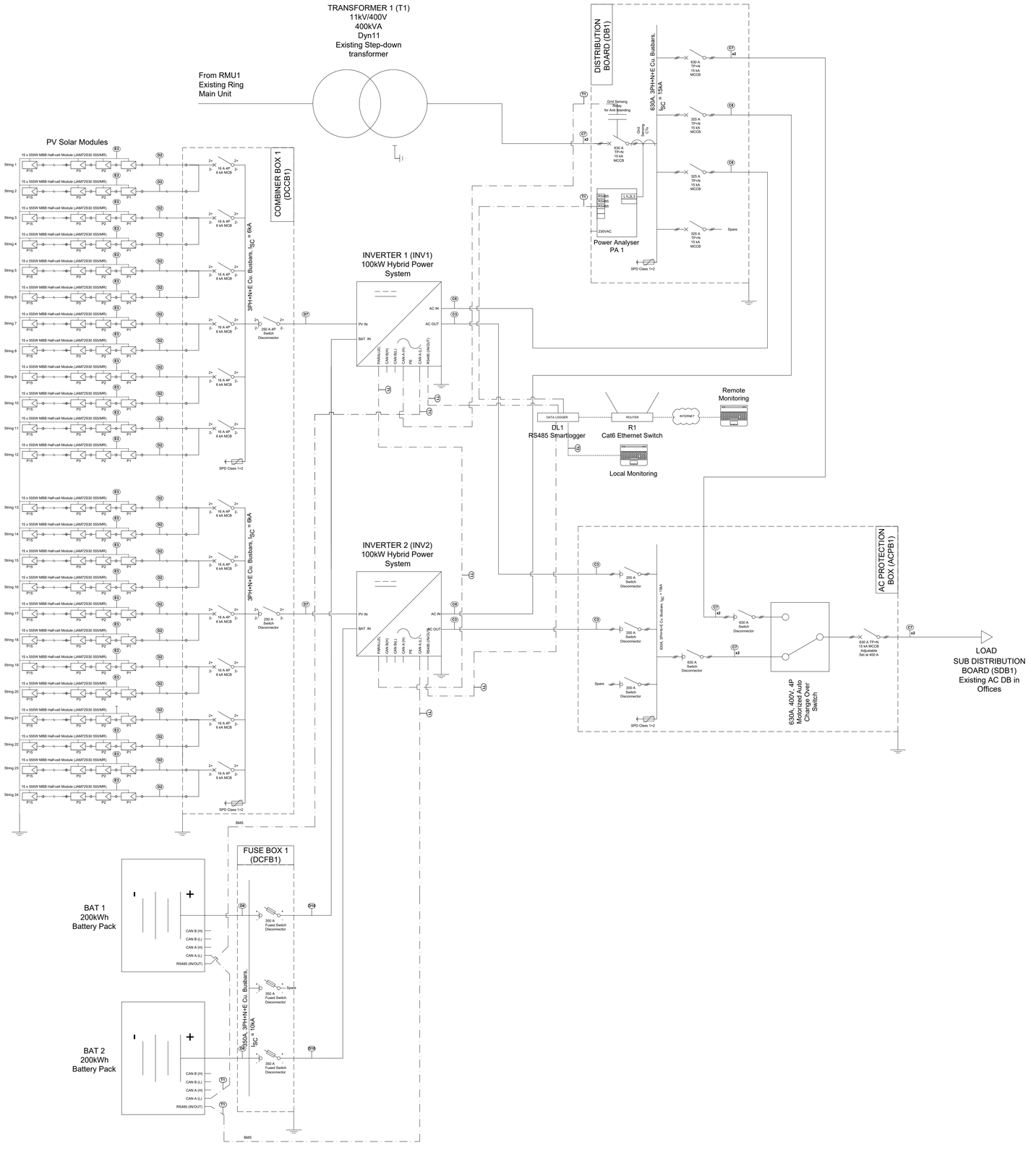


GENERAL NOTES:.
All measurements to be checked and controlled against the drawings on site before any work commences according to the drawings. Any irregularities and discrepancies must immediately be pointed out to the consulting engineer.
All work done should be in accordance with latest SANS standards, relevant codes and municipal by-laws.
CONTRACTOR IS ADVISED TO READ ALL THE NOTES CAREFULLY PRIOR TO COMMENCEMENT WITH WORKS.

GENERAL ELECTRICAL INSTALLATION NOTES:
1. Distribution boards shall comply with requirements of latest SANS 10142-1, SANS1816, SANS1974.
2. The contractor shall verify conditions of the field prior to construction in order to determine conditions for cable routing, lengths, quantity of materials, space available for appliances and equipment.
3. Inverter to be equipped with built-in by-pass switch.
4. The contractor shall take own measurements of quantities for materials and lengths against the drawing.
5. No equipment shall be delivered to site without the written approval of the consulting engineer.
6. Factory acceptance test (FAT) shall be carried out as per SANS 187, with the presence of the consulting engineer or his representative and/or the personnel from local supply authority before the power equipment is released from the manufacturer.
7. On site test shall be carried out as per clause 5 of SANS 1874.
8. Contractor shall coordinate with other service providers on final location of provided equipment, final cable tray routing, and exact location of all equipment noted as "by others".
9. Any work not done to the satisfaction of the consulting engineer shall be remedied and to the Contractor's account.
10. Cable joints shall be carried out by personnel who are certified to do so.
11. Should there be a need to reinstall any part of a circuit, the contractor shall issue details of that particular section including a wiring diagram.
12. An investigation shall be carried out to determine the cause of a defect prior to the work being undertaken.
13. All power circuits to appliances shall be tested and commissioned including the respective switchgear. Such tests shall be conducted in the presence of the Consulting Engineer or his representative and test results shall be submitted to his office within 3 calendar days.
14. Contractor to supply all documentation relating to the major power equipment including wiring diagrams.
15. The Contractor shall make arrangements for training at least one qualified member of staff on the use, operation and maintenance of the electrical installation.
16. Equipment shall be housed in a shipping container. Container shall be fully airconditioned and ventilated.

NOTE A3: ANNOTATIONS:
1. None.

NOTE A4: NOTES PERTAINING REVISIONS TO THIS DRAWING:
1. See clouded area.

NOTE A5: APPLICABLE SPECIFICATIONS (OBTAINABLE FROM CONSULTING ENGINEER'S OFFICE):
1. Standard Quality Specification for general electrical installations.
2. Standard Quality Specification for Electrical Material and Equipment.
3. Detailed Specification for Electrical Installations

NOTE A6: DISCLAIMER:
1. The lines connecting devices shown on this drawing shall not be construed as exact cable routes between source and devices/appliances. These are tentative and it is the responsibility of the contractor to provide the most effective and efficient routes in accordance with regulations and industry best practices.
2. The contractor will be required to indicate all cable routes on the "as-built" drawings.
3. This drawing is limited in scope to specific components of a complete system and is thus a single line representation of the system.
4. **Works classified as "removal and reinstallation" shall ONLY be executed upon a written site instruction.**
5. **Works classified as "committed and decommissioned" shall ONLY be executed upon a written site instruction.**

NOTE A7: ACRONYMS (SELECTIVE):
1. DB - Distribution Board
2. DC - Direct Current
3. AC - Alternating Current
4. MV - Low Voltage
5. MV - Medium Voltage
6. RMU - Ring Main Unit
7. MCB - Miniature Circuit Breaker
8. MCCB - Moulded Case Circuit Breaker
9. SWA - Steel Wire Armour
10. PVC - Polyvinyl Chloride
11. BCEW - Bare Copper Earth Wire
12. SPD - Surge Protective Device
13. PV - Photovoltaic

WIRE SCHEDULE	TYPE	TOTAL LENGTH (m)
C1 - 35mm² 4-core PVC/PVC Cu. cable + 16mm² BCEW	AC	
C2 - 50mm² 4-core PVC/PVC Cu. cable + 25mm² BCEW	AC	
C3 - 70mm² 4-core PVC/PVC Cu. cable + 35mm² BCEW	AC	
C4 - 95mm² 4-core PVC/PVC Cu. cable + 50mm² BCEW	AC	
C5 - 120mm² 4-core PVC/PVC Cu. cable + 70mm² BCEW	AC	
C6 - 150mm² 4-core PVC/PVC Cu. cable + 95mm² BCEW	AC	
C7 - 185mm² 4-core SWA/PVC/PVC Cu. cable + 120mm² BCEW	AC	
C8 - 240mm² 4-core PVC/PVC Cu. cable + 150mm² BCEW	AC	
C9 - 300mm² 4-core PVC/PVC Cu. cable + 185mm² BCEW	AC	
D2 - 6mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D6 - 35mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D7 - 50mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D8 - 95mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D9 - 150mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D10 - 240mm² single core PVC/PVC Cu. cable (2 cables)	DC	
E2 - 4mm² BCEW	PE	
E3 - 6mm² BCEW	PE	
E4 - 10mm² BCEW	PE	
T1 - RS485 Connection/CAN	DATA	
T2 - Cat6 Connection	DATA	

Module Specifications	
360 x Solar JAM72S30-555/MR (1500V)	
STC Rating	555 W
Vmp	42.11 V
Imp	13.18 A
Voc	50.02 V
Isc	14.07 A

Inverter Specifications	
2x HPS100	
Max AC Power Rating	100 kW
Max Input Voltage	1,000 V
Min AC Power Rating	0 W
Min Input Voltage	480 V

LEGEND

- Power Transformer
- Circuit Breaker
- Switch Disconnector (On Load)
- Fused Switch Disconnector
- MC4 Connector
- Photovoltaic Solar Panel
- Earth
- Relay
- Cable Description Tag (e.g x2 means 2 cables in parallel) — C6 x2
- Surge Protective Device
- 3-phase line
- Current Transformer

orientation map

drawing approval

owner's signature	engineer's signature	architect's signature
name	Registration No.	Registration No.

ISSUED FOR CLIENT APPROVAL

file location — paper size: A 1

revision details

No.	DATE	DRW	CHK	DESCRIPTION
B	16.05.2025	N.D	W.H	Detailed Design
A	10.04.2025	N.D	W.H	Concept Block Diagram

client
SOUTH AFRICAN NATIONAL SPACE AGENCY
KRUGERSDORP

principal agent
62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045
Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com
KHULANDLE CONSULTING ENGINEERS SA CC

agent
62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045
Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com
KHULANDLE CONSULTING ENGINEERS SA CC

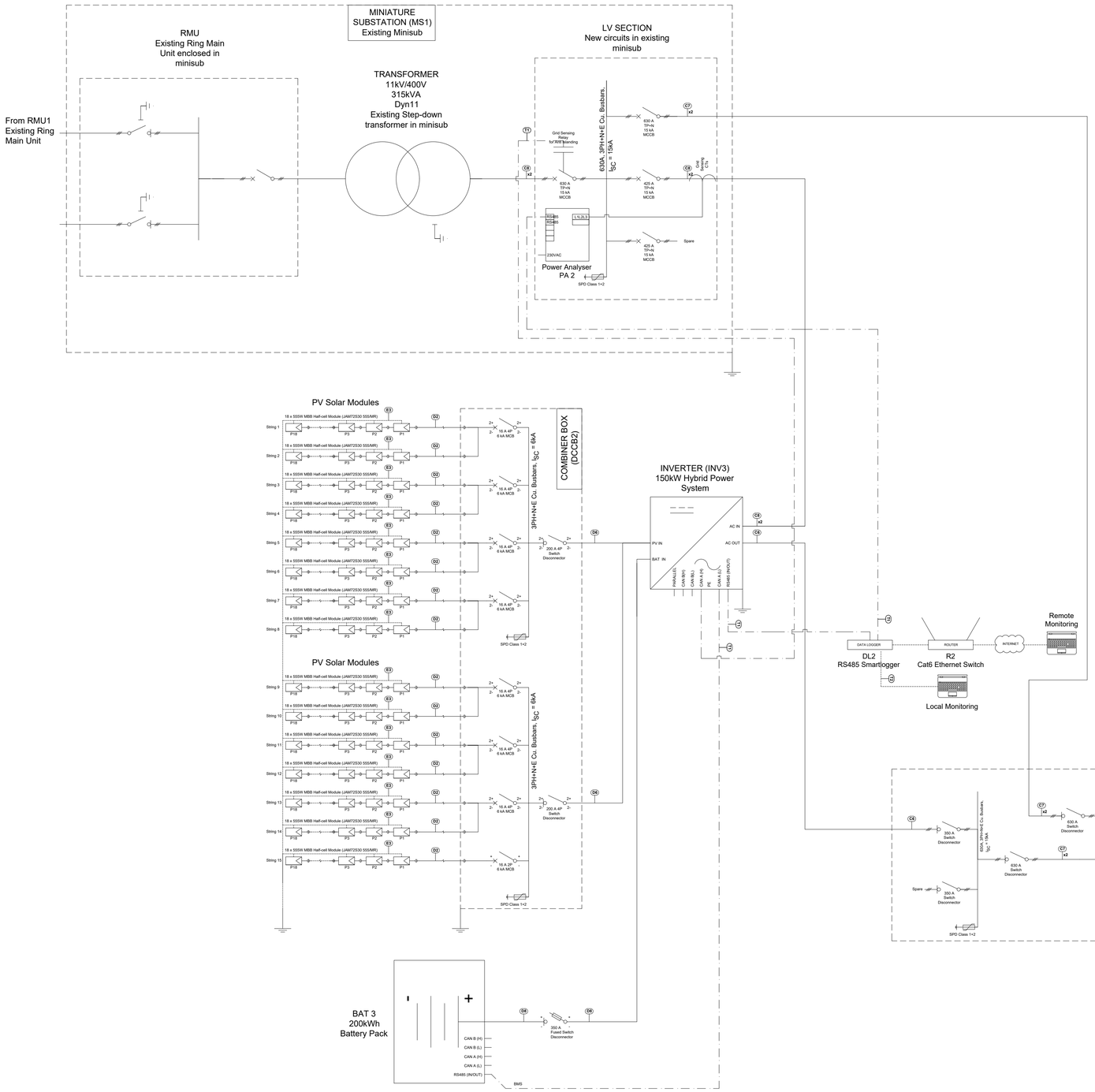
discipline	ELECTRICAL
service	POWER DISTRIBUTION

project name
1 Megawatt Solar Photovoltaic Plant at SANSA Space Station Krugersdorp

proj. ref

drawing title
Single Line Diagram for Complete Solar PV Plant No. 1 (200kW)

project no:	12501	designed:	W.H
scale:	Not to scale	drawn:	N.D
date:	16 May 2025	checked:	J.M
drawing no:	12501-PV-SLD02	revision:	B



GENERAL NOTES:.
All measurements to be checked and controlled against the drawings on site before any work commences according to the drawings. Any irregularities and discrepancies must immediately be pointed out to the consulting engineer.
All work done should be in accordance with latest SANS standards, relevant codes and municipal by-laws.
CONTRACTOR IS ADVISED TO READ ALL THE NOTES CAREFULLY PRIOR TO COMMENCEMENT WITH WORKS.

GENERAL ELECTRICAL INSTALLATION NOTES:
1. Distribution boards shall comply with requirements of latest SANS 10142-1, SANS1816, SANS1974.
2. The contractor shall verify conditions of the field prior to construction in order to determine conditions for cable routing, lengths, quantity of materials, space available for appliances and equipment.
3. Inverter to be equipped with built-in by-pass switch.
4. The contractor shall take own measurements of quantities for materials and lengths against the drawing.
5. No equipment shall be delivered to site without the written approval of the consulting engineer.
6. Factory acceptance test (FAT) shall be carried out as per SANS 187, with the presence of the consulting engineer or his representative and/or the personnel from local supply authority before the power equipment is released from the manufacturer.
7. On site test shall be carried out as per clause 5 of SANS 1874.
8. Contractor shall coordinate with other service providers on final location of provided equipment, final cable tray routing, and exact location of all equipment noted as "by others".
9. Any work not done to the satisfaction of the consulting engineer shall be remedied and to the Contractor's account.
10. Cable joints shall be carried out by personnel who are certified to do so.
11. Should there be a need to reinstall any part of a circuit, the contractor shall issue details of that particular section including a wiring diagram.
12. An investigation shall be carried out to determine the cause of a defect prior to the work being undertaken.
13. All power circuits to appliances shall be tested and commissioned including the respective switchgear. Such tests shall be conducted in the presence of the Consulting Engineer or his representative and test results shall be submitted to his office within 3 calendar days.
14. Contractor to supply all documentation relating to the major power equipment including wiring diagrams.
15. The Contractor shall make arrangements for training at least one qualified member of staff on the use, operation and maintenance of the electrical installation.
16. Equipment shall be housed in a shipping container. Container shall be fully airconditioned and ventilated.

NOTE A3: ANNOTATIONS:
1. None.

NOTE A4: NOTES PERTAINING REVISIONS TO THIS DRAWING:
1. See clouded area.

NOTE A5: APPLICABLE SPECIFICATIONS (OBTAINABLE FROM CONSULTING ENGINEER'S OFFICE):
1. Standard Quality Specification for general electrical installations.
2. Standard Quality Specification for Electrical Material and Equipment.
3. Detailed Specification for Electrical Installations

NOTE A6: DISCLAIMER:
1. The lines connecting devices shown on this drawing shall not be construed as exact cable routes between source and devices/appliances. These are tentative and it is the responsibility of the contractor to provide the most effective and efficient routes in accordance with regulations and industry best practices.
2. The contractor will be required to indicate all cable routes on the "as-built" drawings.
3. This drawing is limited in scope to specific components of a complete system and is thus a single line representation of the system.
4. **Works classified as "removal and reinstallation" shall ONLY be executed upon a written site instruction.**
5. **Works classified as "committed and decommissioned" shall ONLY be executed upon a written site instruction.**

NOTE A7: ACRONYMS (SELECTIVE):
1. DB - Distribution Board
2. DC - Direct Current
3. AC - Alternating Current
4. MV - Low Voltage
5. MV - Medium Voltage
6. RMU - Ring Main Unit
7. MCB - Miniature Circuit Breaker
8. MCCB - Moulded Case Circuit Breaker
9. SWA - Steel Wire Armour
10. PVC - Polyvinyl Chloride
11. BCEW - Bare Copper Earth Wire
12. SPD - Surge Protective Device
13. PV - Photovoltaic

WIRE SCHEDULE	TYPE	TOTAL LENGTH (m)
C1 - 35mm² 4-core PVC/PVC Cu. cable + 16mm² BCEW	AC	
C2 - 50mm² 4-core PVC/PVC Cu. cable + 25mm² BCEW	AC	
C3 - 70mm² 4-core PVC/PVC Cu. cable + 35mm² BCEW	AC	
C4 - 95mm² 4-core PVC/PVC Cu. cable + 50mm² BCEW	AC	
C5 - 120mm² 4-core PVC/PVC Cu. cable + 70mm² BCEW	AC	
C6 - 150mm² 4-core PVC/PVC Cu. cable + 95mm² BCEW	AC	
C7 - 185mm² 4-core SWA/PVC/PVC Cu. cable + 120mm² BCEW	AC	
C8 - 240mm² 4-core PVC/PVC Cu. cable + 150mm² BCEW	AC	
C9 - 300mm² 4-core PVC/PVC Cu. cable + 185mm² BCEW	AC	
D2 - 6mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D6 - 35mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D7 - 50mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D8 - 95mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D9 - 150mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D10 - 240mm² single core PVC/PVC Cu. cable (2 cables)	DC	
E2 - 4mm² BCEW	PE	
E3 - 6mm² BCEW	PE	
E4 - 10mm² BCEW	PE	
T1 - RS485 Connection/CAN	DATA	
T2 - Cat6 Connection	DATA	

Module Specifications	
270 x Solar JAM72S30-555/MR (1500V)	
STC Rating	555 W
Vmp	42.11 V
Imp	13.18 A
Voc	50.02 V
Isc	14.07 A

Inverter Specifications	
HPS150	
Max AC Power Rating	150 kW
Max Input Voltage	1,000 V
Min AC Power Rating	0 W
Min Input Voltage	480 V

LEGEND

- Power Transformer
- Circuit Breaker
- Switch Disconnector (On Load)
- Fused Switch Disconnector
- MC4 Connector
- Photovoltaic Solar Panel
- Earth
- Relay
- Cable Description Tag (e.g x2 means 2 cables in parallel) — C6 x2
- Surge Protective Device
- 3-phase line
- Current Transformer

orientation map

drawing approval

owner's signature	engineer's signature	architect's signature
name	Registration No.	Registration No.

ISSUED FOR CLIENT APPROVAL

file location — paper size: A 1

revision details

No.	DATE	DRW	CHK	DESCRIPTION
B	16.05.2025	N.D	W.H	Detailed Design
A	10.04.2025	N.D	W.H	Concept Block Diagram

client
SOUTH AFRICAN NATIONAL SPACE AGENCY
KRUGERSDORP

principal agent
62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045
Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com
KHULANDLE CONSULTING ENGINEERS SA CC

agent
62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045
Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com
KHULANDLE CONSULTING ENGINEERS SA CC

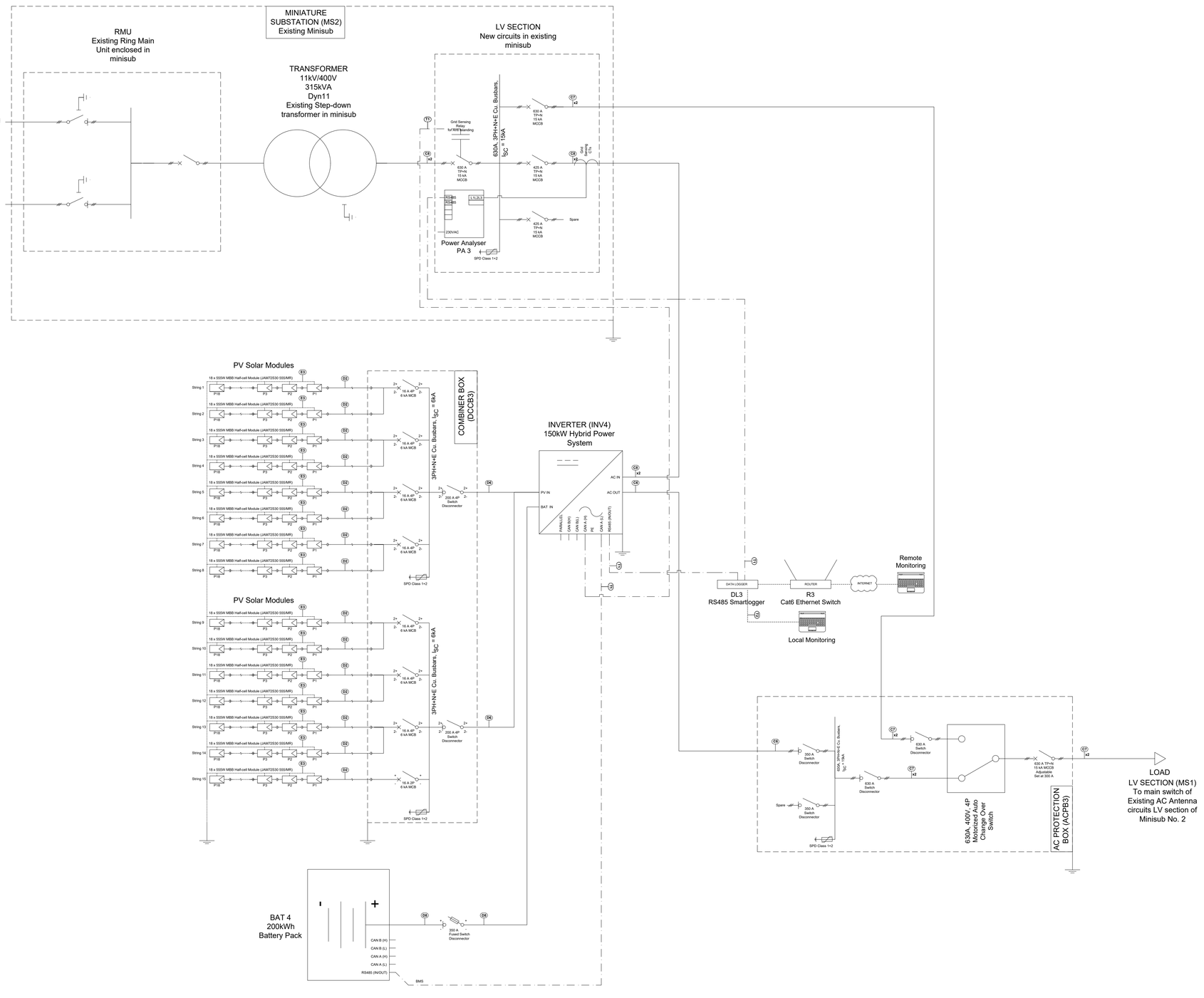
discipline	ELECTRICAL
service	POWER DISTRIBUTION

project name
1 Megawatt Solar Photovoltaic Plant at SANSA Space Station Krugersdorp

proj. ref

drawing title
Single Line Diagram for Complete Solar PV Plant No. 2 (150kW)

project no:	12501	designed:	W.H
scale:	Not to scale	drawn:	N.D
date:	16 May 2025	checked:	J.M
drawing no:	12501-PV-SLD03	revision:	B



GENERAL NOTES:.
All measurements to be checked and controlled against the drawings on site before any work commences according to the drawings. Any irregularities and discrepancies must immediately be pointed out to the consulting engineer.
All work done should be in accordance with latest SANS standards, relevant codes and municipal by-laws.
CONTRACTOR IS ADVISED TO READ ALL THE NOTES CAREFULLY PRIOR TO COMMENCEMENT WITH WORKS.

GENERAL ELECTRICAL INSTALLATION NOTES:
1. Distribution boards shall comply with requirements of latest SANS 10142-1, SANS1816, SANS1974.
2. The contractor shall verify conditions of the field prior to construction in order to determine conditions for cable routing, lengths, quantity of materials, space available for appliances and equipment.
3. Inverter to be equipped with built-in by-pass switch.
4. The contractor shall take own measurements of quantities for materials and lengths against the drawing.
5. No equipment shall be delivered to site without the written approval of the consulting engineer.
6. Factory acceptance test (FAT) shall be carried out as per SANS 187, with the presence of the consulting engineer or his representative and/or the personnel from local supply authority before the power equipment is released from the manufacturer.
7. On site test shall be carried out as per clause 5 of SANS 1874.
8. Contractor shall coordinate with other service providers on final location of provided equipment, final cable tray routing, and exact location of all equipment noted as "by others".
9. Any work not done to the satisfaction of the consulting engineer shall be remedied and to the Contractor's account.
10. Cable joints shall be carried out by personnel who are certified to do so.
11. Should there be a need to reinstall any part of a circuit, the contractor shall issue details of that particular section including a wiring diagram.
12. An investigation shall be carried out to determine the cause of a defect prior to the work being undertaken.
13. All power circuits to appliances shall be tested and commissioned including the respective switchgear. Such tests shall be conducted in the presence of the Consulting Engineer or his representative and test results shall be submitted to his office within 3 calendar days.
14. Contractor to supply all documentation relating to the major power equipment including wiring diagrams.
15. The Contractor shall make arrangements for training at least one qualified member of staff on the use, operation and maintenance of the electrical installation.
16. Equipment shall be housed in a shipping container. Container shall be fully airconditioned and ventilated.

NOTE A3: ANNOTATIONS:
1. None.

NOTE A4: NOTES PERTAINING REVISIONS TO THIS DRAWING:
1. See clouded area.

NOTE A5: APPLICABLE SPECIFICATIONS (OBTAINABLE FROM CONSULTING ENGINEER'S OFFICE):
1. Standard Quality Specification for general electrical installations.
2. Standard Quality Specification for Electrical Material and Equipment.
3. Detailed Specification for Electrical Installations

NOTE A6: DISCLAIMER:
1. The lines connecting devices shown on this drawing shall not be construed as exact cable routes between source and devices/appliances. These are tentative and it is the responsibility of the contractor to provide the most effective and efficient routes in accordance with regulations and industry best practices.
2. The contractor will be required to indicate all cable routes on the "as-built" drawings.
3. This drawing is limited in scope to specific components of a complete system and is thus a single line representation of the system.
4. **Works classified as "removal and reinstallation" shall ONLY be executed upon a written site instruction.**
5. **Works classified as "committed and decommissioned" shall ONLY be executed upon a written site instruction.**

NOTE A7: ACRONYMS (SELECTIVE):
1. DB - Distribution Board
2. DC - Direct Current
3. AC - Alternating Current
4. MV - Low Voltage
5. MV - Medium Voltage
6. RMU - Ring Main Unit
7. MCB - Miniature Circuit Breaker
8. MCCB - Moulded Case Circuit Breaker
9. SWA - Steel Wire Armour
10. PVC - Polyvinyl Chloride
11. BCEW - Bare Copper Earth Wire
12. SPD - Surge Protective Device
13. PV - Photovoltaic

WIRE SCHEDULE	TYPE	TOTAL LENGTH (m)
C1 - 35mm² 4-core PVC/PVC Cu. cable + 16mm² BCEW	AC	
C2 - 50mm² 4-core PVC/PVC Cu. cable + 25mm² BCEW	AC	
C3 - 70mm² 4-core PVC/PVC Cu. cable + 35mm² BCEW	AC	
C4 - 95mm² 4-core PVC/PVC Cu. cable + 50mm² BCEW	AC	
C5 - 120mm² 4-core PVC/PVC Cu. cable + 70mm² BCEW	AC	
C6 - 150mm² 4-core PVC/PVC Cu. cable + 95mm² BCEW	AC	
C7 - 185mm² 4-core SWA/PVC/PVC Cu. cable + 120mm² BCEW	AC	
C8 - 240mm² 4-core PVC/PVC Cu. cable + 150mm² BCEW	AC	
C9 - 300mm² 4-core PVC/PVC Cu. cable + 185mm² BCEW	AC	
D2 - 6mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D6 - 35mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D7 - 50mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D8 - 95mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D9 - 150mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D10 - 240mm² single core PVC/PVC Cu. cable (2 cables)	DC	
E2 - 4mm² BCEW	PE	
E3 - 6mm² BCEW	PE	
E4 - 10mm² BCEW	PE	
T1 - RS485 Connection/CAN	DATA	
T2 - Cat6 Connection	DATA	

Module Specifications	
270 x Solar JAM72S30-555/MR (1500V)	
STC Rating	555 W
Vmp	42.11 V
Imp	13.18 A
Voc	50.02 V
Isc	14.07 A

Inverter Specifications	
HPS150	
Max AC Power Rating	150 kW
Max Input Voltage	1,000 V
Min AC Power Rating	0 W
Min Input Voltage	480 V

LEGEND

- Power Transformer
- Circuit Breaker
- Switch Disconnector (On Load)
- Fused Switch Disconnector
- MC4 Connector
- Photovoltaic Solar Panel
- Earth
- Relay
- C6 x2 — Cable Description Tag (e.g x2 means 2 cables in parallel)
- Surge Protective Device
- 3-phase line
- Current Transformer

orientation map

drawing approval

owner's signature	engineer's signature	architect's signature
name	Registration No.	Registration No.

ISSUED FOR CLIENT APPROVAL

file location — paper size: A 1

revision details

No.	DATE	DRW	CHK	DESCRIPTION
B	16.05.2025	N.D	W.H	Detailed Design
A	10.04.2025	N.D	W.H	Concept Block Diagram

client
SOUTH AFRICAN NATIONAL SPACE AGENCY
KRUGERSDORP

principal agent
62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045
Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com
KHULANDLE CONSULTING ENGINEERS SA CC

agent
62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045
Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com
KHULANDLE CONSULTING ENGINEERS SA CC

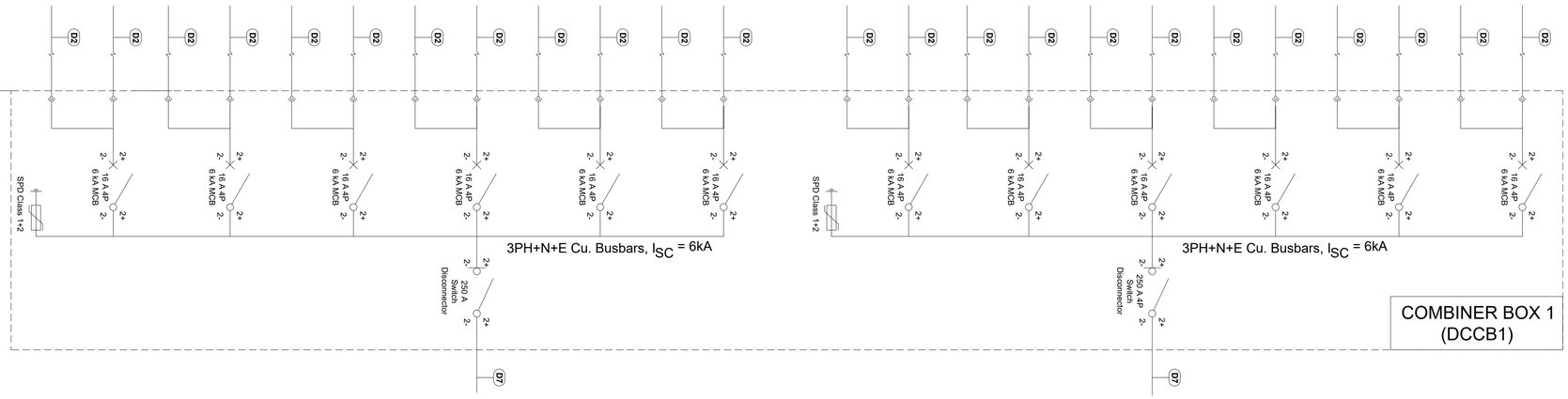
discipline	ELECTRICAL
service	POWER DISTRIBUTION

project name
1 Megawatt Solar Photovoltaic Plant at SANSA Space Station Krugersdorp

proj. ref

drawing title
Single Line Diagram for Complete Solar PV Plant No. 3 (150kW)

project no:	12501	designed:	W.H
scale:	Not to scale	drawn:	N.D
date:	16 May 2025	checked:	J.M
drawing no:	12501-PV-SLD04	revision:	B



GENERAL NOTES:.
All measurements to be checked and controlled against the drawings on site before any work commences according to the drawings. Any irregularities and discrepancies must immediately be pointed out to the consulting engineer.
All work done should be in accordance with latest SANS standards, relevant codes and municipal by-laws.
CONTRACTOR IS ADVISED TO READ ALL THE NOTES CAREFULLY PRIOR TO COMMENCEMENT WITH WORKS.

GENERAL ELECTRICAL INSTALLATION NOTES:
1. Distribution boards shall comply with requirements of latest SANS 10142-1, SANS1816, SANS1974.
2. The contractor shall verify conditions of the field prior to construction in order to determine conditions for cable routing, lengths, quantity of materials, space available for appliances and equipment.
3. The contractor shall take own measurements of quantities for materials and lengths against the drawing.
4. No equipment shall be delivered to site without the written approval of the consulting engineer.
5. Factory acceptance test (FAT) shall be carried out as per SANS 187, with the presence of the consulting engineer or his representative and/or the personnel from local supply authority before the power equipment is released from the manufacturer.
6. On site test shall be carried out as per clause 5 of SANS 1874.
7. Contractor shall coordinate with other service providers on final location of provided equipment, final cable tray routing, and exact location of all equipment noted as "by others".
8. Any work not done to the satisfaction of the consulting engineer shall be remedied and to the Contractor's account.
9. Cable joints shall be carried out by personnel who are certified to do so.
10. Should there be a need to reinstall any part of a circuit, the contractor shall issue details of that particular section including a wiring diagram.
11. An investigation shall be carried out to determine the cause of a defect prior to the work being undertaken.
12. All power circuits to appliances shall be tested and commissioned including the respective switchgear. Such tests shall be conducted in the presence of the Consulting Engineer or his representative and test results shall be submitted to his office within 3 calendar days.
13. Contractor to supply all documentation relating to the major power equipment including wiring diagrams.
14. The Contractor shall make arrangements for training at least one qualified member of staff on the use, operation and maintenance of the electrical installation.
15. Equipment shall be housed in a shipping container. Container shall be fully airconditioned and ventilated.

NOTE A3: ANNOTATIONS:
1. None.

NOTE A4: NOTES PERTAINING REVISIONS TO THIS DRAWING:
1. See clouded area.

NOTE A5: APPLICABLE SPECIFICATIONS (OBTAINABLE FROM CONSULTING ENGINEER'S OFFICE):
1. Standard Quality Specification for general electrical installations.
2. Standard Quality Specification for Electrical Material and Equipment.
3. Detailed Specification for Electrical Installations

NOTE A6: DISCLAIMER:
1. The lines connecting devices shown on this drawing shall not be construed as exact cable routes between source and devices/appliances. These are tentative and it is the responsibility of the contractor to provide the most effective and efficient routes in accordance with regulations and industry best practices.
2. The contractor will be required to indicate all cable routes on the "as-built" drawings.
3. This drawing is limited in scope to specific components of a complete system and is thus a single line representation of the system.
4. **Works classified as "removal and reinstallation" shall ONLY be executed upon a written site instruction.**
5. **Works classified as "ommitted and decommissioned" shall ONLY be executed upon a written site instruction.**

NOTE A7: ACRONYMS (SELECTIVE):
1. DB - Distribution Board
2. DC - *Direct* Current
3. AC - Alternating Current
4. MV - Low Voltage
5. MV - Medium Voltage
6. RMU - Ring Main Unit
7. MCB - Miniature Circuit Breaker
8. MCCB - Moulded Case Circuit Breaker
9. SWA - Steel Wire Armour
10. PVC - Polyvinyl Chloride
11. BCEW - Bare Copper Earth Wire
12. SPD - Surge Protective Device
13. PV - Photovoltaic

WIRE SCHEDULE	TYPE	TOTAL LENGTH (m)
C1 - 35mm² 4-core PVC/PVC Cu. cable + 16mm² BCEW	AC	
C2 - 50mm² 4-core PVC/PVC Cu. cable + 25mm² BCEW	AC	
C3 - 70mm² 4-core PVC/PVC Cu. cable + 35mm² BCEW	AC	
C4 - 95mm² 4-core PVC/PVC Cu. cable + 50mm² BCEW	AC	
C5 - 120mm² 4-core PVC/PVC Cu. cable + 70mm² BCEW	AC	
C6 - 150mm² 4-core PVC/PVC Cu. cable + 95mm² BCEW	AC	
C7 - 185mm² 4-core SWA/PVC/PVC Cu. cable + 120mm² BCEW	AC	
C8 - 240mm² 4-core PVC/PVC Cu. cable + 150mm² BCEW	AC	
C9 - 300mm² 4-core PVC/PVC Cu. cable + 185mm² BCEW	AC	
D2 - 6mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D6 - 35mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D7 - 50mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D8 - 95mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D9 - 150mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D10 - 240mm² single core PVC/PVC Cu. cable (2 cables)	DC	
E2 - 4mm² BCEW	PE	
E3 - 6mm² BCEW	PE	
E4 - 10mm² BCEW	PE	
T1 - RS485 Connection/CAN	DATA	
T2 - Cat6 Connection	DATA	

PANEL CONSTRUCTION DETAILS:

Panel Name:	DCCB1
Purpose:	DC Combiner Box
Construction:	Surface mount
Access:	Front
Material:	Mild steel (1.6mm)
Panels:	Steel escutcheon removable panels with locking pins and square key catches
Doors:	With latch type lockable doors
Exposure:	IP44
Finish:	White powder coated exterior body, white interior painted body, white powder coated panels
Dimensions:	TBC
Labeling:	Exterior - Engraved ivorine/trafolyte installed at front. Danger warning sign Interior - Engraved ivorine/trafolyte, printed legend card, legend card holder on door
Cable Entry:	Bottom & Top
Circuits/Ways	2 x [12 Input/1 Output]
Location:	Inside custom made shipping container/Inverter section
Supplied from:	PV Modules
General:	Allow 40 % spare space capacity for future expansion.

LEGEND

- Circuit Breaker
- Switch Disconnector (On Load)
- Fused Switch Disconnector
- MC4 Connector
- Earth
- Relay
- C6 x2 — Cable Description Tag (e.g x2 means 2 cables in parallel)
- Surge Protective Device
- 3-phase line
- Current Transformer

orientation map

drawing approval

owner's signature	engineer's signature	architect's signature
name	Registration No.	Registration No.

ISSUED FOR CLIENT APPROVAL

file location — paper size: A 1

revision details

No.	DATE	DRW	CHK	DESCRIPTION
B	19.05.2025	N.D	W.H	Refined Detailed Design
A	16.05.2025	N.D	W.H	Detailed Design

client

SOUTH AFRICAN NATIONAL SPACE AGENCY

KRUGERSDORP

principal agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

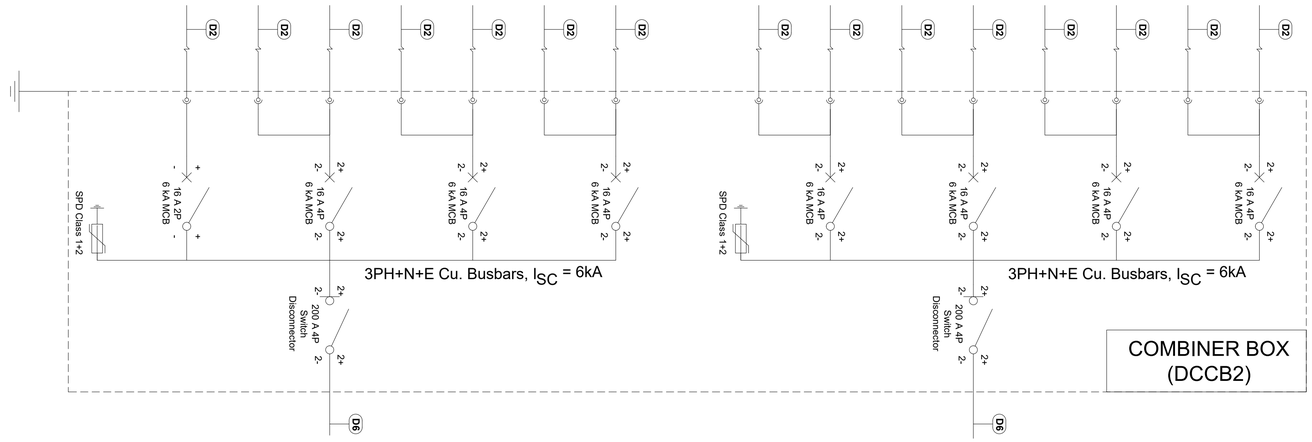
discipline: ELECTRICAL
service: POWER DISTRIBUTION

project name
1 Megawatt Solar Photovoltaic Plant at SANSA Space Station Krugersdorp

proj. ref

drawing title
DC Combiner Box (DCCB1) Single Line Diagram

project no:	12501	designed:	W.H
scale:	Not to scale	drawn:	N.D
date:	19 May 2025	checked:	J.M
drawing no:	12501-PV-SLD05	revision:	B



GENERAL NOTES:.
All measurements to be checked and controlled against the drawings on site before any work commences according to the drawings. Any irregularities and discrepancies must immediately be pointed out to the consulting engineer.
All work done should be in accordance with latest SANS standards, relevant codes and municipal by-laws.
CONTRACTOR IS ADVISED TO READ ALL THE NOTES CAREFULLY PRIOR TO COMMENCEMENT WITH WORKS.

GENERAL ELECTRICAL INSTALLATION NOTES:
1. Distribution boards shall comply with requirements of latest SANS 10142-1, SANS1816, SANS1974.
2. The contractor shall verify conditions of the field prior to construction in order to determine conditions for cable routing, lengths, quantity of materials, space available for appliances and equipment.
3. The contractor shall take own measurements of quantities for materials and lengths against the drawing.
4. No equipment shall be delivered to site without the written approval of the consulting engineer.
5. Factory acceptance test (FAT) shall be carried out as per SANS 187, with the presence of the consulting engineer or his representative and/or the personnel from local supply authority before the power equipment is released from the manufacturer.
6. On site test shall be carried out as per clause 5 of SANS 1874.
7. Contractor shall coordinate with other service providers on final location of provided equipment, final cable tray routing, and exact location of all equipment noted as "by others".
8. Any work not done to the satisfaction of the consulting engineer shall be remedied and to the Contractor's account.
9. Cable joints shall be carried out by personnel who are certified to do so.
10. Should there be a need to reinstall any part of a circuit, the contractor shall issue details of that particular section including a wiring diagram.
11. An investigation shall be carried out to determine the cause of a defect prior to the work being undertaken.
12. All power circuits to appliances shall be tested and commissioned including the respective switchgear. Such tests shall be conducted in the presence of the Consulting Engineer or his representative and test results shall be submitted to his office within 3 calendar days.
13. Contractor to supply all documentation relating to the major power equipment including wiring diagrams.
14. The Contractor shall make arrangements for training at least one qualified member of staff on the use, operation and maintenance of the electrical installation.
15. Equipment shall be housed in a shipping container. Container shall be fully airconditioned and ventilated.

NOTE A3: ANNOTATIONS:
1. None.

NOTE A4: NOTES PERTAINING REVISIONS TO THIS DRAWING:
1. See clouded area.

NOTE A5: APPLICABLE SPECIFICATIONS (OBTAINABLE FROM CONSULTING ENGINEER'S OFFICE):
1. Standard Quality Specification for general electrical installations.
2. Standard Quality Specification for Electrical Material and Equipment.
3. Detailed Specification for Electrical Installations

NOTE A6: DISCLAIMER:
1. The lines connecting devices shown on this drawing shall not be construed as exact cable routes between source and devices/appliances. These are tentative and it is the responsibility of the contractor to provide the most effective and efficient routes in accordance with regulations and industry best practices.
2. The contractor will be required to indicate all cable routes on the "as-built" drawings.
3. This drawing is limited in scope to specific components of a complete system and is thus a single line representation of the system.
4. **Works classified as "removal and reinstallation" shall ONLY be executed upon a written site instruction.**
5. **Works classified as "ommitted and decommissioned" shall ONLY be executed upon a written site instruction.**

NOTE A7: ACRONYMS (SELECTIVE):
1. DB - Distribution Board
2. DC - *Direct Current*
3. AC - Alternating Current
4. MV - Low Voltage
5. MV - Medium Voltage
6. RMU - Ring Main Unit
7. MCB - Miniature Circuit Breaker
8. MCCB - Moulded Case Circuit Breaker
9. SWA - Steel Wire Armour
10. PVC - Polyvinyl Chloride
11. BCEW - Bare Copper Earth Wire
12. SPD - Surge Protective Device
13. PV - Photovoltaic

WIRE SCHEDULE	TYPE	TOTAL LENGTH (m)
C1 - 35mm² 4-core PVC/PVC Cu. cable + 16mm² BCEW	AC	
C2 - 50mm² 4-core PVC/PVC Cu. cable + 25mm² BCEW	AC	
C3 - 70mm² 4-core PVC/PVC Cu. cable + 35mm² BCEW	AC	
C4 - 95mm² 4-core PVC/PVC Cu. cable + 50mm² BCEW	AC	
C5 - 120mm² 4-core PVC/PVC Cu. cable + 70mm² BCEW	AC	
C6 - 150mm² 4-core PVC/PVC Cu. cable + 95mm² BCEW	AC	
C7 - 185mm² 4-core SWA/PVC/PVC Cu. cable + 120mm² BCEW	AC	
C8 - 240mm² 4-core PVC/PVC Cu. cable + 150mm² BCEW	AC	
C9 - 300mm² 4-core PVC/PVC Cu. cable + 185mm² BCEW	AC	
D2 - 6mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D6 - 35mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D7 - 50mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D8 - 95mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D9 - 150mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D10 - 240mm² single core PVC/PVC Cu. cable (2 cables)	DC	
E2 - 4mm² BCEW	PE	
E3 - 6mm² BCEW	PE	
E4 - 10mm² BCEW	PE	
T1 - RS485 Connection/CAN	DATA	
T2 - Cat6 Connection	DATA	

PANEL CONSTRUCTION DETAILS:

Panel Name:	DCCB2
Purpose:	DC Combiner Box
Construction:	Surface mount
Access:	Front
Material:	Mild steel (1.6mm)
Panels:	Steel escutcheon removable panels with locking pins and square key catches
Doors:	With latch type lockable doors
Exposure:	IP44
Finish:	White powder coated exterior body, white interior painted body, white powder coated panels
Dimensions:	TBC
Labeling:	Exterior - Engraved ivorine/trafolyte installed at front. Danger warning sign Interior - Engraved ivorine/trafolyte, printed legend card, legend card holder on door
Cable Entry:	Bottom & Top
Circuits/Ways	2 x [8 Input/1 Output]
Location:	Inside custom made shipping container/Inverter section
Supplied from:	PV Modules
General:	Allow 40 % spare space capacity for future expansion.

LEGEND

- Circuit Breaker
- Switch Disconnector (On Load)
- Fused Switch Disconnector
- MC4 Connector
- Earth
- Relay
- C6 x2 — Cable Description Tag (e.g x2 means 2 cables in parallel)
- Surge Protective Device
- 3-phase line
- Current Transformer

orientation map

drawing approval

owner's signature | engineer's signature | architect's signature

name | Registration No. | Registration No.

ISSUED FOR CLIENT APPROVAL

file location | paper size: A 1

revision details

No.	DATE	DRW	CHK	DESCRIPTION
B	19.05.2025	N.D	W.H	Refined Detailed Design
A	16.05.2025	N.D	W.H	Detailed Design

client

SOUTH AFRICAN NATIONAL SPACE AGENCY

KRUGERSDORP

principal agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

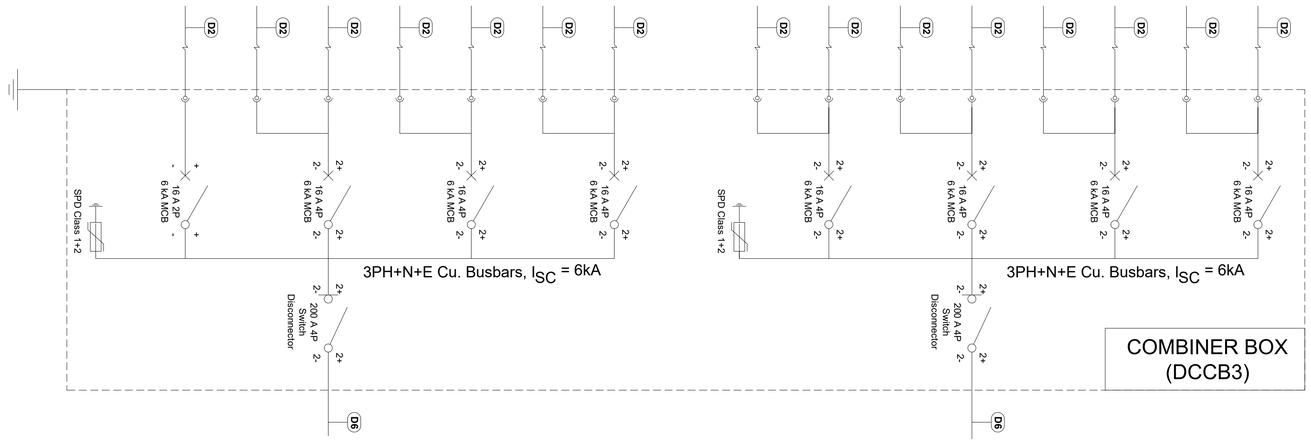
discipline: ELECTRICAL
service: POWER DISTRIBUTION

project name
1 Megawatt Solar Photovoltaic Plant at SANSA Space Station Krugersdorp

proj. ref

drawing title
DC Combiner Box (DCCB2) Single Line Diagram

project no:	12501	designed:	W.H
scale:	Not to scale	drawn:	N.D
date:	19 May 2025	checked:	J.M
drawing no:	12501-PV-SLD06	revision:	B



GENERAL NOTES:.
All measurements to be checked and controlled against the drawings on site before any work commences according to the drawings. Any irregularities and discrepancies must immediately be pointed out to the consulting engineer.
All work done should be in accordance with latest SANS standards, relevant codes and municipal by-laws.
CONTRACTOR IS ADVISED TO READ ALL THE NOTES CAREFULLY PRIOR TO COMMENCEMENT WITH WORKS.

GENERAL ELECTRICAL INSTALLATION NOTES:
1. Distribution boards shall comply with requirements of latest SANS 10142-1, SANS1816, SANS1974.
2. The contractor shall verify conditions of the field prior to construction in order to determine conditions for cable routing, lengths, quantity of materials, space available for appliances and equipment.
3. The contractor shall take own measurements of quantities for materials and lengths against the drawing.
4. No equipment shall be delivered to site without the written approval of the consulting engineer.
5. Factory acceptance test (FAT) shall be carried out as per SANS 187, with the presence of the consulting engineer or his representative and/or the personnel from local supply authority before the power equipment is released from the manufacturer.
6. On site test shall be carried out as per clause 5 of SANS 1874.
7. Contractor shall coordinate with other service providers on final location of provided equipment, final cable tray routing, and exact location of all equipment noted as "by others".
8. Any work not done to the satisfaction of the consulting engineer shall be remedied and to the Contractor's account.
9. Cable joints shall be carried out by personnel who are certified to do so.
10. Should there be a need to reinstall any part of a circuit, the contractor shall issue details of that particular section including a wiring diagram.
11. An investigation shall be carried out to determine the cause of a defect prior to the work being undertaken.
12. All power circuits to appliances shall be tested and commissioned including the respective switchgear. Such tests shall be conducted in the presence of the Consulting Engineer or his representative and test results shall be submitted to his office within 3 calendar days.
13. Contractor to supply all documentation relating to the major power equipment including wiring diagrams.
14. The Contractor shall make arrangements for training at least one qualified member of staff on the use, operation and maintenance of the electrical installation.
15. Equipment shall be housed in a shipping container. Container shall be fully airconditioned and ventilated.

NOTE A3: ANNOTATIONS:
1. None.

NOTE A4: NOTES PERTAINING REVISIONS TO THIS DRAWING:
1. See clouded area.

NOTE A5: APPLICABLE SPECIFICATIONS (OBTAINABLE FROM CONSULTING ENGINEER'S OFFICE):
1. Standard Quality Specification for general electrical installations.
2. Standard Quality Specification for Electrical Material and Equipment.
3. Detailed Specification for Electrical Installations

NOTE A6: DISCLAIMER:
1. The lines connecting devices shown on this drawing shall not be construed as exact cable routes between source and devices/appliances. These are tentative and it is the responsibility of the contractor to provide the most effective and efficient routes in accordance with regulations and industry best practices.
2. The contractor will be required to indicate all cable routes on the "as-built" drawings.
3. This drawing is limited in scope to specific components of a complete system and is thus a single line representation of the system.
4. **Works classified as "removal and reinstallation" shall ONLY be executed upon a written site instruction.**
5. **Works classified as "ommitted and decommissioned" shall ONLY be executed upon a written site instruction.**

NOTE A7: ACRONYMS (SELECTIVE):
1. DB - Distribution Board
2. DC - *Direct Current*
3. AC - Alternating Current
4. MV - Low Voltage
5. MV - Medium Voltage
6. RMU - Ring Main Unit
7. MCB - Miniature Circuit Breaker
8. MCCB - Moulded Case Circuit Breaker
9. SWA - Steel Wire Armour
10. PVC - Polyvinyl Chloride
11. BCEW - Bare Copper Earth Wire
12. SPD - Surge Protective Device
13. PV - Photovoltaic

WIRE SCHEDULE	TYPE	TOTAL LENGTH (m)
C1 - 35mm² 4-core PVC/PVC Cu. cable + 16mm² BCEW	AC	
C2 - 50mm² 4-core PVC/PVC Cu. cable + 25mm² BCEW	AC	
C3 - 70mm² 4-core PVC/PVC Cu. cable + 35mm² BCEW	AC	
C4 - 95mm² 4-core PVC/PVC Cu. cable + 50mm² BCEW	AC	
C5 - 120mm² 4-core PVC/PVC Cu. cable + 70mm² BCEW	AC	
C6 - 150mm² 4-core PVC/PVC Cu. cable + 95mm² BCEW	AC	
C7 - 185mm² 4-core SWA/PVC/PVC Cu. cable + 120mm² BCEW	AC	
C8 - 240mm² 4-core PVC/PVC Cu. cable + 150mm² BCEW	AC	
C9 - 300mm² 4-core PVC/PVC Cu. cable + 185mm² BCEW	AC	
D2 - 6mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D6 - 35mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D7 - 50mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D8 - 95mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D9 - 150mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D10 - 240mm² single core PVC/PVC Cu. cable (2 cables)	DC	
E2 - 4mm² BCEW	PE	
E3 - 6mm² BCEW	PE	
E4 - 10mm² BCEW	PE	
T1 - RS485 Connection/CAN	DATA	
T2 - Cat6 Connection	DATA	

PANEL CONSTRUCTION DETAILS:

Panel Name:	DCCB3
Purpose:	DC Combiner Box
Construction:	Surface mount
Access:	Front
Material:	Mild steel (1.6mm)
Panels:	Steel escutcheon removable panels with locking pins and square key catches
Doors:	With latch type lockable doors
Exposure:	IP44
Finish:	White powder coated exterior body, white interior painted body, white powder coated panels
Dimensions:	TBC
Labeling:	Exterior - Engraved ivorine/trafolyte installed at front. Danger warning sign Interior - Engraved ivorine/trafolyte, printed legend card, legend card holder on door
Cable Entry:	Bottom & Top
Circuits/Ways	2 x [8 Input/1 Output]
Location:	Inside custom made shipping container/Inverter section
Supplied from:	PV Modules
General:	Allow 40 % spare space capacity for future expansion.

LEGEND

- Circuit Breaker
- Switch Disconnector (On Load)
- Fused Switch Disconnector
- MC4 Connector
- Earth
- Relay
- C6 x2 — Cable Description Tag (e.g x2 means 2 cables in parallel)
- Surge Protective Device
- 3-phase line
- Current Transformer

orientation map

drawing approval

owner's signature | engineer's signature | architect's signature

name | Registration No. | Registration No.

ISSUED FOR CLIENT APPROVAL

file location | paper size: A 1

revision details

No.	DATE	DRW	CHK	DESCRIPTION
B	19.05.2025	N.D	W.H	Refined Detailed Design
A	16.05.2025	N.D	W.H	Detailed Design

client

SOUTH AFRICAN NATIONAL SPACE AGENCY

KRUGERSDORP

principal agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

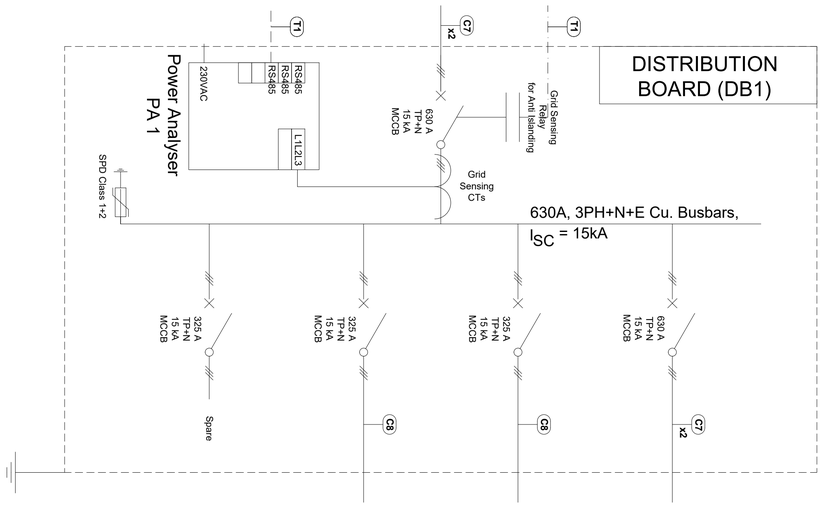
discipline: ELECTRICAL
service: POWER DISTRIBUTION

project name
1 Megawatt Solar Photovoltaic Plant at SANSA Space Station Krugersdorp

proj. ref

drawing title
DC Combiner Box (DCCB3) Single Line Diagram

project no:	12501	designed:	W.H
scale:	Not to scale	drawn:	N.D
date:	19 May 2025	checked:	J.M
drawing no:	12501-PV-SLD07	revision:	B



GENERAL NOTES:.
All measurements to be checked and controlled against the drawings on site before any work commences according to the drawings. Any irregularities and discrepancies must immediately be pointed out to the consulting engineer.
All work done should be in accordance with latest SANS standards, relevant codes and municipal by-laws.
CONTRACTOR IS ADVISED TO READ ALL THE NOTES CAREFULLY PRIOR TO COMMENCEMENT WITH WORKS.

GENERAL ELECTRICAL INSTALLATION NOTES:
1. Distribution boards shall comply with requirements of latest SANS 10142-1, SANS1816, SANS1974.
2. The contractor shall verify conditions of the field prior to construction in order to determine conditions for cable routing, lengths, quantity of materials, space available for appliances and equipment.
3. The contractor shall take own measurements of quantities for materials and lengths against the drawing.
4. No equipment shall be delivered to site without the written approval of the consulting engineer.
5. Factory acceptance test (FAT) shall be carried out as per SANS 187, with the presence of the consulting engineer or his representative and/or the personnel from local supply authority before the power equipment is released from the manufacturer.
6. On site test shall be carried out as per clause 5 of SANS 1874.
7. Contractor shall coordinate with other service providers on final location of provided equipment, final cable tray routing, and exact location of all equipment noted as "by others".
8. Any work not done to the satisfaction of the consulting engineer shall be remedied and to the Contractor's account.
9. Cable joints shall be carried out by personnel who are certified to do so.
10. Should there be a need to reinstall any part of a circuit, the contractor shall issue details of that particular section including a wiring diagram.
11. An investigation shall be carried out to determine the cause of a defect prior to the work being undertaken.
12. All power circuits to appliances shall be tested and commissioned including the respective switchgear. Such tests shall be conducted in the presence of the Consulting Engineer or his representative and test results shall be submitted to his office within 3 calendar days.
13. Contractor to supply all documentation relating to the major power equipment including wiring diagrams.
14. The Contractor shall make arrangements for training at least one qualified member of staff on the use, operation and maintenance of the electrical installation.
15. Equipment shall be housed in a shipping container. Container shall be fully airconditioned and ventilated.

NOTE A3: ANNOTATIONS:
1. None.

NOTE A4: NOTES PERTAINING REVISIONS TO THIS DRAWING:
1. See clouded area.

NOTE A5: APPLICABLE SPECIFICATIONS (OBTAINABLE FROM CONSULTING ENGINEER'S OFFICE):
1. Standard Quality Specification for general electrical installations.
2. Standard Quality Specification for Electrical Material and Equipment.
3. Detailed Specification for Electrical Installations

NOTE A6: DISCLAIMER:
1. The lines connecting devices shown on this drawing shall not be construed as exact cable routes between source and devices/appliances. These are tentative and it is the responsibility of the contractor to provide the most effective and efficient routes in accordance with regulations and industry best practices.
2. The contractor will be required to indicate all cable routes on the "as-built" drawings.
3. This drawing is limited in scope to specific components of a complete system and is thus a single line representation of the system.
4. **Works classified as "removal and reinstallation" shall ONLY be executed upon a written site instruction.**
5. **Works classified as "ommitted and decommissioned" shall ONLY be executed upon a written site instruction.**

NOTE A7: ACRONYMS (SELECTIVE):
1. DB - Distribution Board
2. DC - *Direct Current*
3. AC - Alternating Current
4. MV - Low Voltage
5. MV - Medium Voltage
6. RMU - Ring Main Unit
7. MCB - Miniature Circuit Breaker
8. MCCB - Moulded Case Circuit Breaker
9. SWA - Steel Wire Armour
10. PVC - Polyvinyl Chloride
11. BCEW - Bare Copper Earth Wire
12. SPD - Surge Protective Device
13. PV - Photovoltaic

WIRE SCHEDULE	TYPE	TOTAL LENGTH (m)
C1 - 35mm² 4-core PVC/PVC Cu. cable + 16mm² BCEW	AC	
C2 - 50mm² 4-core PVC/PVC Cu. cable + 25mm² BCEW	AC	
C3 - 70mm² 4-core PVC/PVC Cu. cable + 35mm² BCEW	AC	
C4 - 95mm² 4-core PVC/PVC Cu. cable + 50mm² BCEW	AC	
C5 - 120mm² 4-core PVC/PVC Cu. cable + 70mm² BCEW	AC	
C6 - 150mm² 4-core PVC/PVC Cu. cable + 95mm² BCEW	AC	
C7 - 185mm² 4-core SWA/PVC/PVC Cu. cable + 120mm² BCEW	AC	
C8 - 240mm² 4-core PVC/PVC Cu. cable + 150mm² BCEW	AC	
C9 - 300mm² 4-core PVC/PVC Cu. cable + 185mm² BCEW	AC	
D2 - 6mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D6 - 35mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D7 - 50mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D8 - 95mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D9 - 150mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D10 - 240mm² single core PVC/PVC Cu. cable (2 cables)	DC	
E2 - 4mm² BCEW	PE	
E3 - 6mm² BCEW	PE	
E4 - 10mm² BCEW	PE	
T1 - RS485 Connection/CAN	DATA	
T2 - Cat6 Connection	DATA	

PANEL CONSTRUCTION DETAILS:

Panel Name:	DCCB3
Purpose:	DC Combiner Box
Construction:	Surface mount
Access:	Front
Material:	Mild steel (1.6mm)
Panels:	Steel escutcheon removable panels with locking pins and square key catches
Doors:	With latch type lockable doors
Exposure:	IP44
Finish:	White powder coated exterior body, white interior painted body, white powder coated panels
Dimensions:	TBC
Labeling:	Exterior - Engraved ivorine/trafolyte installed at front. Danger warning sign Interior - Engraved ivorine/trafolyte, printed legend card, legend card holder on door
Cable Entry:	Bottom & Top
Circuits/Ways	2 x [8 Input/1 Output]
Location:	Inside custom made shipping container/Inverter section
Supplied from:	PV Modules
General:	Allow 40 % spare space capacity for future expansion.

LEGEND

- Circuit Breaker
- Switch Disconnector (On Load)
- Fused Switch Disconnector
- MC4 Connector
- Earth
- Relay
- C6 x2 — Cable Description Tag (e.g x2 means 2 cables in parallel)
- Surge Protective Device
- 3-phase line
- Current Transformer

orientation map

drawing approval

owner's signature | engineer's signature | architect's signature

name | Registration No. | Registration No.

ISSUED FOR CLIENT APPROVAL

file location | paper size: A 1

revision details

No.	DATE	DRW	CHK	DESCRIPTION
A	16.05.2025	N.D	W.H	Detailed Design

client: SOUTH AFRICAN NATIONAL SPACE AGENCY — KRUGERSDORP

principal agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

discipline: ELECTRICAL

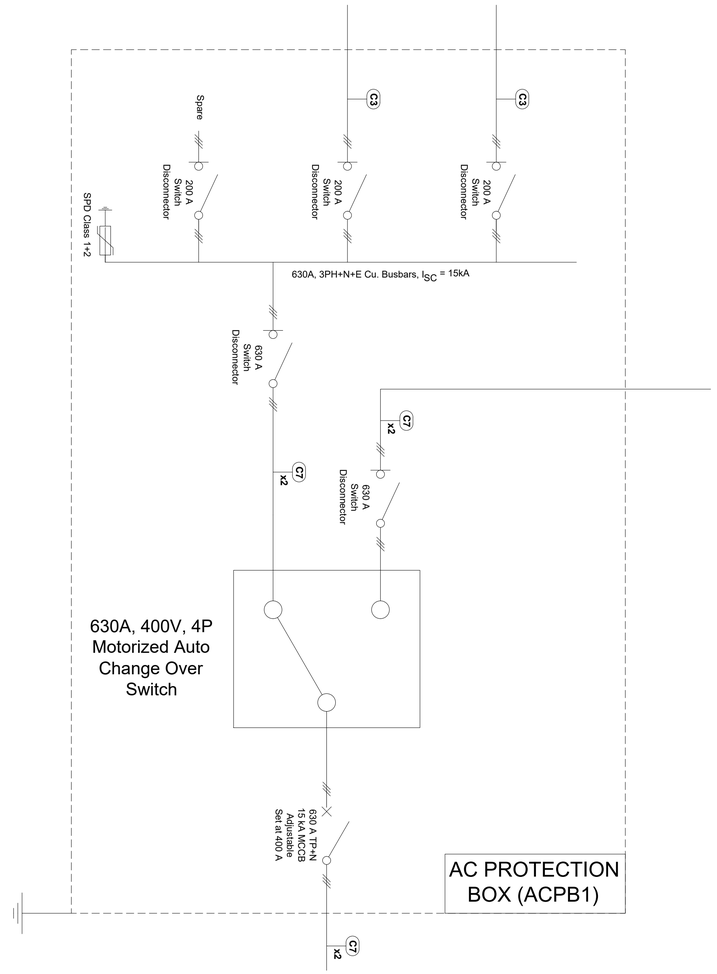
service: POWER DISTRIBUTION

project name: 1 Megawatt Solar Photovoltaic Plant at SANSA Space Station Krugersdorp

proj. ref

drawing title: Mains Distribution Board (MDB1) Single Line Diagram

project no:	12501	designed:	W.H
scale:	Not to scale	drawn:	N.D
date:	16 May 2025	checked:	J.M
drawing no:	12501-PV-SLD11	revision:	A



GENERAL NOTES:.
All measurements to be checked and controlled against the drawings on site before any work commences according to the drawings. Any irregularities and discrepancies must immediately be pointed out to the consulting engineer.
All work done should be in accordance with latest SANS standards, relevant codes and municipal by-laws.
CONTRACTOR IS ADVISED TO READ ALL THE NOTES CAREFULLY PRIOR TO COMMENCEMENT WITH WORKS.

GENERAL ELECTRICAL INSTALLATION NOTES:
1. Distribution boards shall comply with requirements of latest SANS 10142-1, SANS1816, SANS1974.
2. The contractor shall verify conditions of the field prior to construction in order to determine conditions for cable routing, lengths, quantity of materials, space available for appliances and equipment.
3. The contractor shall take own measurements of quantities for materials and lengths against the drawing.
4. No equipment shall be delivered to site without the written approval of the consulting engineer.
5. Factory acceptance test (FAT) shall be carried out as per SANS 187, with the presence of the consulting engineer or his representative and/or the personnel from local supply authority before the power equipment is released from the manufacturer.
6. On site test shall be carried out as per clause 5 of SANS 1874.
7. Contractor shall coordinate with other service providers on final location of provided equipment, final cable tray routing, and exact location of all equipment noted as "by others".
8. Any work not done to the satisfaction of the consulting engineer shall be remedied and to the Contractor's account.
9. Cable joints shall be carried out by personnel who are certified to do so.
10. Should there be a need to reinstall any part of a circuit, the contractor shall issue details of that particular section including a wiring diagram.
11. An investigation shall be carried out to determine the cause of a defect prior to the work being undertaken.
12. All power circuits to appliances shall be tested and commissioned including the respective switchgear. Such tests shall be conducted in the presence of the Consulting Engineer or his representative and test results shall be submitted to his office within 3 calendar days.
13. Contractor to supply all documentation relating to the major power equipment including wiring diagrams.
14. The Contractor shall make arrangements for training at least one qualified member of staff on the use, operation and maintenance of the electrical installation.
15. Equipment shall be housed in a shipping container. Container shall be fully airconditioned and ventilated.

NOTE A3: ANNOTATIONS:
1. None.

NOTE A4: NOTES PERTAINING REVISIONS TO THIS DRAWING:
1. See clouded area.

NOTE A5: APPLICABLE SPECIFICATIONS (OBTAINABLE FROM CONSULTING ENGINEER'S OFFICE):
1. Standard Quality Specification for general electrical installations.
2. Standard Quality Specification for Electrical Material and Equipment.
3. Detailed Specification for Electrical Installations

NOTE A6: DISCLAIMER:
1. The lines connecting devices shown on this drawing shall not be construed as exact cable routes between source and devices/appliances. These are tentative and it is the responsibility of the contractor to provide the most effective and efficient routes in accordance with regulations and industry best practices.
2. The contractor will be required to indicate all cable routes on the "as-built" drawings.
3. This drawing is limited in scope to specific components of a complete system and is thus a single line representation of the system.
4. **Works classified as "removal and reinstallation" shall ONLY be executed upon a written site instruction.**
5. **Works classified as "ommitted and decommissioned" shall ONLY be executed upon a written site instruction.**

NOTE A7: ACRONYMS (SELECTIVE):
1. DB - Distribution Board
2. DC - *Direct* Current
3. AC - Alternating Current
4. MV - Low Voltage
5. MV - Medium Voltage
6. RMU - Ring Main Unit
7. MCB - Miniature Circuit Breaker
8. MCCB - Moulded Case Circuit Breaker
9. SWA - Steel Wire Armour
10. PVC - Polyvinyl Chloride
11. BCEW - Bare Copper Earth Wire
12. SPD - Surge Protective Device
13. PV - Photovoltaic

WIRE SCHEDULE	TYPE	TOTAL LENGTH (m)
C1 - 35mm² 4-core PVC/PVC Cu. cable + 16mm² BCEW	AC	
C2 - 50mm² 4-core PVC/PVC Cu. cable + 25mm² BCEW	AC	
C3 - 70mm² 4-core PVC/PVC Cu. cable + 35mm² BCEW	AC	
C4 - 95mm² 4-core PVC/PVC Cu. cable + 50mm² BCEW	AC	
C5 - 120mm² 4-core PVC/PVC Cu. cable + 70mm² BCEW	AC	
C6 - 150mm² 4-core PVC/PVC Cu. cable + 95mm² BCEW	AC	
C7 - 185mm² 4-core SWA/PVC/PVC Cu. cable + 120mm² BCEW	AC	
C8 - 240mm² 4-core PVC/PVC Cu. cable + 150mm² BCEW	AC	
C9 - 300mm² 4-core PVC/PVC Cu. cable + 185mm² BCEW	AC	
D2 - 6mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D6 - 35mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D7 - 50mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D8 - 95mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D9 - 150mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D10 - 240mm² single core PVC/PVC Cu. cable (2 cables)	DC	
E2 - 4mm² BCEW	PE	
E3 - 6mm² BCEW	PE	
E4 - 10mm² BCEW	PE	
T1 - RS485 Connection/CAN	DATA	
T2 - Cat6 Connection	DATA	

PANEL CONSTRUCTION DETAILS:

Panel Name:	ACPB1
Purpose:	AC Protection Box + Bypass/Changeover
Construction:	Surface mount
Access:	Front
Material:	Mild steel (1.6mm)
Panels:	Steel escutcheon removable panels with locking pins and square key catches
Doors:	With latch type lockable doors
Exposure:	IP44
Finish:	Orange powder coated exterior body, white interior painted body, white powder coated panels
Dimensions:	TBC
Labeling:	Exterior - Engraved ivorine/trafolyte installed at front. Danger warning sign Interior - Engraved ivorine/trafolyte, printed legend card, legend card holder on door
Cable Entry:	Bottom
Location:	Inside custom made shipping container/Inverter section
Supplied from:	Inverter 1 & 2, DB1
General:	Allow 30 % spare space capacity. Changeover switch to be in a separate compartment, padlockable, basemount

LEGEND

- Circuit Breaker
- Switch Disconnector (On Load)
- Fused Switch Disconnector
- MC4 Connector
- Earth
- Relay
- C6 x2 — Cable Description Tag (e.g x2 means 2 cables in parallel)
- Surge Protective Device
- 3-phase line
- Current Transformer

orientation map

drawing approval

owner's signature | engineer's signature | architect's signature

name | Registration No. | Registration No.

ISSUED FOR CLIENT APPROVAL

file location | paper size: A 1

revision details

No.	DATE	DRW	CHK	DESCRIPTION
A	16.05.2025	N.D	W.H	Detailed Design

client

SOUTH AFRICAN NATIONAL SPACE AGENCY

KRUGERSDORP

principal agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

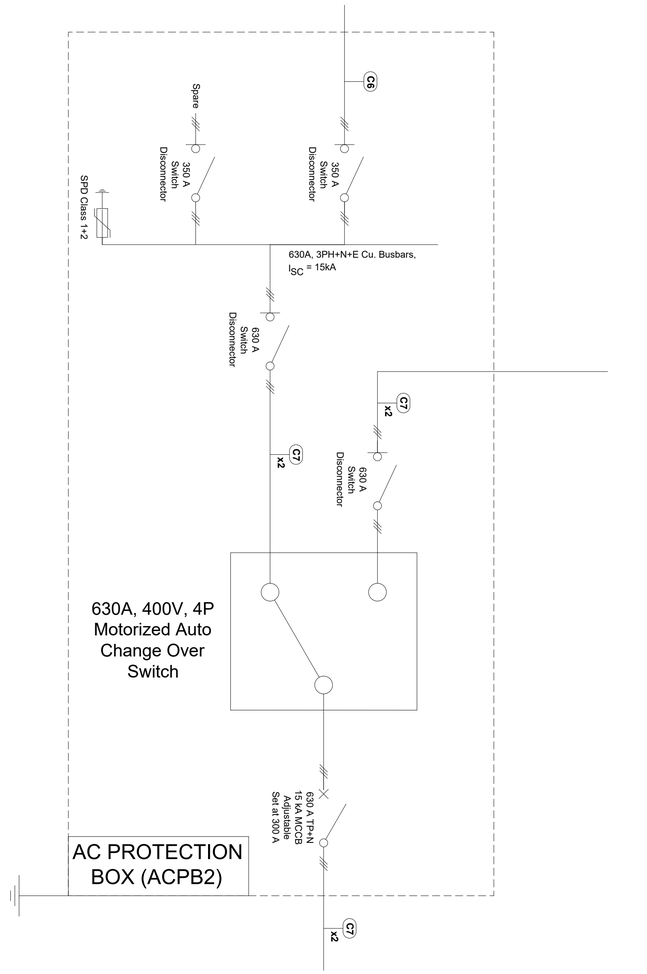
discipline: ELECTRICAL
service: POWER DISTRIBUTION

project name
1 Megawatt Solar Photovoltaic Plant at SANSA Space Station Krugersdorp

proj. ref

drawing title
AC Protection Box (ACPB1) Single Line Diagram

project no:	12501	designed:	W.H
scale:	Not to scale	drawn:	N.D
date:	16 May 2025	checked:	J.M
drawing no:	12501-PV-SLD12	revision:	A



GENERAL NOTES:.
All measurements to be checked and controlled against the drawings on site before any work commences according to the drawings. Any irregularities and discrepancies must immediately be pointed out to the consulting engineer.
All work done should be in accordance with latest SANS standards, relevant codes and municipal by-laws.
CONTRACTOR IS ADVISED TO READ ALL THE NOTES CAREFULLY PRIOR TO COMMENCEMENT WITH WORKS.

GENERAL ELECTRICAL INSTALLATION NOTES:
1. Distribution boards shall comply with requirements of latest SANS 10142-1, SANS1816, SANS1974.
2. The contractor shall verify conditions of the field prior to construction in order to determine conditions for cable routing, lengths, quantity of materials, space available for appliances and equipment.
3. The contractor shall take own measurements of quantities for materials and lengths against the drawing.
4. No equipment shall be delivered to site without the written approval of the consulting engineer.
5. Factory acceptance test (FAT) shall be carried out as per SANS 187, with the presence of the consulting engineer or his representative and/or the personnel from local supply authority before the power equipment is released from the manufacturer.
6. On site test shall be carried out as per clause 5 of SANS 1874.
7. Contractor shall coordinate with other service providers on final location of provided equipment, final cable tray routing, and exact location of all equipment noted as "by others".
8. Any work not done to the satisfaction of the consulting engineer shall be remedied and to the Contractor's account.
9. Cable joints shall be carried out by personnel who are certified to do so.
10. Should there be a need to reinstall any part of a circuit, the contractor shall issue details of that particular section including a wiring diagram.
11. An investigation shall be carried out to determine the cause of a defect prior to the work being undertaken.
12. All power circuits to appliances shall be tested and commissioned including the respective switchgear. Such tests shall be conducted in the presence of the Consulting Engineer or his representative and test results shall be submitted to his office within 3 calendar days.
13. Contractor to supply all documentation relating to the major power equipment including wiring diagrams.
14. The Contractor shall make arrangements for training at least one qualified member of staff on the use, operation and maintenance of the electrical installation.
15. Equipment shall be housed in a shipping container. Container shall be fully airconditioned and ventilated.

NOTE A3: ANNOTATIONS:
1. None.

NOTE A4: NOTES PERTAINING REVISIONS TO THIS DRAWING:
1. See clouded area.

NOTE A5: APPLICABLE SPECIFICATIONS (OBTAINABLE FROM CONSULTING ENGINEER'S OFFICE):
1. Standard Quality Specification for general electrical installations.
2. Standard Quality Specification for Electrical Material and Equipment.
3. Detailed Specification for Electrical Installations

NOTE A6: DISCLAIMER:
1. The lines connecting devices shown on this drawing shall not be construed as exact cable routes between source and devices/appliances. These are tentative and it is the responsibility of the contractor to provide the most effective and efficient routes in accordance with regulations and industry best practices.
2. The contractor will be required to indicate all cable routes on the "as-built" drawings.
3. This drawing is limited in scope to specific components of a complete system and is thus a single line representation of the system.
4. **Works classified as "removal and reinstallation" shall ONLY be executed upon a written site instruction.**
5. **Works classified as "ommitted and decommissioned" shall ONLY be executed upon a written site instruction.**

NOTE A7: ACRONYMS (SELECTIVE):
1. DB - Distribution Board
2. DC - *Direct* Current
3. AC - Alternating Current
4. MV - Low Voltage
5. MV - Medium Voltage
6. RMU - Ring Main Unit
7. MCB - Miniature Circuit Breaker
8. MCCB - Moulded Case Circuit Breaker
9. SWA - Steel Wire Armour
10. PVC - Polyvinyl Chloride
11. BCEW - Bare Copper Earth Wire
12. SPD - Surge Protective Device
13. PV - Photovoltaic

WIRE SCHEDULE	TYPE	TOTAL LENGTH (m)
C1 - 35mm² 4-core PVC/PVC Cu. cable + 16mm² BCEW	AC	
C2 - 50mm² 4-core PVC/PVC Cu. cable + 25mm² BCEW	AC	
C3 - 70mm² 4-core PVC/PVC Cu. cable + 35mm² BCEW	AC	
C4 - 95mm² 4-core PVC/PVC Cu. cable + 50mm² BCEW	AC	
C5 - 120mm² 4-core PVC/PVC Cu. cable + 70mm² BCEW	AC	
C6 - 150mm² 4-core PVC/PVC Cu. cable + 95mm² BCEW	AC	
C7 - 185mm² 4-core SWA/PVC/PVC Cu. cable + 120mm² BCEW	AC	
C8 - 240mm² 4-core PVC/PVC Cu. cable + 150mm² BCEW	AC	
C9 - 300mm² 4-core PVC/PVC Cu. cable + 185mm² BCEW	AC	
D2 - 6mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D6 - 35mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D7 - 50mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D8 - 95mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D9 - 150mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D10 - 240mm² single core PVC/PVC Cu. cable (2 cables)	DC	
E2 - 4mm² BCEW	PE	
E3 - 6mm² BCEW	PE	
E4 - 10mm² BCEW	PE	
T1 - RS485 Connection/CAN	DATA	
T2 - Cat6 Connection	DATA	

PANEL CONSTRUCTION DETAILS:

Panel Name:	ACPB2
Purpose:	AC Protection Box + Bypass/Changeover
Construction:	Surface mount
Access:	Front
Material:	Mild steel (1.6mm)
Panels:	Steel escutcheon removable panels with locking pins and square key catches
Doors:	With latch type lockable doors
Exposure:	IP44
Finish:	Orange powder coated exterior body, white interior painted body, white powder coated panels
Dimensions:	TBC
Labeling:	Exterior - Engraved ivorine/trafolyte installed at front. Danger warning sign Interior - Engraved ivorine/trafolyte, printed legend card, legend card holder on door
Cable Entry:	Bottom
Location:	Inside custom made shipping container/Inverter section
Supplied from:	Inverter 3, LV Section of MS1
General:	Allow 30 % spare space capacity. Changeover switch to be in a separate compartment, padlockable, basemount

LEGEND

- Circuit Breaker
- Switch Disconnector (On Load)
- Fused Switch Disconnector
- MC4 Connector
- Earth
- Relay
- C6 x2 — Cable Description Tag (e.g x2 means 2 cables in parallel)
- Surge Protective Device
- 3-phase line
- Current Transformer

orientation map

drawing approval

owner's signature | engineer's signature | architect's signature

name | Registration No. | Registration No.

ISSUED FOR CLIENT APPROVAL

file location | paper size: A 1

revision details

No.	DATE	DRW	CHK	DESCRIPTION
A	16.05.2025	N.D	W.H	Detailed Design

client
SOUTH AFRICAN NATIONAL SPACE AGENCY
KRUGERSDORP

principal agent
62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045
Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com
KHULANDLE CONSULTING ENGINEERS SA CC

agent
62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045
Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com
KHULANDLE CONSULTING ENGINEERS SA CC

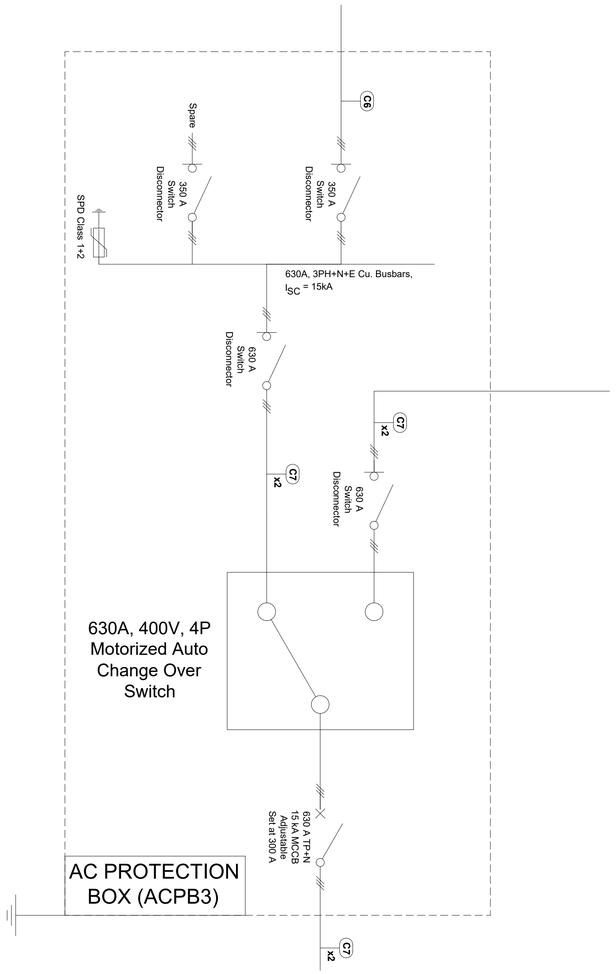
discipline: ELECTRICAL
service: POWER DISTRIBUTION

project name
1 Megawatt Solar Photovoltaic Plant at SANSA Space Station Krugersdorp

proj. ref

drawing title
AC Protection Box (ACPB2) Single Line Diagram

project no:	12501	designed:	W.H
scale:	Not to scale	drawn:	N.D
date:	16 May 2025	checked:	J.M
drawing no:	12501-PV-SLD13	revision:	A



GENERAL NOTES:.
All measurements to be checked and controlled against the drawings on site before any work commences according to the drawings. Any irregularities and discrepancies must immediately be pointed out to the consulting engineer.
All work done should be in accordance with latest SANS standards, relevant codes and municipal by-laws.
CONTRACTOR IS ADVISED TO READ ALL THE NOTES CAREFULLY PRIOR TO COMMENCEMENT WITH WORKS.

GENERAL ELECTRICAL INSTALLATION NOTES:
1. Distribution boards shall comply with requirements of latest SANS 10142-1, SANS1816, SANS1974.
2. The contractor shall verify conditions of the field prior to construction in order to determine conditions for cable routing, lengths, quantity of materials, space available for appliances and equipment.
3. The contractor shall take own measurements of quantities for materials and lengths against the drawing.
4. No equipment shall be delivered to site without the written approval of the consulting engineer.
5. Factory acceptance test (FAT) shall be carried out as per SANS 187, with the presence of the consulting engineer or his representative and/or the personnel from local supply authority before the power equipment is released from the manufacturer.
6. On site test shall be carried out as per clause 5 of SANS 1874.
7. Contractor shall coordinate with other service providers on final location of provided equipment, final cable tray routing, and exact location of all equipment noted as "by others".
8. Any work not done to the satisfaction of the consulting engineer shall be remedied and to the Contractor's account.
9. Cable joints shall be carried out by personnel who are certified to do so.
10. Should there be a need to reinstall any part of a circuit, the contractor shall issue details of that particular section including a wiring diagram.
11. An investigation shall be carried out to determine the cause of a defect prior to the work being undertaken.
12. All power circuits to appliances shall be tested and commissioned including the respective switchgear. Such tests shall be conducted in the presence of the Consulting Engineer or his representative and test results shall be submitted to his office within 3 calendar days.
13. Contractor to supply all documentation relating to the major power equipment including wiring diagrams.
14. The Contractor shall make arrangements for training at least one qualified member of staff on the use, operation and maintenance of the electrical installation.
15. Equipment shall be housed in a shipping container. Container shall be fully airconditioned and ventilated.

NOTE A3: ANNOTATIONS:
1. None.

NOTE A4: NOTES PERTAINING REVISIONS TO THIS DRAWING:
1. See clouded area.

NOTE A5: APPLICABLE SPECIFICATIONS (OBTAINABLE FROM CONSULTING ENGINEER'S OFFICE):
1. Standard Quality Specification for general electrical installations.
2. Standard Quality Specification for Electrical Material and Equipment.
3. Detailed Specification for Electrical Installations

NOTE A6: DISCLAIMER:
1. The lines connecting devices shown on this drawing shall not be construed as exact cable routes between source and devices/appliances. These are tentative and it is the responsibility of the contractor to provide the most effective and efficient routes in accordance with regulations and industry best practices.
2. The contractor will be required to indicate all cable routes on the "as-built" drawings.
3. This drawing is limited in scope to specific components of a complete system and is thus a single line representation of the system.
4. **Works classified as "removal and reinstallation" shall ONLY be executed upon a written site instruction.**
5. **Works classified as "ommitted and decommissioned" shall ONLY be executed upon a written site instruction.**

NOTE A7: ACRONYMS (SELECTIVE):
1. DB - Distribution Board
2. DC - *Direct Current*
3. AC - Alternating Current
4. MV - Low Voltage
5. MV - Medium Voltage
6. RMU - Ring Main Unit
7. MCB - Miniature Circuit Breaker
8. MCCB - Moulded Case Circuit Breaker
9. SWA - Steel Wire Armour
10. PVC - Polyvinyl Chloride
11. BCEW - Bare Copper Earth Wire
12. SPD - Surge Protective Device
13. PV - Photovoltaic

WIRE SCHEDULE	TYPE	TOTAL LENGTH (m)
C1 - 35mm² 4-core PVC/PVC Cu. cable + 16mm² BCEW	AC	
C2 - 50mm² 4-core PVC/PVC Cu. cable + 25mm² BCEW	AC	
C3 - 70mm² 4-core PVC/PVC Cu. cable + 35mm² BCEW	AC	
C4 - 95mm² 4-core PVC/PVC Cu. cable + 50mm² BCEW	AC	
C5 - 120mm² 4-core PVC/PVC Cu. cable + 70mm² BCEW	AC	
C6 - 150mm² 4-core PVC/PVC Cu. cable + 95mm² BCEW	AC	
C7 - 185mm² 4-core SWA/PVC/PVC Cu. cable + 120mm² BCEW	AC	
C8 - 240mm² 4-core PVC/PVC Cu. cable + 150mm² BCEW	AC	
C9 - 300mm² 4-core PVC/PVC Cu. cable + 185mm² BCEW	AC	
D2 - 6mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D6 - 35mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D7 - 50mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D8 - 95mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D9 - 150mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D10 - 240mm² single core PVC/PVC Cu. cable (2 cables)	DC	
E2 - 4mm² BCEW	PE	
E3 - 6mm² BCEW	PE	
E4 - 10mm² BCEW	PE	
T1 - RS485 Connection/CAN	DATA	
T2 - Cat6 Connection	DATA	

PANEL CONSTRUCTION DETAILS:

Panel Name:	ACPB3
Purpose:	AC Protection Box + Bypass/Changeover
Construction:	Surface mount
Access:	Front
Material:	Mild steel (1.6mm)
Panels:	Steel escutcheon removable panels with locking pins and square key catches
Doors:	With latch type lockable doors
Exposure:	IP44
Finish:	Orange powder coated exterior body, white interior painted body, white powder coated panels
Dimensions:	TBC
Labeling:	Exterior - Engraved ivorine/trafolyte installed at front. Danger warning sign Interior - Engraved ivorine/trafolyte, printed legend card, legend card holder on door
Cable Entry:	Bottom
Location:	Inside custom made shipping container/Inverter section
Supplied from:	Inverter 4, LV Section of MS2
General:	Allow 30 % spare space capacity. Changeover switch to be in a separate compartment, padlockable, basemount

LEGEND

- Circuit Breaker
- Switch Disconnector (On Load)
- Fused Switch Disconnector
- MC4 Connector
- Earth
- Relay
- C6 x2 — Cable Description Tag (e.g x2 means 2 cables in parallel)
- Surge Protective Device
- 3-phase line
- Current Transformer

orientation map

drawing approval

owner's signature | engineer's signature | architect's signature

name | Registration No. | Registration No.

ISSUED FOR CLIENT APPROVAL

file location | paper size: A 1

revision details

No.	DATE	DRW	CHK	DESCRIPTION
A	16.05.2025	N.D	W.H	Detailed Design

client

SOUTH AFRICAN NATIONAL SPACE AGENCY

KRUGERSDORP

principal agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

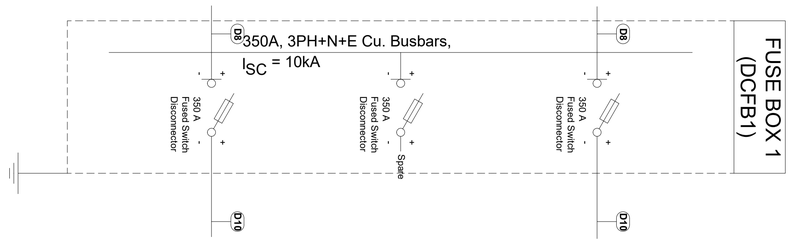
discipline: ELECTRICAL
service: POWER DISTRIBUTION

project name
1 Megawatt Solar Photovoltaic Plant at SANSA Space Station Krugersdorp

proj. ref

drawing title
AC Protection Box (ACPB3) Single Line Diagram

project no:	12501	designed:	W.H
scale:	Not to scale	drawn:	N.D
date:	16 May 2025	checked:	J.M
drawing no:	12501-PV-SLD14	revision:	A



GENERAL NOTES:.
All measurements to be checked and controlled against the drawings on site before any work commences according to the drawings. Any irregularities and discrepancies must immediately be pointed out to the consulting engineer.
All work done should be in accordance with latest SANS standards, relevant codes and municipal by-laws.
CONTRACTOR IS ADVISED TO READ ALL THE NOTES CAREFULLY PRIOR TO COMMENCEMENT WITH WORKS.

GENERAL ELECTRICAL INSTALLATION NOTES:
1. Distribution boards shall comply with requirements of latest SANS 10142-1, SANS1816, SANS1974.
2. The contractor shall verify conditions of the field prior to construction in order to determine conditions for cable routing, lengths, quantity of materials, space available for appliances and equipment.
3. The contractor shall take own measurements of quantities for materials and lengths against the drawing.
4. No equipment shall be delivered to site without the written approval of the consulting engineer.
5. Factory acceptance test (FAT) shall be carried out as per SANS 187, with the presence of the consulting engineer or his representative and/or the personnel from local supply authority before the power equipment is released from the manufacturer.
6. On site test shall be carried out as per clause 5 of SANS 1874.
7. Contractor shall coordinate with other service providers on final location of provided equipment, final cable tray routing, and exact location of all equipment noted as "by others".
8. Any work not done to the satisfaction of the consulting engineer shall be remedied and to the Contractor's account.
9. Cable joints shall be carried out by personnel who are certified to do so.
10. Should there be a need to reinstall any part of a circuit, the contractor shall issue details of that particular section including a wiring diagram.
11. An investigation shall be carried out to determine the cause of a defect prior to the work being undertaken.
12. All power circuits to appliances shall be tested and commissioned including the respective switchgear. Such tests shall be conducted in the presence of the Consulting Engineer or his representative and test results shall be submitted to his office within 3 calendar days.
13. Contractor to supply all documentation relating to the major power equipment including wiring diagrams.
14. The Contractor shall make arrangements for training at least one qualified member of staff on the use, operation and maintenance of the electrical installation.
15. Equipment shall be housed in a shipping container. Container shall be fully airconditioned and ventilated.

NOTE A3: ANNOTATIONS:
1. None.

NOTE A4: NOTES PERTAINING REVISIONS TO THIS DRAWING:
1. See clouded area.

NOTE A5: APPLICABLE SPECIFICATIONS (OBTAINABLE FROM CONSULTING ENGINEER'S OFFICE):
1. Standard Quality Specification for general electrical installations.
2. Standard Quality Specification for Electrical Material and Equipment.
3. Detailed Specification for Electrical Installations

NOTE A6: DISCLAIMER:
1. The lines connecting devices shown on this drawing shall not be construed as exact cable routes between source and devices/appliances. These are tentative and it is the responsibility of the contractor to provide the most effective and efficient routes in accordance with regulations and industry best practices.
2. The contractor will be required to indicate all cable routes on the "as-built" drawings.
3. This drawing is limited in scope to specific components of a complete system and is thus a single line representation of the system.
4. **Works classified as "removal and reinstallation" shall ONLY be executed upon a written site instruction.**
5. **Works classified as "ommitted and decommissioned" shall ONLY be executed upon a written site instruction.**

NOTE A7: ACRONYMS (SELECTIVE):
1. DB - Distribution Board
2. DC - *Direct* Current
3. AC - Alternating Current
4. MV - Low Voltage
5. MV - Medium Voltage
6. RMU - Ring Main Unit
7. MCB - Miniature Circuit Breaker
8. MCCB - Moulded Case Circuit Breaker
9. SWA - Steel Wire Armour
10. PVC - Polyvinyl Chloride
11. BCEW - Bare Copper Earth Wire
12. SPD - Surge Protective Device
13. PV - Photovoltaic

WIRE SCHEDULE	TYPE	TOTAL LENGTH (m)
C1 - 35mm² 4-core PVC/PVC Cu. cable + 16mm² BCEW	AC	
C2 - 50mm² 4-core PVC/PVC Cu. cable + 25mm² BCEW	AC	
C3 - 70mm² 4-core PVC/PVC Cu. cable + 35mm² BCEW	AC	
C4 - 95mm² 4-core PVC/PVC Cu. cable + 50mm² BCEW	AC	
C5 - 120mm² 4-core PVC/PVC Cu. cable + 70mm² BCEW	AC	
C6 - 150mm² 4-core PVC/PVC Cu. cable + 95mm² BCEW	AC	
C7 - 185mm² 4-core SWA/PVC/PVC Cu. cable + 120mm² BCEW	AC	
C8 - 240mm² 4-core PVC/PVC Cu. cable + 150mm² BCEW	AC	
C9 - 300mm² 4-core PVC/PVC Cu. cable + 185mm² BCEW	AC	
D2 - 6mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D6 - 35mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D7 - 50mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D8 - 95mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D9 - 150mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D10 - 240mm² single core PVC/PVC Cu. cable (2 cables)	DC	
E2 - 4mm² BCEW	PE	
E3 - 6mm² BCEW	PE	
E4 - 10mm² BCEW	PE	
T1 - RS485 Connection/CAN	DATA	
T2 - Cat6 Connection	DATA	

PANEL CONSTRUCTION DETAILS:

Panel Name:	DCFB1
Purpose:	DC Battery Fuse Box
Construction:	Surface mount
Access:	Front
Material:	Mild steel (1.6mm)
Panels:	Steel escutcheon removable panels with locking pins and square key catches
Doors:	With latch type lockable doors
Exposure:	IP44
Finish:	White powder coated exterior body, white interior painted body, white powder coated panels
Dimensions:	TBC
Labeling:	Exterior - Engraved ivorine/trafolyte installed at front. Danger warning sign Interior - Engraved ivorine/trafolyte, printed legend card, legend card holder on door
Cable Entry:	Bottom
Circuits/Ways	3 Input/3 Output
Location:	Inside custom made shipping container/Battery section
Supplied from:	Battery Pack
General:	Allow 20 % spare space capacity for future expansion.

LEGEND

- Circuit Breaker
- Switch Disconnector (On Load)
- Fused Switch Disconnector
- MC4 Connector
- Earth
- Relay
- C6 x2 — Cable Description Tag (e.g x2 means 2 cables in parallel)
- Surge Protective Device
- 3-phase line
- Current Transformer

orientation map

drawing approval

owner's signature | engineer's signature | architect's signature

name | Registration No. | Registration No.

ISSUED FOR CLIENT APPROVAL

file location | paper size: A 1

revision details

No.	DATE	DRW	CHK	DESCRIPTION
A	16.05.2025	N.D	W.H	Detailed Design

client

SOUTH AFRICAN NATIONAL SPACE AGENCY

KRUGERSDORP

principal agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

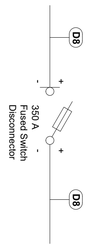
discipline: ELECTRICAL
service: POWER DISTRIBUTION

project name
1 Megawatt Solar Photovoltaic Plant at SANSA Space Station Krugersdorp

proj. ref

drawing title
Battery Fused Protection Box (DCFB1) Single Line Diagram

project no:	12501	designed:	W.H
scale:	Not to scale	drawn:	N.D
date:	16 May 2025	checked:	J.M
drawing no:	12501-PV-SLD15	revision:	A



GENERAL NOTES:.
All measurements to be checked and controlled against the drawings on site before any work commences according to the drawings. Any irregularities and discrepancies must immediately be pointed out to the consulting engineer.
All work done should be in accordance with latest SANS standards, relevant codes and municipal by-laws.
CONTRACTOR IS ADVISED TO READ ALL THE NOTES CAREFULLY PRIOR TO COMMENCEMENT WITH WORKS.

GENERAL ELECTRICAL INSTALLATION NOTES:
1. Distribution boards shall comply with requirements of latest SANS 10142-1, SANS1816, SANS1974.
2. The contractor shall verify conditions of the field prior to construction in order to determine conditions for cable routing, lengths, quantity of materials, space available for appliances and equipment.
3. The contractor shall take own measurements of quantities for materials and lengths against the drawing.
4. No equipment shall be delivered to site without the written approval of the consulting engineer.
5. Factory acceptance test (FAT) shall be carried out as per SANS 187, with the presence of the consulting engineer or his representative and/or the personnel from local supply authority before the power equipment is released from the manufacturer.
6. On site test shall be carried out as per clause 5 of SANS 1874.
7. Contractor shall coordinate with other service providers on final location of provided equipment, final cable tray routing, and exact location of all equipment noted as "by others".
8. Any work not done to the satisfaction of the consulting engineer shall be remedied and to the Contractor's account.
9. Cable joints shall be carried out by personnel who are certified to do so.
10. Should there be a need to reinstall any part of a circuit, the contractor shall issue details of that particular section including a wiring diagram.
11. An investigation shall be carried out to determine the cause of a defect prior to the work being undertaken.
12. All power circuits to appliances shall be tested and commissioned including the respective switchgear. Such tests shall be conducted in the presence of the Consulting Engineer or his representative and test results shall be submitted to his office within 3 calendar days.
13. Contractor to supply all documentation relating to the major power equipment including wiring diagrams.
14. The Contractor shall make arrangements for training at least one qualified member of staff on the use, operation and maintenance of the electrical installation.
15. Equipment shall be housed in a shipping container. Container shall be fully airconditioned and ventilated.

NOTE A3: ANNOTATIONS:
1. None.

NOTE A4: NOTES PERTAINING REVISIONS TO THIS DRAWING:
1. See clouded area.

NOTE A5: APPLICABLE SPECIFICATIONS (OBTAINABLE FROM CONSULTING ENGINEER'S OFFICE):
1. Standard Quality Specification for general electrical installations.
2. Standard Quality Specification for Electrical Material and Equipment.
3. Detailed Specification for Electrical Installations

NOTE A6: DISCLAIMER:
1. The lines connecting devices shown on this drawing shall not be construed as exact cable routes between source and devices/appliances. These are tentative and it is the responsibility of the contractor to provide the most effective and efficient routes in accordance with regulations and industry best practices.
2. The contractor will be required to indicate all cable routes on the "as-built" drawings.
3. This drawing is limited in scope to specific components of a complete system and is thus a single line representation of the system.
4. **Works classified as "removal and reinstallation" shall ONLY be executed upon a written site instruction.**
5. **Works classified as "ommitted and decommissioned" shall ONLY be executed upon a written site instruction.**

NOTE A7: ACRONYMS (SELECTIVE):
1. DB - Distribution Board
2. DC - Direct Current
3. AC - Alternating Current
4. MV - Low Voltage
5. MV - Medium Voltage
6. RMU - Ring Main Unit
7. MCB - Miniature Circuit Breaker
8. MCCB - Moulded Case Circuit Breaker
9. SWA - Steel Wire Armour
10. PVC - Polyvinyl Chloride
11. BCEW - Bare Copper Earth Wire
12. SPD - Surge Protective Device
13. PV - Photovoltaic

WIRE SCHEDULE	TYPE	TOTAL LENGTH (m)
C1 - 35mm² 4-core PVC/PVC Cu. cable + 16mm² BCEW	AC	
C2 - 50mm² 4-core PVC/PVC Cu. cable + 25mm² BCEW	AC	
C3 - 70mm² 4-core PVC/PVC Cu. cable + 35mm² BCEW	AC	
C4 - 95mm² 4-core PVC/PVC Cu. cable + 50mm² BCEW	AC	
C5 - 120mm² 4-core PVC/PVC Cu. cable + 70mm² BCEW	AC	
C6 - 150mm² 4-core PVC/PVC Cu. cable + 95mm² BCEW	AC	
C7 - 185mm² 4-core SWA/PVC/PVC Cu. cable + 120mm² BCEW	AC	
C8 - 240mm² 4-core PVC/PVC Cu. cable + 150mm² BCEW	AC	
C9 - 300mm² 4-core PVC/PVC Cu. cable + 185mm² BCEW	AC	
D2 - 6mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D6 - 35mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D7 - 50mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D8 - 95mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D9 - 150mm² single core PVC/PVC Cu. cable (2 cables)	DC	
D10 - 240mm² single core PVC/PVC Cu. cable (2 cables)	DC	
E2 - 4mm² BCEW	PE	
E3 - 6mm² BCEW	PE	
E4 - 10mm² BCEW	PE	
T1 - RS485 Connection/CAN	DATA	
T2 - Cat6 Connection	DATA	

PANEL CONSTRUCTION DETAILS:

Panel Name:	DCFB2
Purpose:	DC Battery Fuse Box
Construction:	Surface mount
Access:	Front
Material:	Mild steel (1.6mm)
Panels:	Steel escutcheon removable panels with locking pins and square key catches
Doors:	With latch type lockable doors
Exposure:	IP44
Finish:	White powder coated exterior body, white interior painted body, white powder coated panels
Dimensions:	TBC
Labeling:	Exterior - Engraved ivorine/trafolyte installed at front. Danger warning sign Interior - Engraved ivorine/trafolyte, printed legend card, legend card holder on door
Cable Entry:	Bottom & Top
Circuits/Ways	1 Input/1 Output
Location:	Inside custom made shipping container/Battery section
Supplied from:	Battery Pack
General:	Allow 20 % spare space capacity for future expansion.

LEGEND

- Circuit Breaker
- Switch Disconnector (On Load)
- Fused Switch Disconnector
- MC4 Connector
- Earth
- Relay
- C6 x2 — Cable Description Tag (e.g x2 means 2 cables in parallel)
- Surge Protective Device
- 3-phase line
- Current Transformer

orientation map

drawing approval

owner's signature | engineer's signature | architect's signature

name | Registration No. | Registration No.

ISSUED FOR CLIENT APPROVAL

file location | paper size: A 1

revision details

No.	DATE	DRW	CHK	DESCRIPTION
A	16.05.2025	N.D	W.H	Detailed Design

client

SOUTH AFRICAN NATIONAL SPACE AGENCY

KRUGERSDORP

principal agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

discipline: ELECTRICAL
service: POWER DISTRIBUTION

project name
1 Megawatt Solar Photovoltaic Plant at SANSA Space Station Krugersdorp

proj. ref

drawing title
Battery Fused Protection Box (DCFB2) Single Line Diagram

project no:	12501	designed:	W.H
scale:	Not to scale	drawn:	N.D
date:	16 May 2025	checked:	J.M
drawing no:	12501-PV-SLD16	revision:	A

GENERAL NOTES:
All measurements to be checked and controlled against the drawings on site before any work commences according to the drawings. Any irregularities and discrepancies must immediately be pointed out to the consulting engineer.
All work done should be in accordance with latest SANS standards, relevant codes and municipal by-laws.
CONTRACTOR IS ADVISED TO READ ALL THE NOTES CAREFULLY PRIOR TO COMMENCEMENT WITH WORKS.

GENERAL ELECTRICAL INSTALLATION NOTES:
1. Distribution boards shall comply with requirements of latest SANS 10142-1, SANS1816, SANS1974.
2. The contractor shall verify conditions of the field prior to construction in order to determine conditions for cable routing, lengths, quantity of materials, space available for appliances and equipment.
3. Contractor shall call for pre-construction meeting prior to any excavation.
4. The contractor shall take own measurements of quantities for materials and lengths against the drawing.
5. Contractor will supply all trenching and conduit as per technical specification.
6. Sleeves shall be provided at all cable road crossings.
7. The contractor shall obtain all permits required by the public authority and/or landlord having jurisdiction, including a right-of-way permit.
8. All easements required for construction shall be secured and submitted to the Engineer for recording prior to commencement of work. No work which requires an easement shall proceed until this is complete.
9. No equipment shall be delivered to site without the written approval of the consulting engineer.
10. Factory acceptance test (FAT) shall be carried out as per SANS 187, with the presence of the consulting engineer or his representative and/or the personnel from local supply authority before the power equipment is released from the manufacturer.
11. Road surface recovery, Prepare Asphalt materials or Paving etc., according to the original standard to recover the road surface including asphalt-aggregate mixture.
12. GPR, Geoscan, Utility locating in-road services, and existing reticulation shall be carried out prior to any excavation.
13. Record all coordinates for route, manholes, plinths, etc., and shall be verified with a Land Surveyor prior to any excavation.
14. On site test shall be carried out as per clause 5 of SANS 1874.
15. Contractor shall coordinate with other service providers on final location of provided equipment, final cable tray routing, and exact location of all equipment noted as "by others".
16. Any work not done to the satisfaction of the consulting engineer shall be remedied and to the Contractor's account.
17. Cable joints shall be carried out by personnel who are certified to do so.
18. Switchgear and enclosures shall conform to approved manufacturers as per the Technical Specifications and according to Municipal requirements.
19. Should there be a need to reinstall any part of a circuit, the contractor shall issue details of that particular section including a wiring diagram.
20. An investigation shall be carried out to determine the cause of a defect prior to the work being undertaken.
21. All power circuits to appliances shall be tested and commissioned including the respective switchgear. Such tests shall be conducted in the presence of the Consulting Engineer or his representative and test results shall be submitted to his office within 3 calendar days.
22. Contractor to supply all documentation relating to the major power equipment including wiring diagrams.
23. The Contractor shall make arrangements for training at least one qualified member of staff on the use, operation and maintenance of the electrical installation.
24. Equipment shall be housed in a shipping container. Container shall be fully airconditioned and ventilated.

NOTE A3: ANNOTATIONS:
1. None.

NOTE A4: NOTES PERTAINING REVISIONS TO THIS DRAWING:
1. See clouded area.

NOTE A5: APPLICABLE SPECIFICATIONS (OBTAINABLE FROM CONSULTING ENGINEER'S OFFICE):
1. Standard Quality Specification for general electrical installations.
2. Standard Quality Specification for Electrical Material and Equipment.
3. Detailed Specification for Electrical Installations

NOTE A6: DISCLAIMER:
1. The lines connecting devices shown on this drawing shall not be construed as exact cable routes between source and devices/appliances. These are tentative and it is the responsibility of the contractor to provide the most effective and efficient routes in accordance with regulations and industry best practices.
2. The contractor will be required to indicate all cable routes on the "as-built" drawings.
3. This drawing is limited in scope to specific components of a complete system and is thus a single line representation of the system.
4. **Works classified as "removal and reinstallation" shall ONLY be executed upon a written site instruction.**
5. **Works classified as "committed and decommissioned" shall ONLY be executed upon a written site instruction.**

NOTE A7: ACRONYMS (SELECTIVE):
1. DB - Distribution Board
2. DC - Direct Current
3. AC - Alternating Current
4. MV - Low Voltage
5. MV - Medium Voltage
6. RMU - Ring Main Unit
7. MCB - Miniature Circuit Breaker
8. MCCB - Moulded Case Circuit Breaker
9. SWA - Steel Wire Armour
10. PVC - Polyvinyl Chloride
11. BCEW - Bare Copper Earth Wire
12. SPD - Surge Protective Device
13. PV - Photovoltaic
14. VD - Voltage Drop
15. MH - Manhole
16. HDPE - High Density Polythene
17. UG - Underground
18. BFGL - Below Finished Ground Level

WIRE SCHEDULE	TYPE	TOTAL LENGTH (m)
C1 - 35mm² 4-core PVC/PVC Cu. cable + 16mm² BCEW	AC	
C2 - 50mm² 4-core PVC/PVC Cu. cable + 25mm² BCEW	AC	
C3 - 70mm² 4-core PVC/PVC Cu. cable + 35mm² BCEW	AC	
C4 - 95mm² 4-core PVC/PVC Cu. cable + 50mm² BCEW	AC	
C5 - 120mm² 4-core PVC/PVC Cu. cable + 70mm² BCEW	AC	
C6 - 150mm² 4-core PVC/PVC Cu. cable + 95mm² BCEW	AC	
C7 - 185mm² 4-core PVC/PVC Cu. cable + 120mm² BCEW	AC	
C8 - 240mm² 4-core PVC/PVC Cu. cable + 150mm² BCEW	AC	
C9 - 300mm² 4-core PVC/PVC Cu. cable + 185mm² BCEW	AC	
D2 - 6mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D6 - 35mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D7 - 50mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D8 - 95mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D9 - 150mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D10 - 240mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
E2 - 4mm² BCEW	PE	
E3 - 6mm² BCEW	PE	
E4 - 10mm² BCEW	PE	
T1 - RS485 Connection/CAN	DATA	
T2 - Cat6 Connection	DATA	

Modules	360
DC Nameplate	199.8 kWp
AC Nameplate	200 kWp
Modules per string	15
Number of Strings	24
Azimuth	0°

LEGEND

- Power Transformer
- Photovoltaic Solar Module
- DC Cable
- AC Cable
- HDPE Sleeve Ends
- AC Cable Joint
- Manhole as per Specification

orientation map

drawing approval

owner's signature	engineer's signature	architect's signature
name	Registration No.	Registration No.

ISSUED FOR CLIENT APPROVAL

file location: —
paper size: A 0

revision details

No.	DATE	DRW	CHK	DESCRIPTION
B	01.07.2025	N.D	W.H	Changed Tables Location
A	16.05.2025	N.D	W.H	Detailed Design

client
SOUTH AFRICAN NATIONAL SPACE AGENCY
KRUGERSDORP

principal agent
62 Van Rynweld Ave., Pierre Van Rynweld, Pretoria, 0045
Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com
KHULANDLE CONSULTING ENGINEERS SA CC

agent
62 Van Rynweld Ave., Pierre Van Rynweld, Pretoria, 0045
Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com
KHULANDLE CONSULTING ENGINEERS SA CC

discipline: ELECTRICAL
service: POWER DISTRIBUTION

project name
1 Megawatt Solar Photovoltaic Plant at SANSA Space Station Krugersdorp

proj. ref

drawing title
Site Electrical Reticulation Layout of DC/LV Power for Complete Solar PV Plant No. 1 (200kW)

project no:	12501	designed:	W.H
scale:	1:150	drawn:	N.D
date:	01 July 2025	checked:	J.D
drawing no:	12501-PV-EL02	revision:	B

GENERAL NOTES:
All measurements to be checked and controlled against the drawings on site before any work commences according to the drawings. Any irregularities and discrepancies must immediately be pointed out to the consulting engineer.
All work done should be in accordance with latest SANS standards, relevant codes and municipal by-laws.
CONTRACTOR IS ADVISED TO READ ALL THE NOTES CAREFULLY PRIOR TO COMMENCEMENT WITH WORKS.

GENERAL ELECTRICAL INSTALLATION NOTES:
1. Distribution boards shall comply with requirements of latest SANS 10142-1, SANS1816, SANS1974.
2. The contractor shall verify conditions of the field prior to construction in order to determine conditions for cable routing, lengths, quantity of materials, space available for appliances and equipment.
3. Contractor shall call for pre-construction meeting prior to any excavation.
4. The contractor shall take own measurements of quantities for materials and lengths against the drawing.
5. Contractor will supply all trenching and conduit as per technical specification.
6. Sleeves shall be provided at all cable road crossings.
7. The contractor shall obtain all permits required by the public authority and/or landlord having jurisdiction, including a right-of-way permit.
8. All easements required for construction shall be secured and submitted to the Engineer for recording prior to commencement of work. No work which requires an easement shall proceed until this is complete.
9. No equipment shall be delivered to site without the written approval of the consulting engineer.
10. Factory acceptance test (FAT) shall be carried out as per SANS 187, with the presence of the consulting engineer or his representative and/or the personnel from local supply authority before the power equipment is released from the manufacturer.
11. Road surface recovery, Propare Asphalt materials or Paving etc., according to the original standard to recover the road surface including asphalt-aggregate mixture.
12. GPR, Geocean, Utility locating in-road services, and existing reticulation shall be carried out prior to any excavation.
13. Record all coordinates for route, manholes, plintha, etc., and shall be verified with a Land Surveyor prior to any excavation.
14. On site test shall be carried out as per clause 5 of SANS 1874.
15. Contractor shall coordinate with other service providers on final location of provided equipment, final cable tray routing, and exact location of all equipment noted as "by others".
16. Any work not done to the satisfaction of the consulting engineer shall be remedied and to the Contractor's account.
17. Cable joints shall be carried out by personnel who are certified to do so.
18. Switchgear and enclosures shall conform to approved manufacturers as per the Technical Specifications and according to Municipal requirements.
19. Should there be a need to reinstall any part of a circuit, the contractor shall issue details of that particular section including a wiring diagram.
20. An investigation shall be carried out to determine the cause of a defect prior to the work being undertaken.
21. All power circuits to appliances shall be tested and commissioned including the respective switchgear. Such tests shall be conducted in the presence of the Consulting Engineer or his representative and test results shall be submitted to his office within 3 calendar days.
22. Contractor to supply all documentation relating to the major power equipment including wiring diagrams.
23. The Contractor shall make arrangements for training at least one qualified member of staff on the use, operation and maintenance of the electrical installation.
24. Equipment shall be housed in a shipping container. Container shall be fully airconditioned and ventilated.

NOTE A3: ANNOTATIONS:
1. None.

NOTE A4: NOTES PERTAINING REVISIONS TO THIS DRAWING:
1. See clouded area.

NOTE A5: APPLICABLE SPECIFICATIONS (OBTAINABLE FROM CONSULTING ENGINEER'S OFFICE):
1. Standard Quality Specification for general electrical installations.
2. Standard Quality Specification for Electrical Material and Equipment.
3. Detailed Specification for Electrical Installations

NOTE A6: DISCLAIMER:
1. The lines connecting devices shown on this drawing shall not be construed as exact cable routes between source and devices/appliances. These are tentative and it is the responsibility of the contractor to provide the most effective and efficient routes in accordance with regulations and industry best practices.
2. The contractor will be required to indicate all cable routes on the "as-built" drawings.
3. This drawing is limited in scope to specific components of a complete system and is thus a single line representation of the system.
4. **Works classified as "removal and reinstallation" shall ONLY be executed upon a written site instruction.**
5. **Works classified as "committed and decommissioned" shall ONLY be executed upon a written site instruction.**

NOTE A7: ACRONYMS (SELECTIVE):
1. DB - Distribution Board
2. DC - Direct Current
3. AC - Alternating Current
4. MV - Low Voltage
5. MV - Medium Voltage
6. RMU - Ring Main Unit
7. MCB - Miniature Circuit Breaker
8. MCCB - Moulded Case Circuit Breaker
9. SWA - Steel Wire Armour
10. PVC - Polyvinyl Chloride
11. BCEW - Bare Copper Earth Wire
12. SPD - Surge Protective Device
13. PV - Photovoltaic
14. VD - Voltage Drop
15. MH - Manhole
16. HDPE - High Density Polythene
17. UG - Underground
18. BFGL - Below Finished Ground Level

WIRE SCHEDULE	TYPE	TOTAL LENGTH (m)
C1 - 35mm² 4-core PVC/PVC Cu. cable + 16mm² BCEW	AC	
C2 - 50mm² 4-core PVC/PVC Cu. cable + 25mm² BCEW	AC	
C3 - 70mm² 4-core PVC/PVC Cu. cable + 35mm² BCEW	AC	
C4 - 95mm² 4-core PVC/PVC Cu. cable + 50mm² BCEW	AC	
C5 - 120mm² 4-core PVC/PVC Cu. cable + 70mm² BCEW	AC	
C6 - 150mm² 4-core PVC/PVC Cu. cable + 95mm² BCEW	AC	
C7 - 185mm² 4-core PVC/PVC Cu. cable + 120mm² BCEW	AC	
C8 - 240mm² 4-core PVC/PVC Cu. cable + 150mm² BCEW	AC	
C9 - 300mm² 4-core PVC/PVC Cu. cable + 185mm² BCEW	AC	
D2 - 6mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D6 - 35mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D7 - 50mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D8 - 95mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D9 - 150mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D10 - 240mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
E2 - 4mm² BCEW	PE	
E3 - 6mm² BCEW	PE	
E4 - 10mm² BCEW	PE	
T1 - RS485 Connection/CAN	DATA	
T2 - Cat6 Connection	DATA	

Modules	270
DC Nameplate	149.8 kWp
AC Nameplate	150 kWp
Modules per string	18
Number of Strings	15
Azimuth	0°

LEGEND

- Miniature Substation
- Photovoltaic Solar Module
- DC Cable
- AC Cable
- **HDPE Sleeve** Ends
- AC Cable Joint
- Manhole as per Specification

orientation map

drawing approval

owner's signature	engineer's signature	architect's signature
name	Registration No.	Registration No.

ISSUED FOR CLIENT APPROVAL

file location

paper size
A 0

revision details

No.	DATE	DRW	CHK	DESCRIPTION
B	01.07.2025	N.D	W.H	Changed Tables Location
A	16.05.2025	N.D	W.H	Detailed Design

client
SOUTH AFRICAN NATIONAL SPACE AGENCY
KRUGERSDORP

principal agent
62 Van Ryneveld Ave, Pierre Van Rynevelt Pretoria, 0045
Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com
KHULANDLE CONSULTING ENGINEERS SA CC

agent
62 Van Rynevelt Ave, Pierre Van Rynevelt Pretoria, 0045
Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com
KHULANDLE CONSULTING ENGINEERS SA CC

discipline	ELECTRICAL
service	POWER DISTRIBUTION

project name
1 Megawatt Solar Photovoltaic Plant at SANSA Space Station Krugersdorp

proj. ref

drawing title
Site Electrical Reticulation Layout of DC/LV Power for Complete Solar PV Plant No. 2 (150kW)

project no:	12501	designed:	W.H
scale:	1:150	drawn:	N.D
date:	01 July 2025	checked:	J.D
drawing no:	12501-PV-EL03	revision:	B

GENERAL NOTES:
All measurements to be checked and controlled against the drawings on site before any work commences according to the drawings. Any irregularities and discrepancies must immediately be pointed out to the consulting engineer.
All work done should be in accordance with latest SANS standards, relevant codes and municipal by-laws.
CONTRACTOR IS ADVISED TO READ ALL THE NOTES CAREFULLY PRIOR TO COMMENCEMENT WITH WORKS.

GENERAL ELECTRICAL INSTALLATION NOTES:
1. Distribution boards shall comply with requirements of latest SANS 10142-1, SANS1816, SANS1974.
2. The contractor shall verify conditions of the field prior to construction in order to determine conditions for cable routing, lengths, quantity of materials, space available for appliances and equipment.
3. Contractor shall call for pre-construction meeting prior to any excavation.
4. The contractor shall take own measurements of quantities for materials and lengths against the drawing.
5. Contractor will supply all trenching and conduit as per technical specification.
6. Sleeves shall be provided at all cable road crossings.
7. The contractor shall obtain all permits required by the public authority and/or landlord having jurisdiction, including a right-of-way permit.
8. All easements required for construction shall be secured and submitted to the Engineer for recording prior to commencement of work; No work which requires an easement shall proceed until this is complete.
9. No equipment shall be delivered to site without the written approval of the consulting engineer.
10. Factory acceptance test (FAT) shall be carried out as per SANS 187, with the presence of the consulting engineer or his representative and/or the personnel from local supply authority before the power equipment is released from the manufacturer.
11. Road surface recovery, Prepare Asphalt materials or Paving etc., according to the original standard to recover the road surface including asphalt-aggregate mixture.
12. GPR, Geoscan, Utility locating in-road services, and existing reticulation shall be carried out prior to any excavation.
13. Record all coordinates for route, manholes, plintha, etc., and shall be verified with a Land Surveyor prior to any excavation.
14. On site test shall be carried out as per clause 5 of SANS 1874.
15. Contractor shall coordinate with other service providers on final location of provided equipment, final cable tray routing, and exact location of all equipment noted as "by others".
16. Any work not done to the satisfaction of the consulting engineer shall be remedied and to the Contractor's account.
17. Cable joints shall be carried out by personnel who are certified to do so.
18. Switchgear and enclosures shall conform to approved manufacturers as per the Technical Specifications and according to Municipal requirements.
19. Should there be a need to reinstall any part of a circuit, the contractor shall issue details of that particular section including a wiring diagram.
20. An investigation shall be carried out to determine the cause of a defect prior to the work being undertaken.
21. All power circuits to appliances shall be tested and commissioned including the respective switchgear. Such tests shall be conducted in the presence of the Consulting Engineer or his representative and test results shall be submitted to his office within 3 calendar days.
22. Contractor to supply all documentation relating to the major power equipment including wiring diagrams.
23. The Contractor shall make arrangements for training at least one qualified member of staff on the use, operation and maintenance of the electrical installation.
24. Equipment shall be housed in a shipping container. Container shall be fully airconditioned and ventilated.

NOTE A3: ANNOTATIONS:
1. None.

NOTE A4: NOTES PERTAINING REVISIONS TO THIS DRAWING:
1. See clouded area.

NOTE A5: APPLICABLE SPECIFICATIONS (OBTAINABLE FROM CONSULTING ENGINEER'S OFFICE):
1. Standard Quality Specification for general electrical installations.
2. Standard Quality Specification for Electrical Material and Equipment.
3. Detailed Specification for Electrical Installations

NOTE A6: DISCLAIMER:
1. The lines connecting devices shown on this drawing shall not be construed as exact cable routes between source and devices/appliances. These are tentative and it is the responsibility of the contractor to provide the most effective and efficient routes in accordance with regulations and industry best practices.
2. The contractor will be required to indicate all cable routes on the "as-built" drawings.
3. This drawing is limited in scope to specific components of a complete system and is thus a single line representation of the system.
4. **Works classified as "removal and reinstallation" shall ONLY be executed upon a written site instruction.**
5. **Works classified as "committed and decommissioned" shall ONLY be executed upon a written site instruction.**

NOTE A7: ACRONYMS (SELECTIVE):
1. DB - Distribution Board
2. DC - Direct Current
3. AC - Alternating Current
4. MV - Low Voltage
5. MV - Medium Voltage
6. RMU - Ring Main Unit
7. MCB - Miniature Circuit Breaker
8. MCCB - Moulded Case Circuit Breaker
9. SWA - Steel Wire Armour
10. PVC - Polyvinyl Chloride
11. BCEW - Bare Copper Earth Wire
12. SPD - Surge Protective Device
13. PV - Photovoltaic
14. VD - Voltage Drop
15. MH - Manhole
16. HDPE - High Density Polythene
17. UG - Underground
18. BFGL - Below Finished Ground Level

WIRE SCHEDULE	TYPE	TOTAL LENGTH (m)
C1 - 35mm² 4-core PVC/PVC Cu. cable + 16mm² BCEW	AC	
C2 - 50mm² 4-core PVC/PVC Cu. cable + 25mm² BCEW	AC	
C3 - 70mm² 4-core PVC/PVC Cu. cable + 35mm² BCEW	AC	
C4 - 95mm² 4-core PVC/PVC Cu. cable + 50mm² BCEW	AC	
C5 - 120mm² 4-core PVC/PVC Cu. cable + 70mm² BCEW	AC	
C6 - 150mm² 4-core PVC/PVC Cu. cable + 95mm² BCEW	AC	
C7 - 185mm² 4-core PVC/PVC Cu. cable + 120mm² BCEW	AC	
C8 - 240mm² 4-core PVC/PVC Cu. cable + 150mm² BCEW	AC	
C9 - 300mm² 4-core PVC/PVC Cu. cable + 185mm² BCEW	AC	
D2 - 6mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D6 - 35mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D7 - 50mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D8 - 95mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D9 - 150mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
D10 - 240mm² single core class 5 PVC Cu. cable (Red+Black)	DC	
E2 - 4mm² BCEW	PE	
E3 - 6mm² BCEW	PE	
E4 - 10mm² BCEW	PE	
T1 - RS485 Connection/CAN	DATA	
T2 - Cat6 Connection	DATA	

Modules	270
DC Nameplate	149.8 kWp
AC Nameplate	150 kWp
Modules per string	18
Number of Strings	15
Azimuth	0°

LEGEND

- Miniature Substation
- Photovoltaic Solar Module
- DC Cable
- AC Cable
- HDPE Sleeve Ends
- AC Cable Joint
- Manhole as per Specification

orientation map

drawing approval

owner's signature	engineer's signature	architect's signature
name	Registration No.	Registration No.

ISSUED FOR CLIENT APPROVAL

file location — paper size: A 0

revision details

No.	DATE	DRW	CHK	DESCRIPTION
B	01.07.2025	N.D	W.H	Revised Offset
A	16.05.2025	N.D	W.H	Detailed Design

client

SOUTH AFRICAN NATIONAL SPACE AGENCY

KRUGERSDORP

principal agent

62 Van Ryneveld Ave, Pierre Van Ryneveld Pretoria, 0043

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

agent

62 Van Ryneveld Ave, Pierre Van Ryneveld Pretoria, 0043

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

discipline: ELECTRICAL
service: POWER DISTRIBUTION

project name
1 Megawatt Solar Photovoltaic Plant at SANSA Space Station Krugersdorp

proj. ref

drawing title
Site Electrical Reticulation Layout of DC/LV Power for Complete Solar PV Plant No. 3 (150kW)

project no:	12501	designed:	W.H
scale:	1:150	drawn:	N.D
date:	01 July 2025	checked:	J.D
drawing no:	12501-PV-EL04	revision:	B

S1/1/1	S1/2/1	S1/3/1	S1/4/1	S1/5/1	S1/6/1	S1/7/1	S1/8/1	S2/1/1	S2/2/1	S2/3/1	S2/4/1	S2/5/1	S2/6/1	S2/7/1	S3/1/1	S3/2/1	S3/3/1	S3/4/1	S3/5/1	S3/6/1	S3/7/1	S3/8/1	S4/1/1	S4/2/1	S4/3/1	S4/4/1	S4/5/1	S4/6/1	S4/7/1
S1/15/1	S1/14/1	S1/13/1	S1/12/1	S1/11/1	S1/10/1	S1/9/1	S2/15/1	S2/14/1	S2/13/1	S2/12/1	S2/11/1	S2/10/1	S2/9/1	S2/8/1	S3/15/1	S3/14/1	S3/13/1	S3/12/1	S3/11/1	S3/10/1	S3/9/1	S4/15/1	S4/14/1	S4/13/1	S4/12/1	S4/11/1	S4/10/1	S4/9/1	S4/8/1

TABLE 1
(2X30 Modules)

S5/1/1	S5/2/1	S5/3/1	S5/4/1	S5/5/1	S5/6/1	S5/7/1	S5/8/1	S6/1/1	S6/2/1	S6/3/1	S6/4/1	S6/5/1	S6/6/1	S6/7/1	S7/1/1	S7/2/1	S7/3/1	S7/4/1	S7/5/1	S7/6/1	S7/7/1	S7/8/1	S8/1/1	S8/2/1	S8/3/1	S8/4/1	S8/5/1	S8/6/1	S8/7/1
S5/15/1	S5/14/1	S5/13/1	S5/12/1	S5/11/1	S5/10/1	S5/9/1	S6/15/1	S6/14/1	S6/13/1	S6/12/1	S6/11/1	S6/10/1	S6/9/1	S6/8/1	S7/15/1	S7/14/1	S7/13/1	S7/12/1	S7/11/1	S7/10/1	S7/9/1	S8/15/1	S8/14/1	S8/13/1	S8/12/1	S8/11/1	S8/10/1	S8/9/1	S8/8/1

TABLE 2
(2X30 Modules)

S9/1/1	S9/2/1	S9/3/1	S9/4/1	S9/5/1	S9/6/1	S9/7/1	S9/8/1	S10/1/1	S10/2/1	S10/3/1	S10/4/1	S10/5/1	S10/6/1	S10/7/1	S11/1/1	S11/2/1	S11/3/1	S11/4/1	S11/5/1	S11/6/1	S11/7/1	S11/8/1	S12/1/1	S12/2/1	S12/3/1	S12/4/1	S12/5/1	S12/6/1	S12/7/1
S9/15/1	S9/14/1	S9/13/1	S9/12/1	S9/11/1	S9/10/1	S9/9/1	S10/15/1	S10/14/1	S10/13/1	S10/12/1	S10/11/1	S10/10/1	S10/9/1	S10/8/1	S11/15/1	S7/14/1	S11/13/1	S11/12/1	S11/11/1	S11/10/1	S11/9/1	S12/15/1	S12/14/1	S12/13/1	S12/12/1	S12/11/1	S12/10/1	S12/9/1	S12/8/1

TABLE 3
(2X30 Modules)

GENERAL NOTES:.
All measurements to be checked and controlled against the drawings on site before any work commences according to the drawings. Any irregularities and discrepancies must immediately be pointed out to the consulting engineer.
All work done should be in accordance with latest SANS standards, relevant codes and municipal by-laws.
CONTRACTOR IS ADVISED TO READ ALL THE NOTES CAREFULLY PRIOR TO COMMENCEMENT WITH WORKS.

GENERAL ELECTRICAL INSTALLATION NOTES:
1. Wiring of modules shall comply with requirements of latest SANS 10142-1, SANS1816, SANS1974.
2. The contractor shall verify conditions of the field prior to construction in order to determine conditions for cable routing, lengths, quantity of materials, space available for appliances and equipment.
3. Inverter to be equipped with built-in by-pass switch.
4. The contractor shall take own measurements of quantities for materials and lengths against the drawing.
5. No equipment shall be delivered to site without the written approval of the consulting engineer.
6. Factory acceptance test (FAT) shall be carried out as per SANS 187, with the presence of the consulting engineer or his representative and/or the personnel from local supply authority before the power equipment is released from the manufacturer.
7. On site test shall be carried out as per clause 5 of SANS 1874.
8. Contractor shall coordinate with other service providers on final location of provided equipment, final cable tray routing, and exact location of all equipment noted as "by others".
9. Any work not done to the satisfaction of the consulting engineer shall be remedied and to the Contractor's account.
10. MC4 connectors shall be connected out by personnel who are certified to do so.
11. Should there be a need to reinstall any part of a circuit, the contractor shall issue details of that particular section including a wiring diagram.
12. An investigation shall be carried out to determine the cause of a defect prior to the work being undertaken.
13. All power circuits to appliances shall be tested and commissioned including the respective switchgear. Such tests shall be conducted in the presence of the Consulting Engineer or his representative and test results shall be submitted to his office within 3 calendar days.
14. Contractor to supply all documentation relating to the major power equipment including wiring diagrams.
15. The Contractor shall make arrangements for training at least one qualified member of staff on the use, operation and maintenance of the electrical installation.
16. Equipment shall be housed in a shipping container. Container shall be fully air-conditioned and ventilated.

NOTE A3: ANNOTATIONS:
1. None.

NOTE A4: NOTES PERTAINING REVISIONS TO THIS DRAWING:
1. See clouded area.

NOTE A5: APPLICABLE SPECIFICATIONS (OBTAINABLE FROM CONSULTING ENGINEER'S OFFICE):
1. Standard Quality Specification for general electrical installations.
2. Standard Quality Specification for Electrical Material and Equipment.
3. Detailed Specification for Electrical Installations

NOTE A6: DISCLAIMER:
1. The lines connecting devices shown on this drawing shall not be construed as exact cable routes between source and devices/appliances. These are tentative and it is the responsibility of the contractor to provide the most effective and efficient routes in accordance with regulations and industry best practices.
2. The contractor will be required to indicate all cable routes on the "as-built" drawings.
3. This drawing is limited in scope to specific components of a complete system and is thus a single line representation of the system.
4. **Works classified as "removal and reinstallation" shall ONLY be executed upon a written site instruction.**
5. **Works classified as "committed and decommissioned" shall ONLY be executed upon a written site instruction.**

NOTE A7: ACRONYMS (SELECTIVE):
1. DB - Distribution Board
2. DC - Direct Current
3. AC - Alternating Current
4. MV - Low Voltage
5. MV - Medium Voltage
6. RMU - Ring Main Unit
7. MCB - Miniature Circuit Breaker
8. MCCB - Moulded Case Circuit Breaker
9. SWA - Steel Wire Armour
10. PVC - Polyvinyl Chloride
11. BCEW - Bare Copper Earth Wire
12. SPD - Surge Protective Device
13. PV - Photovoltaic

CIRCUIT NUMBER REPRESENTATION:

S1/1/1 — S1 [String No. 1]/1 or P1 [Module No. 1]/1 [Inverter 1]

String Parameters:
S1: 631.65 V, 8.33kW, 13.18A
S2: 631.65 V, 8.33kW, 13.18A
S3: 631.65 V, 8.33kW, 13.18A
S4: 631.65 V, 8.33kW, 13.18A
S5: 631.65 V, 8.33kW, 13.18A
S6: 631.65 V, 8.33kW, 13.18A
S7: 631.65 V, 8.33kW, 13.18A
S8: 631.65 V, 8.33kW, 13.18A
S9: 631.65 V, 8.33kW, 13.18A
S10: 631.65 V, 8.33kW, 13.18A
S11: 631.65 V, 8.33kW, 13.18A
S12: 631.65 V, 8.33kW, 13.18A

LEGEND

Photovoltaic Solar Panel

orientation map

drawing approval

owner's signature | engineer's signature | architect's signature

name | Registration No. | Registration No.

ISSUED FOR CLIENT APPROVAL

file location | paper size: A 1

revision details

No.	DATE	DRW	CHK	DESCRIPTION
A	16.05.2025	N.D	W.H	Detailed Design

client

SOUTH AFRICAN NATIONAL SPACE AGENCY

KRUGERSDORP

principal agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

discipline: ELECTRICAL
service: POWER DISTRIBUTION

project name
1 Megawatt Solar Photovoltaic Plant at SANSA Space Station Krugersdorp

proj. ref

drawing title
Module Stringing Arrangement for Inverter 1

project no:	12501	designed:	W.H
scale:	NTS	drawn:	N.D
date:	16 May 2025	checked:	J.D
drawing no:	12501-PV-AV05	revision:	A

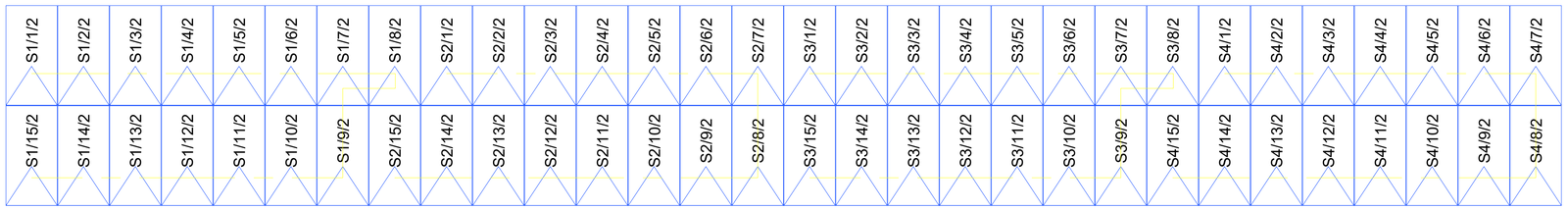


TABLE 4
(2X30 Modules)

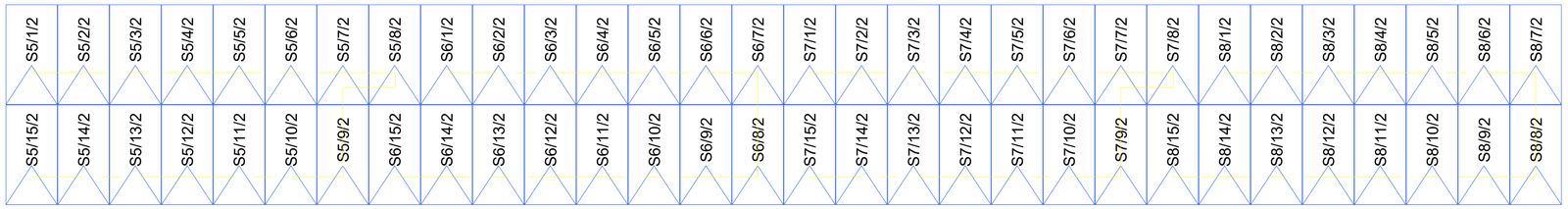


TABLE 5
(2X30 Modules)

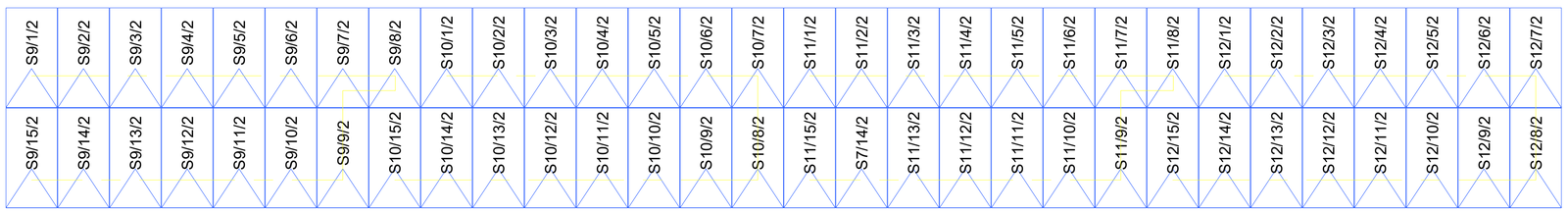


TABLE 6
(2X30 Modules)

GENERAL NOTES:.
All measurements to be checked and controlled against the drawings on site before any work commences according to the drawings. Any irregularities and discrepancies must immediately be pointed out to the consulting engineer.
All work done should be in accordance with latest SANS standards, relevant codes and municipal by-laws.
CONTRACTOR IS ADVISED TO READ ALL THE NOTES CAREFULLY PRIOR TO COMMENCEMENT WITH WORKS.

GENERAL ELECTRICAL INSTALLATION NOTES:
1. Wiring of modules shall comply with requirements of latest SANS 10142-1, SANS1816, SANS1974.
2. The contractor shall verify conditions of the field prior to construction in order to determine conditions for cable routing, lengths, quantity of materials, space available for appliances and equipment.
3. Inverter to be equipped with built-in by-pass switch.
4. The contractor shall take own measurements of quantities for materials and lengths against the drawing.
5. No equipment shall be delivered to site without the written approval of the consulting engineer.
6. Factory acceptance test (FAT) shall be carried out as per SANS 187, with the presence of the consulting engineer or his representative and/or the personnel from local supply authority before the power equipment is released from the manufacturer.
7. On site test shall be carried out as per clause 5 of SANS 1874.
8. Contractor shall coordinate with other service providers on final location of provided equipment, final cable tray routing, and exact location of all equipment noted as "by others".
9. Any work not done to the satisfaction of the consulting engineer shall be remedied and to the Contractor's account.
10. MC4 connectors shall be connected out by personnel who are certified to do so.
11. Should there be a need to reinstall any part of a circuit, the contractor shall issue details of that particular section including a wiring diagram.
12. An investigation shall be carried out to determine the cause of a defect prior to the work being undertaken.
13. All power circuits to appliances shall be tested and commissioned including the respective switchgear. Such tests shall be conducted in the presence of the Consulting Engineer or his representative and test results shall be submitted to his office within 3 calendar days.
14. Contractor to supply all documentation relating to the major power equipment including wiring diagrams.
15. The Contractor shall make arrangements for training at least one qualified member of staff on the use, operation and maintenance of the electrical installation.
16. Equipment shall be housed in a shipping container. Container shall be fully air-conditioned and ventilated.

NOTE A3: ANNOTATIONS:
1. None.

NOTE A4: NOTES PERTAINING REVISIONS TO THIS DRAWING:
1. See clouded area.

NOTE A5: APPLICABLE SPECIFICATIONS (OBTAINABLE FROM CONSULTING ENGINEER'S OFFICE):
1. Standard Quality Specification for general electrical installations.
2. Standard Quality Specification for Electrical Material and Equipment.
3. Detailed Specification for Electrical Installations

NOTE A6: DISCLAIMER:
1. The lines connecting devices shown on this drawing shall not be construed as exact cable routes between source and devices/appliances. These are tentative and it is the responsibility of the contractor to provide the most effective and efficient routes in accordance with regulations and industry best practices.
2. The contractor will be required to indicate all cable routes on the "as-built" drawings.
3. This drawing is limited in scope to specific components of a complete system and is thus a single line representation of the system.
4. **Works classified as "removal and reinstallation" shall ONLY be executed upon a written site instruction.**
5. **Works classified as "ommitted and decommissioned" shall ONLY be executed upon a written site instruction.**

NOTE A7: ACRONYMS (SELECTIVE):
1. DB - Distribution Board
2. DC - Direct Current
3. AC - Alternating Current
4. MV - Low Voltage
5. MV - Medium Voltage
6. RMU - Ring Main Unit
7. MCB - Miniature Circuit Breaker
8. MCCB - Moulded Case Circuit Breaker
9. SWA - Steel Wire Armour
10. PVC - Polyvinyl Chloride
11. BCEW - Bare Copper Earth Wire
12. SPD - Surge Protective Device
13. PV - Photovoltaic

CIRCUIT NUMBER REPRESENTATION:

S1/1/1 S1 [String No. 1]/1 or P1 [Module No. 1]/1 [Inverter 1]

String Parameters:
S1: 631.65 V, 8.33kW, 13.18A
S2: 631.65 V, 8.33kW, 13.18A
S3: 631.65 V, 8.33kW, 13.18A
S4: 631.65 V, 8.33kW, 13.18A
S5: 631.65 V, 8.33kW, 13.18A
S6: 631.65 V, 8.33kW, 13.18A
S7: 631.65 V, 8.33kW, 13.18A
S8: 631.65 V, 8.33kW, 13.18A
S9: 631.65 V, 8.33kW, 13.18A
S10: 631.65 V, 8.33kW, 13.18A
S11: 631.65 V, 8.33kW, 13.18A
S12: 631.65 V, 8.33kW, 13.18A

LEGEND

Photovoltaic Solar Panel

orientation map

drawing approval

owner's signature | engineer's signature | architect's signature

name | Registration No. | Registration No.

ISSUED FOR CLIENT APPROVAL

file location | paper size: A 1

revision details

No.	DATE	DRW	CHK	DESCRIPTION
A	16.05.2025	N.D	W.H	Detailed Design

client

SOUTH AFRICAN NATIONAL SPACE AGENCY

KRUGERSDORP

principal agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

discipline: ELECTRICAL
service: POWER DISTRIBUTION

project name
1 Megawatt Solar Photovoltaic Plant at SANSA Space Station Krugersdorp

proj. ref

drawing title
Module Stringing Arrangement for Inverter 2

project no:	12501	designed:	W.H
scale:	NTS	drawn:	N.D
date:	16 May 2025	checked:	J.D
drawing no:	12501-PV-AV06	revision:	A

S1/1/3	S1/2/3	S1/3/3	S1/4/3	S1/5/3	S1/6/3	S1/7/3	S1/8/3	S1/9/3	S2/1/3	S2/2/3	S2/3/3	S2/4/3	S2/5/3	S2/6/3	S2/7/3	S2/8/3	S2/9/3	S3/1/3	S3/2/3	S3/3/3	S3/4/3	S3/5/3	S3/6/3	S3/7/3	S3/8/3	S3/9/3
S1/18/3	S1/17/3	S1/16/3	S1/15/3	S1/14/3	S1/13/3	S1/12/3	S1/11/3	S1/10/3	S2/18/3	S2/17/3	S2/16/3	S2/15/3	S2/14/3	S2/13/3	S2/12/3	S2/11/3	S2/10/3	S3/18/3	S3/17/3	S3/16/3	S3/15/3	S3/14/3	S3/13/3	S3/12/3	S3/11/3	S3/10/3

TABLE 7
(2X27 Modules)

S4/1/3	S4/2/3	S4/3/3	S4/4/3	S4/5/3	S4/6/3	S4/7/3	S4/8/3	S4/9/3	S5/1/3	S5/2/3	S5/3/3	S5/4/3	S5/5/3	S5/6/3	S5/7/3	S5/8/3	S5/9/3	S6/1/3	S6/2/3	S6/3/3	S6/4/3	S6/5/3	S6/6/3	S6/7/3	S6/8/3	S6/9/3
S4/18/3	S4/17/3	S4/16/3	S4/15/3	S4/14/3	S4/13/3	S4/12/3	S4/11/3	S4/10/3	S5/18/3	S5/17/3	S5/16/3	S5/15/3	S5/14/3	S5/13/3	S5/12/3	S5/11/3	S5/10/3	S6/18/3	S6/17/3	S6/16/3	S6/15/3	S6/14/3	S6/13/3	S6/12/3	S6/11/3	S6/10/3

TABLE 8
(2X27 Modules)

S7/1/3	S7/2/3	S7/3/3	S7/4/3	S7/5/3	S7/6/3	S7/7/3	S7/8/3	S7/9/3	S8/1/3	S8/2/3	S8/3/3	S8/4/3	S8/5/3	S8/6/3	S8/7/3	S8/8/3	S8/9/3	S9/1/3	S9/2/3	S9/3/3	S9/4/3	S9/5/3	S9/6/3	S9/7/3	S9/8/3	S9/9/3
S7/18/3	S7/17/3	S7/16/3	S7/15/3	S7/14/3	S7/13/3	S7/12/3	S7/11/3	S7/10/3	S8/18/3	S8/17/3	S8/16/3	S8/15/3	S8/14/3	S8/13/3	S8/12/3	S8/11/3	S8/10/3	S9/18/3	S9/17/3	S9/16/3	S9/15/3	S9/14/3	S9/13/3	S9/12/3	S9/11/3	S9/10/3

TABLE 9
(2X27 Modules)

S10/1/3	S10/2/3	S10/3/3	S10/4/3	S10/5/3	S10/6/3	S10/7/3	S10/8/3	S10/9/3	S11/1/3	S11/2/3	S11/3/3	S11/4/3	S11/5/3	S11/6/3	S11/7/3	S11/8/3	S11/9/3	S12/1/3	S12/2/3	S12/3/3	S12/4/3	S12/5/3	S12/6/3	S12/7/3	S12/8/3	S12/9/3
S10/18/3	S10/17/3	S10/16/3	S10/15/3	S10/14/3	S10/13/3	S10/12/3	S10/11/3	S10/10/3	S11/18/3	S11/17/3	S11/16/3	S11/15/3	S11/14/3	S11/13/3	S11/12/3	S11/11/3	S11/10/3	S12/18/3	S12/17/3	S12/16/3	S12/15/3	S12/14/3	S12/13/3	S12/12/3	S12/11/3	S12/10/3

TABLE 10
(2X27 Modules)

S13/1/3	S13/2/3	S13/3/3	S13/4/3	S13/5/3	S13/6/3	S13/7/3	S13/8/3	S13/9/3	S14/1/3	S14/2/3	S14/3/3	S14/4/3	S14/5/3	S14/6/3	S14/7/3	S14/8/3	S14/9/3	S15/1/3	S15/2/3	S15/3/3	S15/4/3	S15/5/3	S15/6/3	S15/7/3	S15/8/3	S15/9/3
S13/18/3	S13/17/3	S13/16/3	S13/15/3	S13/14/3	S13/13/3	S13/12/3	S13/11/3	S13/10/3	S14/18/3	S14/17/3	S14/16/3	S14/15/3	S14/14/3	S14/13/3	S14/12/3	S14/11/3	S14/10/3	S15/18/3	S15/17/3	S15/16/3	S15/15/3	S15/14/3	S15/13/3	S15/12/3	S15/11/3	S15/10/3

TABLE 11
(2X27 Modules)

GENERAL NOTES:.
All measurements to be checked and controlled against the drawings on site before any work commences according to the drawings. Any irregularities and discrepancies must immediately be pointed out to the consulting engineer.
All work done should be in accordance with latest SANS standards, relevant codes and municipal by-laws.
CONTRACTOR IS ADVISED TO READ ALL THE NOTES CAREFULLY PRIOR TO COMMENCEMENT WITH WORKS.

GENERAL ELECTRICAL INSTALLATION NOTES:
1. Wiring of modules shall comply with requirements of latest SANS 10142-1, SANS1816, SANS1974.
2. The contractor shall verify conditions of the field prior to construction in order to determine conditions for cable routing, lengths, quantity of materials, space available for appliances and equipment.
3. Inverter to be equipped with built-in by-pass switch.
4. The contractor shall take own measurements of quantities for materials and lengths against the drawing.
5. No equipment shall be delivered to site without the written approval of the consulting engineer.
6. Factory acceptance test (FAT) shall be carried out as per SANS 187, with the presence of the consulting engineer or his representative and/or the personnel from local supply authority before the power equipment is released from the manufacturer.
7. On site test shall be carried out as per clause 5 of SANS 1874.
8. Contractor shall coordinate with other service providers on final location of provided equipment, final cable tray routing, and exact location of all equipment noted as "by others".
9. Any work not done to the satisfaction of the consulting engineer shall be remedied and to the Contractor's account.
10. MC4 connectors shall be connected out by personnel who are certified to do so.
11. Should there be a need to reinstall any part of a circuit, the contractor shall issue details of that particular section including a wiring diagram.
12. An investigation shall be carried out to determine the cause of a defect prior to the work being undertaken.
13. All power circuits to appliances shall be tested and commissioned including the respective switchgear. Such tests shall be conducted in the presence of the Consulting Engineer or his representative and test results shall be submitted to his office within 3 calendar days.
14. Contractor to supply all documentation relating to the major power equipment including wiring diagrams.
15. The Contractor shall make arrangements for training at least one qualified member of staff on the use, operation and maintenance of the electrical installation.
16. Equipment shall be housed in a shipping container. Container shall be fully air-conditioned and ventilated.

NOTE A3: ANNOTATIONS:
1. None.

NOTE A4: NOTES PERTAINING REVISIONS TO THIS DRAWING:
1. See clouded area.

NOTE A5: APPLICABLE SPECIFICATIONS (OBTAINABLE FROM CONSULTING ENGINEER'S OFFICE):
1. Standard Quality Specification for general electrical installations.
2. Standard Quality Specification for Electrical Material and Equipment.
3. Detailed Specification for Electrical Installations

NOTE A6: DISCLAIMER:
1. The lines connecting devices shown on this drawing shall not be construed as exact cable routes between source and devices/appliances. These are tentative and it is the responsibility of the contractor to provide the most effective and efficient routes in accordance with regulations and industry best practices.
2. The contractor will be required to indicate all cable routes on the "as-built" drawings.
3. This drawing is limited in scope to specific components of a complete system and is thus a single line representation of the system.
4. **Works classified as "removal and reinstallation" shall ONLY be executed upon a written site instruction.**
5. **Works classified as "committed and decommissioned" shall ONLY be executed upon a written site instruction.**

NOTE A7: ACRONYMS (SELECTIVE):
1. DB - Distribution Board
2. DC - Direct Current
3. AC - Alternating Current
4. MV - Low Voltage
5. MV - Medium Voltage
6. RMU - Ring Main Unit
7. MCB - Miniature Circuit Breaker
8. MCCB - Moulded Case Circuit Breaker
9. SWA - Steel Wire Armour
10. PVC - Polyvinyl Chloride
11. BCEW - Bare Copper Earth Wire
12. SPD - Surge Protective Device
13. PV - Photovoltaic

CIRCUIT NUMBER REPRESENTATION:

S1/1/1 S1 [String No. 1]/1 or P1 [Module No. 1]/1 [Inverter 1]

String Parameters:
S1: 757.98 V, 9.99kW, 13.18A
S2: 757.98 V, 9.99kW, 13.18A
S3: 757.98 V, 9.99kW, 13.18A
S4: 757.98 V, 9.99kW, 13.18A
S5: 757.98 V, 9.99kW, 13.18A
S6: 757.98 V, 9.99kW, 13.18A
S7: 757.98 V, 9.99kW, 13.18A
S8: 757.98 V, 9.99kW, 13.18A
S9: 757.98 V, 9.99kW, 13.18A
S10: 757.98 V, 9.99kW, 13.18A
S11: 757.98 V, 9.99kW, 13.18A
S12: 757.98 V, 9.99kW, 13.18A
S13: 757.98 V, 9.99kW, 13.18A
S14: 757.98 V, 9.99kW, 13.18A
S15: 757.98 V, 9.99kW, 13.18A

LEGEND

Photovoltaic Solar Panel

orientation map

drawing approval

owner's signature | engineer's signature | architect's signature

name | Registration No. | Registration No.

ISSUED FOR CLIENT APPROVAL

file location | paper size A 1

revision details

No.	DATE	DRW	CHK	DESCRIPTION
A	16.05.2025	N.D	W.H	Detailed Design

client

SOUTH AFRICAN NATIONAL SPACE AGENCY

KRUGERSDORP

principal agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

agent

62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045

Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com

KHULANDLE CONSULTING ENGINEERS SA CC

discipline: ELECTRICAL
service: POWER DISTRIBUTION

project name
1 Megawatt Solar Photovoltaic Plant at SANSA Space Station Krugersdorp

proj. ref

drawing title
Module Stringing Arrangement for Inverter 3

project no:	12501	designed:	W.H
scale:	NTS	drawn:	N.D
date:	16 May 2025	checked:	J.D
drawing no:	12501-PV-AV07	revision:	A

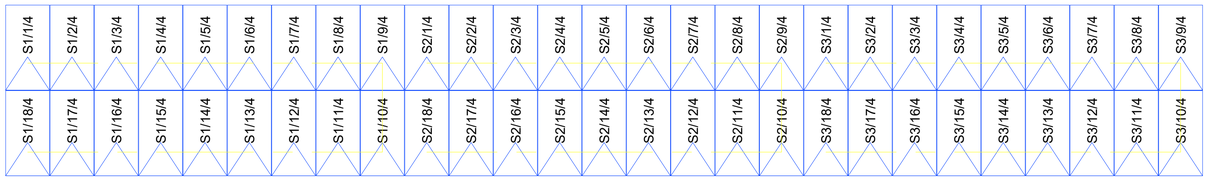


TABLE 12
(2X27 Modules)

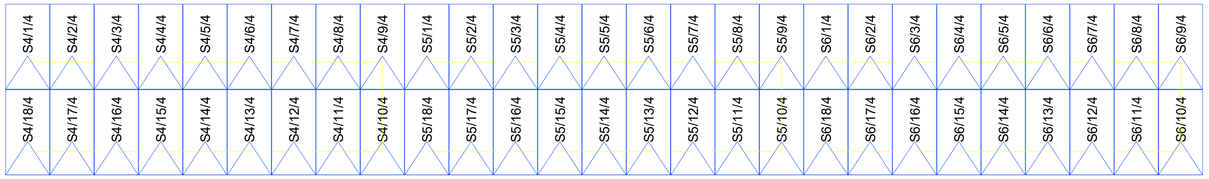


TABLE 13
(2X27 Modules)

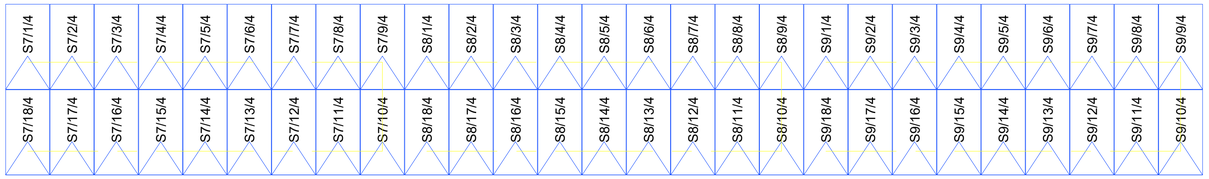


TABLE 14
(2X27 Modules)

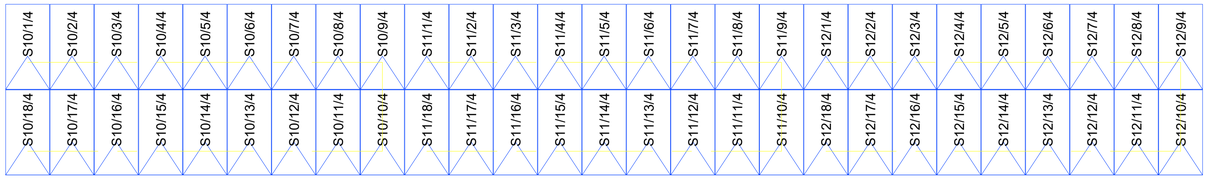


TABLE 15
(2X27 Modules)

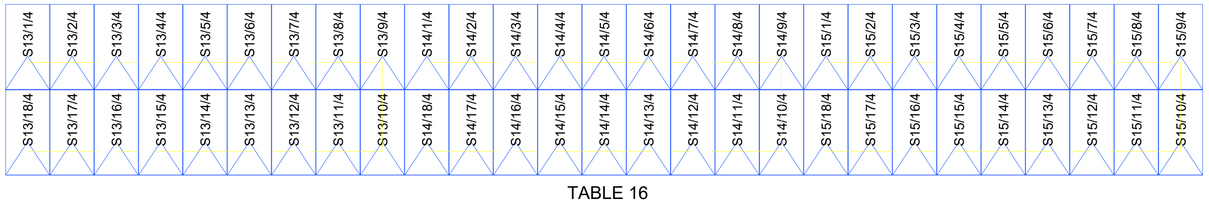


TABLE 16
(2X27 Modules)

GENERAL NOTES:.
All measurements to be checked and controlled against the drawings on site before any work commences according to the drawings. Any irregularities and discrepancies must immediately be pointed out to the consulting engineer.
All work done should be in accordance with latest SANS standards, relevant codes and municipal by-laws.
CONTRACTOR IS ADVISED TO READ ALL THE NOTES CAREFULLY PRIOR TO COMMENCEMENT WITH WORKS.

GENERAL ELECTRICAL INSTALLATION NOTES:
1. Wiring of modules shall comply with requirements of latest SANS 10142-1, SANS1816, SANS1974.
2. The contractor shall verify conditions of the field prior to construction in order to determine conditions for cable routing, lengths, quantity of materials, space available for appliances and equipment.
3. Inverter to be equipped with built-in by-pass switch.
4. The contractor shall take own measurements of quantities for materials and lengths against the drawing.
5. No equipment shall be delivered to site without the written approval of the consulting engineer.
6. Factory acceptance test (FAT) shall be carried out as per SANS 187, with the presence of the consulting engineer or his representative and/or the personnel from local supply authority before the power equipment is released from the manufacturer.
7. On site test shall be carried out as per clause 5 of SANS 1874.
8. Contractor shall coordinate with other service providers on final location of provided equipment, final cable tray routing, and exact location of all equipment noted as "by others".
9. Any work not done to the satisfaction of the consulting engineer shall be remedied and to the Contractor's account.
10. MC4 connectors shall be connected out by personnel who are certified to do so.
11. Should there be a need to reinstall any part of a circuit, the contractor shall issue details of that particular section including a wiring diagram.
12. An investigation shall be carried out to determine the cause of a defect prior to the work being undertaken.
13. All power circuits to appliances shall be tested and commissioned including the respective switchgear. Such tests shall be conducted in the presence of the Consulting Engineer or his representative and test results shall be submitted to his office within 3 calendar days.
14. Contractor to supply all documentation relating to the major power equipment including wiring diagrams.
15. The Contractor shall make arrangements for training at least one qualified member of staff on the use, operation and maintenance of the electrical installation.
16. Equipment shall be housed in a shipping container. Container shall be fully air-conditioned and ventilated.

NOTE A3: ANNOTATIONS:
1. None.

NOTE A4: NOTES PERTAINING REVISIONS TO THIS DRAWING:
1. See clouded area.

NOTE A5: APPLICABLE SPECIFICATIONS (OBTAINABLE FROM CONSULTING ENGINEER'S OFFICE):
1. Standard Quality Specification for general electrical installations.
2. Standard Quality Specification for Electrical Material and Equipment.
3. Detailed Specification for Electrical Installations

NOTE A6: DISCLAIMER:
1. The lines connecting devices shown on this drawing shall not be construed as exact cable routes between source and devices/appliances. These are tentative and it is the responsibility of the contractor to provide the most effective and efficient routes in accordance with regulations and industry best practices.
2. The contractor will be required to indicate all cable routes on the "as-built" drawings.
3. This drawing is limited in scope to specific components of a complete system and is thus a single line representation of the system.
4. **Works classified as "removal and reinstallation" shall ONLY be executed upon a written site instruction.**
5. **Works classified as "ommitted and decommissioned" shall ONLY be executed upon a written site instruction.**

NOTE A7: ACRONYMS (SELECTIVE):
1. DB - Distribution Board
2. DC - Direct Current
3. AC - Alternating Current
4. MV - Low Voltage
5. MV - Medium Voltage
6. RMU - Ring Main Unit
7. MCB - Miniature Circuit Breaker
8. MCCB - Moulded Case Circuit Breaker
9. SWA - Steel Wire Armour
10. PVC - Polyvinyl Chloride
11. BCEW - Bare Copper Earth Wire
12. SPD - Surge Protective Device
13. PV - Photovoltaic

CIRCUIT NUMBER REPRESENTATION:

S1\P1 S1 [String No. 1]\1 or P1 [Module No. 1]\1 [Inverter 1]

String Parameters:
S1: 757.98 V, 9.99kW, 13.18A
S2: 757.98 V, 9.99kW, 13.18A
S3: 757.98 V, 9.99kW, 13.18A
S4: 757.98 V, 9.99kW, 13.18A
S5: 757.98 V, 9.99kW, 13.18A
S6: 757.98 V, 9.99kW, 13.18A
S7: 757.98 V, 9.99kW, 13.18A
S8: 757.98 V, 9.99kW, 13.18A
S9: 757.98 V, 9.99kW, 13.18A
S10: 757.98 V, 9.99kW, 13.18A
S11: 757.98 V, 9.99kW, 13.18A
S12: 757.98 V, 9.99kW, 13.18A
S13: 757.98 V, 9.99kW, 13.18A
S14: 757.98 V, 9.99kW, 13.18A
S15: 757.98 V, 9.99kW, 13.18A

LEGEND

Photovoltaic Solar Panel

orientation map

drawing approval

owner's signature	engineer's signature	architect's signature
name	Registration No.	Registration No.

ISSUED FOR CLIENT APPROVAL

file location — paper size: A 1

revision details

No.	DATE	DRW	CHK	DESCRIPTION
A	16.05.2025	N.D	W.H	Detailed Design

client
SOUTH AFRICAN NATIONAL SPACE AGENCY
KRUGERSDORP

principal agent
62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045
Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com
KHULANDLE CONSULTING ENGINEERS SA CC

agent
62 Van Ryneveld Ave., Pierre Van Ryneveld Pretoria, 0045
Telefax: (012) 662 3611
e-mail: admin@khulacon.com
website: www.khulacon.com
KHULANDLE CONSULTING ENGINEERS SA CC

discipline: ELECTRICAL
service: POWER DISTRIBUTION

project name
1 Megawatt Solar Photovoltaic Plant at SANSA Space Station Krugersdorp

proj. ref

drawing title
Module Stringing Arrangement for Inverter 4

project no:	12501	designed:	W.H
scale:	NTS	drawn:	N.D
date:	16 May 2025	checked:	J.D
drawing no:	12501-PV-AV08	revision:	A