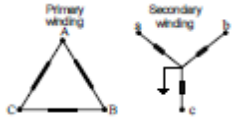
DISTRIBUTION COMMISSIONING TEST SHEET – NON MPS DISTRIBUTION TRANSFORMER
HPC-4DL-07-0021-2014

This commissioning test sheet covers the checking, testing and commissioning of all replacement or new installations of non-modular package substation (non-MPS) ground-mounted transformers up to 1,000 kVA 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, disconnect the cables from the equipment on both sides and make the area safe.



DATE:		**Project No.**		**Name of Officer**	
Transformer Location:					

1. TRANSFORMER DESCRIPTION

Rated Voltages	kV	V	Rated kVA	kVA	Stock code		Serial Number	

2. VISUAL INSPECTION AND SAFETY CHECK

Inspect the following: • Rating plate • Tank and bushings • Tap setting • Oil level • HV terminations • LV Busbar bolts • LV terminations • Neutral connection • MEN/N-E connections	1	Check that the installation complies with the distribution construction standards (Part 10 G3) and applicable design drawings.			☐
	2	Check that Public Safety has been considered (e.g., cabinets secured and locked, trip hazards removed where applicable).			☐
	3	Check the supply to the transformer, that it is switched off and isolated as per switching sheet and permit.			☐
	4	Confirm (with approved testing device) that the transformer is de-energised.			☐
	5	Ensure that the earth system is complete, undamaged and bonded to earth points. Check 2 m clearance to conductive services or structures, and 15 m clearance to Telstra/NBN pits.			☐
	6	Check that the nearest conductive material is at least two (2) metres away from the earth ring/system (take a photo if possible).	Measured distance	m	
	7	Transformer voltage rating matches system voltage. Note: Check the correct winding voltage has been selected while installing dual voltage transformer like 6.6-11 kV Tx.			☐
	8	Transformer tap is at the position of previously installed transformer or per network planning requirements.			☐
	9	Transformer oil level is satisfactory (if visible).			☐
	10	Transformer tank and bushings in good condition (no oil leaks).			☐
	11	HV cables are correctly rated and properly terminated, connected on to the transformer bushings.			☐
	12	The dead-end plugs are the correct voltage rating, correctly installed (transformer with 2 sets of HV bushings).and cables are clamped (legacy NON-MPS won't have clamps)			☐
	13	Check where possible LV Busbar bolts/nuts for changes to alignment marks or if nuts are missing (stop commissioning if missing or no longer aligned).			☐

	14	LV cables are properly terminated and connected on fuse-way / MCB (transformer LV bushings for legacy Non-MPS) and cables are clamped (legacy NON MPS won't have clamps)	☐
	15	Check the neutral cable is connected to the neutral bar, the earth cable to the earth bar, and check the MEN link is connected.	☐
	16	All labels fitted and numbered correctly.	☐

3. EARTH RESISTANCE TEST

1	Test earth resistance using one of the following DCT's and record value in 3.4.					☐
2	New earth stakes, use HPC-4DL-07-0004-2014 DCT- Earth Testing of Distribution Substation, to test the earths.					☐
3	Existing earth stakes, use HPC-4DL-07-0037-2017 DCT- Earth Testing of Altered Systems, to test the earths.					☐
4	Previous test value if known	= _____Ω	Measured value	= _____Ω	Value acceptable	Yes ☐ No ☐
	Measured value would be acceptable if **below 10 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, 10 Ohms is acceptable.					☐
5	Earth stake resistance above **10 Ohms or outside of an acceptable value** must be communicated to the formal leader or Asset manager					☐

4. INSULATION RESISTANCE TEST

1		Ensure that the earth resistance test has been completed with acceptable results prior to commissioning.			☐
		Ensure that the high voltage (HV) and low voltage (LV) windings of the transformer are de-energised.			☐
		Disconnect all connections to the transformer's HV bushings, LV cables to the MCCB or Fuse Disconnector as well as MEN links Note: for Legacy Non-MPS – disconnect LV cables to the LV bushings as well.			☐
	Using an insulation resistance tester, for a minimum of 1 minute for a stable reading, test the following: (Short circuit all winding terminals of the source of the same voltage level together.) See end of test sheet for connection points.	Test Connection	Test Voltage	Expected Results	Test Results
		Primary HV to Tank	2.5 kV	>1,000 MΩ	Ω
		Primary HV to Secondary LV	1 kV	>100 MΩ	Ω
		Secondary LV to Tank	1 kV	>100 MΩ	Ω
2	Confirm transformer has been discharged after testing.				☐

5. LV PROTECTION DEVICE CHECK

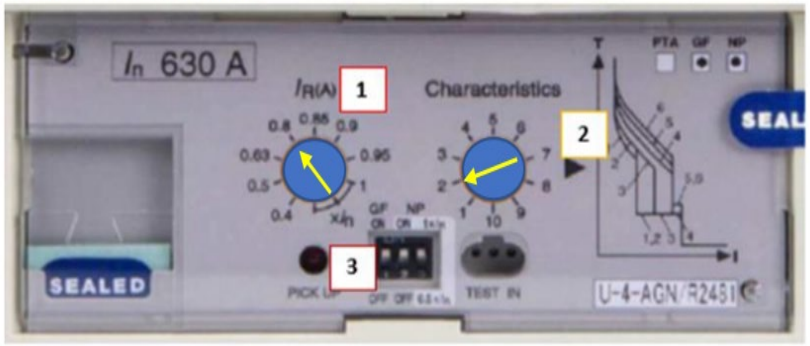
Confirm that the appropriate LV protection device (and settings) has been installed.

315 kVA – 3 x 500 A NH3 type fuses installed ☐

630 kVA – TERASAKI TEMBREAK 2 1,600 A MCB set and displayed below (Single/Parallel/Sole Use applications) ☐

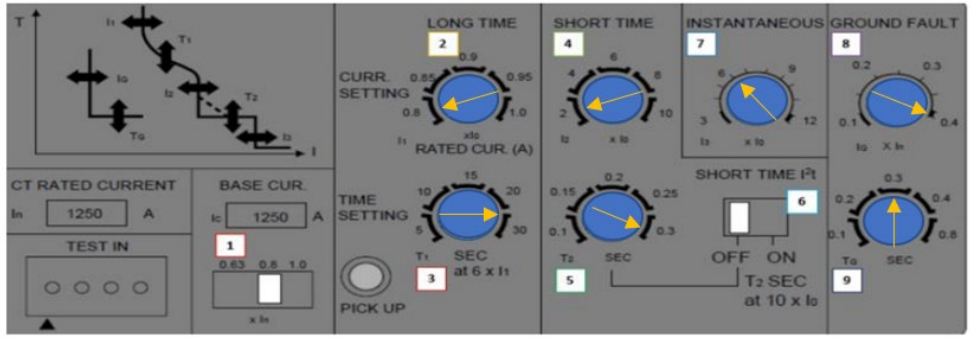
Adjustable settings		
IR	Characteristics	GF
0.8	2	On
1280 A		
1	2	3

Example of setting locations



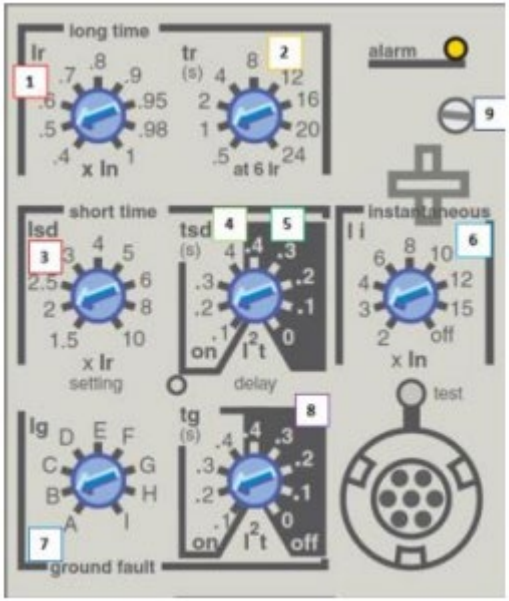
1,000 kVA – "TERASAKI TEMBREAK 1 2,500 A" MCB set and displayed below (Single/Sole Use applications only) ☐

Adjustable settings								
Io	I1	T1	I2	T2	Ramp	I3	Ig	Tg
0.8	0.8	25 sec	2	0.3 sec	Off	6	0.4	0.3 sec
2000 A	1600 A		4000 A			12000 A	1000 A	
1	2	3	4	5	6	7	8	9



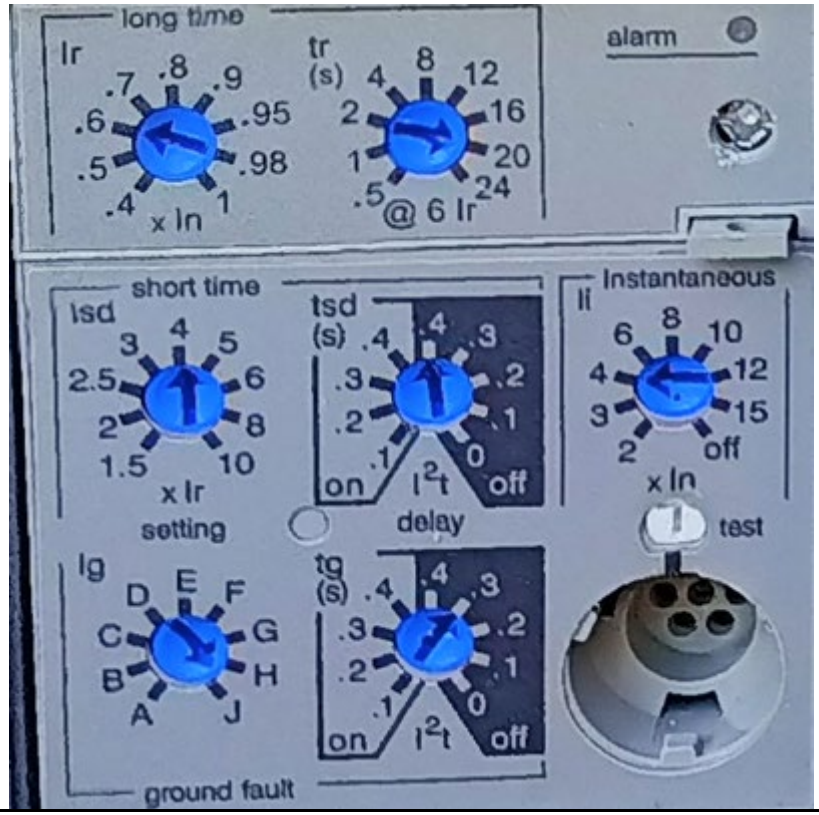
630 KVA – SCHNEIDER NS1600bN 1600 A MCCB set and displayed below (Single/Parallel/Sole Use applications)

Adjustable settings								
IR	TR	Isd	Tsd	Ramp	Ii	Ig	Tg	Rating Plug
0.8	12 sec	3	0.4	Off	6	0.75(j)	Off	Standard
1280 A		3840 A			9600 A	1200 A	0.3 sec	



1,000 kVA – “SCHNEIDER NS2500bN 2500 A” MCB set and displayed below (Single/Sole Use applications only)

Adjustable settings								
IR	TR	Isd	Tsd	Ramp	Ii	Ig	Tg	Rating Plug
0.6	20 sec	4	0.4	Off	4	0.45(j)	Off	Standard
1500 A		6000 A			10000 A	1200 A	0.3 sec	



6. CABLE RECONNECTION

1	Reconnect phase cables, tighten bolts with recommended torque stated below.	☐
2	Reconnect neutral cables, tighten bolts with recommended torque stated below.	☐
3	Reconnect neutral-to-earth links, tighten bolts with recommended torque stated below.	☐

Suggested bolt torques:
- M10 stainless steel bolts: 38 Nm
- M12 stainless steel bolts: 66 Nm
- M14 stainless steel bolts: 106 Nm
- M16 stainless steel bolts: 162 Nm

7. HANDOVER OF RESPONSIBILITY FOR THE COMPLETION OF SECTION 1 TO 6

I hereby certify that section 1 to 6 has been completed with satisfactory results and transfer responsibility to the commissioning officer.

Testing Officer: _____ Pay Number: _____

Signature: _____ Date: DD/MM/YY Time: HH:MM

8. COMMISSIONING AND ENERGISATION OF TRANSFORMER WITHOUT LOAD

NOTE Highest risk of failure of a transformer is at energisation – ensure escape plan in place and JRA reflects potential hazard.

Check that the transformer LV is not connected to the LV network
Check the HV fuse rating before energising the transformer HV
Conduct a voltage and phase rotation test on the LV once the transformer is energised.

Check that the HV fuses are correct.				Fuse Rating	A		☐
Energies the transformer HV as per HV switching program (check for abnormal noise)				Program No.			☐
Conduct a voltage and phase rotation test on LV side of transformer, preferably at LV disconnect or fuse box.							☐
Test Connection	Value Ranges	Selected Tap Voltage	Test Results	Test Connection	Value Ranges	Selected Tap Voltage	Test Results
Red to neutral	226 – 254 V	_____V	V	Red to white	390 – 440 V	_____V	V
White to neutral			V	White to blue			V
Blue to neutral			V	Blue to red			V
Phase rotation (123 or abc or RWB)				Rotation			

9. PHASING TEST

Conduct a phasing test at the open points of the LV network, where the LV supply is coming from another transformer.	Conduct the phasing test under switching schedules on points of the LV network where the potential of the energised transformer can be matched with the potential of another energised transformer. This test ensures that the interconnections of transformers are made or can be made for operational purposes. • If the LV conductors are energised from an interconnected transformer, conduct the phasing test at the new transformer's LV disconnector. • If the LV conductors are not energised, proceed to section 6 and conduct the phasing test on normally open points where it can be interconnected from another transformer.

10. ENERGISATION OF THE LV NETWORK

Conduct a voltage and phase rotation test on the LV once the transformer is energised.	If applicable, ensure all short-circuiting equipment is removed from LV network.					☐
	If applicable, check that the LV fuses are correct					☐
	Energise the LV circuits as per LV switching program.		Program No.			☐
	Ensure that the LV network is returned to its normal operating configuration. If applicable, ensure that the LV circuits are not interconnected with any other transformers and are supplied only from the supply transformers.					☐
	Conduct a voltage test on the LV disconnector of the new transformer to ascertain whether the transformer supply is within statutory limits during load conditions.					☐
	Test Connection	Allowed Range	Test Results	Test Connection	Allowed Range	Test Results
	Red to neutral	226 – 254 V	V	Red to white	390 – 440 V	V
	White to neutral		V	White to blue		V
	Blue to neutral		V	Blue to red		V
	Conduct a service connection test on all installations where the service connections have been disturbed.					☐
	Check that all cabinets are secured and locked. (If applicable).					☐

11. OPERATIONAL HANDOVER

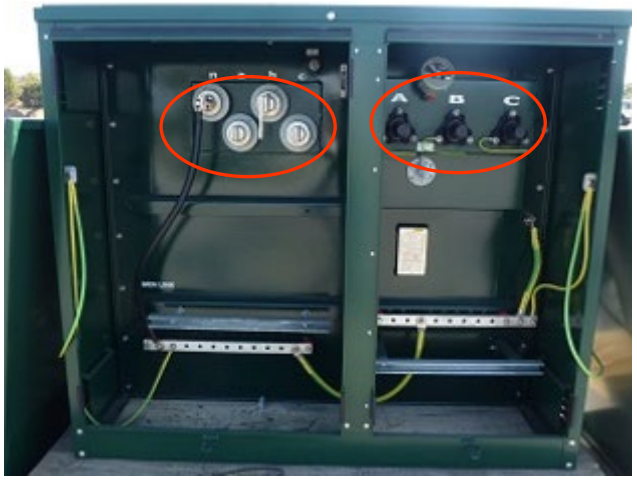
The commissioning officer must ensure that all checks are completed and the test results comply with the minimum standards.

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: _____

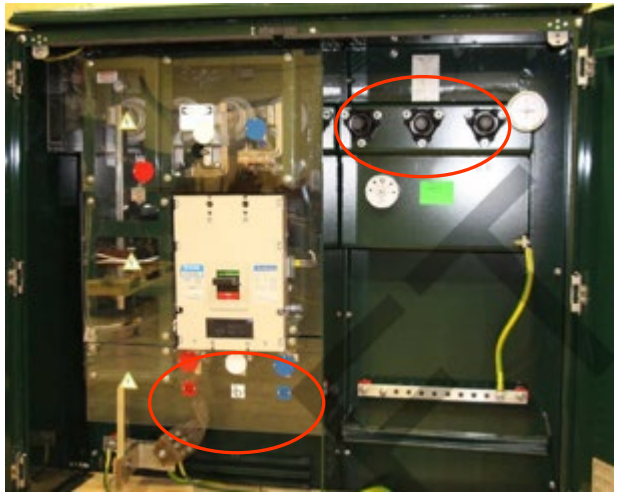
Signature: _____ Date: DD/MM/YY Time: HH:MM

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.



315-1000kVA Non-MPS (Legacy)

315kVA Non-MPS



630-1000kVA Non-MPS

Connection Points - Disconnect all cables for testing