

# EARTHING EQUIPMENT

With Safety Locks & Key Multiplier

For

Rolling Stock Applications



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# Introduction

Before any Electrical traction vehicle like Locomotives, EMU's, MEMU's or any AC metro train, taken for maintenance in the shed or depot it has to be grounded properly for the safety of the maintenance staff.

This catalogue describes the application and sequence of operation to bring the electric traction vehicle fully earthed by using different components of earthing system.

The whole Earthing system comprises of the following components.

## AC Earthing Switch



## DC Earthing Switch



## Key Multiplier

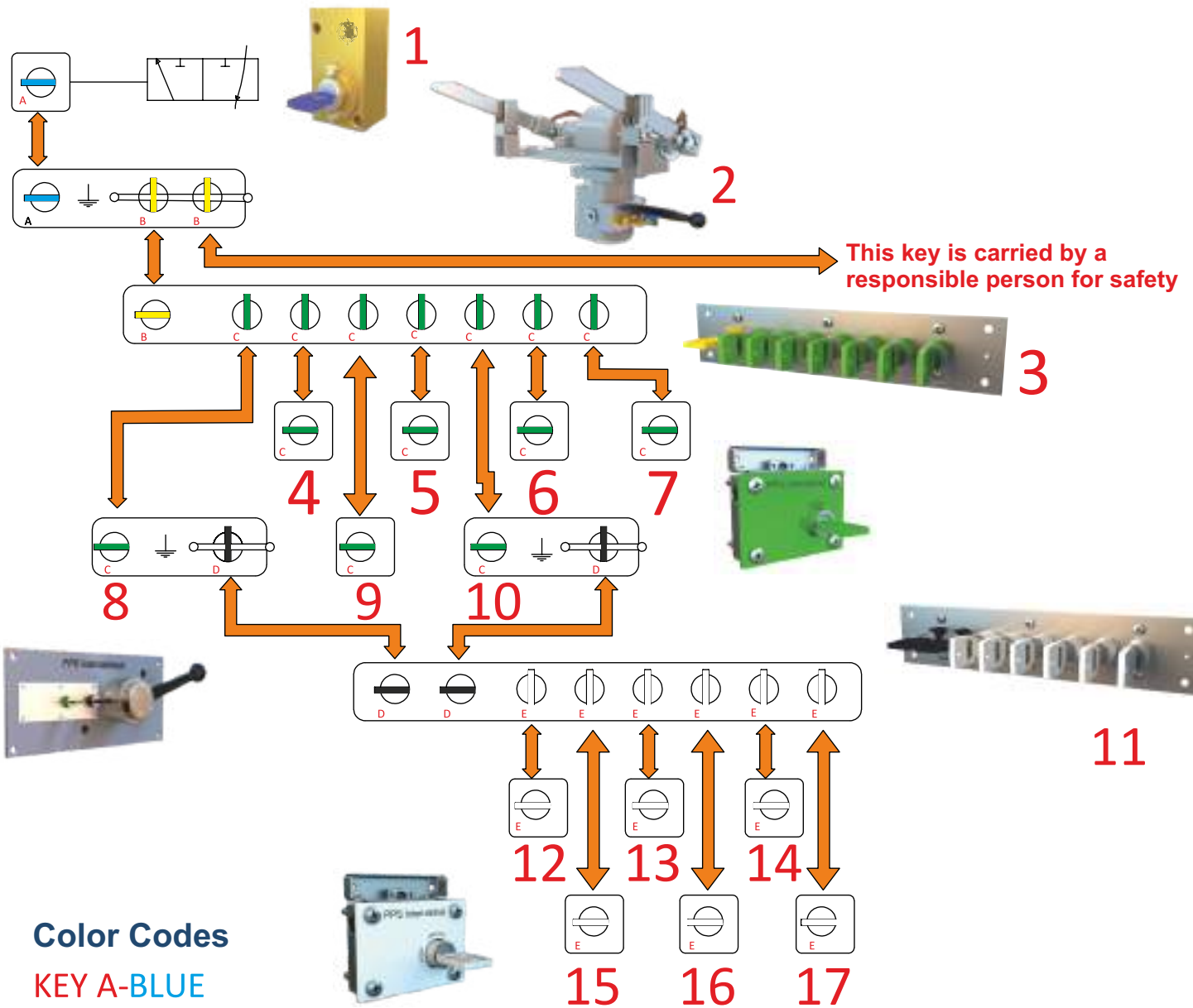


## Air Isolating Valve



## Door Locks





### Color Codes

- KEY A-BLUE
- KEY B-YELLOW
- KEY C-GREEN
- KEY D-BLACK
- KEY E-WHITE

- |   |   |
|---|---|
| 01. Pantograph air supply isolating valve   | 10. Earthing Switch of traction converter 2 |
| 02. Earthing switch for Loco VCB            | 11. Key Multiplier-2                        |
| 03. Key Multiplier-1                        | 12. Door Lock traction converter 1          |
| 04. Door lock auxiliary circuits, Block 1   | 13. Door Lock traction converter 1          |
| 05. Door lock auxiliary circuits, Block 2   | 14. Door Lock traction converter 1          |
| 06. Door lock auxiliary converter 1         | 15. Door Lock traction converter 2          |
| 07. Door lock auxiliary converter 2         | 16. Door Lock traction converter 2          |
| 08. Earthing switch of traction converter 1 | 17. Door Lock traction converter 2          |
| 09. Door Lock on filter block               |   |



## Roof Mounted AC Earthing Switch - 25 KV / 15 KV

AC Earthing Switch is a roof mounted, manually operated, two pole switch with safety interlocks, designed to connect both the poles of electric Loco VCB to ground the electrical circuits.

Earthing switch is made in two parts.

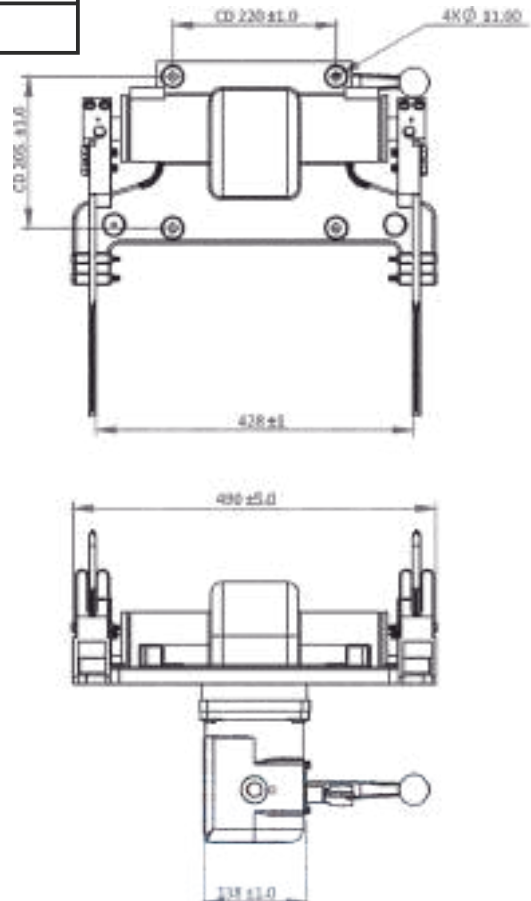
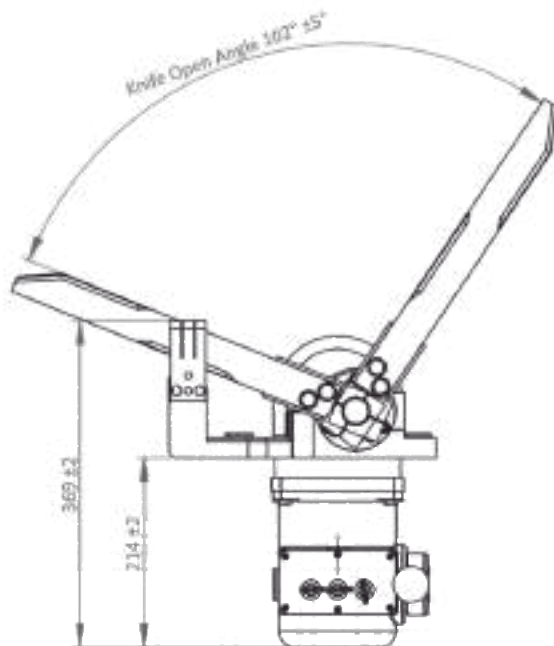
Upper part remain over the roof whereas the lower part comes under the roof and is accessible from inside the locomotive ceiling.

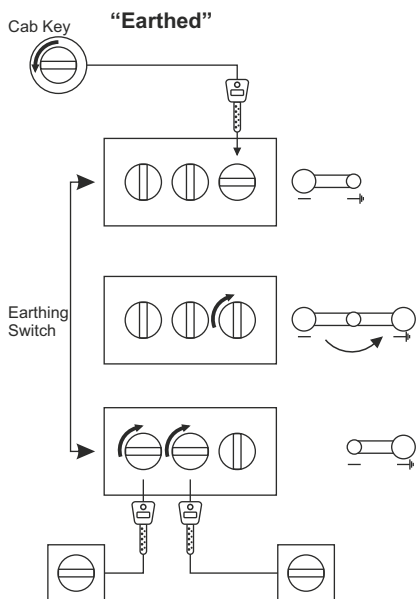
Blue key removed from Air isolating cock shall be inserted in the Earthing Switch to unlock the rotating handle and to earth the vehicle by rotating a handle by 180°, through which both the electrical arms will get engaged with both the poles of VCB.



### TECHNICAL DATA

Rated Voltage	25 KV / 15 KV
Rated Current	400A
Number of poles	2
Operation	Manual
Safety interlocking keys	1" A" + 2" B"
Applications	Electrical Locomotives / EMU / MEMU / AC Metro Car
Weight	24 kg
Mounting	Roof



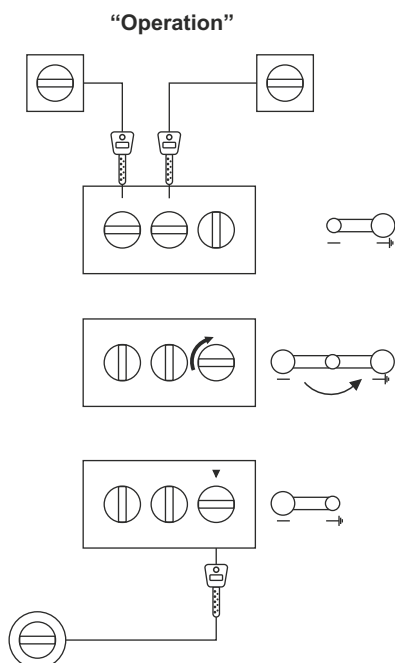


**Operation of the earthing Switch**

1. Cut off the Pantograph Air supply by rotating blue key mounted on the isolating valve and remove the blue key
2. Insert the key blue in AC Earthing switch and turn, which will release the two arms from its locking position.
3. Turn the Earthing Switch handle by 180° to bring the vehicle into earthing.

The two electrical arms will get engage with the Loco VCB.

4. Remove the two yellow keys, out of which one key will go to key multiplier and the other key will be kept by a responsible person for safety reasons.



**Return to the Normal Mode**

1. To revert back to normal condition, the procedure described above has to be reversed.

DC Earthing Switch is generally mounted on the body of the main traction converter of the vehicle.

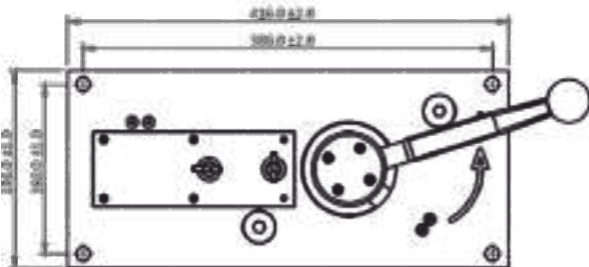
Before opening the main traction converter door, the body of the converter shall be earthed first to ensure the safety of maintenance staff from shocks.



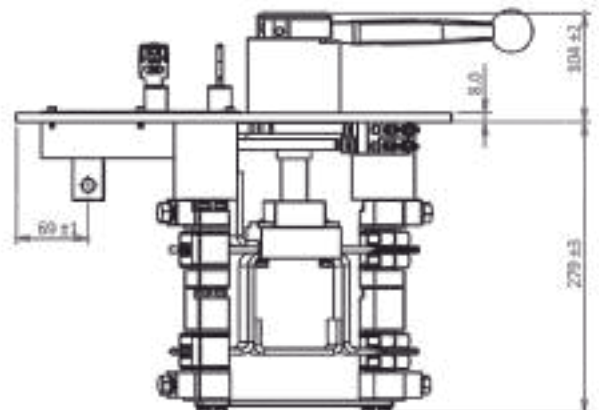
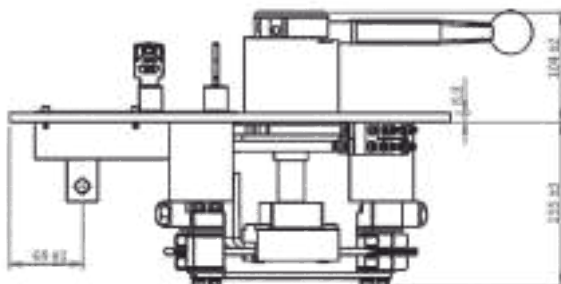
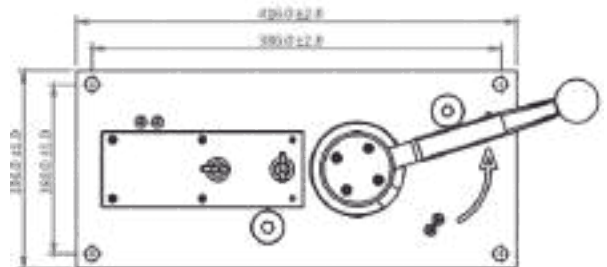
## TECHNICAL DATA

No. of Poles		2 or 4
Nominal voltage	UN	3 [kV] DC/AC
Rated insulation voltage	UNm	4,8 [kV] DC/AC
Rated operating voltage	U <sub>max2</sub>	3,6 [kV] DC/AC
Frequency	f	50 or 60 [Hz]
Dielectric test voltage: pole – pole (AC 50 Hz during 60 s)	U <sub>a</sub>	14 [kV]
Dielectric test voltage: main circuit – earth (AC 50 Hz during 60 s)	U <sub>a</sub>	17,5 [kV]
Dielectric test voltage: main circuit - auxiliary contacts circuit (AC 50 Hz during 60 s)	U <sub>a</sub>	14 [kV]
Ambient temperature outdoors	T <sub>amb</sub>	-40°C to +70°C
Applications		Traction Converter
Mounting position		Horizontal
Fastening		Bolted from the base
El. connections		cables and connector
Size		See dimension sketch
Weight		10 Kg

2 poles

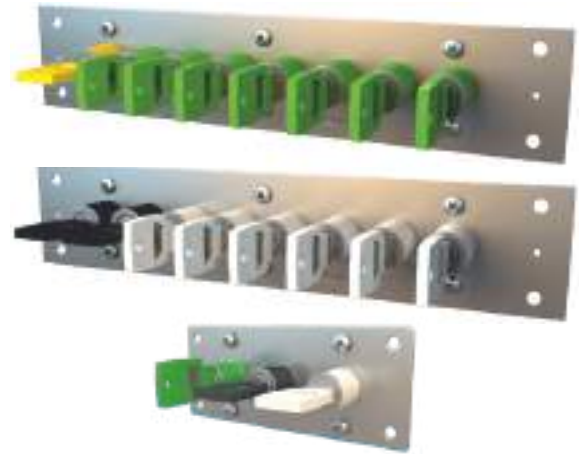


4 poles



### Key Multiplier

Key Multiplier is a Safety Device which will allow to isolate and guarantee the electrical grounding before access of maintenance staff to roof mounted equipment and the high voltage power equipment such as the filter cubical, auxiliary converters, traction converters, auxiliary cubicles and control cubicles or any other high voltage equipment.



### Air Isolating Valve

Air Isolating valve is an air control device generally mounted inside the Locomotive, supplying air to the pantograph.

The air supply to the pantograph can be disconnected by rotating a blue key mounted on the air isolating valve.

The closing of air supply will lower the pantograph there by disconnecting 25 KV from OHE to locomotive.



### Door Locks

These Door Locks are generally available in different colors like Blue, Yellow, Green, Black, and white and can be used on the doors of the auxiliary equipments.

Depending upon the type of the vehicle, different color of locks can be used. However in general green & white door locks are used in 3 phase locomotives.



### **TECHNICAL SPECIFICATIONS**

Mechanical Service life	20,000 operations
Codes for Lock and Key	computerized profile and colour coding.
Working temperature range	25°C to 70°C
Humidity	max. 100% saturation during rainy season.



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Revision:- 1.0  
08/2019