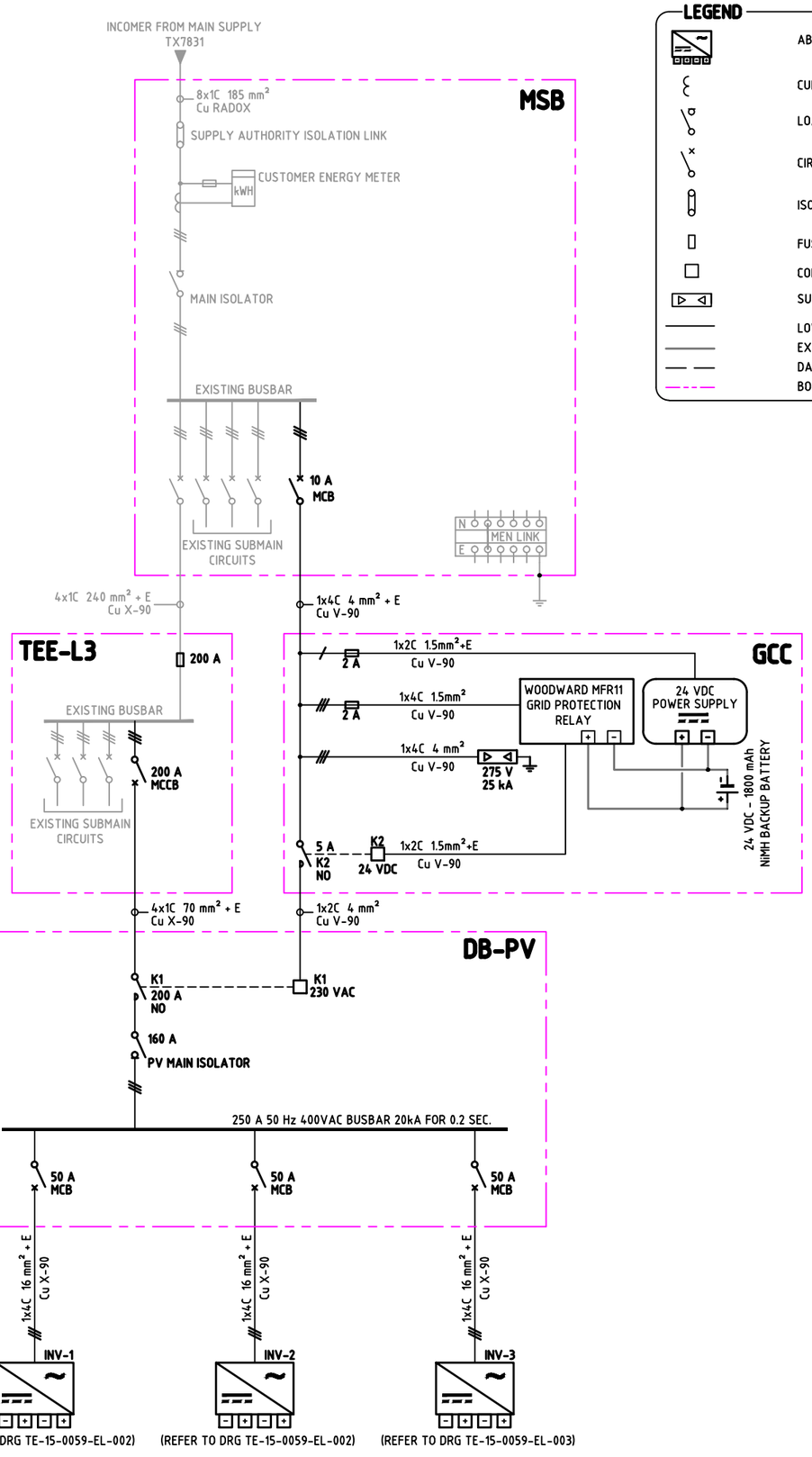
[redacted]

1. Technology: Solar PV
2. Maximum Power: 100kW
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



LEGEND

- ABB TRIO-27.6-TL-OUTD INVERTER
- CURRENT TRANSFORMER
- LOAD MAKE/BREAK ISOLATOR
- CIRCUIT BREAKER
- ISOLATION LINK
- FUSE
- CONTACTOR COIL
- SURGE DIVERTER
- LOW VOLTAGE AC CIRCUIT WIRE
- EXTRA LOW VOLTAGE DC CIRCUIT WIRE
- DATA/SIGNAL CABLE
- BOARD/PANEL OUTLINE

GRID PROTECTION STRATEGY

PRIMARY GRID PROTECTION STRATEGY

PRIMARY GRID PROTECTION SCHEME TO BE PROVIDED VIA ABB TRIO AS 4777 COMPLIANT INVERTERS

DESIGNATION	MODEL	COMPLIANCE	MAX. OUTPUT POWER
INV-1	ABB TRIO-27.6-TL-OUTD	AS 4777	30 kW
INV-2	ABB TRIO-27.6-TL-OUTD	AS 4777	30 kW
INV-3	ABB TRIO-27.6-TL-OUTD	AS 4777	30 kW
		TOTAL	90 kW

INVERTER SETTINGS

ANSI CODE	DESCRIPTION	TRIP SETTING	
27P	PHASE UNDERVOLTAGE	200 V L-N	364 V L-N
59P	PHASE OVERVOLTAGE (10 SEC)	270 V L-N	467 V L-N
81U	UNDERFREQUENCY	48.0 Hz	
81O	OVERFREQUENCY	52.0 Hz	
	DISCONNECT TIME	2 SEC	
	RECONNECT TIME	60 SEC	
	POWER FACTOR	1	

BACKUP GRID PROTECTION STRATEGY

BACKUP GRID PROTECTION SCHEME TO BE PROVIDED VIA WOODWARD MFR11 PROTECTION RELAY CONTROLLING A NORMALLY OPEN CONTACTOR IN THE DB-PV SUBMAIN

ANSI CODE	DESCRIPTION	TRIP SETTING		TIME
27P	PHASE UNDERVOLTAGE	200 V L-N	364 V L-N	2 SEC
59P	PHASE OVERVOLTAGE	270 V L-N	467 V L-N	2 SEC
81U	UNDERFREQUENCY	48.0 Hz		2 SEC
81O	OVERFREQUENCY	52 Hz		2 SEC
-	VOLTAGE VECTOR SHIFT	8° IN A HALF CYCLE		0 SEC
-	RATE OF CHANGE OF FREQUENCY	0.4 Hz/SEC		0 SEC

ABBREVIATIONS

GCC	GENERATOR CONNECTION CUBICLE
MSB	MAIN SWITCH BOARD
DB	DISTRIBUTION BOARD
TEE	TEE OFF BOARD
PV	PHOTOVOLTAIC
L3	LEVEL THREE

NOTES:

1. SOLAR PV SYSTEM INSTALLATION TO BE IN ACCORDANCE WITH AS/NZS 3000, AS/NZS 3008, AS/NZS 5033, AS 4777, AS/NZS 1170, AS/NZS 1768, ALL SUPPLY AUTHORITY REQUIREMENTS AND CLEAN ENERGY COUNCIL GUIDELINES.

Rev. No.	Dwn.	Ckd.	Description	Date
1	[redacted]		ISSUED FOR APPROVAL	20-02-15

NOT FOR CONSTRUCTION
FOR APPROVAL ONLY

todae solar [redacted]

PROJECT NAME: [redacted] 100 kW

CLIENT'S NAME: [redacted]

Project Address [redacted]

Sheet Title: AC SCHEMATIC

Drawn	Date	Checked	Date
[redacted]	20-02-15	[redacted]	20-02-15

Status	Scale
FOR APPROVAL	NTS

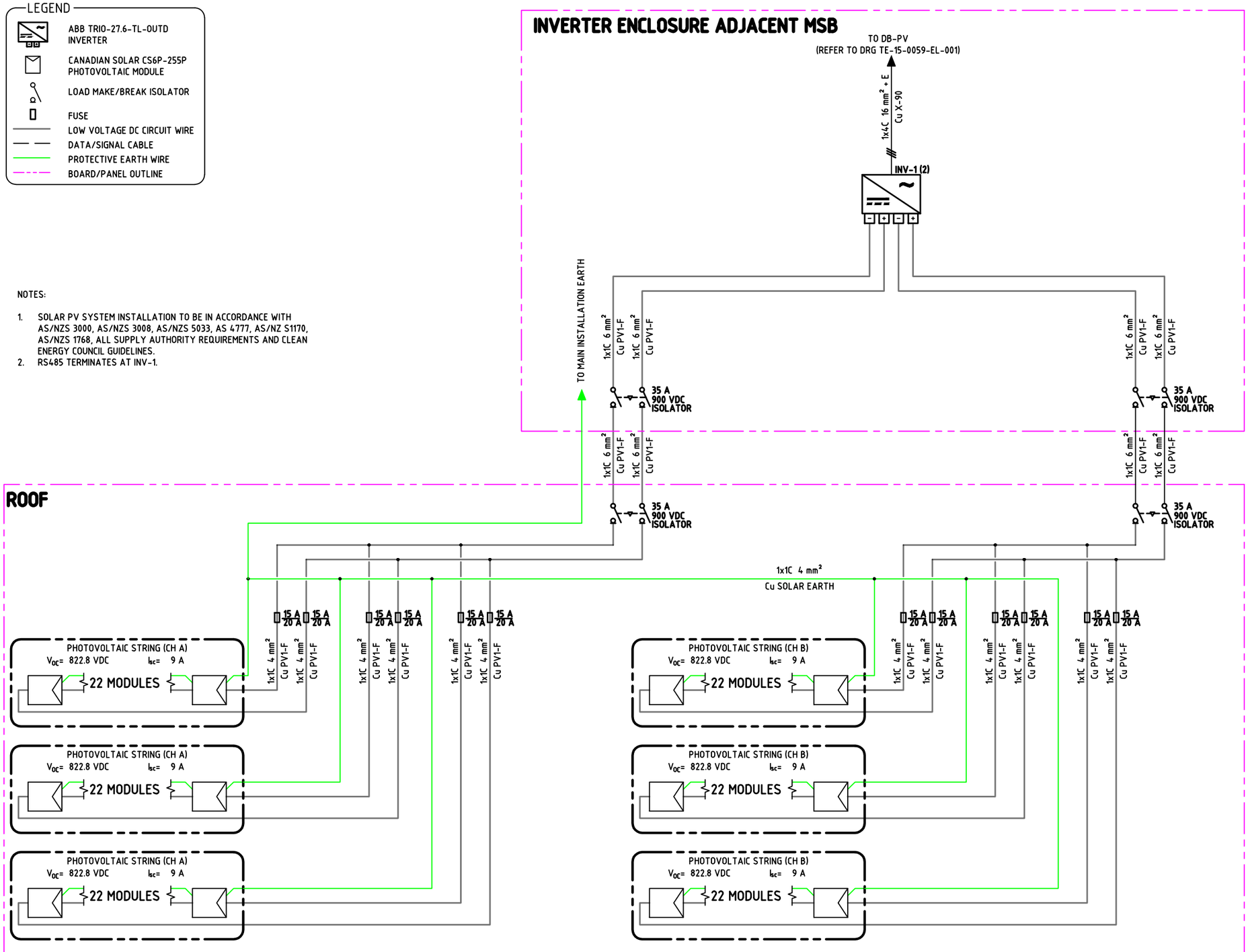
Drawing No.	Revision
TE-15-0059-EL-001	1

LEGEND

- ABB TRIO-27.6-TL-OUTD INVERTER
- CANADIAN SOLAR CS6P-255P PHOTOVOLTAIC MODULE
- LOAD MAKE/BREAK ISOLATOR
- FUSE
- LOW VOLTAGE DC CIRCUIT WIRE
- DATA/SIGNAL CABLE
- PROTECTIVE EARTH WIRE
- BOARD/PANEL OUTLINE

NOTES:

1. SOLAR PV SYSTEM INSTALLATION TO BE IN ACCORDANCE WITH AS/NZS 3000, AS/NZS 3008, AS/NZS 5033, AS 4777, AS/NZ S1170, AS/NZS 1768, ALL SUPPLY AUTHORITY REQUIREMENTS AND CLEAN ENERGY COUNCIL GUIDELINES.
2. RS485 TERMINATES AT INV-1.



Rev. No.	Dwn.	Ckd.	Description	Date
1	[redacted]		ISSUED FOR APPROVAL	20-02-15

NOT FOR CONSTRUCTION
FOR APPROVAL ONLY

todae solar

[redacted]

[redacted] 100 kW

Project Address

[redacted]

Sheet Title

DC SCHEMATIC (INV-1 & 2)

Drawn	Date	Checked	Date
[redacted]	20-02-15	[redacted]	20-02-15

Status	Scale
FOR APPROVAL	NTS

Drawing No.	Revision
TE-15-0059-EL-002	1

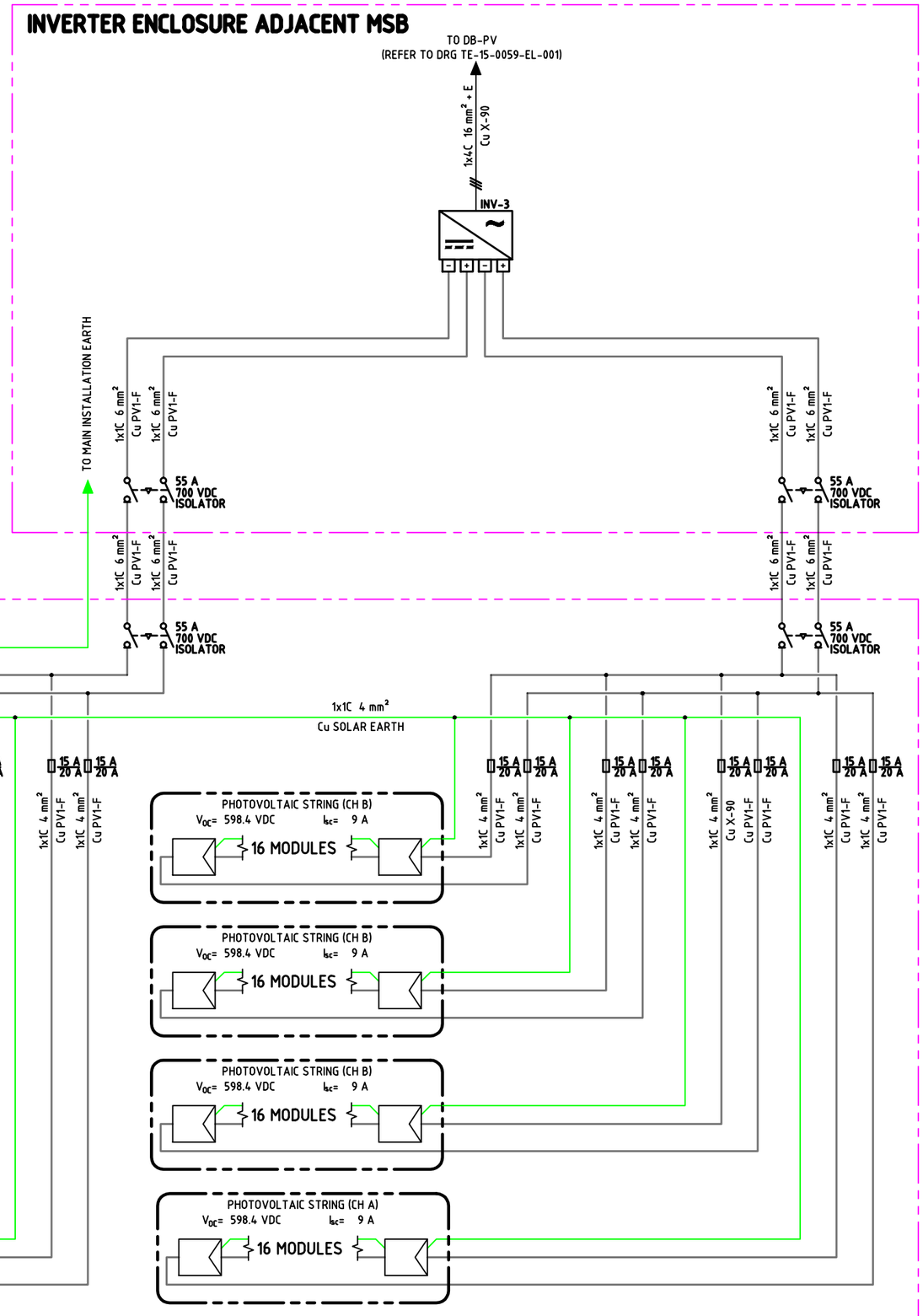
[redacted]

LEGEND

- ABB TRIO-27.6-TL-OUTD INVERTER
- CANADIAN SOLAR CS6P-255P PHOTOVOLTAIC MODULE
- LOAD MAKE/BREAK ISOLATOR
- FUSE
- LOW VOLTAGE DC CIRCUIT WIRE
- DATA/SIGNAL CABLE
- PROTECTIVE EARTH WIRE
- BOARD/PANEL OUTLINE

NOTES:

1. SOLAR PV SYSTEM INSTALLATION TO BE IN ACCORDANCE WITH AS/NZS 3000, AS/NZS 3008, AS/NZS 5033, AS 4777, AS/NZ S1170, AS/NZS 1768, ALL SUPPLY AUTHORITY REQUIREMENTS AND CLEAN ENERGY COUNCIL GUIDELINES.



Rev. No.	Dwn.	Ckd.	Description	Date
1	[redacted]		ISSUED FOR APPROVAL	20-02-15

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FOR APPROVAL ONLY

todae solar

[redacted]

[redacted] 100 kW

Project Address

[redacted]

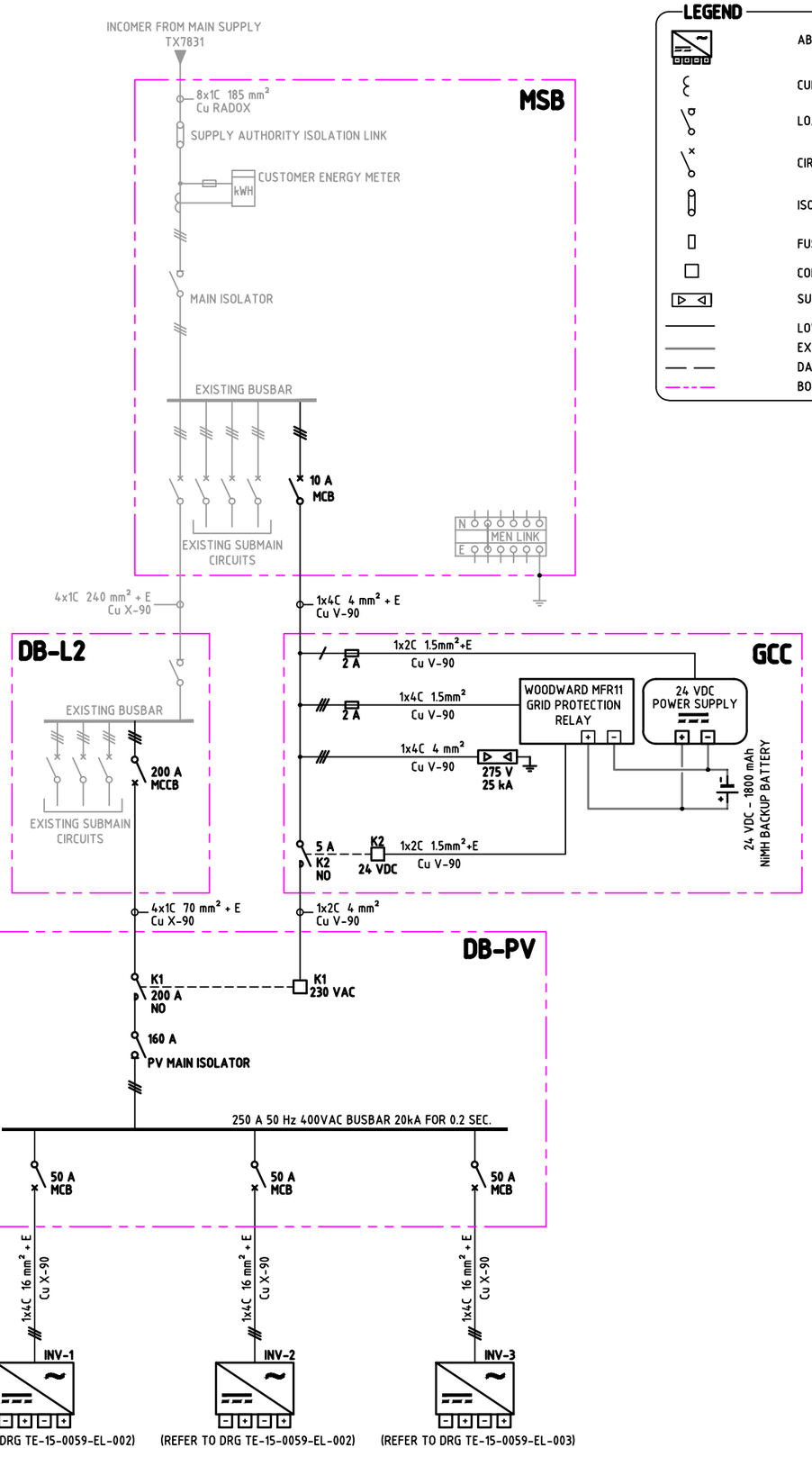
Sheet Title

DC SCHEMATIC (INV-3)

Dra.	Date	Ch.	Date
[redacted]	20-02-15	[redacted]	20-02-15

Status	Scale
FOR APPROVAL	NTS

Drawing No.	Revision
TE-15-0059-EL-003	1



LEGEND

- ABB TRIO-27.6-TL-OUTD INVERTER
- CURRENT TRANSFORMER
- LOAD MAKE/BREAK ISOLATOR
- CIRCUIT BREAKER
- ISOLATION LINK
- FUSE
- CONTACTOR COIL
- SURGE DIVERTER
- LOW VOLTAGE AC CIRCUIT WIRE
- EXTRA LOW VOLTAGE DC CIRCUIT WIRE
- DATA/SIGNAL CABLE
- BOARD/PANEL OUTLINE

GRID PROTECTION STRATEGY

PRIMARY GRID PROTECTION STRATEGY

PRIMARY GRID PROTECTION SCHEME TO BE PROVIDED VIA ABB TRIO AS 4777 COMPLIANT INVERTERS

DESIGNATION	MODEL	COMPLIANCE	MAX. OUTPUT POWER
INV-1	ABB TRIO-27.6-TL-OUTD	AS 4777	30 kW
INV-2	ABB TRIO-27.6-TL-OUTD	AS 4777	30 kW
INV-3	ABB TRIO-27.6-TL-OUTD	AS 4777	30 kW
		TOTAL	90 kW

INVERTER SETTINGS

ANSI CODE	DESCRIPTION	TRIP SETTING
27P	PHASE UNDERVOLTAGE	200 V L-N 364 V L-N
59P	PHASE OVERVOLTAGE (10 SEC)	270 V L-N 467 V L-N
81U	UNDERFREQUENCY	48.0 Hz
810	OVERFREQUENCY	52.0 Hz
	DISCONNECT TIME	2 SEC
	RECONNECT TIME	60 SEC
	POWER FACTOR	1

BACKUP GRID PROTECTION STRATEGY

BACKUP GRID PROTECTION SCHEME TO BE PROVIDED VIA WOODWARD MFR11 PROTECTION RELAY CONTROLLING A NORMALLY OPEN CONTACTOR IN THE DB-PV SUBMAIN

ANSI CODE	DESCRIPTION	TRIP SETTING	TIME
27P	PHASE UNDERVOLTAGE	200 V L-N 364 V L-N	2 SEC
59P	PHASE OVERVOLTAGE	270 V L-N 467 V L-N	2 SEC
81U	UNDERFREQUENCY	48.0 Hz	2 SEC
810	OVERFREQUENCY	52 Hz	2 SEC
-	VOLTAGE VECTOR SHIFT	8° IN A HALF CYCLE	0 SEC
-	RATE OF CHANGE OF FREQUENCY	0.4 Hz/SEC	0 SEC

ABBREVIATIONS

GCC	GENERATOR CONNECTION CUBICLE
MSB	MAIN SWITCH BOARD
DB	DISTRIBUTION BOARD
PV	PHOTOVOLTAIC
L2	LEVEL TWO

NOTES:

1. SOLAR PV SYSTEM INSTALLATION TO BE IN ACCORDANCE WITH AS/NZS 3000, AS/NZS 3008, AS/NZS 5033, AS 4777, AS/NZS 1170, AS/NZS 1768, ALL SUPPLY AUTHORITY REQUIREMENTS AND CLEAN ENERGY COUNCIL GUIDELINES.

Rev. No.	Dwn.	Ckd.	Description	Date
1	[redacted]		ISSUED FOR APPROVAL	20-02-15

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todae solar [redacted]

[redacted] 100 kW

Project Address
[redacted]

Sheet Title
AC SCHEMATIC

Dr.	Date	Chk.	Date
[redacted]	20-02-15	[redacted]	20-02-15

Status	Scale
FOR APPROVAL	NTS

Drawing No.	Revision
TE-15-0059-EL-001	1

ABB Stringsizer - Configuration Report

Location
CONTINENT Oceania
COUNTRY Australia
LOCATION MC - Sydney

Temperature (°C)	Amb	Cell
Minimum	-3°C	-3°C
Average	18°C	53°C
Maximum	46°C	81°C

Mounting method
Flush on roof

Inverter Model TRIO-27.6-TL-OUTD BASE
Rated AC Power [kW]/ Rated AC Voltage [V] 27600 / 400
Mppt Configuration INDEPENDENT MPPT (Num. MPPT ind.: 2)
Total number of PV modules 132
Installed DC Power (STC) [kW] 33660
Notes The selected inverter dont't have string protection fuses on board. If it is proposed to design a photovoltaic generator in a group of three strings or more groups of three parallel strings, assess the inclusion of protection fuses of suitable size.

PV Panel (manufacturer / model) Canadian Solar / CS6P-255P
Technology
STC Rated Power [W] 255
Open Circuit Voltage - Voc [V] 37.4
Short Circuit Current - Isc [A] 9
Maximum Power Voltage - Vmp [V] 30.2
Maximum Power Current - Imp [A] 8.43
Temperature Coefficient - Voc [V/°C] -0.13
Temperature Coefficient - Isc [mA/°C] 5.48

	MPPT1	MPPT2
PV Panels/String	22	22
Number of Parallel Strings	3	3
Total number of PV modules	66	66
Notes	1, 2, 3	1, 2, 3
Installed DC Power (STC) [kW]	16.83	16.83
Maximum Power/MPPT [kW]	16.00	16.00
$P_{PV(INST),MPPTi}/P_{MPPTMAX}$	105.2%	105.2%
$P_{PV(inst)}/P_{ACR}$	122.0%	
$P_{PV(inst)}/P_{ACMAX}$	112.2%	
PV Panel Max System Voltage [Vdc]	1000	1000
Inverter Maximum Input Voltage [Vdc]	1000	1000
String Open Circuit Voltage @-3°C [Vdc]	902.9	902.9
String Open Circuit Voltage @81°C [Vdc]	662.6	662.6
Inverter Activation Voltage (default) [Vdc]	430	430
Inverter Recommended Activation Voltage [Vdc]	Default (430)	Default (430)
String Max Power Voltage @-3°C [Vdc]	726.0	726.0
String Max Power Voltage @53°C [Vdc]	602.8	602.8
String Max Power Voltage @81°C [Vdc]	541.2	541.2
Inverter MPP Operating Range* [Vdc]	301 - 950	301 - 950
PV Array Max Short Circuit Curr. @81°C [Adc]	27.9	27.9
Inverter Max Short Circuit Current/MPPT [Adc]	40	40
PV Array MPP Current @81°C [Adc]	26.2	26.2
Inverter Max MPPT Input Current [Adc]	32	32
Notes legend	*) Range for MPPT operation considering the voltage default activation; 1)- Designer Note: Possibility of output power limiting; 2)- The number of strings in parallel exceeds the number of inputs on the inverter: please provide an esternal string box.; 3)- Number of parallel strings greater than 2. Verify the need to install fuses for reverse current protection	

ABB Stringsizer - Configuration Report

Location
CONTINENT Oceania
COUNTRY Australia
LOCATION MC - Sydney

Temperature (°C)	Amb	Cell
Minimum	-3°C	-3°C
Average	18°C	53°C
Maximum	46°C	81°C

Mounting method
Flush on roof

Inverter Model TRIO-27.6-TL-OUTD BASE
Rated AC Power [kW]/ Rated AC Voltage [V] 27600 / 400
Mppt Configuration INDEPENDENT MPPT (Num. MPPT ind.: 2)
Total number of PV modules 128
Installed DC Power (STC) [kW] 32640
Notes The selected inverter dont't have string protection fuses on board. If it is proposed to design a photovoltaic generator in a group of three strings or more groups of three parallel strings, assess the inclusion of protection fuses of suitable size.

PV Panel (manufacturer / model) Canadian Solar / CS6P-255P
Technology
STC Rated Power [W] 255
Open Circuit Voltage - Voc [V] 37.4
Short Circuit Current - Isc [A] 9
Maximum Power Voltage - Vmp [V] 30.2
Maximum Power Current - Imp [A] 8.43
Temperature Coefficient - Voc [V/°C] -0.13
Temperature Coefficient - Isc [mA/°C] 5.48

	MPPT1	MPPT2
PV Panels/String	16	16
Number of Parallel Strings	4	4
Total number of PV modules	64	64
Notes	1, 2, 3	1, 2, 3
Installed DC Power (STC) [kW]	16.32	16.32
Maximum Power/MPPT [kW]	16.00	16.00
$P_{PV(INST),MPPTi}/P_{MPPTMAX}$	102.0%	102.0%
$P_{PV(inst)}/P_{ACR}$	118.3%	
$P_{PV(inst)}/P_{ACMAX}$	108.8%	
PV Panel Max System Voltage [Vdc]	1000	1000
Inverter Maximum Input Voltage [Vdc]	1000	1000
String Open Circuit Voltage @-3°C [Vdc]	656.6	656.6
String Open Circuit Voltage @81°C [Vdc]	481.9	481.9
Inverter Activation Voltage (default) [Vdc]	430	430
Inverter Recommended Activation Voltage [Vdc]	Default (430)	Default (430)
String Max Power Voltage @-3°C [Vdc]	528.0	528.0
String Max Power Voltage @53°C [Vdc]	438.4	438.4
String Max Power Voltage @81°C [Vdc]	393.6	393.6
Inverter MPP Operating Range* [Vdc]	301 - 950	301 - 950
PV Array Max Short Circuit Curr. @81°C [Adc]	37.2	37.2
Inverter Max Short Circuit Current/MPPT [Adc]	40	40
PV Array MPP Current @81°C [Adc]	34.9	34.9
Inverter Max MPPT Input Current [Adc]	32	32
Notes legend	*) Range for MPPT operation considering the voltage default activation; 1)- Designer Note: Possibility of output power limiting; 2)- The number of strings in parallel exceeds the number of inputs on the inverter: please provide an esternal string box.; 3)- Number of parallel strings greater than 2. Verify the need to install fuses for reverse current protection	