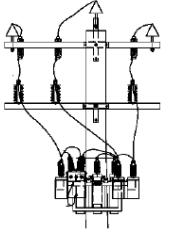


DISTRIBUTION COMMISSIONING TEST SHEET – POLE MOUNTED CAP BANK

HPC-4DL-07-0025-2014

This commissioning test sheet covers the checking, testing and commissioning of all replacement or new installations of pole-mounted capacitor banks before energisation.



NOTE: Tests must be carried out after the installation, alteration or repair and before putting back to service.
SAFETY: At all times maintain suitable clearance to all other electrical equipment and verify planned escape routes.
 In preparation for the tests, wherever possible, de-energise, isolate and make the area safe.

DATE:		Reference Work Order No.		Name of Officer	
Cap Bank Location:					

1. CAP BANK DESCRIPTION

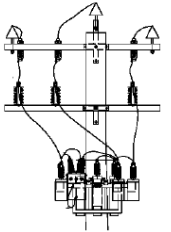
System Voltage	kV	Stock code		Label/GIS ID code	
Serial Number					

2. VISUAL INSPECTION AND SAFETY CHECK

Structure	1	Check that the installation complies with the distribution construction standards and applicable design drawings.	<input type="checkbox"/>
	2	Check that Public Safety has been considered (e.g. cabinet secured and locked, trip hazards removed where applicable).	<input type="checkbox"/>
	3	Check the supply to the cap bank, that it is switched off and isolated as per switching sheet and permit.	<input type="checkbox"/>
	4	Confirm (with approved testing device) that the cap bank is de-energised.	<input type="checkbox"/>
	5	Check that the cap bank rating matches system voltage.	<input type="checkbox"/>
	6	Check that the earth system (including capacitor and control) is complete, undamaged and bonded to earth points.	<input type="checkbox"/>
	7	Ensure that the insulated caps have been fitted to all medium voltage (MV) connections.	<input type="checkbox"/>
	8	Check that the anti-climbing guards and danger plate are fitted and correctly numbered	<input type="checkbox"/>
	9	Check that the structure is numbered and labelled correctly with labels signs fitted correctly.	<input type="checkbox"/>
Capacitor	10	Check the capacitors for damage to tank, cracks in boots, oil leaks, bushings are sound and no excessive dirt.	<input type="checkbox"/>
	11	Confirm that all electrical connections are tight.	<input type="checkbox"/>
	12	Check that all the MV lightning arresters have bird caps fitted and are tensioned correctly.	<input type="checkbox"/>

DISTRIBUTION COMMISSIONING TEST SHEET – POLE MOUNTED CAP BANK HPC-4DL-07-0025-2014

This commissioning test sheet covers the checking, testing and commissioning of all replacement or new installations of pole-mounted capacitor banks before energisation.



MV dropout fuse - Confirm that the fuse element size corresponds to the table below.

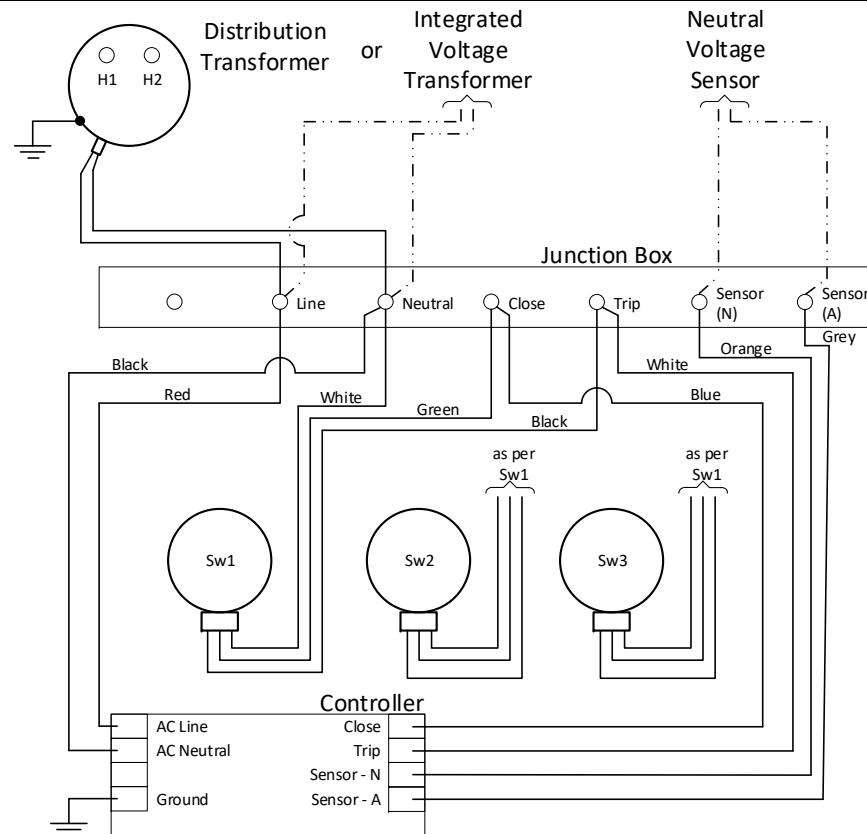
13

kVAR	11	22	33
500	40	20	16
1,000	80	40	31.5

☐

Control unit - Confirm all secondary connections are as per the wiring diagram.

14

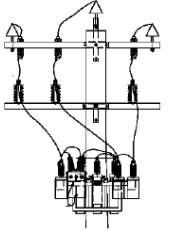


☐

DISTRIBUTION COMMISSIONING TEST SHEET – POLE MOUNTED CAP BANK

HPC-4DL-07-0025-2014

This commissioning test sheet covers the checking, testing and commissioning of all replacement or new installations of pole-mounted capacitor banks before energisation.



3. EARTH RESISTANCE

1	Test earth resistance using one of the following DCT's and record value in 3.4.	<input type="checkbox"/>						
2	New earth stake, use HPC-4DL-07-0038-2017 DCT- Earth Testing of Distribution Poles, to test the earth.	<input type="checkbox"/>						
3	Existing earth stake, use HPC-4DL-07-0037-2017 DCT- Earth Testing of Altered Systems, to test the earth.	<input type="checkbox"/>						
4	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">Previous test value if known</td> <td style="width: 15%;">= _____ Ω</td> <td style="width: 20%;">Measured value</td> <td style="width: 20%;">= _____ Ω</td> <td style="width: 20%;">Value acceptable</td> <td style="width: 5%;">Yes <input type="checkbox"/> / No <input type="checkbox"/></td> </tr> </table> <p>Measured value would be acceptable if below 30 Ohms or a value between 0.8 and 1.2 which is obtained when dividing the Measured value by the Previous test value. Note: If previous test value is not known a value less than or equal to, 30 Ohms is acceptable.</p>	Previous test value if known	= _____ Ω	Measured value	= _____ Ω	Value acceptable	Yes <input type="checkbox"/> / No <input type="checkbox"/>	<input type="checkbox"/>
Previous test value if known	= _____ Ω	Measured value	= _____ Ω	Value acceptable	Yes <input type="checkbox"/> / No <input type="checkbox"/>			
5	Earth stake resistance above 30 Ohms or outside of an acceptable value must be communicated to the formal leader or Asset manager.	<input type="checkbox"/>						

4. HANDOVER OF RESPONSIBILITY FOR THE COMPLETION OF SECTIONS 1 TO 3

I hereby certify that sections 1 to 3 have been completed with satisfactory results and transfer responsibility to the network operating authority.

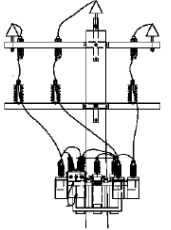
Commissioning Officer: _____	Pay Number: _____
Signature: _____	Date: <u>DD/MM/YY</u> Time: <u>HH:MM</u>

1. **DO NOT ENERGISE THE REGULATOR.** All dropout fuses and capacitor bank switches must be open.
2. Control unit doors must be locked with two (NMK2) Horizon Power approved padlocks.
3. Attach an “**Out of Service (Warning)**” tag to the padlock on the front of the control cabinet.
4. Inform HPCC of the status of the capacitor bank.
5. Ensure the work area is left tidy with no hazards to the public.
6. Hand over responsibility to the commissioning authority

DISTRIBUTION COMMISSIONING TEST SHEET – POLE MOUNTED CAP BANK

HPC-4DL-07-0025-2014

This commissioning test sheet covers the checking, testing and commissioning of all replacement or new installations of pole-mounted capacitor banks before energisation.

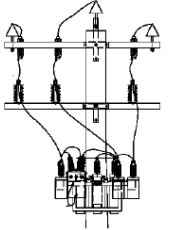


5. CONTROL SETTING AND TESTING

Controller power supply setting instructions	1	Integrated Voltage Transformer Supplied <input type="checkbox"/>	Distribution Transformer Supplied <input type="checkbox"/>		
	2	Check that all the dropout fuses and capacitor bank switches are open.			<input type="checkbox"/>
	3	Disconnect the L and N from the voltage transformer at the junction box and leave it safe.	N/A	<input type="checkbox"/>	
	4	Ensure SCADA CONTROL is set to LOCAL.			<input type="checkbox"/>
	5	Ensure OPERATION MODE is set to MANUAL.			<input type="checkbox"/>
	6	Connect the interface between the controller and the control cable.			<input type="checkbox"/>
	7	Supply the controller (through an interface) from a reliable 240 V source. If a normal 240 V supply is unavailable, use a minimum 3 kVA generator. Conduct a polarity test on the 240 V supply. For testing purposes, use an effective earthed reference point spaced more than 2 meters from any electrically conductive object embedded in the ground. Press the switch on the interface to power up the controller.	Close the distribution transformer dropout fuses to power up the controller and conduct a polarity test on the 240 V supply.		<input type="checkbox"/>
Controller setting and testing instructions	8	Telemetered CQ930 Controller <input type="checkbox"/>	Non-telemetered <input type="checkbox"/>		
	9	Upload the settings (.cfg) to the controller and adjust the date and time.			<input type="checkbox"/>
	10	Temporarily change the Max Daily Ops to 1.			<input type="checkbox"/>
	11	Change SCADA CONTROL to REMOTE.	Press the CLOSE button/toggle switch.	<input type="checkbox"/>	
	12	Request an integrity scan to wake up the communications.			
	13	Operate SCADA CONTROL REMOTE/LOCAL (Supervisory Control) to test the uncontrolled change of state (UCOS) alarm. Leave in REMOTE.			
	14	Operate OPERATION MODE AUTO/MANUAL to test the UCOS alarm. Leave in MANUAL.			
	15	Disconnect and reconnect the load fuse to test the UCOS alarm. Request a remote close command to test the remote control function.			

DISTRIBUTION COMMISSIONING TEST SHEET – POLE MOUNTED CAP BANK HPC-4DL-07-0025-2014

This commissioning test sheet covers the checking, testing and commissioning of all replacement or new installations of pole-mounted capacitor banks before energisation.



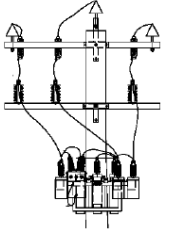
	16	Check if the CLOSE LED/Lamp is blinking continuously and the manual operation delay (30 s) is activated.		<input type="checkbox"/>
	17	Wait for the capacitor bank to close.		<input type="checkbox"/>
	18	Request a remote open command to test the remote-control function.	Press the OPEN button/toggle switch.	<input type="checkbox"/>
	19	The OPEN LED/Lamp blinks continuously and the manual operation delay (30 s) is activated. Note: There is a 5 min delay (Reclose Block) between consecutive close commands. This allows time for the capacitors to discharge. Any close commands within this period are denied by the controller.		<input type="checkbox"/>
	20	Wait for the capacitor bank switches to open.		<input type="checkbox"/>
	21	Change SCADA CONTROL to LOCAL.	Check that the Reclose Block and the Max Daily Cycle are active.	<input type="checkbox"/>
	22	Change the Max Daily Ops back to its original setting.		<input type="checkbox"/>
	23	Ensure that SCADA CONTROL is set to LOCAL.		<input type="checkbox"/>
	24	Ensure that OPERATION MODE is set to AUTO.		<input type="checkbox"/>

6. PUTTING THE CAPACITOR INTO SERVICE

Controller setting and testing instructions	1	Integrated Voltage Transformer Supplied <input type="checkbox"/>	Distribution Transformer Supplied <input type="checkbox"/>	
	2	Press the switch on the controller interface to OFF. Remove the controller interface and reconnect the control cable to the controller. Reconnect the L and N in the junction box and close the capacitor bank dropout fuses as per the switching program. Conduct a polarity test on the 240 V supply.	Close the capacitor bank dropout fuse as per the switching program and conduct a polarity test on the 240 V supply.	<input type="checkbox"/>
	3	Set the controller to AUTO and either REMOTE (if there is a SCADA/comms link) to HPCC or LOCAL (if there is no SCADA/comms link) to the HPCC. Do not manually close the capacitor bank onto the network.		<input type="checkbox"/>
	4	After seven days in service, download a full report (.csv) from the controller. Save the file to the relevant document management file and notify Network Planning.		<input type="checkbox"/>
	5	Remove the “Out Of Service (Warning)” tag from the padlock on the front of the control cabinet.		<input type="checkbox"/>

**DISTRIBUTION COMMISSIONING TEST SHEET – POLE MOUNTED CAP BANK
HPC-4DL-07-0025-2014**

This commissioning test sheet covers the checking, testing and commissioning of all replacement or new installations of pole-mounted capacitor banks before energisation.

**7. OPERATIONAL HANDOVER**

The commissioning officer must ensure that all checks have been completed and the test results comply with the minimum standards.

I hereby certify that all sections have been completed with satisfactory results and transfer responsibility to the network operating authority. This equipment is ready to be **SAFELY** energised.

Commissioning Officer: _____

Pay Number: _____

Signature: _____

Date: _____

DD/MM/YY

Time: _____

HH:MM

1. Ensure the work area is left tidy with no hazards to the public.
2. Hand over responsibility to the operating authority
3. Return this sheet to the project/working file as a record of commissioning and as a document required for the Handover Certificate.

NOTE: The CQ930 Capacitor Controller Manual (Rev 1.34) [DM# 47460438](#)