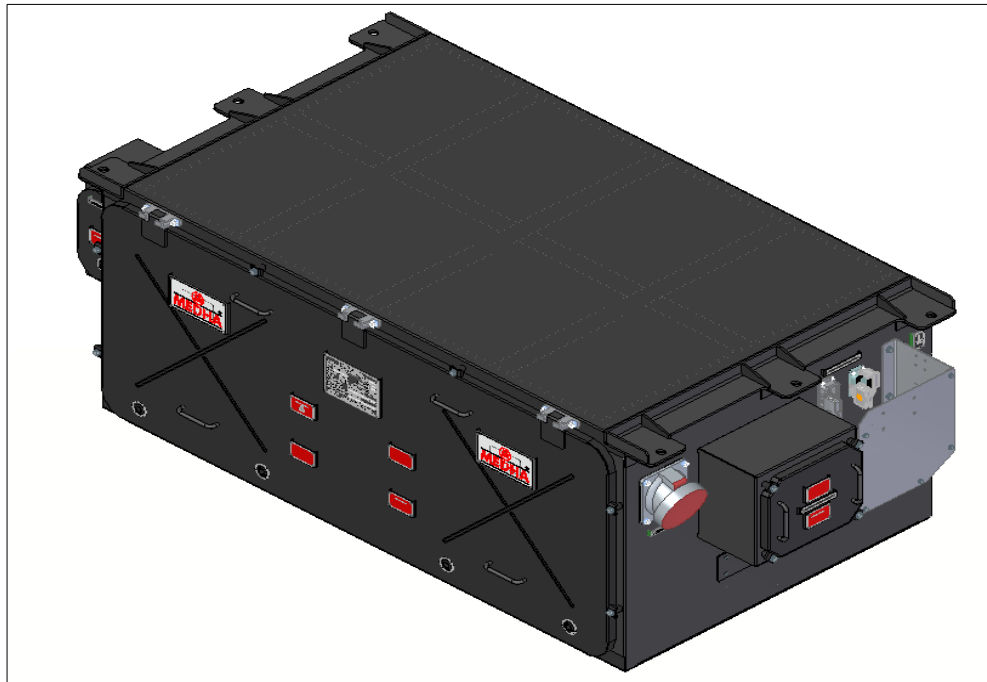




# Maintenance Manual

## TYPE MAE675UV2



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# BATTERY BOX UNIT (BBU)

## 1.1 Introduction

Regulated Static battery Charger fed from three phase auxiliary supply shall be provided. Its rating and charging characteristics shall be matched to the battery, by monitoring of charging current and voltage shall have provision for fine adjustment and good stability with current limitation to avoid overcharging or undercharging of batteries Battery Box Unit (BBU) is proposed in each basic unit

## 1.2 Technical Data & Description of the Interface

### 1.2.1 Mechanical Data

Converter Size	2150 X 1060 X 740 (LXWXH)
Cabinet	SS-304
Mass	990 kg (approx.)
Degree of protection	IP65

### 1.2.2 Electrical Data

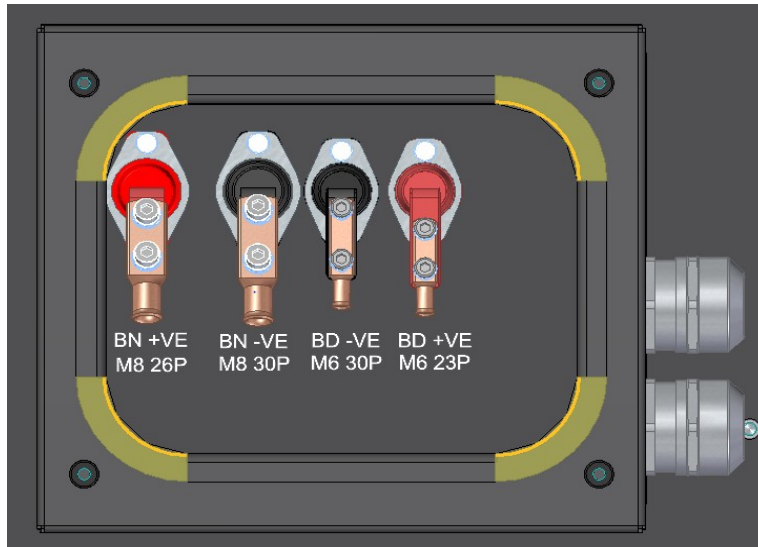
#### BBU:

Requirements	Parameters
Battery Type	LFP
Battery Capacity	3 x 228 Ah
Battery Energy	70.4 kWh
Nominal Voltage	103 VDC
Voltage Range	86 VDC to 116VDC
Battery Module Arrangement	8S3P
Battery Designation	IF P54/174/208[((4S)8S)3P]E-10+65/80

## 1.3 External Interface

### 1.3.1 Input/Output Terminals and connections

S. no.	Connection Name	Terminal	Recommended wire size
1	Battery N +Ve	BN +Ve	70mm <sup>2</sup>
2	Battery N -Ve	BN -Ve	70mm <sup>2</sup>
3	Battery D -Ve	BD -Ve	35mm <sup>2</sup>
4	Battery D +Ve	BD +Ve	35mm <sup>2</sup>



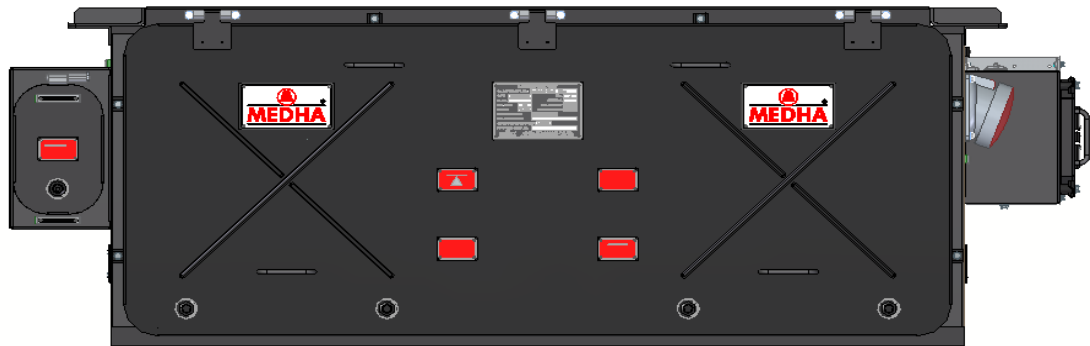
### 1.3.2 Control connectors (CON1 & CON2)

There are two control connectors (CON1 & CON2). CON2 is used for 110 V DC control supply and for digital signals and CON1 is used for interface between TCMS and BBU with Ethernet communication.

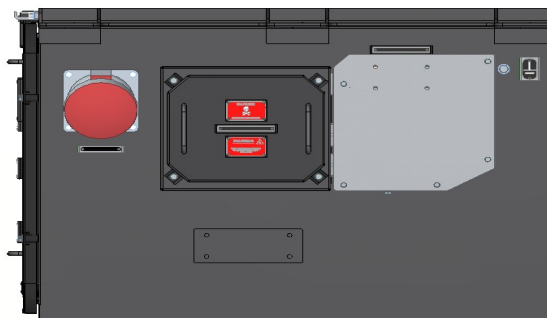
## 1.4 Design

### 1.4.1 Structural Design

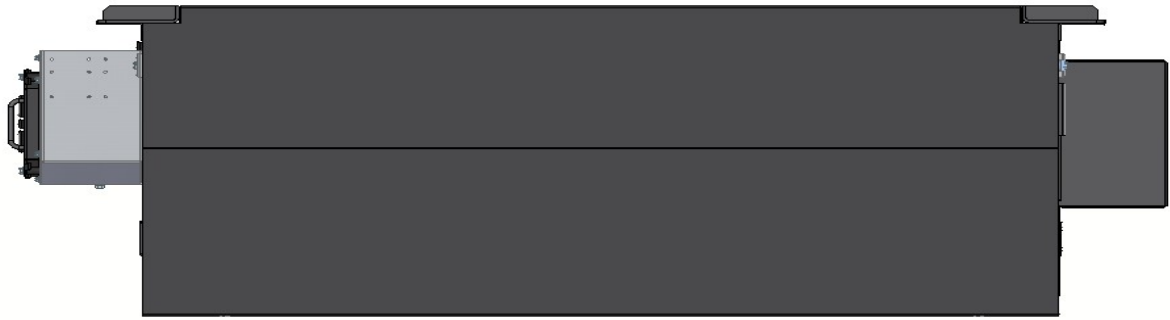
BBU Cabinet is designed to be installed in under slung of NDTC coach . LHS, RHS, front and back views are shown below.



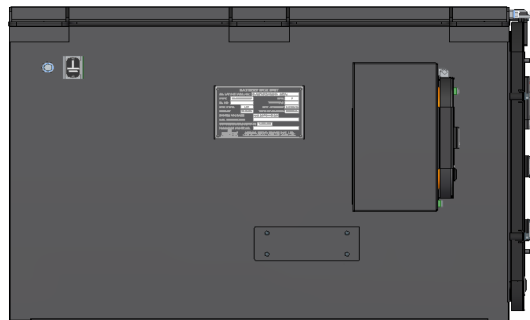
Front View



Right Side View



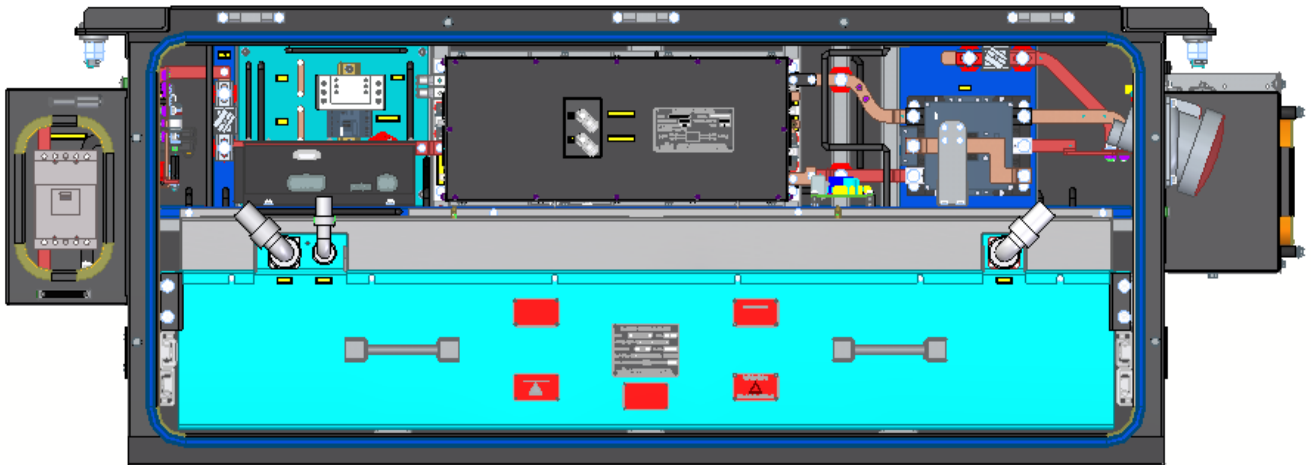
Rear View

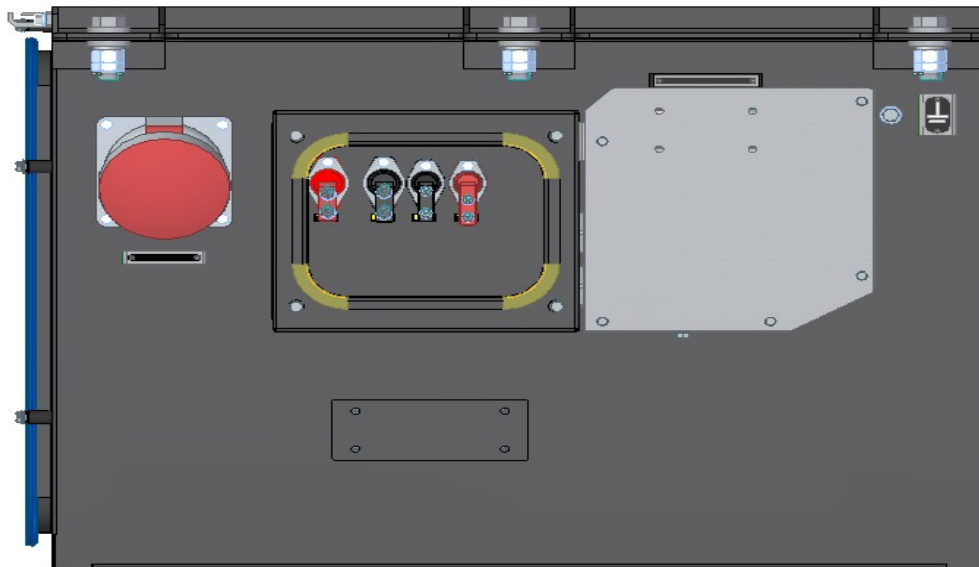


Left Side View

## 1.5 Component Layout in the Cabinet

The following diagram show the position of the major components in the BBU.





## 1.6 Accessibility

The Battery Box modular system can be accessed and serviced quickly and easily.

## 1.7 Cooling

The BBU is Natural-Cooling Unit

## 1.8 Safety Instructions

To prevent accidents follow these steps:

1. Put the train in duty position
2. Verify that there is no voltage remaining between DC+ and DC- by measuring with a voltmeter.
3. Ensure the adequate cooling time has been allowed, if train has recently been running.
4. Use appropriate depot Personal Protective Equipment (PPE) when working with hot components and dusty environment.
5. Always wear a dust mask when working in dusty environment.
6. Please follow safety instructions on related assembly.

### 1.8.1 Personal safety

Before commencing any work on the vehicle the personnel shall always:

- Set the vehicle to the correct operating position for the task to be performed
- Study the necessary safety precautions within the documentation and on the vehicle

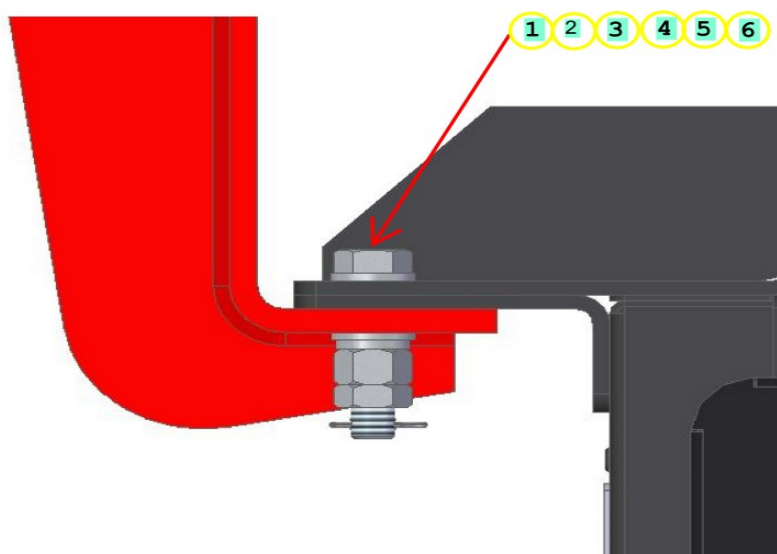
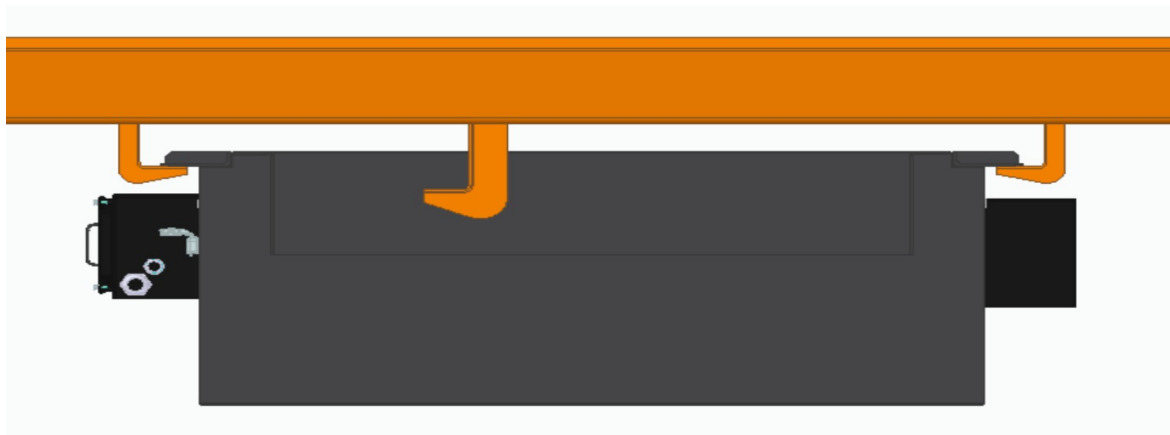
## 1.8.2 Work on vehicle

When carrying out maintenance work on the vehicle, the instructions should be followed carefully.

- Always use protective clothing and protective equipment.
- Make sure you have worn the safety shoes, gloves
- Set the placard “Work in progress” or follow the employer instruction.
- Before commencing work on the vehicle, ensure that all voltage is disconnected.

## 1.9 Mounting:

1. Ensure that the unit bolted tightly there should not be any slackness of mounting fasteners and cotter pin should be intact to lock nut.
2. Check the converter unit for any damage.





## 1.10 Maintenance Schedule Check list

S. no.	Connection Name	10 Days	30 Days	180 Days
1	Ensure that the Battery Box unit is bolted tightly to the vehicle	√	√	√
2	Check the unit for any damage	√	√	√
3	Clean information and warning labels on doors.		√	√
4	Check the healthiness (color) of silica gel, they should be blue, replace silica gel if found pink.			√
5	Ensure that the door sealing gaskets are free from from cut marks and physical damages.			√
6	Visual Inspection of all the mounting hardware for the mechanical and electrical components for any slackness by seeing changes in torque markings.			√
7	Check electrical connections and ground connections for corrosion to resolve. Ensure that connections are tight.			√
8	Check components and cables for damage. If found address them.			√
9	Do visual inspections for evidence of excessive temperature and arcing (Voltage flash overs) and resolve it.			√
10	Ensure that all the cable ties are tight and intact.			√
11	Check the healthiness of Fan, there should not be any abnormal sound.			√
12	Open and clean unit doors. Remount properly with all bolts.			√
13	While doing maintenance if any abnormality / damage found, it should be addressed on need (issue severity) basis.			√

### 1.10.1 Cleaning

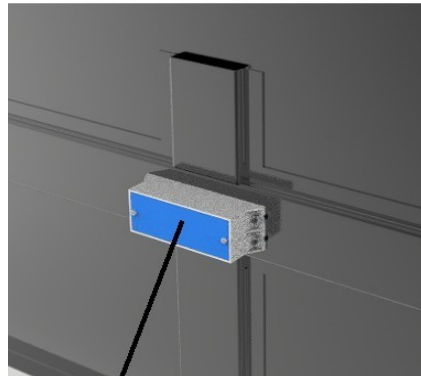
- After cleaning reassemble the Doors to the unit.

### 1.10.2 Batteries cleaning procedure

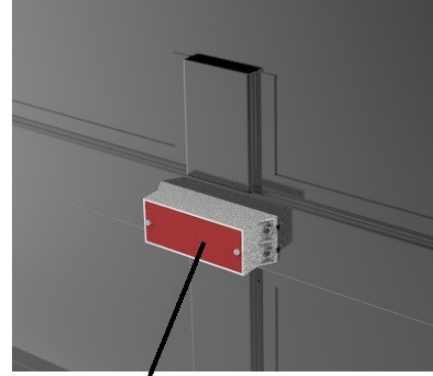
- Clean the Batteries surface (i.e., outer surface, terminals and other accessible dust deposited surfaces) with soft brush only.
  - Suck the dust with vacuum cleaner .
  - Blow the forced air on the Batteries
- Note: Ensure Cradle locking position

### 1.10.3 Common Checklist

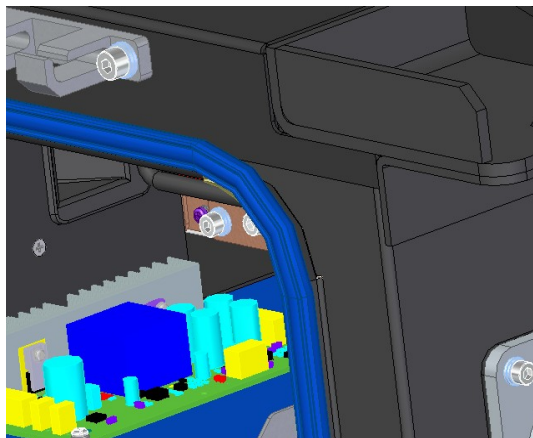
1. Clean all doors & its name plates.
2. Check healthiness(color) of Silica gel (Inside the doors), they should be Blue, Replace silica gel if found Pink.



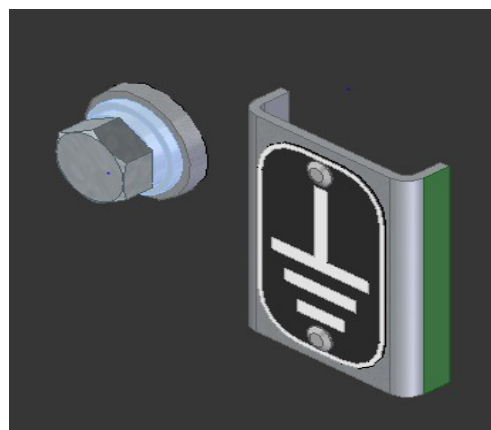
BLUE  
COLOR  
(HEALTHY)



PINK  
COLOR  
(UN-HEALTHY)



3. Ensure that all door sealing gaskets are free from cut marks and physical damages, If found replace with new one.
4. Visual Inspection of all the mounting hardware for the mechanical and electrical components for any slackness by seeing changes in torque markings.



5. Check electrical connections and ground connections for corrosion to resolve. Ensure that connections are tight.

- Clean all Batteries surface (i.e., outer surface, terminals and other accessible dust deposited surfaces) with soft brush only. Suck the dust with vacuum cleaner & blow the magnetics with blower.

### 1.11 List of line Replaceable Units (LRU's)

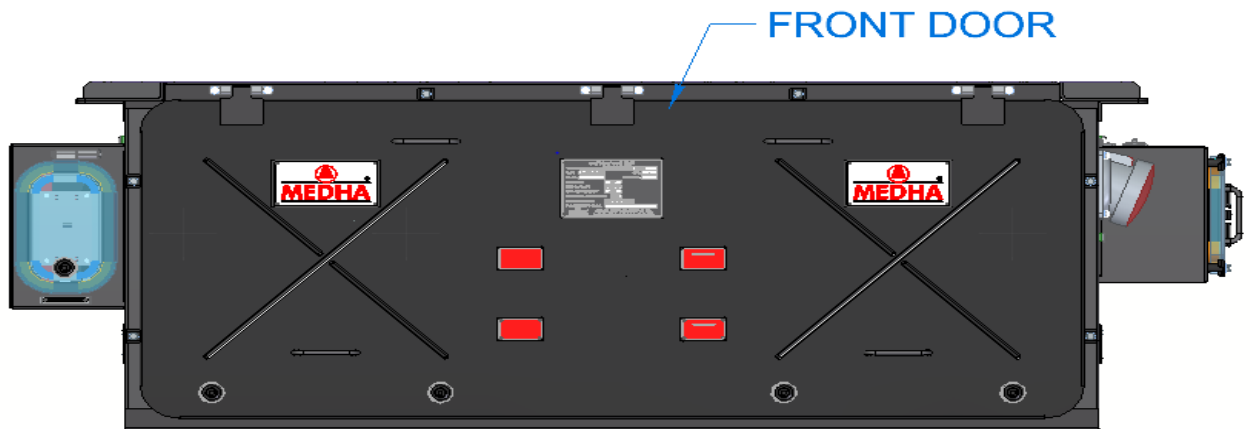
**Battery charger module**

**BMS module**

**Battery module**

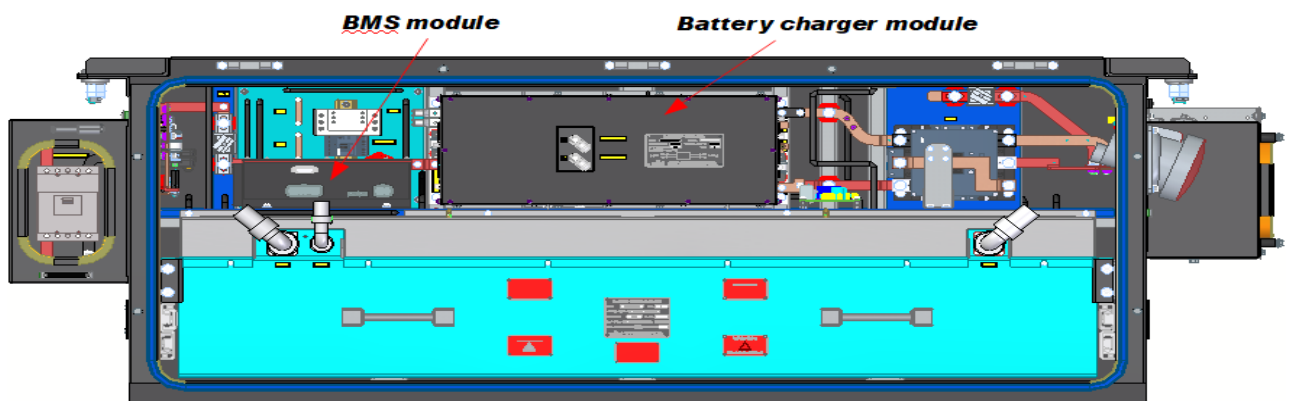
### 1.12 Modules replacement procedure

- For accessing key-B refer Interlocking section 1.10



- Open the Front door lock with key-B and Place the door aside( Module chamber door is shown in below image.)

#### **BBU FRONT VIEW WITH DOOR**



#### **BBU FRONT VIEW WITH OUT DOOR**

### 1.13 Battery charger module replacement procedure

Unplug the electrical connectors

Remove electrical busbar connections

Remove earth connection

Remove the module mounting hardware (M8 socket screws) using extended allen key

*Remove the module and replace with the new module*

***Reconnect/ Remount all components & apply required torque If any abnormality/ damage found, it should be addressed on need basis, by following the common check list mentioned in Section 1.10***

### 1.14 BMS Module replacement procedure

a) Unplug the electrical connectors

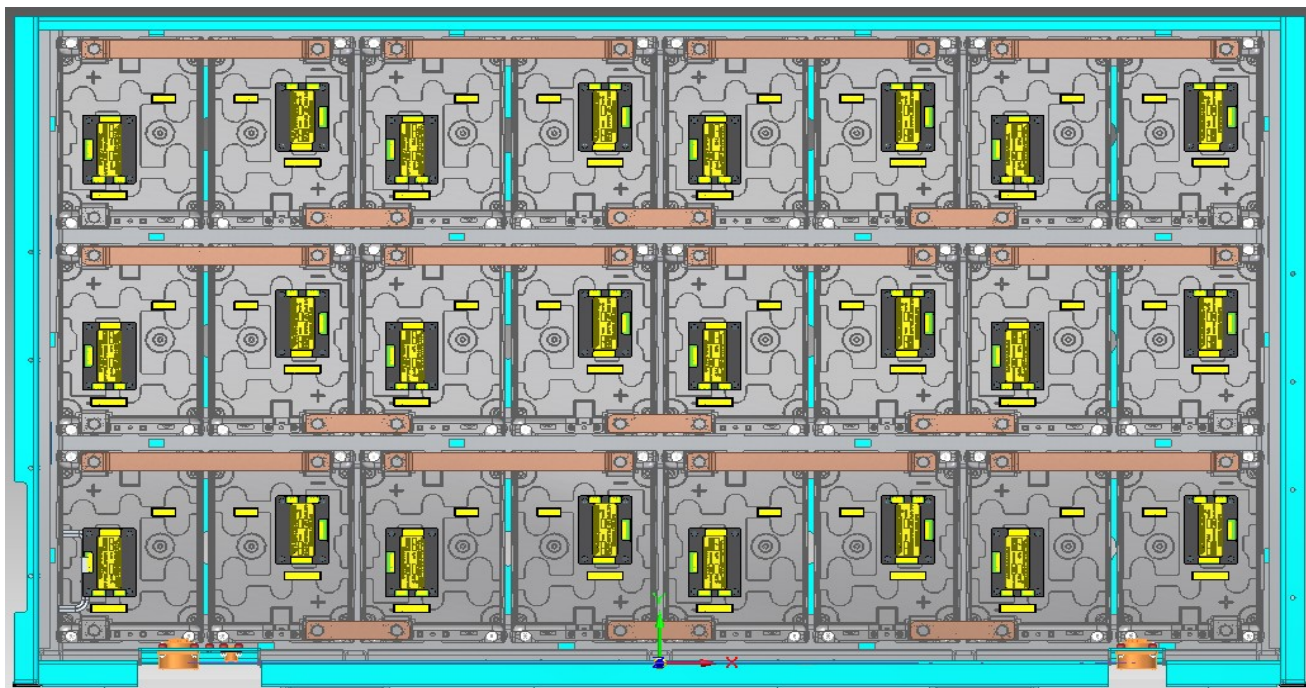
b) Remove earth connection

c) Remove the module mounting hardware (M8 socket screws) using extended allen key

d) Remove the module and replace with the new module

e) Reconnect/ Remount all components & apply required torque If any abnormality/ damage found, it should be addressed on need basis, by following the common check list mentioned in Section 1.10

### 1.15 Battery Module replacement procedure



a) Unplug the electrical connections

b) Remove Cradle assembly top cover.

c) Remove the Cradle assembly mounting hardware

- d) Pull the Cradle assembly by holding two handles.
- e) Unplug the electrical connections between batteries.
- f) Unscrew the hardware of Lugs & Busbars
- g) Remove the Lugs & Busbars between batteries.  
Unscrew the hardware of battery.
- h) If any abnormality/ damage found, it should be addressed on need basis, by following the common check list mentioned in Section 1.10

### **1.16 Maintenance of Heat Sinks**

No maintenance is required for the Heat sinks. In case if there is any Heat Sink thermal performance degradation is identified through temperature derations or shutdowns in the converter even if the blower motor is running in the right direction, then remove the Heat Sink module and clean it as per the procedure given below.

#### **1.16.1 Heat sink cleaning**

- Remove the modules from the unit as per procedure mention for removing and replacing LRU's
- Clean the Heat sink fins with ISO-propyl alcohol by using lint free cloth and brush. Suck the air through fins by vacum blower for removing the dirt from fins.

Maintenance Manual

## **BATTERY BOX UNIT FOR TRAIN 18 TYPE MAE 675 UV2**

# **BATTERY BOX UNIT FOR TRAIN18**



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