

# Technical Specification

## NON AMBIENT IN-OPERANDO SYSTEM

Model : BES rev2.1

### Revisions :

Revision	Date	Initials	Comments
1	Dec 1, 2021	G.A KANG	First Draft

### References :

Ref No.	Documents ID	Initials

**PDC TECHNOLOGY**

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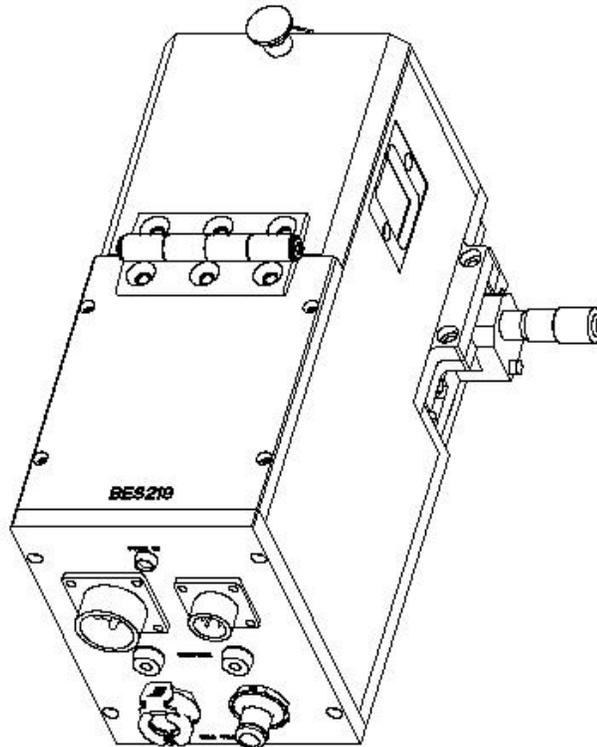
## 1. General

### 1.1 Purpose

This is the Non ambient Battery Test system(BES) developed to measure the electrode reactions which occur during charging and discharging with XRD.

### 1.2 Description

The size of the BES is W162mm×D255mm×H138mm. This system is suitable for Research & Development. The BES attachment is designed to mount on the Panalytical XRD System.



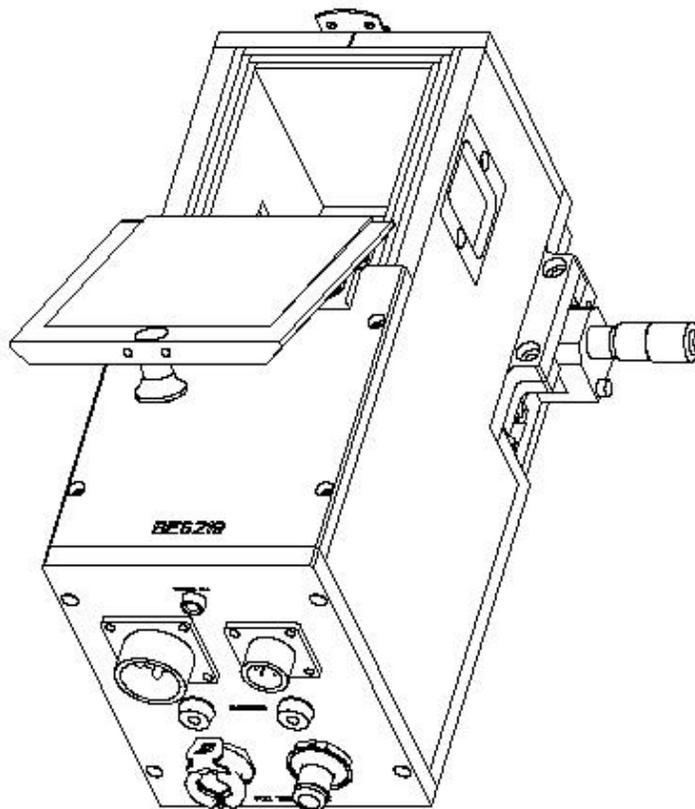
External view of BES module

## 2. Configuration

The standard configuration of the BES consists of the following components.

## 2.1 Main Chamber

Whole Dimension	W162mm×D255mm×H138mm
Main Body	Aluminum 5052
Hard Insulator	Phenol Resin
Middle Insulator	PEEK or POM
Surface Insulator	Heat Resistance PE



External view of Chamber module

## 2.2 Pouch cell Holding Module

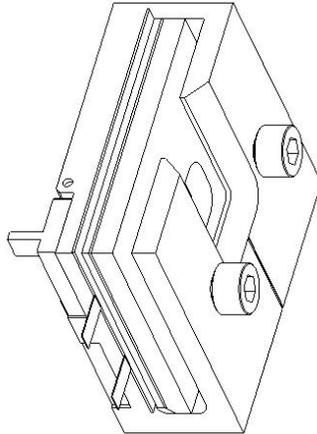
Whole Dimension	W62mm×D39mm×H56mm
Main Body	PEEK and Silicone rubber
Pushing Plate	PEEK and Silicone rubber

Pushing & fixed Type

Wrench Bolting

Electrode

Copper



**External view of pouch cell holding module**

### **2.3 Coin cell Holding Module**

Whole Dimension

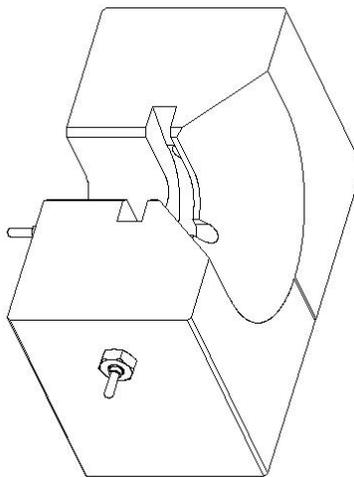
W111mm×D117mm×H92mm

Main Body

PEEK

Electrode

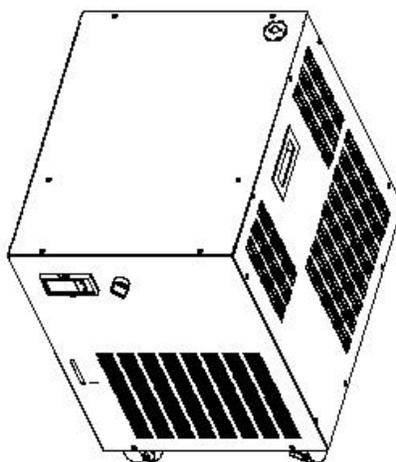
Au coated Nickel pin



**External view of coin cell holding module**







**External view of chiller module**  
(It may be different from the picture)

### 3. General specification

XRD Measurement Range	Incident Angle( $\theta$ ) : 0° 2 $\theta$ Measurement : > 30°
Number of Poles	2 Poles
Temperature Range	-10°C ~ 70°C
Pouch Cell Sample Size	Max. W60mm×H60mm
Coin Cell Sample Size	2032 cell
Control Type	Peltier PID
Resolution	±0.1 °C
Control accuracy	±0.2 °C

### 4. Inspection Condition

The inspection condition of the BES consists of the following configurations.

#### 4.1 XRD System (Based on Panalytical XRD)

Detector	More than "Pixel 1D" X'celerator & etc : Check Panalytical
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Optic	BBHD FDS & etc : Check Panalytical
Tube	Cu or Mo (The intensity depends on the tube life time, Plz Check it.)

#### **4.2 Sample (Based on Cathode Material / Coin cell basis)**

Cathode Material	LCO (Lithium Cobalt Oxide)
Cathode Diameter	D > ø14mm
Cathode Weight	W > 50mg
Separator Size	D > ø18mm (Recommend)
Li Metal Size	D > ø16mm (Recommend)
Li Metal Thickness	300um

#### **4.3 Battery Characteristics (Coin cell basis)**

It is compared with the capacity.

LCO Ideal Capacity	140 mAh/g
Charge/Discharge, ISBC	C > 110 mAh/g (80%)

#### **4.4 Charge / Discharge Conditions**

Rest Time	10 Hour
C rate	0.1 C
Cycle	2 Cycle

### **5. Warranty**

PDC Technology provides a warranty against equipment failure due to deficiency in design and manufacturing of the equipment for repair and replacement of parts free of charge to the customer within 12 month from acceptance. However, consumable items such as Cell, Be sheet and O-rings shall be excluded from the warranty.