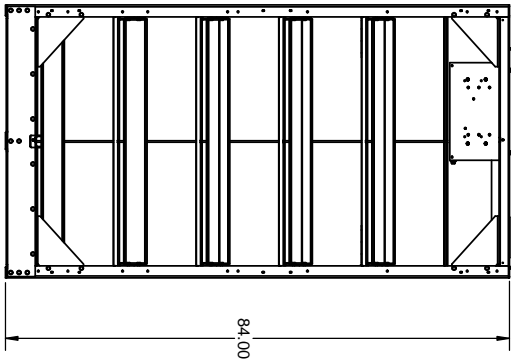
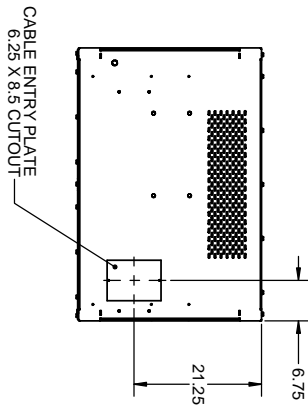
BATTERY MODEL	WEIGHT (LBS)
EAST PENN - HR7500ET	6771

BREAKER DETAIL

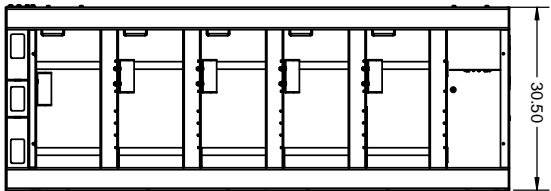
OUTPUT TO UPS



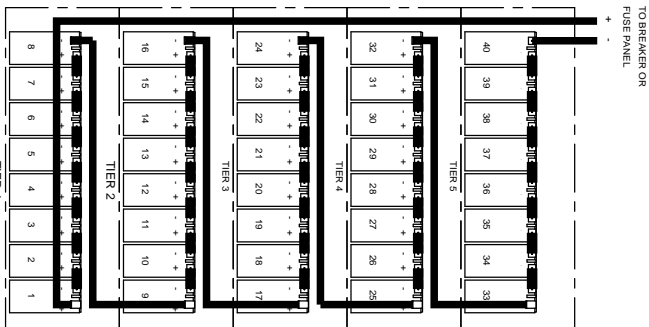
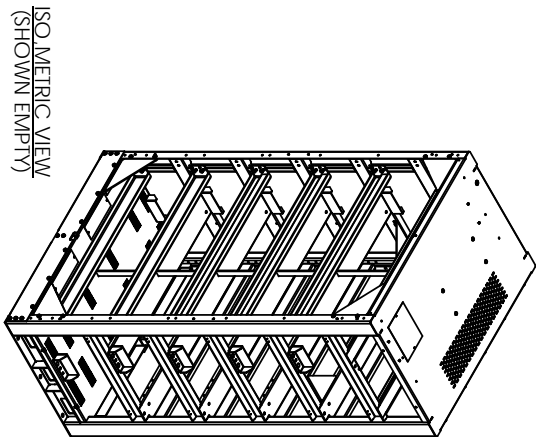
AUXILIARY CONTACTS LISTED APPLICABLE WHEN BREAKER IS IN THE CLOSED (ON) POSITION



FRONT VIEW
(SHOWN EMPTY)



SIDE VIEW
(SHOWN EMPTY)



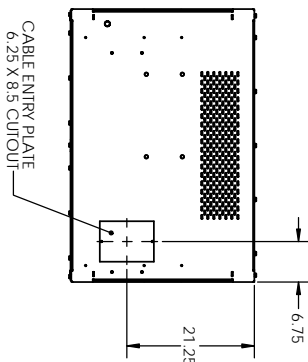
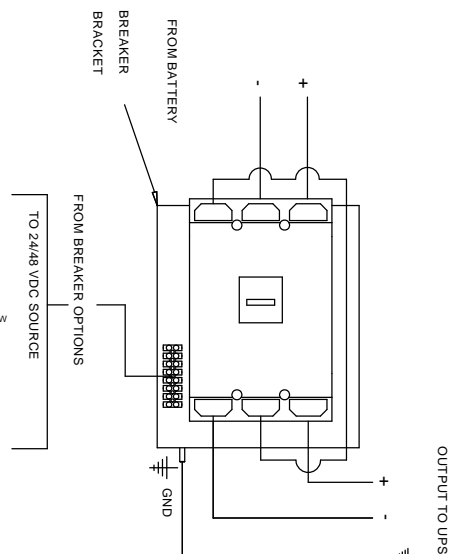
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES		PROJECTION		DATE	
ESS		NAME		DRAWN BY	
Electronic Systems Support		REV		11/17/17	
3233 W. Kingsley Rd. Garland, Texas 75041 PH: 972-272-2468 FAX: 972-276-9844		SIZE		DWG. NO.	
EPR54 BATTERY RACK		C		DOC-015700	
480V, 40 BLOCs		SCALE: 1:16		SHEET 1 OF 1	
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CABINET NOTES:

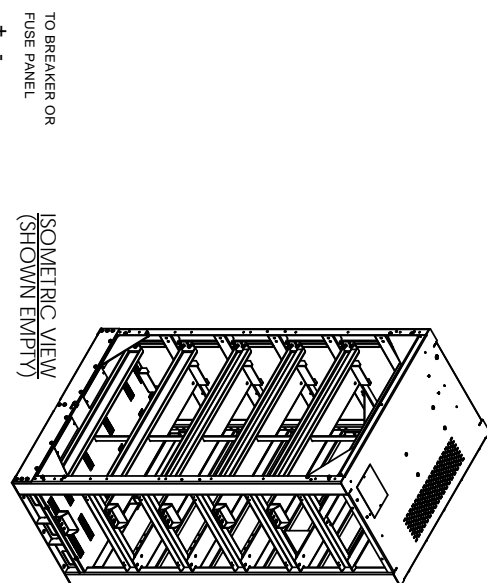
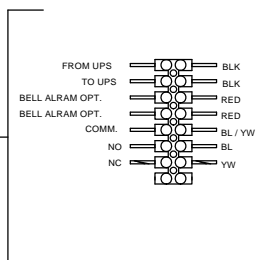
1. NEMA 1 DESIGN
2. EMPTY CABINET WEIGHT: 681 LBS. (308 KG)
3. SEE TABLE FOR LOADED WEIGHTS

BATTERY MODEL	WEIGHT (LBS)
EAST PENN - HR7500ET	5571

BREAKER DETAIL

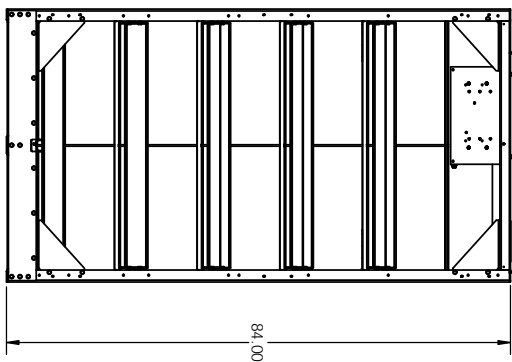


AUXILIARY CONTACTS LISTED APPLICABLE WHEN BREAKER IS IN THE CLOSED (ON) POSITION

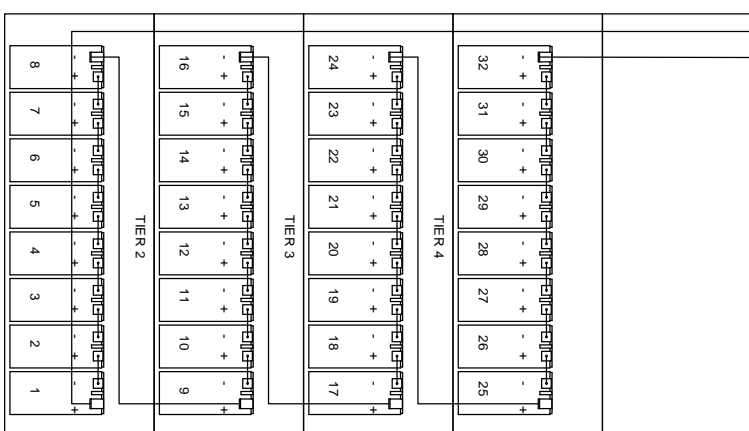
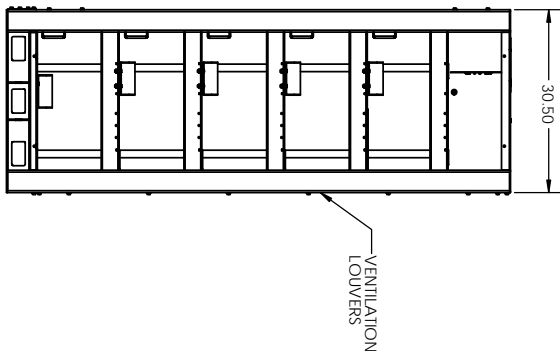


ISOMETRIC VIEW
(SHOWN EMPTY)

FRONT VIEW
(SHOWN EMPTY)



SIDE VIEW
(SHOWN EMPTY)



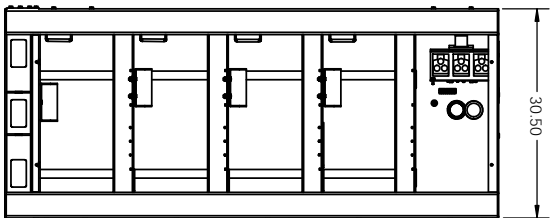
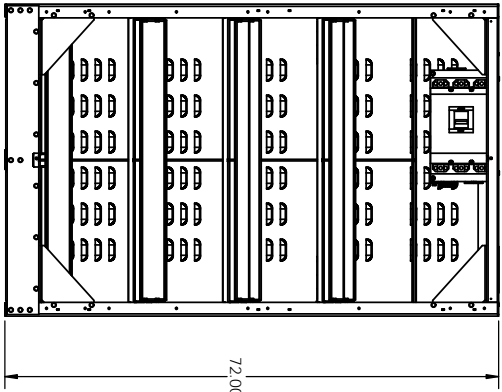
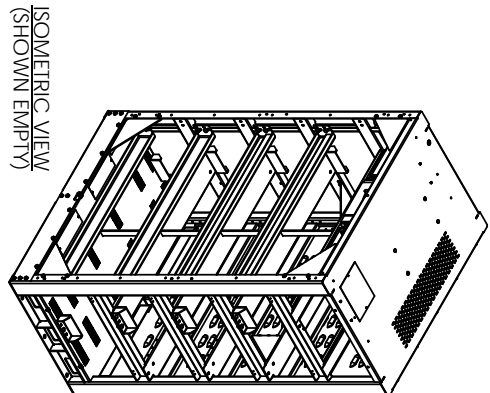
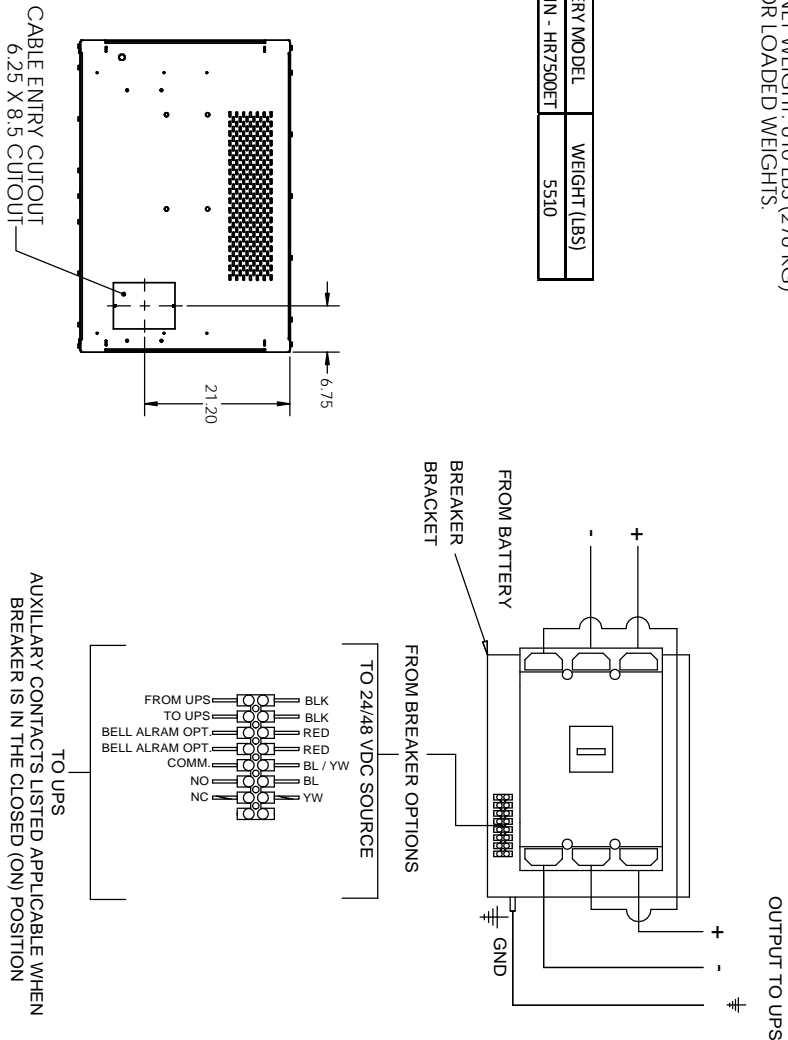
TYP 384V WIRING

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3233 W. Kingsley Rd. Garland, Texas 75041 PH: 972-272-2468 FAX: 972-276-9844		PROJECTION ⊕ DATE	
TITLE: EFR54 BATTERY RACK, 384V, 32 BLOC'S		DESIGNED BY RJW 11/17/17	
SIZE		DWG. NO.	
C		DOC-015800	
SCALE: 1:16		REV A	
SHEET 1 OF 1			

- CABINET NOTES:
1. NEMA 1 DESIGN.
 2. EMPTY CABINET WEIGHT: 610 LBS (276 KG)
 3. SEE TABLE FOR LOADED WEIGHTS.

BATTERY MODEL	WEIGHT (LBS)
EAST PENN - HR7500ET	5510

BREAKER DETAIL



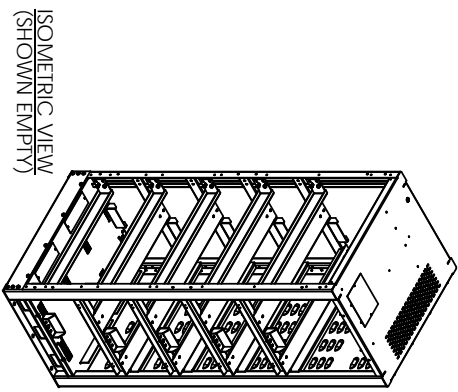
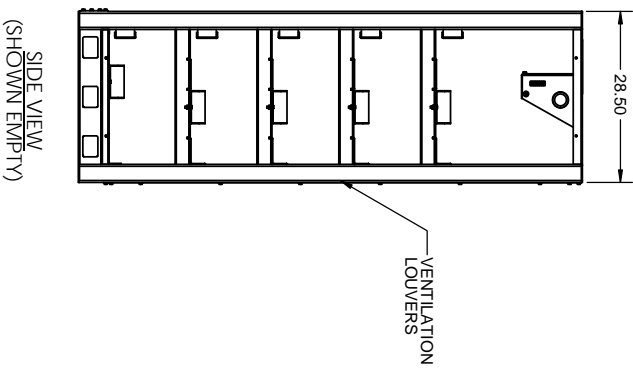
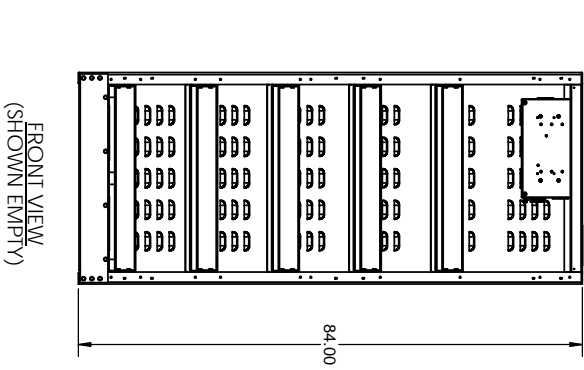
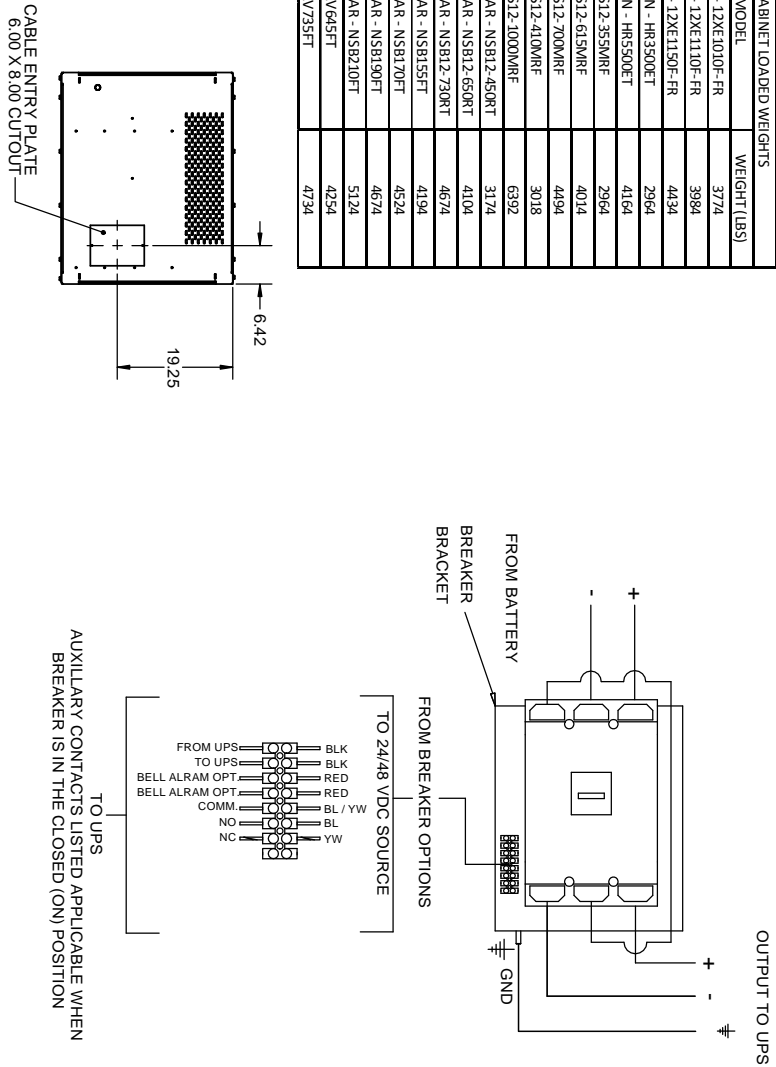
TYP 384V WIRING

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES		PROJECTION		DATE	
ESS Electronic Systems Support		NAME		DRAWN BY	
3233 W. Kingsley Rd. Garland, Texas 75041 PH: 972-272-2468 FAX: 972-272-9844		REV		SHEET 1 OF 1	
TITLE: EFR44 BATTERY RACK		SIZE: DWG. NO. DOC-015900		REV: A	
384V, 32 BLOCs		SCALE: 1:12		SHEET 1 OF 1	

- CABINET NOTES:
1. NEMA 1 DESIGN
 2. EMPTY CABINET WEIGHT: 465 LBS. (210 KG)
 3. SEE TABLE FOR LOADED WEIGHTS.

BATTERY MODEL	WEIGHT (LBS)
ENERSYS - 12XE1010F-FR	3774
ENERSYS - 12XE1110F-FR	3984
ENERSYS - 12XE1150F-FR	4434
EAST PENN. - HR5300ET	2964
EAST PENN. - HR5500ET	4164
C&D - UPS12-355MRF	2964
C&D - UPS12-615MRF	4014
C&D - UPS12-700MRF	4494
C&D - UPS12-410MRF	3018
C&D - UPS12-1000MRF	6392
NORTHSTAR - NSB12-450RT	3174
NORTHSTAR - NSB12-650RT	4104
NORTHSTAR - NSB12-730RT	4674
NORTHSTAR - NSB155FT	4194
NORTHSTAR - NSB120FT	4524
NORTHSTAR - NSB190FT	4674
NORTHSTAR - NSB210FT	5124
GNB - S12V645FT	4254
GNB - S12V735FT	4734

BREAKER DETAIL



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UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

ESS Electronic Systems Support

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Garland, Texas 75041
PH: 972-272-2468
FAX: 972-276-9844

PROJECT: EFR51 BATTERY RACK
DATE: 11/17/17
SCALE: 1:16
SHEET: 1 OF 1



NOTES



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