

GENERAL NOTES:

1.

ALL INFORMATION ON EXISTING INFRASTRUCTURE SHALL BE CONFIRMED ON SITE.

2.

ALL ELECTRICAL AND AUXILIARY INFRASTRUCTURE SHALL BE MECHANICALLY SUPPORTED AND CONSTRUCTED AS FIT FOR PURPOSE.

3.

ALL WORK SHALL BE COMPLY WITH THE NATIONAL CONSTRUCTION CODE, THE WORKPLACE HEALTH AND SAFETY ACT AND ALL APPLICABLE AND REFERENCED CODES, STANDARDS AND RELEVANT MANUFACTURERS GUIDELINES, INCLUDING BUT NOT LIMITED TO:

•AS 3000 AUSTRALIAN WIRING RULES

•AS 3008.1.1 ELECTRICAL INSTALLATIONS-SELECTION OF CABLES

•AS 4836 SAFE WORKING ON OR NEAR LOW VOLTAGE ELECTRICAL INSTALLATIONS AND EQUIPMENT

•AS 5033 INSTALLATION AND SAFETY REQUIREMENTS FOR PHOTOVOLTAIC(PV) ARRAYS

•AS 4777.1 GRID CONNECTION OF ENERGY SYSTEMS VIA INVERTERS-INSTALLATION REQUIREMENTS

•AS 4777.2 GRID CONNECTION OF ENERGY SYSTEMS VIA INVERTERS-INVERTER REQUIREMENTS

•PV MODULE INSTALLATION MANUAL

•RACKING INSTALLATION MANUAL

•INVERTER INSTALLATION MANUAL

•CURRENT TRANSFORMER INSTALLATION MANUAL

4.

INDICATION LAMP AND EMERGENCY PUSH BUTTON SHALL BE LOCATED ON PANEL ESCUTCHEON ON DOOR.

5.

INCLUDE FOR SUITABLE SWITCHMODE POWER SUPPLY UNIT. 24VDC.

6.

CEC CERTIFIED CONTRACTOR SHALL SUPPLY DETAILED SCHEMATICS FOR APPROVAL PRIOR TO MANUFACTURE.

7.

CONTACTORS WITHIN EACH DWELLING SHALL INCLUDE LAMP FIXED TO ESCUTCHON PANEL TO INDICATE SYSTEM OPERATION (ON / OFF).

8.

ALL (DO) OUTPUT SIGNALS FROM MOXA RTU SHALL BE VIA A RELAY MODULE.

9.

ENERGY MAESTRO COMMUNICATION BOX DISTRIBUTED SIEMENS BASED SLAVE CONTROLLER SHALL BE WALL MOUNTED IN SHADE UNDER EAVE OR INDOORS ADJACENT THE INVERTER. PRE-WIRED 1 PHASE+N+PE SUPPLY AND THE 2 ETHERNET CABLES SHALL BE WIRED AS SHOWN IN SLD AND AS PER THE INSTALLATION MANUAL.COMMUNICATION BOX SHALL PROPAGATE CENTRAL CONTROLLER'S PROTECTION AND CONTROL REQUIREMENTS TO DISTRIBUTED IES.SYSTEM OPERATES IN FAIL-SAFE WHERE IT DISCONNECTS INVERTER DURING LOSS OF COMMUNICATION OR ANYLOCALIZED FAILURE.

10.

CONNECTION AND CONTROL TOPOLOGY SHOWN IS REFLECTIVE OF ALL 147 DWELLINGS.

11.

VOLTAGE RISE OF THE SITE IES SHALL BE CONFIRMED TO BE 2%.

12.

STATIC IP ADDRESS OF THE SAME DEDICATED SUBNET AND VLAN (TOTAL OF 297+3SPARES,300) SHALL BE ALLOCATED FOR IES IN COORDINATION WITH NETWORK OPERATOR.

13.

FIREWALL WALL RULES SPECIFIC TO ENERGY MAESTRO SYSTEM AND FRONIUS INVERTERS SHALL BE COORDINATED AND WHITE-LISTED WITH NETWORK OPERATOR.

PROTECTION STRATEGY EXPLANATION:

1.

ALL INVERTERS SHALL BE COMPLIANT WITH AS4777.2, IEC62116 AND DNSP (AUSNET SERVICES) STANDARDS.
2.

LOSS OF MAINS PROTECTION DEVICE SHALL BE COMPLIANT WITH IEC60255 AND ALL CONTROL EQUIPMENT IN THE TRIPPING CIRCUIT, IF ANY, SHALL BE COMPLIANT WITH IEC60255.
3.

CURRENT TRANSFORMERS SHALL BE COMPLIANT WITH AS60044.
4.

IES INVERTER(S) SHALL HAVE SETTINGS AS PER TABLE 2 AND GRID PROTECTION RELAY (GPR) AS PER TABLE 1.
5.

SYSTEM SHALL OPERATE FAIL SAFE PRINCIPLE FURTHER DESCRIBED.

•THE ISOLATION POINTS SHALL BE PROVIDED VIA SUITABLY RATED NORMALLY OPEN (NO) AC CONTACTOR(S), DISCONNECTING ALL ACTIVE CONDUCTORS OF IES INVERTER(S) FROM THE GRID.

•UPON STARTUP THE GPR WILL HAVE A STARTUP DELAY, AFTER WHICH THE GPR WILL ENERGIZE THE AC CONTACTOR(S) IF GRID PARAMETERS ARE WITHIN LIMITS.

•AS LONG AS GRID PARAMETERS ARE WITHIN LIMITS, STIPULATED IN THE TABLES BELOW, IES INVERTER(S) WILL REMAIN COUPLED WITH THE GRID.

•IF GRID PARAMETERS DEVIATE FROM THE GIVEN TABLES WITHIN THE SPECIFIED TIMEFRAME, THE IES GPR WILL DE-COUPLED THE IES FROM THE GRID(VIA THE AC CONTACTOR(S)). AFTER THE SPECIFIED TIMEFRAME, IF THE GRID PARAMETERS ARE WITHIN THE LIMITS IES GPR RE-CONNECT THEIES INVERTER(S).

•WHERE IF ANY INTERMEDIATE COMMUNICATION DEVICE WERE UTILIZED, THEY WILL BE CONFIGURED TO HAVE A MAXIMUM FAIL-SAFE DISCONNECTION TIME OF 5.0 SEC, IN THE EVENT OF ANY COMMUNICATION FAILURE.

TABLE 1.1 – IES GPR PROTECTION FUNCTIONS (AS4777.1 CLAUSE 3.4.4)

PROTECTION FUNCTIONAL DESCRIPTION	ANSI	IEC 60617	TRIP SETTING	TRIP TIME DELAY	MAX DISCONNECTION TIME
10 min SUSTAINED OVER VOLTAGE	59P	U>	255 V _{L-n}	15.0 SEC	15.0 SEC
OVER VOLTAGE	59P	U>	260V _{L-n}	2.0 SEC	2.0 SEC
UNDER VOLTAGE	27P	U<	180 V _{L-n}	2.0 SEC	2.0 SEC
OVER FREQUENCY	81O	F>	52 Hz	2.0 SEC	2.0 SEC
UNDER FREQUENCY	81U	F<	47 Hz	2.0 SEC	2.0 SEC
RATE OF CHANGE OF FREQUENCY (ROCOF)	81R	df/dt	3 Hz/sec	1.0 SEC	1.0 SEC
VOLTAGE VECTOR SHIFT (VVS)	78V	VS	8°	1.0 SEC	1.0 SEC
RECONNECT TIME	-		60 SEC		
STARTUP DELAY	-		60 SEC		

TABLE 2.1 – IES INVERTER PROTECTION FUNCTIONS (AS4777.2 CLAUSE 7.4-7.7)

PROTECTION FUNCTIONAL DESCRIPTION	ANSI	IEC 60617	TRIP SETTING	TRIP TIME DELAY	MAX DISCONNECTION TIME
10 min SUSTAINED OVER VOLTAGE	59P	U>	258 V _{L-n}	3.0 SEC	3.0 SEC
OVER VOLTAGE 1	59P	U>	260V _{L-n}	1.0 SEC	2.0 SEC
OVER VOLTAGE 2	59P	U>>	265 V _{L-n}	INSTANTANEOUS	0.2 SEC
UNDER VOLTAGE	27P	U<	180 V _{L-n}	1.0 SEC	2.0 SEC
OVER FREQUENCY	81O	F>	52 Hz	INSTANTANEOUS	0.2 SEC
UNDER FREQUENCY	81U	F<	47 Hz	1.0 SEC	2.0 SEC
EXPORT LIMIT (SOFT RAMP)	32	P>	FULL EXPORT		
RECONNECT TIME	-		60 SEC		

TABLE 2.2 – IES INVERTER VOLT-WATT RESPONSE MODE SETTINGS (AS4777.2 CLAUSE 6.3.2)

REFERENCE	VOLTAGE	SETTING (P/P RATED %)
V1	207V	100%
V2	220V	100%
V3	253V	100%
V4	259V	20%

TABLE 2.3 – IES INVERTER VOLT-VAR RESPONSE MODE SETTINGS (AS4777.2 CLAUSE 6.3.2)

REFERENCE	VOLTAGE	SETTING (VAR % RATED VA)	SETTING (PF)
V1	208V	44% LEADING	0.9 LEADING
V2	220V	0 %	1
V3	241V	0 %	1
V4	253V	44% LAGGING	0.9 LAGGING

RESEARCH SUBMISSION
DOCUMENT ISSUED FOR FINAL YEAR PROJECT RESEARCH SUBMISSION

REV	DATE	DESCRIPTION	Drn.	Chkd.	REV	DATE	DESCRIPTION	Drn.	Chkd.
RS1	27/04/25	RESEARCH SUBMISSION	M.N.	JZ-P10					
RS2	02/06/25	RESEARCH SUBMISSION	M.N.	JZ-P10					

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CONTRACTORS MUST VERIFY ALL DIMENSIONS AT THE JOB BEFORE COMMENCING ANY WORK OR MAKING ANY SHOP DRAWINGS WHICH MUST BE SUBMITTED AND APPROVED BEFORE MANUFACTURE. ANY EXTRA ENTAILED IN WORK HEREON MUST BE CLAIMED AND APPROVAL OBTAINED BEFORE PROCEEDING OTHERWISE NO EXTRA WILL BE ALLOWED.

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ELECTRICAL SERVICES -
GENERAL NOTES

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