## 1.4 Battery Mode (BMO)

**1.4.1 Feature Objective:**

The objective of designing the battery mode (BMO) system is to monitor the outputs of Battery State Control, Contactor Control and decide which mode is battery is in. Battery Mode helps other features to carry out their functionality depending upon what state the battery is in, e.g. Contactors Closing or Charging or Sleeping.

**1.4.2 Functional Description:**

There are 8 modes which are determined by the BMO feature. Description of the modes are given below:

Mode 0 : BMS Power off : BMS hasn’t received any wake-up signal. This is the default output from the controller.

Mode 1 : BMS Power on : BMS has received wake-up signal through either key or charger.

Mode 2 : Contactor Closing : When the contactors are being closed, i.e. pre-charge contactor + main contactor or charger contactor.

Mode 3 : Power Closed : When the contactor closing procedure is complete and the battery is connected to the vehicle or the charger.

Mode 4 : Contactor Opening : When the contactors are opening due to key or charger being turned off or due to a fault.

Mode 5 : Charging : Once the Power is closed (Mode 3) it is in charging mode if the current is fed into the battery pack.

Mode 6 : Discharging : Once the Power is closed (Mode 3) it is in discharging mode if the current is drawn from the battery pack.

Mode 7 : ChargingSleep : Once BSC gives a Sleep Status of battery and the contactors opened, but the socket charger is still connected.

**1.4.3 I/O description:**

The BMO feature requires the dynamic I/O shown in the following table

|  |  |  |  |
| --- | --- | --- | --- |
| **Signal(s)** | **I/O** | **Description** | **Units/comments** |
| vitm\_veh\_voltage | Input | Vehicle Side Voltage from VITM | V |
| vitm\_pack\_voltage | Input | Battery Pack voltage form VITM | V |
| vitm\_pack\_current | Input | Battery Pack current from VITM | A |
| key | Input | Key Signal | state |
| charger | Input | Charger Signal | State |
| cc\_pre\_cmd | Input | Pre-charger contactor command from CC | State |
| cc\_main\_cmd | Input | Main Contactor command from CC | state |
| cc\_chg\_cmd | Input | Charger Contactor command from CC | State |
| bsc\_sleep\_status | Input | Sleep status of battery from BSC | State |
| bmo\_mode | Output | Calculated Battery Mode | State |
| bmo\_charging\_status | Output | Output to know if Battery Mode is in charging | State |
| bmo\_discharging\_status | Output | Output to know if Battery Mode is discharging | State |