



**TS132 - F2**

**Embedded Generation Commissioning  
Witnessing Plan Template  
above 500kVA**

**Issued: September 2023**

## Revision Notice

Revision Number	Date	Details	Author	Approved
1	25 Sept 2023	New Document	A Lee	M. Napolitano

### SA Power Networks:

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2. These Rules are subject to change from time to time.
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## Instruction

Sections	Below documentation must be provided to SA Power Networks 5 business days prior to SA Power Networks Witnesser attending site for commissioning witnessing. All documentation is to be sent to the Project Manager.  SA Power Networks Technician will review the information in this section and check prior to attending site.	Customer responsibility on Day of Commissioning
<b>Section 1-</b> Offsite Commissioning Checks	Table 1, 2, 4, 5 completed	None
<b>Section 2-</b> On-site Commissioning Checks	None	Table 6 to be demonstrated & Customer to sign off on day
<b>Section 3-</b> Compliance Testing	Table 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 completed	Table 9, 10, 11, 12, 13, 16 to be demonstrated & Customer to sign off on day
<b>Section 4-</b> On-line Commissioning	Table 17, 19, 20, 21, 22 completed	Table 18, 19, 20, 21, 22, 23 to be demonstrated & Customer to sign off on day
<b>Section 5 –</b> Final Sign Off	None	Customer Sign Off

Sections within this document that have **table headings that are highlighted blue**, must be filled out and **completed by the Customer**, section table **headings that are in orange** will be filled out by the **SA Power Networks Witnesser** on the day.

*Please provide along with your Commissioning Plan a brief description of the method you intend to use to demonstrate each of the settings within it.* This will assist should there be insufficient radiance for example on a PV system on the day of commissioning, being able to modify to suit conditions.

Please note that the grey text only serves as a placeholder, and these entries will vary from site to site.

The following requirements must be met prior to SA Power Networks Witnesser attending the Customer’s site for commissioning witnessing:

- All isolation equipment (main switches, main isolators, etc.) must be compliant to all applicable standards and requirements;
- Labelling must be complete and compliant to all applicable standards and requirements;
- The shutdown procedure is complete and compliant to all applicable standards and requirements; and
- Any other requirements of the Engineering Report.

## 1. Off-Site Commissioning Checks

**Table 1:** General Project Information

Customer Name	
Engineering Report Number	
Engineering Report Revision	
Site Address	
Total Solar PV Approved Capacity	
Total Battery Approved Capacity	
Total Synchronous Approved Capacity	
Voltage and Reactive Power Control	
Operating Philosophy	
Maximum Export (AC)	
Minimum Import (AC)	
Responsible Qualified Person*	
Installer Accreditation Number	
Click Witnessing Date	
Site Contact Name	
Site Contact Mobile Phone Number	

\* A person who understands the operation and configuration of the system and can demonstrate all aspects of this plan.

**Table 2:** NMI Information

NMI 1	
NMI 1 Solar PV Approved Capacity	
NMI 1 Battery Approved Capacity	
NMI 1 Synchronous Approved Capacity	
NMI 1 Voltage and Reactive Power Control	
NMI 1 Maximum Export (AC)	
NMI 1 Minimum Import (AC)	
Site Agreed Demand	

For any additional NMIs, please complete an additional table for each NMI - refer Appendix A.

**Table 3:** SA Power Networks Site Information

Witnessing Officer	
Order Number	
Transformer Number(s)	
Site Number	

**Table 4: Documentation Checklist**

Documentation Provided Prior to Witnessing Booking Date			Check
Protection test results for the protection relay(s)			
Written and signed statement from suitably qualified protection technician that the generating system is installed as per the SA Power Networks Engineering Report			
Protection Settings Report			
Compliance Monitoring Plan			
All relevant eCOCs received (Electrical Legal Compliance)			
Single Line Diagrams (as built)			
Incomer CB injection test, earth grid test results (new sites connected at HV)			
Receipt of all Inverter Serial Numbers			
A copy of the instructions to be followed by the installer to commission the Remote disconnection / reconnection technical solution per the provider’s specifications			
Sign-off for Compliance	<b>Customer</b>		<b>SAPN</b>

**Table 5: Smarter Homes Requirements**

Smarter Homes Compliance Checks			Response
Relevant Agent appointed for the generating system			
Technical solution used for remote disconnection and reconnection			
Sign-off for Compliance	<b>Customer</b>		<b>SAPN</b>

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## 2. On-Site Pre-Commissioning Checks

Section 2 pre-connection checks must be witnessed by the SA Power Networks Witnesser prior to proceeding to compliance testing in Section 3.

**Table 6:** On-Site Commissioning Checks

On-Site Pre-Commissioning Checks				Check
New plant installed is as per the original approved application. The customer accepts responsibility to rectify this if found to be incorrect.				
Inverters will disconnect when rotating generator operates (rotating gen only)				
Bi-directional/import/export meter installed and aligns with NMI				
Generator Circuit Breaker will open upon detecting protection relay failure				
Site National Meter Identifiers (NMI) Correct as per Engineering Report				
Confirm revenue meter aligns with NMI				
Meter, CTs, etc physically and electrically located as per SLD				
Site additional NMIs (parent/meshed) (Refer Appendix A for additional NMI details if applicable)				
Customer power quality logger installed for 7-day measurement (2 days prior to gen online)				
Sign-off for Compliance	<b>Customer</b>		<b>SAPN</b>	

**SA Power Network Witnesser Comments:**

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### 3. Compliance Testing

#### 3.1 Settings Compliance Testing

The Customer is to declare how they will undertake proof of compliance of Inverter Protection and Power Quality Response settings for the SA Power Networks Witnesser.

If the Generating System consists of multiple kinds/types of inverters (e.g., solar and battery inverters), please include several versions of the relevant tables to cover each kind/type.

Section 3 Compliance Testing checks must be witnessed by the SA Power Networks Witnesser prior to proceeding to compliance testing in Section 4.

**Table 7:** Compliance Witnessing Methodology

Location(s) (E.g.: Individual inverter panels, Web portal, control room, etc)	Method of Demonstration (E.g.: Inverter control panel display, Global variable display, etc)	Responsible Qualified Person (Customer)

Table 8 and Table 9 detail the inverter model, type and required anti-islanding protection setting check on the installed inverters to ensure compliance to AS4777.2 and the requirements in the Engineering Report. By filling out the **Inverter Model, Type, Setting, and Trip Time** values, the Customer declares that these are the values and units that will be seen on site. **Everything announced here must be visually verifiable.**

**Table 8:** Inverter Model and Type Check

Inverter Model	Inverter Type

Please ensure the setting and trip time values are correct to TS132. Please see Appendix B and TS133 when the inverters are connected at HV.

**Table 9: Inverter Settings Checklist**

Inverter Protection	Setting		Trip Time		Inverter No 1-10															
Nominal Voltage	230V																			
Over Voltage Level 1 (V)	265V	115%	1.0sec	50cyc																
Over Voltage Level 2 (V)	275V	120%	0.2sec	10cyc																
Under Voltage Level 1 (V)	180V	78%	10sec	500cyc																
Under Voltage Level 2 (V)	70V	30%	1.0sec	50cyc																
10min Average Sustained Voltage	258V	112%																		
Over Frequency (f)	52Hz	104%	0.2sec	10cyc																
Under Frequency (f)	47Hz	94%	1.0sec	50cyc																
Active anti-islanding	Displayed		Function Tested																	
Soft Ramp Up after Reconnect	Enabled 16.67%																			
Reconnect Time	60sec																			

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## 4. Power Response Setting Check

Table 10, Table 11 and Table 12 detail the power quality response setting checks on the installed inverters to ensure compliance to AS4777.2 and the requirements in the Engineering Report, if applicable. By filling out the **Setting, On/Off, Voltage, VAR% and Power %** values, the Customer declares that these are the values and units that will be seen on site. **Everything announced here must be visually verifiable.**

Please See Appendix C in place of Table 10 for Rotating Generation.

**Table 10:** Power Quality Response Setting Checklist

Inverter Power Quality Response	Setting	On/Off		
Fixed Power Factor mode (if required)		On		Off
Volt-VAr response mode		On		Off
Volt-VAr reaction time		On		Off
Volt-Watt response mode		On		Off

**Table 11:** Reactive Power - Volt-VAr response mode (TS132 Table 8)

Reference	Voltage in Volts	VAR % rated VA	Inverter No 1-10																	
V <sub>1</sub>																				
V <sub>2</sub>																				
V <sub>3</sub>																				
V <sub>4</sub>																				

**Table 12:** Active Power- Volt-Watt response mode (TS132 Table 9)

Reference	Voltage in Volts	Power % rated Power	Inverter No 1-10																	
V <sub>1</sub>																				
V <sub>2</sub>																				

Customer to prove settings compliance to SA Power Networks Witnesser on multiple inverters. Ensure at least one is checked for every string of inverters.

Number of inverters \_\_\_\_\_ Total inverters size \_\_\_\_\_

Number of inverters \_\_\_\_\_ Total inverters size \_\_\_\_\_

## 4.1 Protection Settings Check

The Customer is to declare below in Table 13 how they will undertake proof of compliance of Anti-Islanding Relay settings, including detailed steps, for the SA Power Networks Witnesser to witness. Please note: If there are multiple protection relays, please attach an external copy with additional tables of similar format cover each kind/type.

**Table 13:** Compliance Witnessing Methodology

Location(s)	Method(s) of Demonstration	Responsible Qualified Person
<b>Steps to undertake Controlled Testing</b>		

**Table 14** below is to be filled with measured values on site **on the day** of commissioning witnessing.

Injection Testing

Injection testing is strongly recommended to prove the protection functionality of the relay, which provides back-up anti-islanding protection. This ensures that all functions of the protection relay will operate correctly in situ.

When the protection elements in the relay are to be demonstrated via an injection test kit, SA Power Networks Witnesser is to witness the correct settings being applied and the appropriate breaker being operated. A copy of the log of events are to be provided to SA Power Networks prior to site commissioning.

Please note: This is in addition to the pre-commissioning injection test.

Controlled Testing

If controlled testing is to be undertaken to prove functionality of the protection relay in situ, the customer will adhere to the following process and accept the additional risks associated.

When the protection elements are to be demonstrated via set-point manipulation on the relay, the voltage, frequency, and export set-points will be adjusted to cause a trip under normal operational conditions, e.g. Under Voltage will be tested by setting the trip point to 245V.

Table 14 details the required protection setting check on the installed protection relay to ensure compliance to AS4777.1 and the requirements in the Engineering Report. By filling out the **Setting and Trip Time** values, the Customer declares that these are the values and units that will be seen

on site. The settings must be verifiable via visual inspection either on the protection relay panel or software on device connected to the relay.

Upon completion of the controlled testing, it is the responsibility of the proponent to return the setting to the values as specified in the Engineering Report. SA Power Networks is not liable if the incorrect settings are left in the relay as a result of controlled testing.

Please see Appendix B when the NPU relay’s VT is connected at HV and Appendix C for Rotating Generation.

**Table 14:** Protection Relay Settings Checklist for LV connected Systems

Relay Protection 1	Make/Model				Serial No.			
Protection Relay 1 Make/Model & Serial Number								
Measured Voltage	Red		V	White		V	Blue	V
Measured Frequency			Hz					

Relay Protection 1	Setting	Trip Time/Cycles	Check
Reference/Nominal Voltage			
Control Device			
Change - Auto Fault Reset Delay Time			
Over Voltage Level 1			
Over Voltage Level 1 Function Test Value			
Over Voltage Level 2			
Over Voltage Level 2 Function Test Value			
Under Voltage Level 1			
Under Voltage Level 1 Function Test Value			
Under Voltage Level 2			
Under Voltage Level 2 Function Test Value			
Sustained Overvoltage (average 10 mins)			
Over Frequency			
Over Frequency Function Test Value			
Under Frequency			
Under Frequency Function Test Value			
Select one: ROCOF Stage 1 (preferred)			
or ROCOF Stage 2			
Vector Shift			
Voltage Unbalance			
Auto Fault Reset			
Minimum Import / Zero Export <sup>2</sup> (if applicable)			
Protection Relay Password			
Tamper seal serial number			

<sup>1</sup> Vector Shift must remain disabled unless special SA Power Networks approval is given

<sup>2</sup> Specify whether Directional Overcurrent or Reverse Power protection function will be implemented

Relay Protection 1	Displayed Value with No Generation		Displayed Value with Generation	
Output achieved		<i>kW</i>		<i>kW</i>
Load observed		<i>kW</i>		<i>kW</i>

- Ensure that all set points are returned to correct settings as listed in Table 14.
- SA Power Networks Witnesser confirms that the generator CB opens upon protection relay failure.
- Check Circuit Breaker Fail operation (if applicable).

Before proceeding to the next section, ensure that any manipulated settings have been returned to their original settings.

Sign off	Customer	
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**SA Power Networks Witnesser’s Comments:**

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## 5. On-Line Commissioning

This section details tests that are to be demonstrated to the SA Power Networks Witnesser to ensure the system meets the requirements of the Engineering Report/Network Planning Response after connection to the network. This section includes Control tests, SCADA Control tests and Communications tests.

See Appendix D for Inter-Trip Process prior to completing Section 5: On-Line Commissioning (If Applicable).

### 5.1 Methodology

The Customer is to declare below, in Table 15, location, method, and person responsible for undertaking proof of compliance of Control Checks and Tests for the SA Power Networks Witnesser to witness.

Table 15 to Table 21 detail tests (if applicable) that are to be demonstrated to SA Power Networks that the Generating System meets the requirements of the Engineering Report after connection to the network.

On-Line Commissioning checks must be witnessed by the SA Power Networks Witnesser prior to proceeding to compliance testing.

**Table 15:** Compliance Witnessing Methodology

<b>Test</b>	<b>Location</b> (E.g.: Web portal, control panel, etc)	<b>Method of Demonstration</b> (E.g.: Global setpoint manipulation, control panel adjustment, etc)	<b>Responsible Qualified Person</b> (Customer)
Control Tests			
SCADA Control Tests			
Communications Tests			

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**5.1.1 Preparation for Export Control Tests**

Required Preparation and Steps to enable Export Control Tests

**5.1.2 Preparation for Battery Control Tests – If Applicable**

Required Preparation and Steps to enable Battery Control Tests

**5.1.3 Preparation for SCADA Control Tests**

Required Preparation and Steps to enable SCADA Control Tests

**5.1.4 Preparation for Communications Tests**

Required Preparation and Steps to enable Communications Tests

**5.2 Online Commissioning Control Checks**

**Table 16:** Online Commissioning Control Checks

Online Commissioning Control Checks	Settings ('Tick' One)			
Loss of supply all inverters isolate from network		No		Yes
Generator interlock (if applicable)		Tested	Viewed	None
Radio frequency remote interlock		Tested	Viewed	None
Control Method		PLC		Manager
Export / Import controller		PLC		Manager
Control device(s)		Contactors		Breaker

### 5.3 Export Control Tests

**Table 17:** Export Protection Relay Control Test

Export - Protection Relay Control Test	
Parameter	Setting
1) Control method of disconnection	
2) Observe 100% of allowable export generation	
3) Lower Connection point trip value Stage 1 (below observed kW)	
4) Observe disconnection	
5) Reset control trip value Stage 1 to original value	
6) Lower Connection point trip value Stage 2 (below observed kW)	
7) Observe disconnection	
8) Reset control trip value Stage 2 to original value	
9) Simulate Trip Scenario	
10) Measure Ramp Down Speed	
11) Re-energize Relay	
12) Measure Ramp Up Speed	
13) Connection point fixed power factor value	

**Table 18:** Export Control Tests

Export / Import - Control Manager / Inverter / PLC Tests			
Step & Parameter	Setpoint	Measured Load	Measured Gen.
1) Remove all control – record total generation & load			
2) Apply 50% control of recorded generation			
3) Apply 20% control of recorded generation			
4) Apply 0% control of recorded generation			
5) Disconnect communication cable to reference meter			
6) Protection relay status for above condition			
7) Control manager/PLC/Inverter status for above condition			
8) Reconnect Comms Cable and Observe Response (system ramp)			
9) Apply all control – record total generation & load			

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## 5.4 Battery Control Tests – If Applicable

**Table 19:** Battery Control Tests

Battery Control Test				
Step & Parameter	Setpoint	Battery Value	Load	Generation
1. Remove All Controls				
2. Charge Battery from Grid				
3. Discharge Battery to Grid				
4. Apply Control and Check Status				
5. Simulate Trip Scenario				
6. Reinstate - Confirm battery isolates from the network				
7. Measure Ramp Down Speed				

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## 5.5 SCADA Control Tests

**Table 20:** SCADA Control Tests

Step & Parameter										
<b>1. Contact NOC and sign on to the feeder. NOC Operator Name:</b> 2. SA Power Networks to issue Permission to Connect Signal 3. SA Power Networks to execute the following steps and issue the following setpoint values (GDL) via SCADA and witness correct system operation										
4. Record SCADA Voltage at 0% Generation	Red:		V	White:		V	Blue:		V	
GDL Limit Control Test	Setpoint			Measured						
	Exp - Limit	GDL		Pf	Power		VArS			
5. Remove all controls – record system maximum values				Pf		kW				kVAr
6. Alter GDL - Export Limit Max				Pf		kW				kVAr
7. Ramp up to shown GDL setpoint of Max Value				Pf		kW				kVAr
8. Ramp up to shown GDL setpoint of Max Value				Pf		kW				kVAr
9. Ramp down to shown GDL setpoint of Max Value				Pf		kW				kVAr
10. Ramp up to shown GDL setpoint of Max Value				Pf		kW				kVAr
11. Record SCADA Voltage at 100% Generation	Red:		V	White:		V	Blue:		V	
Net Export Limiter (If applicable)	Setpoint			Measured						
	Exp-Limit	GDL		Pf	Power		VArS			
12. Alter Export limit – Keep GDL Max				Pf		kW				kVAr
13. Ramp down to shown Export Limit Value				Pf		kW				kVAr
14. Ramp down to shown Export Limit Value				Pf		kW				kVAr
15. Ramp system up to shown Export Limit Value				Pf		kW				kVAr
16. Apply Permission Denied & record time taken to reach 0%										
Power Factor Limit Control (If Applicable)	Setpoint			Measured						
	Exp-Limit	GDL		Pf	Power		VArS			
17. Set GDL Max	-				-					
18. Set Export Limit to Max		-			-					
19. Issue Permission Granted & record time taken to 100%							min			

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20. Alter power factor setpoint <sup>3</sup>									
Please note: Power Factor setpoints used must meet the following requirements									
<ul style="list-style-type: none"> <li>At least 4 power factor setpoints</li> <li>At least one positive and one negative setpoint</li> <li>Down to 0.05 lower than the required power factor</li> <li>Power factor setpoint intervals not exceeding 0.05 at a time</li> </ul>									
Alter power factor									
Record SCADA Voltage									
Alter power factor									
Record SCADA Voltage									
Alter power factor									
Record SCADA Voltage									
Alter power factor									
Record SCADA Voltage									
Alter power Factor									
Record SCADA Voltage									
Alter power Factor									
Record SCADA Voltage									
22. Set required power factor, GDL and Export Limit									
<b>System should now be in what will be normal / auto operation mode</b>									

### 5.6 Communications Tests

Table 21: Communications Tests

Communications Tests										
Disconnect RTU communication – inverters all ramp to 0 %					Yes		No			
System Soft Ramps down	Time		Inverter State		On		Off	Control Device	Trip	Idle
System Hard Ramps down					On		Off		Trip	Idle
Reconnect RTU communication	Heartbeat returns				Yes		No			
System Soft ramps up	Time									
Disconnect communication between inverter and reference meter										
System Soft Ramps down	Time		Inverter State		On		Off	Control Device	Trip	Idle
System Hard Ramps down					On		Off		Trip	Idle
Re-instate communication between inverter and reference meter										
System Soft ramps up	Time									
<b>System should now be in what will be normal / Auto operation mode</b>										
Sign-off for Compliance	Customer			SAPN						
<b>Contact NOC and <u>sign off</u> the feeder</b>			NOC Operator Name							

<sup>3</sup> The minimum power factor to be altered down to is 0.8pf. If insufficient power factor range to fully carry out tests, apply smaller 0.02pf steps or otherwise please contact Connections Planning for proposed revised power factor alteration values.

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## 6. Final Sign-Off

On-Line Commissioning checks must be witnessed by the SA Power Networks Witnesser prior to proceeding to Final Sign-Off.

Final Agreement	Customer	SAPN
Go ahead has been received from all parties		
Site Witness sticker placed on NPU panel		

Smarter Homes Regulations Check		
Parameter	Customer (Signature)	Date
The Customer of the designated electricity generating plant confirms that they have commissioned the Remote disconnection / Reconnection technical solution as per the provider’s instructions and is capable of performing the function at the time of installation.		

Customer Representative	
Name:	
Signed:	
Date:	

SA Power Networks Representative	
Name:	
Signed:	
Date:	

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## Appendix A - Additional NMI Tables

**Table A1:** NMI Information

	NMI 2	NMI 3	NMI 4	NMI 5
NMI Number				
NMI Solar PV Approved Capacity				
NMI Battery Approved Capacity				
NMI Synchronous Approved Capacity				
NMI Power Factor				
NMI Maximum Export				
NMI Minimum Import				

If additional space is required, please provide external table in similar format.

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## Appendix B - Alternate Tables for HV Site Inverters (if applicable)

The following table is for use in place of Table 9 when the customer’s site is supplied at HV. Only to be used when the inverters / cluster controllers reference the HV for protection and control.

Inverters connected to the customer’s LV should be consistent with the standard LV requirements.

**Table B1:** Inverter Settings Checklist (HV Reference)

Inverter Anti-Islanding Protection		Setting	Trip Time		Inverter Check			
Over Voltage Level 1 (V)								
Over Voltage Level 2 (V)								
Under Voltage Level 1 (V)								
Under Voltage Level 2 (V)								
Sustained Overvoltage (average 10 mins)								
Over Frequency (f)								
Under Frequency (f)								
Active anti-islanding								
Soft Ramp Up after Reconnect								
Reconnect Time								
Sign-off for Compliance	<b>Customer</b>		<b>SAPN</b>					

The following table is for use in place of Table 14 when the NPU relay’s VT is connected at HV:

**Table B2:** HV Protection Relay Settings Checklist

Relay Protection	Setting	Trip Time		Check
Reference/Nominal Voltage				
Control Device				
Change- Auto Fault Rest Delay time				
Over Voltage Level 1				
Over Voltage Level 2				
Under Voltage Level 1				
Under Voltage Level 2				
Sustained Overvoltage (average 10 mins)				
Over Frequency				
Under Frequency				
Select one: ROCOF Stage 1 (preferred)				
or ROCOF Stage 2				
Vector Shift				
Voltage Unbalance				
Minimum Import / Zero Export (if applicable)				
Auto Fault Reset				
Relay Delay Time Change				
Protection Relay Password				
Tamper seal serial number				
Sign-off for Compliance	<b>Customer</b>		<b>SAPN</b>	

## Appendix C - Alternate Tables for Rotating Generating Units (If applicable)

Commissioning of rotating generating units does not require commissioning witnessing of Table 10, Table 11 and Table 12.

The following table is for use in place of Table 10 for rotating generating units:

**Table C1: HV Rotating Protection Relay Settings Checklist**

Power Quality Response			Setting
Fixed Power Factor mode (as per Engineering Report if stated)			
Ramp Rate		Enabled	
Sign-off for Compliance	Customer		SAPN

The following table is for use in place of Table 16 when the NPU relay's VT is connected at LV:

**Table C2: Rotating Protection Relay Settings Checklist**

Relay Protection	Setting	Trip Time/Cycles	
Over Voltage			
Under Voltage			
Over Frequency			
Under Frequency			
Select one: ROCOF Stage 1 (preferred)			
or ROCOF Stage 2			
Vector Shift			
Minimum Import / Zero Export (if applicable)			
Auto Fault Reset			
Relay Delay Time Change			
Sign-off for Compliance	Customer		SAPN

## Appendix D - Commissioning Witnessing Inter-trip Protection Schemes (if applicable)

The requirements for an inter-trip will be captured within the Engineering Report for rotating generating systems not using *Minimum Import*, or inverter generating systems that are *not AS4777* compliant.

Prior to commencing 'Section 3: On-line Commissioning', proceed with the following **inter-trip** process. If the protection does not respond as intended, **do not proceed with witness commissioning**. The rotating generating units may not connect to the network until the defect is rectified.

### At the time of confirming the appointment:

Confirm with the Project Manager who will be the responsible site contact  
(Contact Substation Operations – David Skein).

*Included in the appointment will be a check sheet that needs to be completed at the time of testing.*

### At the time of confirming the appointment:

- Record the name of the substation(s) the trip signal will be sent from:

	Substation
1	
2	

- Confirm with the Substation Operator that the inter-trip labelling at the substation is correct.

- Record the nominated circuit breaker(s) that will be operating, and the breaker labelling is correct.

Circuit Breaker No	Label	Trip from Sub 1	Trip from Sub 2	Circuit Breaker No	Label	Trip from Sub 1	Trip from Sub 2

- Confirm with the Substation Operator what the expectations will be when the signal is sent; explain this process to the customer.
- Operate the generator (which must be running) at level acceptable to the customer. Expect this to be low in order to avoid damage to generating unit equipment.
- Request the Substation Operator to simulate the trip signal.
- The trip signal needs to be received and the nominated breaker(s) should trip instantaneously. Confirm the nominated breaker(s) tripped.
- Check the generating units cannot start (try force start the generation, force close of contact or PLC)
- Allow 30sec to check if there is any auto reclose function. This may not occur.
- Request the Substation Operator release the latch signal (ie. restore to system normal).
- Allow customer to start generator and ramp to an acceptable level.
- Repeat for substation 2 (if applicable).
- Proceed with 'Section 3: On-line Commissioning'.

**Note:** Permission denied on rotating systems must result in the generator circuit breaker(s) opening (not immediately but upon a ramp down to a low enough level without causing potential damage to gen).