

D	17-09-2021	PROTECTION SETTING AMMENDED	NG	JJT	JJT
C	10-09-2021	TRIP CIRCUIT K ADDED; VARIOUS OTHER AMMENDMENTS	NG	JJT	JJT
B	07-09-2021	SECOND WATTWATCHERS METER ADDED; VARIOUS MINOR AMMENDMENTS	NG	JJT	JJT
A	06-09-2021	ISSUED FOR REVIEW	NG	JJT	JJT

DWG NO.	DESCRIPTION	REV.	DATE	DESCRIPTION	DWN	CKD	APPD

REFERENCE DRAWINGS		REVISION	

ComAp

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DRAWN	NG
CHECKED	JJT
APPROVED	JJT - RPEQ 12221
DATE	17-09-2021
JOB No.	20-0110
SCALE	NTS
SHEET	1 OF 2

CUSTOMER: WESTSIDE ENERGY	
BEERENBERG HES	
COMAP HYBRID ENERGY MANAGEMENT SYSTEM	
SINGLE LINE DIAGRAM	
PROTECTION SLD	
A3	DWG NO: 301
	REV: D

PRIMARY MAINS ANSI PROTECTIONS (PV GCB) - SOLAR INVERTERS			
ANSI CODE	DESCRIPTION	SETPOINT	DELAY
59	OVER VOLTAGE - 1	260 V	1 s
59	OVER VOLTAGE - 2	265 V	0.2 s
27	UNDER VOLTAGE	180 V	1 s
59	SUSTAINED OVER VOLTAGE (10 MINUTE AVERAGE)	258 V	3 s
81O	OVER FREQUENCY	52 Hz	0.2 s
81U	UNDER FREQUENCY	47 Hz	1 s

PRIMARY MAINS ANSI PROTECTIONS (BESS GCB) - SEL 700GT			
ANSI CODE	DESCRIPTION	SETPOINT	DELAY
59	OVER VOLTAGE - 1	260 V	1 s
59	OVER VOLTAGE - 2	265 V	0.2 s
27	UNDER VOLTAGE	180 V	1 s
59	SUSTAINED OVER VOLTAGE (10 MINUTE AVERAGE)	258 V	3 s
81O	OVER FREQUENCY	52 Hz	0.2 s
81U	UNDER FREQUENCY	47 Hz	1 s

EMBEDDED GENERATION EQUIPMENT RATINGS			
DESIGNATION	MODEL	ACTIVE ANTI-ISLAND COMPLIANCE	MAX POWER OUTPUT
PV01	FIMER (ABB) PVS-100-TL	AS 4777.2	100 kW
PV02	FIMER (ABB) PVS-100-TL	AS 4777.2	100 kW
PV03	FIMER (ABB) PVS-100-TL	AS 4777.2	100 kW
BESS	POWERCACHE	VF MODE	250 kW
GEN1	PRAMAC GSW-560V	SAPN REPORT NC-015175 ISSUE B	437 kW
TOTAL EMBEDDED GENERATION CAPACITY			987 kW

MAINS SECONDARY ANSI PROTECTIONS (MCB) - INTELIPRO (PR3)			
ANSI CODE	DESCRIPTION	SETPOINT	DELAY
59	OVER VOLTAGE	253 V	0.4 s
27	UNDERVOLTAGE	216.2 V	0.4 s
81O	OVER FREQUENCY	52 Hz	0.4 s
81U	UNDER FREQUENCY	47 Hz	0.4 s
81R	RATE OF CHANGE OF FREQUENCY - 1	3 Hz/s	1 s
81R	RATE OF CHANGE OF FREQUENCY - 2	4 Hz/s	0.25 s
50BF	CIRCUIT BREAKER FAIL		0.1 s after breaker fail detected

MAINS ANSI PROTECTIONS (PV GCB) - INTELHYBRID (C32+HMI)			
ANSI CODE	DESCRIPTION	SETPOINT	DELAY
59	OVER VOLTAGE	260 V	2 s
27	UNDER VOLTAGE	180 V	2 s
59	SUSTAINED OVER VOLTAGE (10 MINUTE AVERAGE)	258 V	15 s
81O	OVER FREQUENCY	52 Hz	2 s
81U	UNDER FREQUENCY	47 Hz	2 s


MAINS ANSI PROTECTIONS (MCB) - INTELIMAINS (C11+HMI / PR2)			
ANSI CODE	DESCRIPTION	SETPOINT	DELAY
59	OVER VOLTAGE	253 V	0.4 s
27	UNDERVOLTAGE	216.2 V	0.4 s
59	SUSTAINED OVER VOLTAGE (10 MINUTE AVERAGE)	258 V	15 s
81O	OVER FREQUENCY	52 Hz	0.4 s
81U	UNDER FREQUENCY	47 Hz	0.4 s
32	DIRECTIONAL POWER - 1	199 kW	120 s
32	DIRECTIONAL POWER - 2	298.5 kW	0.4 s
50BF	CIRCUIT BREAKER FAIL		0.1 s after breaker fail detected

MAINS ANSI PROTECTIONS (BESS GCB) - INTELIMAINS (C11+HMI / PR2)			
ANSI CODE	DESCRIPTION	SETPOINT	DELAY
59	OVER VOLTAGE	260 V	2 s
27	UNDER VOLTAGE	180 V	2 s
59	SUSTAINED OVER VOLTAGE (10 MINUTE AVERAGE)	258 V	15 s
81O	OVER FREQUENCY	52 Hz	2 s
81U	UNDER FREQUENCY	47 Hz	2 s
25	SYNCHRONISATION	5°	See Note 1
50BF	CIRCUIT BREAKER FAIL		0.1 s after breaker fail detected

GEN ANSI PROTECTIONS (GENERATOR GCB) - INTELIGEN (C1)			
ANSI CODE	DESCRIPTION	SETPOINT	DELAY
27	UNDER VOLTAGE	180 V	2 s
59	OVER VOLTAGE	260 V	2 s
59	SUSTAINED OVER VOLTAGE (10 MINUTE AVERAGE)	255 V	15 s
81U	UNDER FREQUENCY	47 Hz	2 s
81O	OVER FREQUENCY	52 Hz	2 s
81R	RATE OF CHANGE OF FREQUENCY	3 Hz/s	0.5 s
78	VOLTAGE VECTOR SHIFT	12°	0.01 s
32	DIRECTIONAL POWER	10 %	5 s

¹ - 3 x SYNCH CHECK RELAYS USED AS BACKUP TO COMAP INTERNAL SYNC CHECK. THESE MEASURE THE MAINS, HYBRID BUS AND BATTERY VOLTAGES

SYSTEM COMPONENT	PRIMARY			SECONDARY / CENTRAL			BREAKER FAIL / BACKUP		
	BY	TRIPS	TRIP CIRCUIT	BY	TRIPS	TRIP CIRCUIT	BY	TRIPS	TRIP CIRCUIT
SOLAR	SOLAR INVERTERS	INTERNAL	N/A	IS-NTC-HYBRID	PV GCB UVT COIL PV GCB OPEN COIL	TRIP C	NOT IMPLEMENTED FOR IEC 62116 COMPLIANT CURRENT SOURCE INVERTER		
				WATTWATCHERS POWER METER	INTERTRIP TO IS-NTC-HYBRID	TRIP K			
BESS	BESS SEL PROTECTION RELAY AND INVERTER	INTERNAL	TRIP A	IM-NTC-BB	MCB SHT COIL MCB OPEN COIL	TRIP D	IS-NTC-HYBRID	BESS GCB UVT COIL BESS GCB OPEN COIL	TRIP F
DIESEL GENSET	IM-NTC-BB	MCB SHT COIL MCB OPEN COIL	TRIP B	IPRO	MCB SHT COIL	TRIP E	IM-NTC-BB	GENSET GCB UVT COIL	TRIP G
							IPRO	INTERTRIP TO IM-NTC-BB INTERTRIP TO IS-NTC-HYBRID	TRIP H

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		D	17-09-2021	PROTECTION SETTING AMMENDED	NG	JJT	JJT				CHECKED	JJT	BEERENBERG HES COMAP HYBRID ENERGY MANAGEMENT SYSTEM SINGLE LINE DIAGRAM PROTECTION SETTINGS					
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		A	06-09-2021	ISSUED FOR REVIEW	NG	JJT	JJT				JOB No.	20-0110						
								SCALE	NTS	SHEET	2 OF 2	A3	DWG NO:	302	REV:	D		

REFERENCE DRAWINGS

REVISION

FULL DWG NO: AUS-DWG-20-0110-0301_2