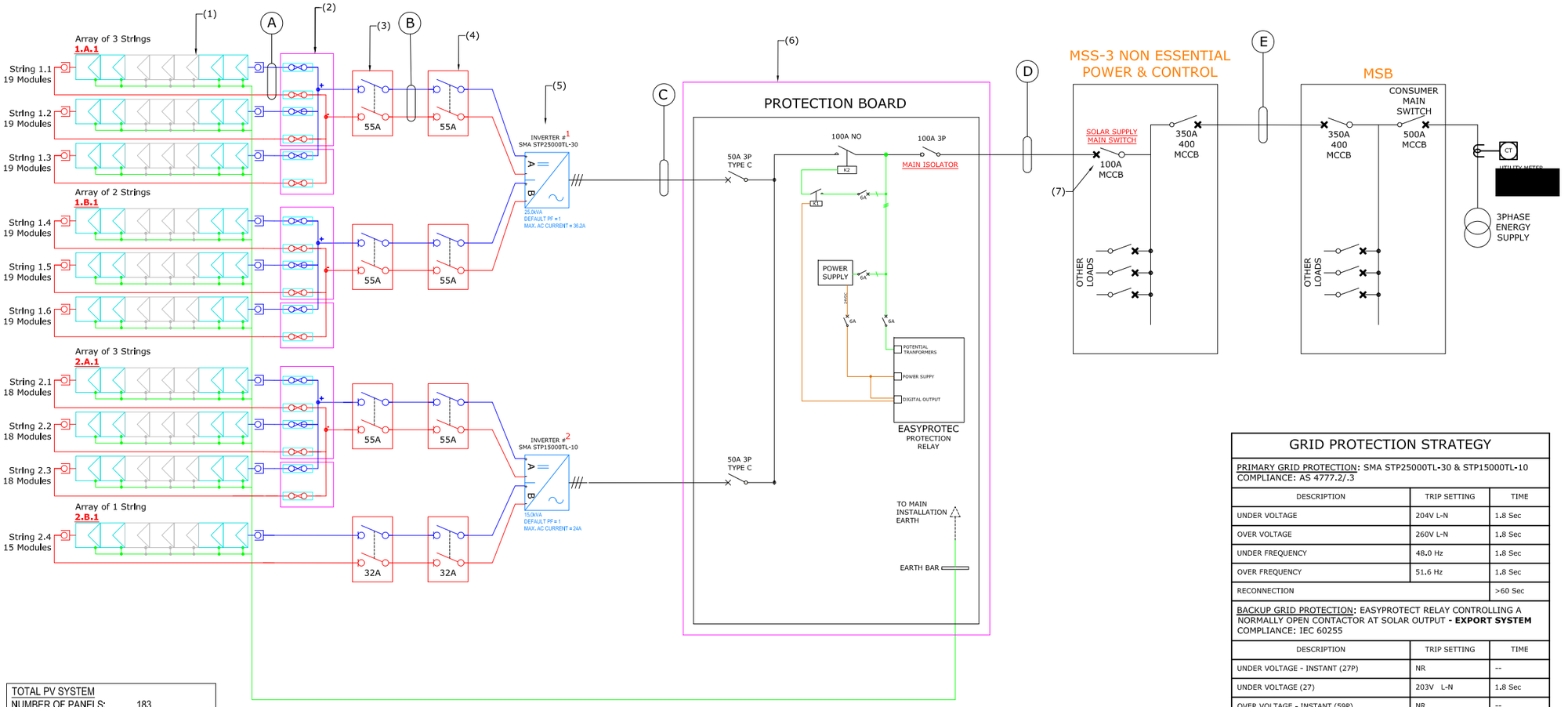
[redacted]

1. Technology: Solar PV
2. Maximum Power: 40 kW
3. Contribution to fault levels: N/A
4. Size & rating of the relevant Transformer: N/A
5. Single line diagram: refer to following page
6. Protection Systems & Communication Systems: refer to following page
7. Voltage Control and reactive power capability: N/A
8. Details specific to the location of facility: N/A

[redacted]

EQUIPMENT SCHEDULE

TAG	QTY	DESCRIPTION
(1)	1	PV ARRAY - (183) JA SOLAR JAM6-60-285/PR
(2)	3	6x 15A FUSES IN 2x 4P IP66 ENCLOSURES
(3)	3 1	1000V / 55A DC LOAD ISOLATOR - 4 POLES IN SERIES INSIDE IP66 ENCLOSURE 1000V / 32A DC LOAD ISOLATOR - 4 POLES IN SERIES INSIDE IP66 ENCLOSURE
(4)	3 1	1000V / 55A DC LOAD ISOLATOR - 4 POLES IN SERIES INSIDE IP66 ENCLOSURE 1000V / 32A DC LOAD ISOLATOR - 4 POLES IN SERIES INSIDE IP66 ENCLOSURE
(5)	1 1	SMA STP25000TL-30 INVERTER SMA STP15000TL-10 INVERTER
(6)	1	PROTECTION BOARD: PROTECTION RELAY, 100A CONTACTOR, 100A ISOLATOR, 1x 50A ABB MCBs, 1x 40A ABB MCBs, 24VDC POWER SUPPLY AND UPS, IP65 PANEL
(7)	1	SOLAR SUPPLY MAIN SWITCH - 100A MCCB (MAKE MODEL)



GRID PROTECTION STRATEGY

PRIMARY GRID PROTECTION: SMA STP25000TL-30 & STP15000TL-10
COMPLIANCE: AS 4777.2/.3

DESCRIPTION	TRIP SETTING	TIME
UNDER VOLTAGE	204V L-N	1.8 Sec
OVER VOLTAGE	260V L-N	1.8 Sec
UNDER FREQUENCY	48.0 Hz	1.8 Sec
OVER FREQUENCY	51.6 Hz	1.8 Sec
RECONNECTION		>60 Sec

BACKUP GRID PROTECTION: EASYPROTECT RELAY CONTROLLING A NORMALLY OPEN CONTACTOR AT SOLAR OUTPUT - **EXPORT SYSTEM**
COMPLIANCE: IEC 60255

DESCRIPTION	TRIP SETTING	TIME
UNDER VOLTAGE - INSTANT (27P)	NR	--
UNDER VOLTAGE (27)	203V L-N	1.8 Sec
OVER VOLTAGE - INSTANT (59P)	NR	--
OVER VOLTAGE (59)	265V L-N	1.8 Sec
UNDER FREQUENCY (81U)	48.3 Hz	1.8 Sec
OVER FREQUENCY (81O)	51.7 Hz	1.8 Sec
REVERSE POWER EXPORT LIMIT	NR	--
VECTOR SHIFT (78)	8°	0 Sec
ROCOF (81R)	1 Hz/s	0.8 Sec
NEUTRAL VOLTAGE DISPLACEMENT (59N)	NR	--
TIME BEFORE RESET		60 SEC

WIRING SCHEDULE

TAG	DESCRIPTION	CABLE SIZE	LONGEST RUN	VDROP
A	PV TO ISOLATOR	20x 1C 6mm² PV1-F	20m	0.12%
B	ARRAY ISOLATOR TO INV. ISOLATOR	4x 2C 6mm² PV1-F	30m	0.43%
C	INVERTER TO PVDB	2x 16mm² 4C+E	5m	0.146%
D	PVDB TO MSS3	1x 50mm² 4C+E	5m	0.085%
E	MSS3 TO MSB	4X 1C 240mm² PVC/PVCu+E	45m	0.114%

TOTAL PV SYSTEM
NUMBER OF PANELS: 183
OVERALL kWp: 52.155 kWp

SOLAR PV PANEL
JA SOLAR
JAM6-60-285/PR
POLY
Pmax: 285 W
Vmp: 31.81VDC
Voc: 39.2VDC
Impp: 8.96A
Isc: 9.44A
Max. Series Fuse Rating: 15A
Dimensions: 1650x991x40 mm

SYSTEM CONFORMITY:

ALL INVERTERS ARE AS4777 ACCREDITED
ALL FRAMING AND INSTALLATION TO AS1170.2
ALL PANELS AND INVERTERS ARE APPROVED BY CEC AND DNSP
INSTALLATION AND LABELLING TO BE IN ACCORDANCE WITH AS3000 / AS5033:2014, ALL OTHER APPLICABLE STANDARDS, CURRENT CEC REQUIREMENTS AND SERVICE AND INSTALLATION RULES
AC VOLTAGE DROP BETWEEN EACH INVERTER AND MSB SHALL MEET EACH DNSP REGULATIONS
DC VOLTAGE DROP BETWEEN ARRAYS AND INVERTERS <3% IN ACCORDANCE WITH AS5033:2014

Rev	Date	Comments	Dwn	Chkd
D	27/07/2016	Address amended	[redacted]	
C	26/07/2016	Meter changed		
B	22/07/2016	Table updated		
A	23/06/2016	Table updated		

NOTES:

ALL WIRING, COMPONENTS AND EARTHING MUST BE INSTALLED IN ACCORDANCE WITH AS/NZS 3000 & 5033:2014 AND ALL THE CURRENT CEC REQUIREMENTS.

EARTHING CABLE RUNS ARE INDICATIVE ONLY. ONLY EARTH CABLES USED FOR PV MODULE BONDING ARE INDICATED FOR CLARITY.

AC VOLTAGE RISE TO MEET THE ASSOCIATED DNSP REGULATION.
DC LOSSES BETWEEN ARRAYS [INCLUDING LOSSES IN STRING CABLES] AND INVERTERS TO BE <3%P.

NOTE - VOLTAGES OVER 600VDC
SYSTEM MUST COMPLY WITH RESTRICTED ACCESS REQUIREMENTS. INSTALL PADLOCK ON ENCLOSURES IF REQUIRED AND ENSURE ALL WIRING AND SYSTEM COMPONENTS FOLLOW THE AS3000 DEFINITION OF RESTRICTED ACCESS. DOMESTIC DWELLING MUST NOT HAVE SYSTEMS OVER 600V.

CONDUITS, CABLE TRAYS AND ALL CABLE MANAGEMENT SYSTEMS MUST ALLOW FOR HEAT EXPANSION AS WELL TO AVOID DAMAGE TO CABLES AND SHALL BE INSTALLED SUCH THAT THEY WILL LAST FOR THE LIFE OF THE SYSTEM.

todae solar

[redacted]

PROJECT NAME:
MCPV1414

CLIENT'S NAME:
[redacted]

Project Address
[redacted]

Sheet Title
ELECTRICAL SCHEMATIC

Drawn	Date	Checked	Date
[redacted]	17/05/2016	[redacted]	17/05/2016

Status: FOR CONSTRUCTION
Scale: NTS

Drawing No.: MCPV1414-300
Revision: D

[redacted]

REV	DESCRIPTION	DATE	APPROVED
NEW	PRELIMINARY	09 JUNE 2016	[redacted]
A	AS-BUILT		

PROJECT No: P1100-14-AU-PV
SYSTEM NO: S-AU-1100
DRAWING NO: 9771-1105
CUSTOMER: [redacted]
PROJECT: [redacted]
SUBJECT: SOLAR INVERTER INTERFACE CONTROL
CONTROL WIRING
SOLARTUNE CONTROL WITH EASYPROTEC RELAY (PROTECTION ONLY)

SHEET	CONTENTS
1	COVER AND CONTENTS
2	LEGENDS
3	SYSTEM OVERVIEW
4	DETAILED LAYOUT
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	

IMPORTANT - PLEASE NOTE :

TO PREVENT PERSONAL INJURY AND/OR PROPERTY DAMAGE, PERSONNEL USING THIS DRAWING MUST BE KNOWLEDGEABLE OF THE SYSTEM AND AWARE OF APPROPRIATE SAFETY PRACTICES. THE INFORMATION CONTAINED ON THIS DRAWING IS BELIEVED TO BE CORRECT. HOWEVER, PM CONTROL SYSTEMS PTE LTD MAKES NO REPRESENTATION, AND TAKES NO RESPONSIBILITY, FOR THE ACCURACY OF ANY INFORMATION PROVIDED BY OTHERS, OR ANY INTERFACE WIRING WHICH IS PART OF THE ORIGINAL SYSTEM, OR EQUIPMENT MODIFICATIONS OR ADDITIONS TO THE SYSTEM MADE AT ANY TIME BY OTHERS, WHETHER OR NOT ANY OF THESE EQUIPMENT MODIFICATIONS OR ADDITIONS ARE CONTAINED IN THIS DRAWING.

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN MILLIMETERS.
DRAWING DEFINITIONS AND TOLERANCES SHALL BE FOUND IN SS-112.

MATERIAL:

REF. DWGS.

THIRD ANGLE PROJECTION

APPROVALS		DATE
ENGINEER	[redacted]	09JUN16
DRAWN BY	[redacted]	09JUN16

PM Control Systems
[redacted]
TITLE:
SOLAR INVERTER INTERFACE CONTROL
COVER AND CONTENTS

SIZE	SYSTEM PART NO.	DRAWING NO.	REV
A3	S-AU-1100	9771-1105	NEW

SCALE : N.T.S. SHEET 1 OF 4

STANDARD WIRING NOTES

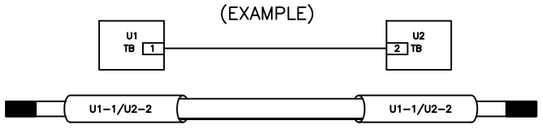
ALL WIRING IS ø1mm2 UNLESS SPECIFIED OTHERWISE

1. WIRING IS ø16mm2
2. WIRING IS ø2.5mm2
3. WIRING IS ø1.5mm2
4. UNLESS OTHERWISE SPECIFIED:
   A. RELAYS SHOWN DE-ENERGISED.
   B. RELAYS ENERGISED FOR FUNCTION.
   C. RELAY CONTACT RATINGS:
      - 8.0A AT 28VDC
      - 8.0A AT 110VDC
      - 8.0A AT 250VAC
5. 120Ω RESISTOR
6. CUSTOMER PROVIDE WIRING.
7. DASHED LINES INDICATE CUSTOMER FIELD WIRING.
8. CUSTOMER SUPPLIED
9. EXISTING

PM. PM CONTROL SUPPLIED

CABLE LABELLING IS USED TO BE (MATERIAL) TRAFFOLYTE.
ALL FIELD WIRING ARE PROVIDED BY CUSTOMER.

(EXAMPLE)



MISCELLANEOUS ABBREVIATIONS

FTM – FIELD TERMINAL MODULE

SHLD – SHIELD

I.S – INTRINSICALLY SAFE

ELECTRICAL SYMBOLS USED

	SINGLE POLE MCB		COMMUNICATION CABLE (RS485)
	TRIPLE POLE MCB		COMMUNICATION CABLE (ETHERNET STRAIGHT)
	CONTACTOR, 3 PHASE	1	TERMINAL BLOCK
	FUSE	1 / 2	TERMINAL BLOCKS TIED
8 K3 1	RELAY COIL		TEST TERMINAL BLOCK
2 K3 3	CONTACT, NORMALLY OPEN		TO SAFETY GROUND
	DIODE (NOT USED)		CHASSIS GROUND (NOT USED)
RED	415VAC WIRE PHASE L1 (RED)		INSTRUMENT GROUND (NOT USED)
WHITE	415VAC WIRE PHASE L2 (WHITE)		I.S EARTH BAR (NOT USED)
BLUE	415VAC WIRE PHASE L3 (BLUE)		WIRES NOT JOINED
BLACK	415VAC WIRE NEUTRAL (BLACK)		WIRES JOINED
	+24VDC (ORANGE)	OR	SIGNAL CABLE SHIELD (NOT USED)
	24VDC COMMON (BROWN)		

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN MILLIMETERS.
DRAWING DEFINITIONS AND TOLERANCES SHALL BE FOUND IN SS-112.

MATERIAL:

REF. DWGS.

THIRD ANGLE PROJECTION

APPROVALS		DATE
ENGINEER	[redacted]	09JUN16
DRAWN BY	[redacted]	09JUN16

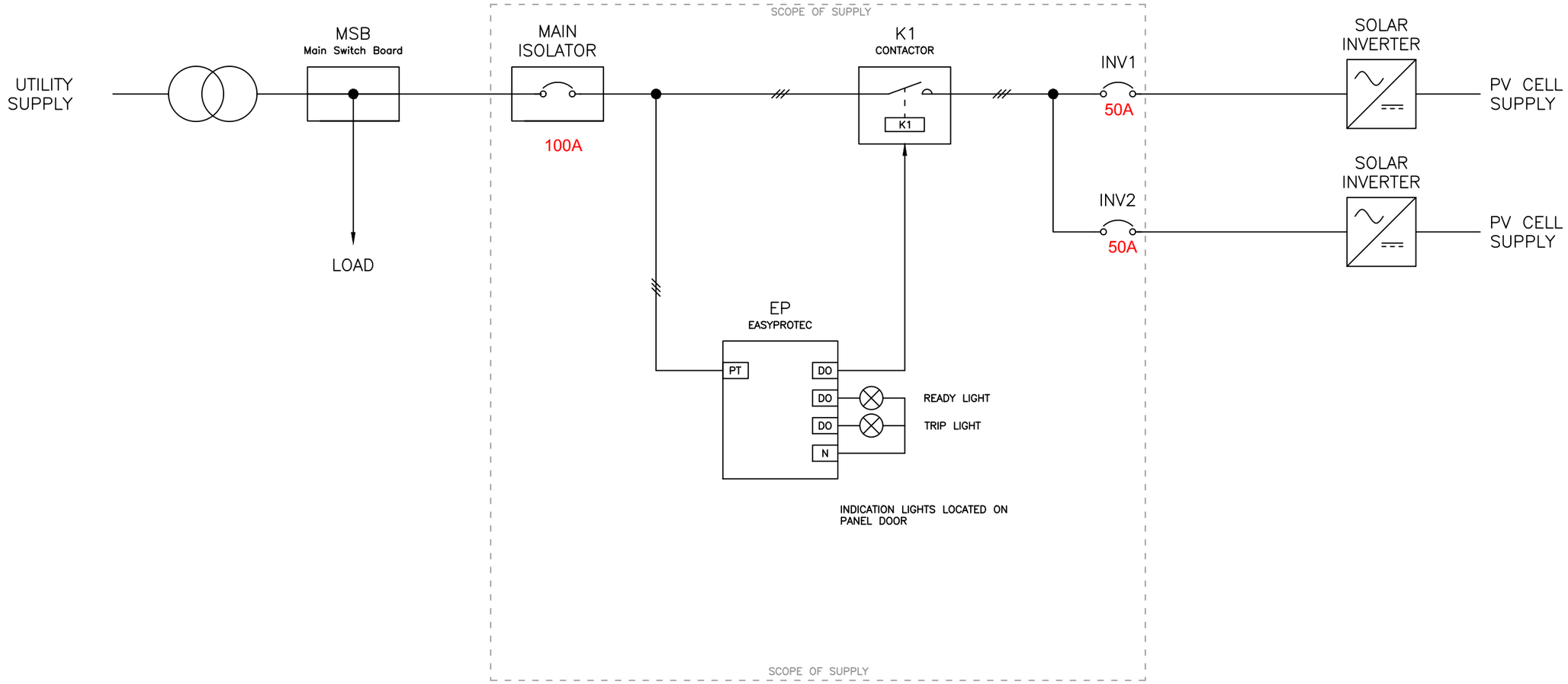
PM Control Systems [redacted]

TITLE

SOLAR INVERTER INTERFACE CONTROL LEGENDS

SIZE	SYSTEM PART NO.	DRAWING NO.	REV
A3	S-AU-1100	9771-1105	NEW

SCALE : N.T.S. SHEET 2 OF 4



UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN MILLIMETERS.
DRAWING DEFINITIONS AND TOLERANCES SHALL BE FOUND IN SS–112.

MATERIAL:

REF. DWGS.

THIRD ANGLE PROJECTION

APPROVALS		DATE
ENGINEER	[redacted]	09JUN16
DRAWN BY	[redacted]	09JUN16

PM Control Systems [redacted]

TITLE

SOLAR INVERTER INTERFACE CONTROL SYSTEM OVERVIEW

SIZE	SYSTEM PART NO.	DRAWING NO.	REV
A3	S–AU–1100	9771–1105	NEW

SCALE : N.T.S.

SHEET 3 OF 4

EXTERNAL WIRING | INTERNAL PANEL WIRING

UTILITY SUPPLY

L1
L2
L3
N

MAIN ISOLATOR

100A

1

RED
WHITE
BLUE
BLACK

CONTACTOR

2 1
4 3
6 5

K1

A1 A2

100A

INTERNAL PANEL WIRING | EXTERNAL WIRING

INV1

50A

INV2

50A

PV CELL SUPPLY

L1
L2
L3
N

PV CELL SUPPLY

L1
L2
L3
N

CB4 6A

E4 12 R1 8 E4/1 E4/2 N4

TEST LINK

N

CB5 6A

E5

N

MONITORING POWER POINT

L
N
GND

POWER SUPPLY 240VAC TO 24VDC

CB2 6A E2

L
N
GND

1 +
2 −

CB3 2A

3 3A
2 2A

TEST LINK

ES EASYPROTEC

13 12 POWER SUPPLY

R3 WATCHDOG
42 41 40

R2 TRIP RELAY
39 38 37

X1 X2

TEST LINK

A1 R1 A2

15 17 19 21 POTENTIONAL TRANSFORMERS

N1

TEST LINK

N

CB1

6A E30A E30B
6A E20A E20B
6A E10A E10B

3

EXTERNAL WIRING | INTERNAL PANEL WIRING

INTERNAL PANEL WIRING | EXTERNAL WIRING

UNLESS OTHERWISE SPECIFIED:
ALL DIMENSIONS ARE IN MILLIMETERS.
DRAWING DEFINITIONS AND TOLERANCES SHALL BE FOUND IN SS-112.

MATERIAL:

REF. DWGS.

THIRD ANGLE PROJECTION

APPROVALS	DATE
ENGINEER [redacted]	09JUN16
DRAWN BY [redacted]	09JUN16

PM Control Systems [redacted]

TITLE

SOLAR INVERTER INTERFACE CONTROL
DETAILED LAYOUT

SIZE	SYSTEM PART NO.	DRAWING NO.	REV
A3	S-AU-1100	9771-1105	NEW

SCALE : N.T.S.

SHEET 4 OF 4