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Please read this manual carefully before installation, maintenance and operation.

1 Safety

For the safe use of the CapCube, please ensure the following:

- Installation and maintenance is undertaken only by authorised and qualified personnel in accordance with current local regulations
- Isolate the equipment from the supply before working
- Wait 5 minutes after isolating supply before handling
- After 5 minutes, short circuit the capacitor terminals with a piece of insulated cable to confirm discharge

Failure to follow the safety rules may lead to bodily injury, premature failure of the capacitors, or other material damage to installations.

2 Upon Receipt of Goods

2.1 Inspection on Receipt

Inspect the packing and immediately report any damages

Unpack the CapCube components and check the following:

- Data on the label corresponds to that of the purchase order
- CapCube components are not damaged
- Any loss or damage should be reported immediately to your nearest ABB agent

2.2 Storage-Transportation-Handling

Store indoors, in dry, dust free and non-corrosive environment protected from vibrations or shocks.

Storage in initial packing is recommended.

Storage temperature:

- Minimum: -40°C/-40°F
- Maximum: 75°C/167°F
3 Installation Description

3.1 LV Cabling

Remove rear cover of CapCube to gain access to the cable compartment. If LV cabling is required to be installed for over pressure detection in the capacitors, ensure that the cable is run from the LV compartment down the cable ducting on the side of the cubicle and into the cable compartment. This should be completed before the capacitors and reactors are installed for ease of installation. Figure 1 shows the cable ducts located on the left and right hand internal walls of the CapCube.

![Figure 1: LV cable ducts run up the left and right hand sides of the voltage transformer (VT) compartment of the CapCube (for access to the LV compartment)](image-url)
3.2 Perspex Insulating Plate

On the underside of the roof section of the cable compartment, locate and remove the 4 x 12mm nuts and bolts as indicated in Figure 2.

Place the perspex insulating plate across the underside roof section and secure into place with the 4 x 12mm nuts and bolts the were removed in the previous step, as shown in Figure 3.

Note: Do not tighten the bolts to greater than 20NM as this may cause the perspex to crack

Figure 2: Remove and retain these 4 x 12mm nuts and bolts

Figure 3: Secure the Perspex insulation plate with the 4 x 12mm nuts and bolts
3.3 Voltage Transformer Compartment

3.3.1 Step One
At the rear of the CapCube under the bottom lip of the rear access opening to the cable compartment, locate and remove the 5 x 12mm nuts and bolts shown in Figure 4.

![Figure 4: Voltage transformer compartment](image)

3.3.2 Step Two
Access the CapCube via the voltage transformer compartment door and remove the 2 x 12mm nuts and bolts shown in Figure 5.

![Figure 5: Voltage transformer compartment](image)
3.3.3 Step Three
At the front edge of the voltage transformer compartment, locate and remove the 1 x 12mm nut and bolt as shown in Figure 6.

![Figure 6](image)

3.3.4 Step Four
Place the support bar for reactors one and two into the voltage transformer compartment using the 3 existing bolt holes to ensure that the support bar is located correctly into position. Once all three bolt holes are aligned correctly, re-insert the 1 x 12mm front nut and bolt as shown in Figure 7.

![Figure 7](image)
### 3.3.5 Step Five

From the rear of the CapCube, position the capacitor and third reactor mounting bracket into position on the floor of the cable compartment. Using the 5 bolts holes at the rear of the cable compartment and the 2 bolt holes into the VT compartment as a confirmation of correct positioning, as shown in [Figure 8](#).

![Figure 8](image)

### 3.3.6 Step Six

Insert the 5 x 12mm, and remaining 2 x 12 mm nuts and bolts into the existing holes to secure the capacitor and third reactor mounting bracket into position.

![Figure 9](image)
3.3.7 Step Seven
Lift reactor three into position and secure into place by inserting the M16 x 40 bolt up through the bottom of the mounting bracket and into the base of the insulator post of the reactor, as shown in Figure 10.

Figure 10
3.4 Cabling Legend

Figure 11 shows the cable connections within the CapCube. Please refer to Figure 11 to assist with the identification and routing of interconnecting cables.

![Cable connections within CapCube](image)

**Figure 11**: Cable connections within CapCube

3.4.1 Mono Blocks Connection

Connect R1, W1 and B1 to the Mono Blocks as shown in Figure 12.

![Mono Blocks Connection](image)

**Figure 12**
3.5 Capacitor units

Insert the right hand capacitor into position on the mounting bracket via the three stage process, as illustrated in Figure 13, Figure 14, Figure 15.

Note: Take care with lifting as the capacitors are can weigh in excess of 30 kg each.

Repeat above steps for left hand side and centre capacitor, with all capacitor flanges positioned over the tapped mounting holes. Insert and tighten the 3 x 17mm mounting bolts as indicated in Figure 16.

3.6 Cabling

Connect the earthing bar tail to the 12 mm nut and bolt, second from the left on the capacitor and reactor mounting bracket, and tighten to form a solid earth connection as shown in Figure 17.
3.6.1 Copper Earth
Secure the Copper earth bar to all 3 three capacitor mid mounted flanges with 3 x 17mm nuts and bolts as well as a flat washer on either side and a spring washer on the nut side as shown in Figure 18.

Ensure that there is continuity between the earth bar and the chassis of the CapCube.
3.7 Cable Connection

Connect cables R2, W2 and B2 to the capacitors as shown below in Figure 11, and route the cables into the voltage transformer compartment in readiness for connection to the reactors at a later stage.

3.7.1 Star point
Create the star point for the 3 capacitors by connecting all three rear terminations, as shown in the Figure 19.

![Figure 19: Star point](image_url)

3.7.2 Secure Capacitor Units and Reactor
Enter the CapCube via the voltage transformer compartment and install the 3 x 17mm bolts into the base flanges of the capacitors to secure them to the capacitor and reactor mounting bracket, as shown in Figure 20.

![Figure 20: Insert and tighten 17mm bolts](image_url)
3.7.3 Connect Cable to Reactor

Connect the lower end of cable W1 to the top of the rear reactor. Once complete, connect the lower end of cable W2 to the bottom of the rear reactor.

3.8 Installation of Reactors

Install reactor number two into position as indicated in Figure 21. Once in position, secure into place by inserting the 24mm bolt up through the reactor supporting bracket and into the base on the insulating post of the reactor.

Note: Ensure that the connection tab on the top of the reactor is at 180 degrees to that of reactor number three.

Figure 21: Bottom connection tabs of reactors 2 and 3 are at 180 degrees to each other

- Connect the lower end of cable R1 to the top of the middle reactor
- Connect the lower end of cable R2 to the bottom of the middle reactor

Refer to Figure 11 for the diagram of cable connections.
3.8.1 Reactor Two
Install reactor number one onto the reactor support bracket and ensure the bottom connection tab is at 180 degrees to that of reactor number 2, as shown in Figure 22.

![Figure 22: Bottom connection tabs of reactors 1 and 2 are at 180 degrees to each other](image)

- Connect the lower end of cable B1 to the top of the front reactor
- Connect the lower end of cable B2 to the bottom of the front reactor

Refer to Figure 11 for diagram of cable connections.

3.8.2 Remove Nuts and Bolts
At the rear of CapCube, remove and retain the 4 x 12mm nuts and bolts shown in Figure 23 and Figure 24 in order to secure the perspex wings.
3.8.3 Installation of Perspex
Insert and secure the perspex insulation wings with the 4 x 12mm nuts and bolts retained in the previous step, as shown in Figure 25.

**Note:** Be sure not to tension the bolts higher than 20NM, as this could cause the perspex to crack

![Figure 25: 4 x 12mm nuts and bolts](image)

3.9 Completion of Installation
Replace the rear cover on the CapCube. Installation is now complete.