

Operation manual for the XX sub-system  
of HERD full-functional prototype at CERN Beam Test 2021 (V0.1)

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## 1 Introduction

### 1.1 Introduction of the XX sub-system

Figure 1-1 Illustration of XX sub-system

Table 1-1 Device list of XX sub-system

No.	Device name	Function
1.		
2.		

\*

### 1.2 Purposes of BT for XX sub-system

## 2 Hardware

### 2.1 Unpacking

Number	Device	Dimension(m)	Remark /Use
1	General table	3.2*1.6*1.4	
2	Electric cabinet	0.6*0.5*0.8	Power and control of table
3	Prototype	1.6*1.6*0.9	-Tile and trigger electronics
4	Supporting device box	1.4*1.4*0.8	TRD, cables, computers and tools



1. General table



2. Electric cabinet



3. Prototype



4. Supporting device box

Figure 1. All the devices and packing boxes

## Unpacking process

Firstly , unpacking the supporting device box(number 4) to find some tools;

This aluminum box contains all the tools needed in next steps. We just need to remove the box cover, then we could get all the devices. Do not remove the box from its wooden base support, or we will need to remake a new one when devices come back to china after beam test.

\* Forklift won't be needed for this supporting device box. Below read unpack step details.

**Step 1.** unwarp the plastic film , and then loosen the tightener ;

**Step 2.** Remove the cover to find AUX carton , and take out the tools numbered **AUX-4,5, AUX-15 ,AUX-17**

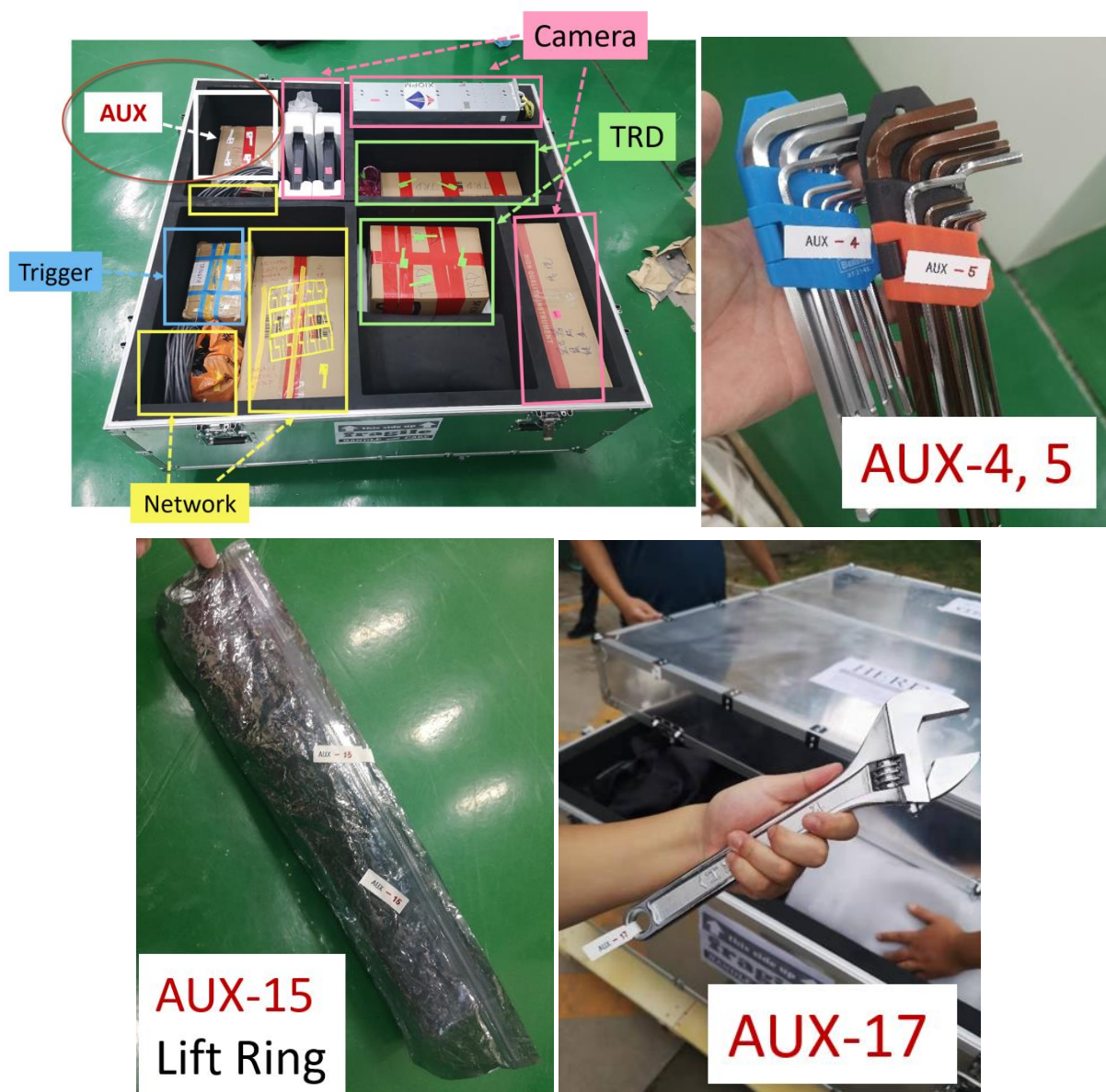


Figure 2. Devices's position in the box and serial number

Secondly , unpacking prototype (number 3)

\* Forklift won't be needed for this prototype box.

**Step 1.** unwarp the plastic film , and then loosen the tightener fixing the aluminum box .

**Step 2.** Using allen key (AUX-4,5,) unscrew the bolts all around the aluminum box , remove the cover .

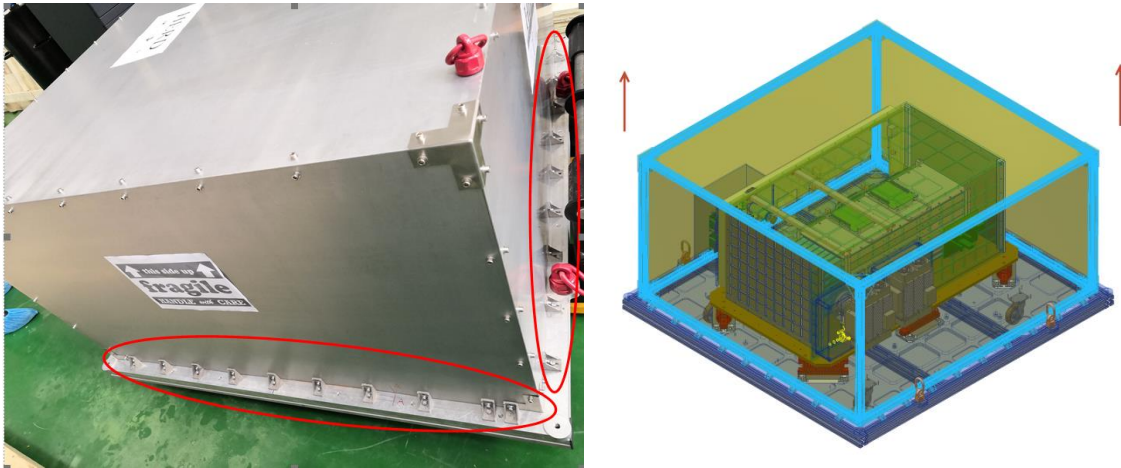


Figure 3. Aluminum box's cover

**Step 3.** Remove four handles on the short sides after using allen key (AUX-4,5.) unscrew the bolts ;

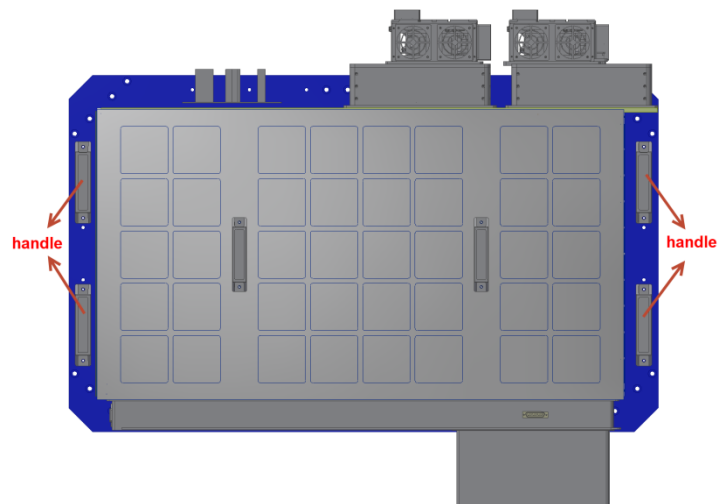


Figure 4. Handles in prototype

**Step 4.** Install four lift rings and washers on the bottom plate which were packed in the bag numbered AUX-15 (Do not forget the washers between the rings and bottom panel) , the holes are under four handles , adjustable spanner (AUX-17) can be used to tighten the rings .



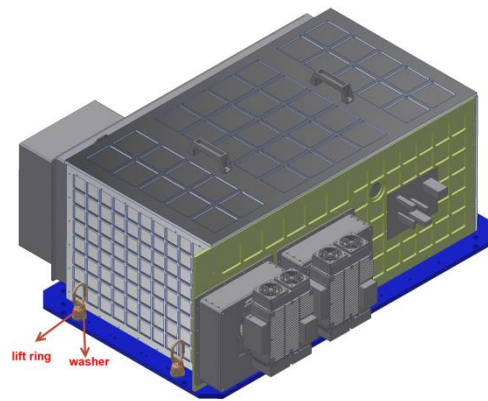
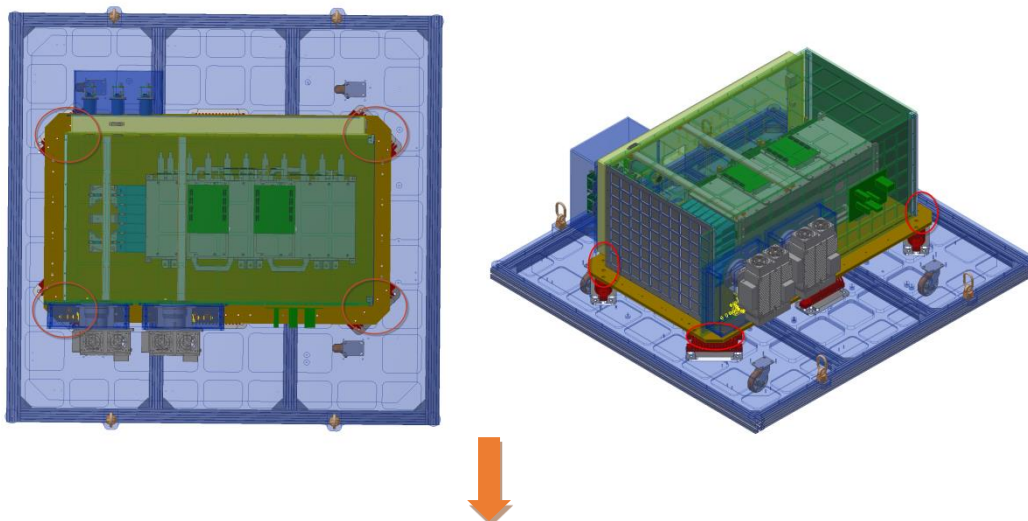


Figure 5. Lifting rings in the prototype

**Step 5.** Unscrew the bolts fastening the prototype and the damper at four corners, do not dismantle the dampers .



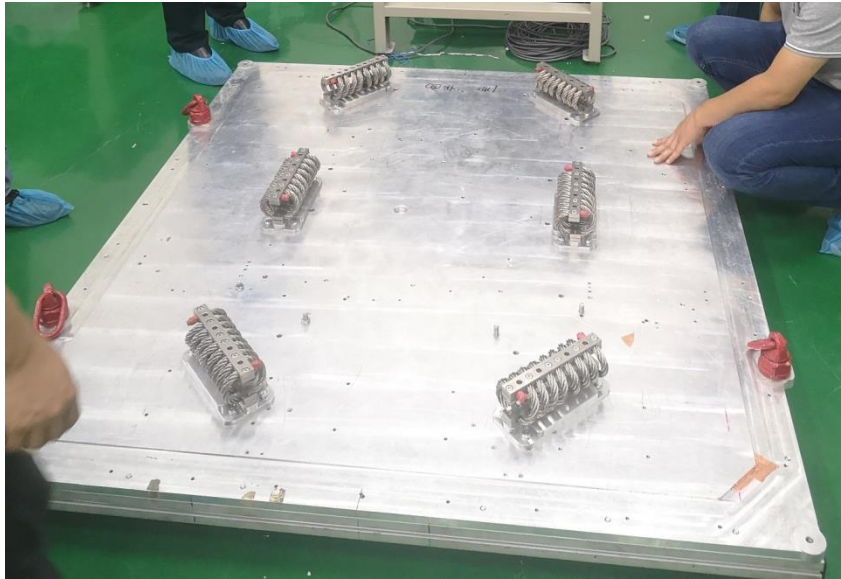


Figure 6. Bolts and dampers of the prototype

**Step 6.** open the top cover of prototype ,remove lead sheath and Install PD electronics

**Step 7.** Lifting the prototype to test or beam area with 4 lift rings on the bottom plate.

Thirdly ,unpacking the General table

\* Forklift must be needed.

**Step 1.** Unpack the wooden box , disclose the general table ;

**Step 2.** Remove all the bolts on the four corners which used to fix the binding belt;

Step 3. The translation stage weighs 1500kg, so forklift must be needed. After all the belts are removed and the stage is free. Forklift could begin work. In this step, please be careful and pay more attention, it is "the forklift can only lift the translation stage from one specified side of the stage". In one of the two long-edges of the translation stage, words "fork this side" was wrote, Forklift can only work from this side. Every time, if the translation need to be moved, forklift can only be allowed to work in this way.





Figure 7. Bolts and belts fastening the translation stage

Lastly unpacking Electric cabinet box

\* Forklift must be needed.

This cabinet weighs 100kg, also need forklift to remove it from the wooden-case. But there is no specified side that the forklift need to stick to. Forklift can work from either side of the two long-edges.

**Step 1.** Unpack the small wooden box , inside it is the electric cabinet (Number 2), Emergency stop panel was uninstalled for its size's exceeding in height direction;

**Step 2.** Using the phillips screwdriver unscrew the two phillips screws inside the cabinet , then install the emergency stop panel on top of the cabinet using these two screws .

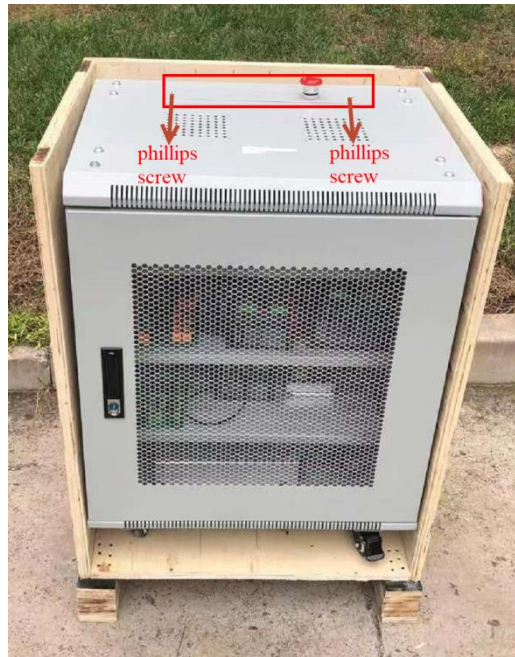


Figure 8 The electric cabinet of the translation stage

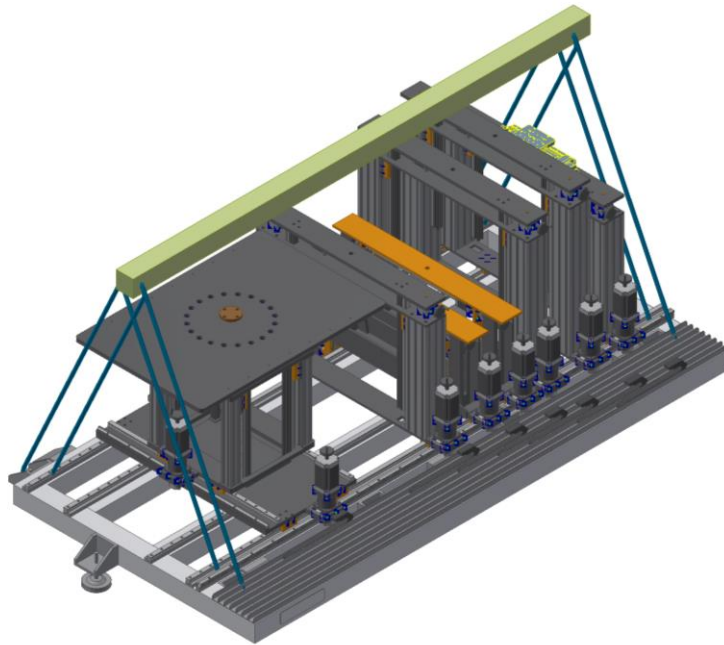
## 2.2 On-site transportation and connection

Number	Device	On-site transportation	note
1	General table	lifting	One Lifting beam and four lifting belts
2	Electric cabinet	Hanging basket	
3	Prototype	lifting	four lifting belts
4	Supporting device box	Hanging basket	

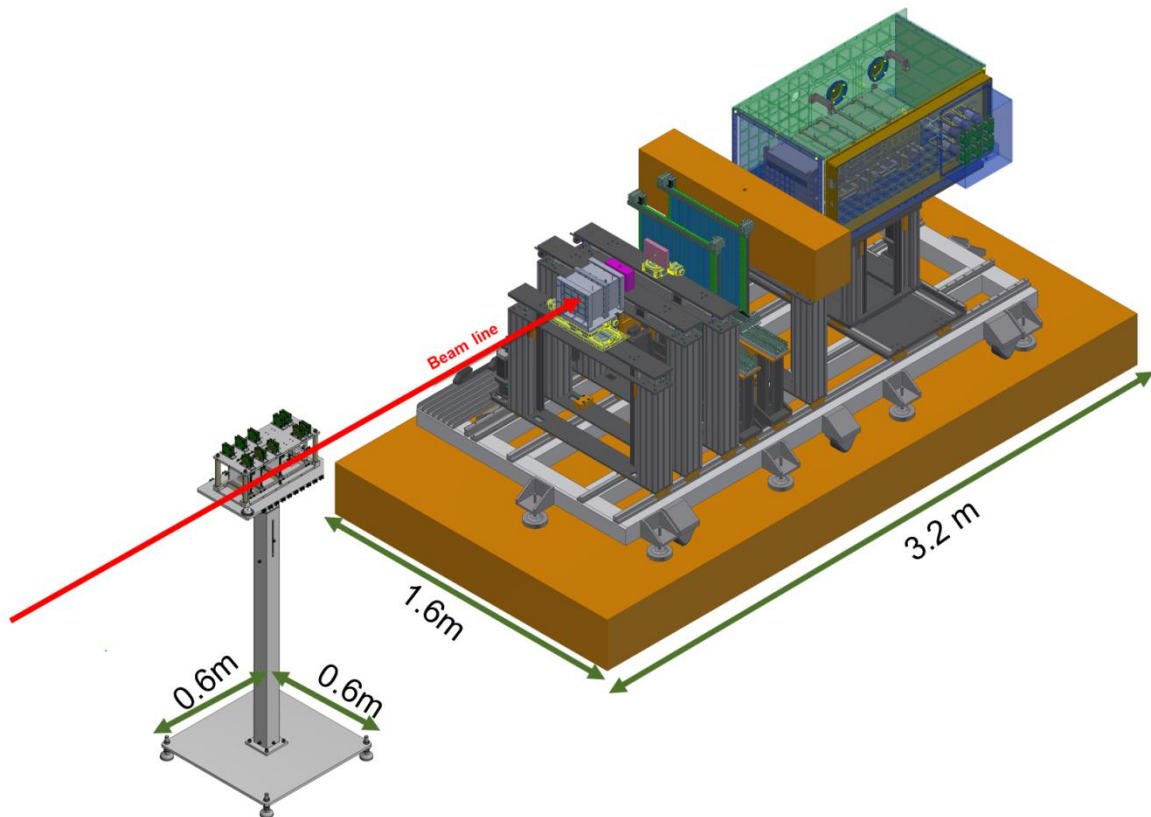
### 1. General table on-site transportation and connection

Note: The beam pipe at PPE134 is 2060 mm above the ground floor, the general table need a 'elevated floor' composed of concrete blocks which is 800mm above the ground floor

**Step 1.** prepare one lifting beam( length:2800mm)and four lifting belts ,four lifting belts tie four beams of the table and connected to the lifting beam as shown .



**Step 2.** Lifting general table to the beam area , once beam line and the table midline was aligned ,put the table to the floor



**Step 3** Remove all the packaging tape and the white cable ties which were used for fixing the top plates; Pay attention to the connectors ;



**Step 4.** using adjustable spanner adjust all the anchor bolts ,put the spirit level(AUX-9) on each top plate to check the leveling. Do not push the platform of CALO(the biggest one )

**Step .5** move each table to proper position manually by handwheel on motor ;

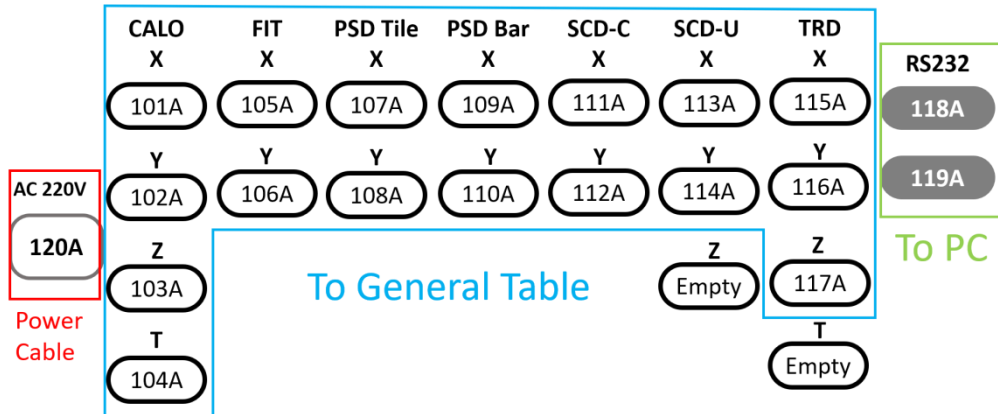
**Step.6** install each device to their corresponding table .

### General table connection

The interface panel on the back of the electronics cabinet and its schematic diagram are shown in the figures below:



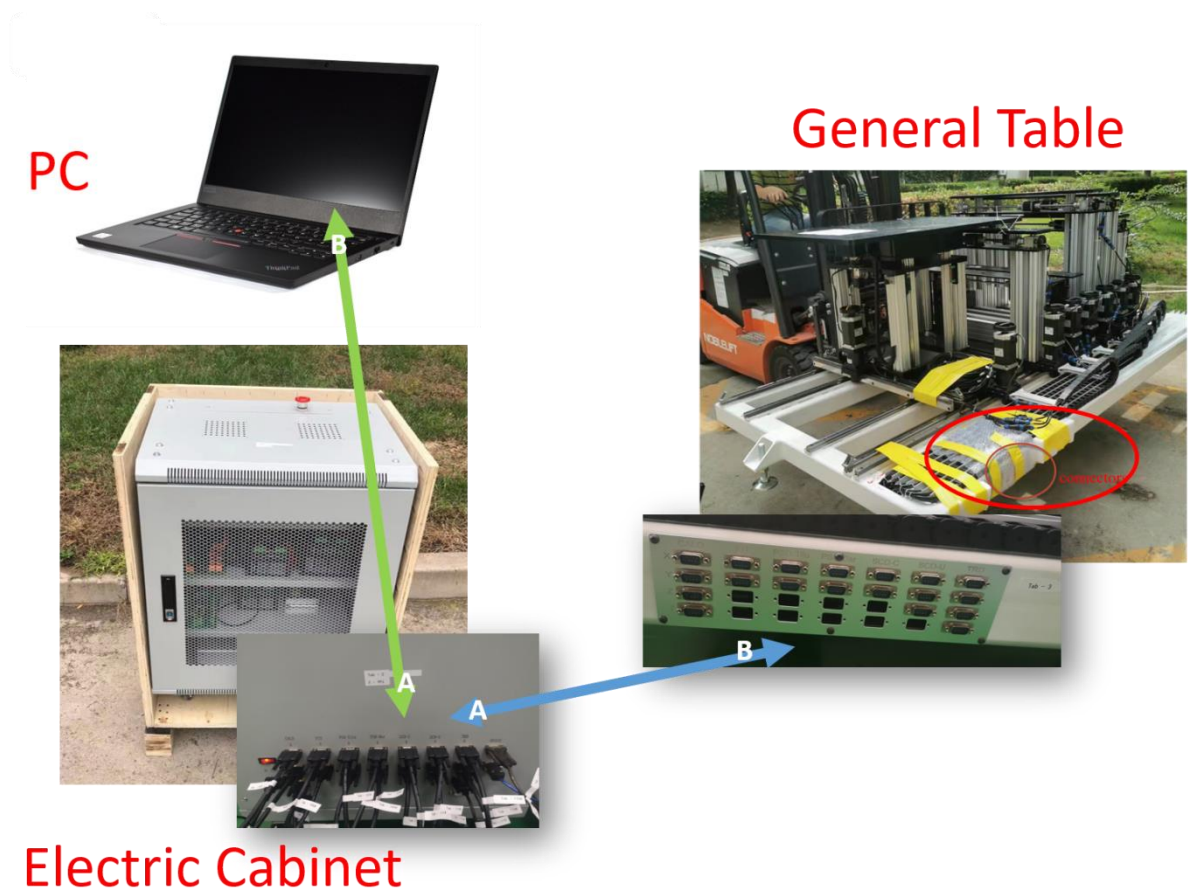




The ports in the blue area corresponds to the connectors of the general table, while the two ports in the green area need to be connected to the USB port of the control PC.

The A and B ends of the cable should be connected to the corresponding ports on the cabinet and the general table respectively.

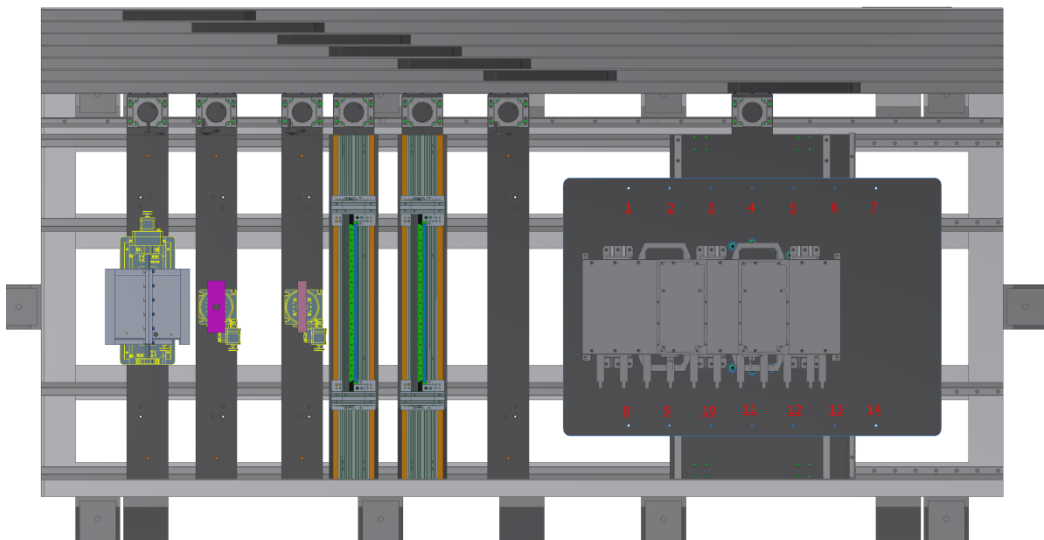
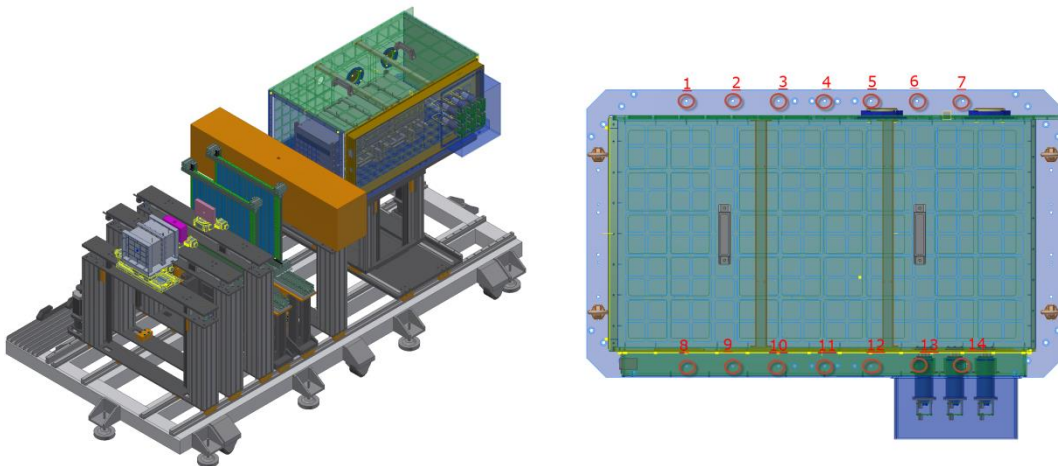
The connection diagram is as follows:





## 2. Prototype on-site transportation and connection

**Step 1.** Lifting prototype to the platform make sure all holes at the long side are alignment ,using the bolts that connected the prototype and damper (two or three bolts can work ). Do not push the platform to align the hole , so as to avoid damage to the motor.



## 2.3 Packing

1、general table

2、 prototype

3、

### **3 Control software**

#### **3.1 Introduction**

#### **3.2 Normal operations**

##### **3.2.1 Pre-test outside the beam area before beam test**

##### **3.2.2 Particle run**

##### **3.2.3 Calibration run**

##### **3.2.4 Test outside the beam area after beam test**

#### **3.3 Abnormal operations**

Operations in case of errors.

##### **3.3.1.1 Sub title 4**

### **4 Conclusion**