



FINAL ACCEPTANCE AND COMPLIANCE TESTS SOLAR PV SYSTEMS NAMIBIA S4H GP 600497

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|--|--|
| Site Name or ID: Eiseb Health Clinic | Inspection date: 13.12.2017 |
| GSOL Representative: Mr. Oscar Ditlevsen | Note: Off-Grid System |

FAC Test Description:

- The main objective of the Final Acceptance Test is to assure the purchaser that all the components of the System are installed in right quantity, and the System met the relevant requirements.
- The Final Acceptance Test is successfully performed when the FAC requirements for a system included in the relevant purchase order are met, the FAC are performed successfully and no severity level 1(service affecting) or no severity level 2 (non-service affecting) defects remain in the system.
- The punch list shall list all defects ranked as severity level 1 or 2 defects identified during the respective final acceptance test, if any. All level 1 defects shall be remedied by contractor prior to final acceptance. All level 2 defects can be remedied by contractor during 4 weeks after signing FAC.

Severity Level 1 Defects:

Severity Level 1 defects or service affecting defects are all defects that can contribute to FAC failure.

Severity Level 2 Defects:

Severity Level 2 defects or non-service affecting defects are all defects that cannot contribute to FAC failure and should be marked on the document for clearance after the FAC visit. After FAC all severity level 2 defects should be cleared during 4 weeks. The same punch/snag list should be used to verify that all snags identified at FAC are cleared.

Severity Level 1 Defects List:

- Power System not operational (system not supplying power to equipment)
- Power System functioning but not functioning in battery mode.
- Solar chargers not functioning (not supplying DC to the battery or some modules not operational)
- Inverters not functioning (not supplying AC load or some modules not operational)
- Mains mode not functional (not supplying AC load when mains is available, PV panels disconnected and battery discharged)
- Batteries not functional.
- PV panels not functional.
- Delivery not complete.

Severity Level 2 Defects List:

- All other snags identified on site as per the table on page 3.



| BILL OF QUANTITY / COMPONENT | PART NUMBER | QUANTITY | CHECKED (GSOL) | APPROVED (CUSTOMER) |
|--|---------------|----------|----------------|---------------------|
| Victron Quattro 48/8k/110-100/100 | QUA488020000 | 1 | X | ✓ |
| Victron SmartSolar MPPT 250//100-TR | SCC125110210 | 1 | X | ✓ |
| Victron Lynx Distributor | LYN060102000 | 1 | X | ✓ |
| Victron Lynx Power In | LYN020102000 | 1 | X | ✓ |
| Victron Lynx Shunt VE.Can | LYN040102100 | 1 | X | ✓ |
| Victron Color Control GX | BPP000300100R | 1 | X | ✓ |
| BAE Cell 6 PVV 900 PPOL horizontal batteries | 2089017 | 24 | X | ✓ |
| EGing Solar 250Watt Poly, Alu panel | 02250P05 | 24 | X | ✓ |
| Circuit breaker B 16A 1 pole | 2622758039 | 2 | X | ✓ |
| Circuit breaker C 32A 1 pole | 2122721414 | 2 | X | ✓ |
| Outdoor cabinet for batteries and inverter w/cooling | SBC-DK | 1 | X | ✓ |



| SEVERITY LEVEL 1 SNAGS – SERVICE AFFECTING SNAGS: | PASS | FAIL | CLEARED |
|---|------|------|---------|
| Power System operational? Supplying power to equipment | X | | ✓ |
| Power System tested in hybrid mode, stable in all modes: generator/mains, solar and battery (not related to generator issues) | X | | ✓ |
| All Solar chargers functional? Charging batteries when solar energy available. | X | | ✓ |
| All Inverters functional? Supplying load to AC equipment. | X | | ✓ |
| All Solar panels functional? | X | | ✓ |
| Battery operation to be verified? | X | | ✓ |
| Delivery complete? | X | | ✓ |
| SEVERITY LEVEL 2 SNAGS –NON - SERVICE AFFECTING SNAGS: | PASS | FAIL | CLEARED |
| Installation is as per agreed layout design. | X | | ✓ |
| The visual inspection of equipment is free from any damage. | X | | ✓ |
| All connections (cabling and coopers) correct gauge and securely terminated. | X | | ✓ |
| Solar structure properly mounted on the roof or ground. | X | | ✓ |
| All solar panels firmly fixed on roof or ground structure. | X | | ✓ |
| All equipment labeled. | X | | ✓ |
| No alarms present on power system. | X | | ✓ |
| System log files to be verified. | X | | ✓ |
| System Voltage Calibration and readings to be checked & verified. | X | | ✓ |
| Load & Battery Current Calibration to be checked & verified | X | | ✓ |
| Battery Breaker to be tested & verified. | X | | ✓ |
| Load Breakers to be tested & verified. | X | | ✓ |
| Battery rack properly installed | X | | ✓ |
| Batteries free from damages and acid leakages properly installed on rack. | X | | ✓ |
| Check earth connections to Power system and Solar panels | X | | ✓ |
| Staff training performed. | X | | ✓ |



| DESCRIPTION | VALUE | COMMENTS |
|--|---------|--|
| Min. AC Load during FAC visit: | 0,08 kW | Nurse House |
| Max. AC Load during FAC visit: | 0,8 kW | All Clinic lights + Cabinet cooling active |
| Current from Solar chargers: | 60A | Can go from 0 to 100A |
| Battery voltage: | 56,7V | |
| Generator Rating: | N/A | No grid or genset present. |
| Equipment Room Temperature at FAC visit: | 30 °C | Cabinet set to 26 °C |
| Battery voltage to switch on Mains: | 49V | No mains active |
| AC Current available from mains: | 32A | Limited by programming and breaker |

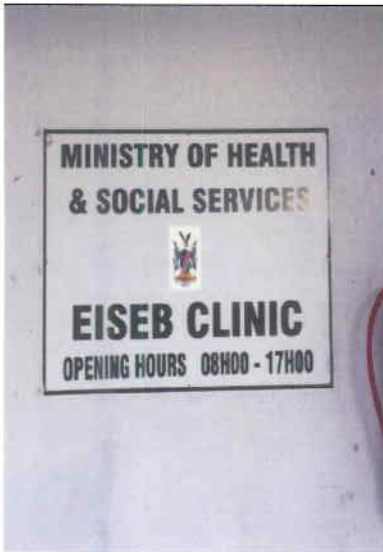
| SNAGS LIST – TO BE CLEARED | RESPONSIBLE | CLEARED |
|---|-------------|---------|
| Installation Complete – no pending installation related action. | | |
| | | |
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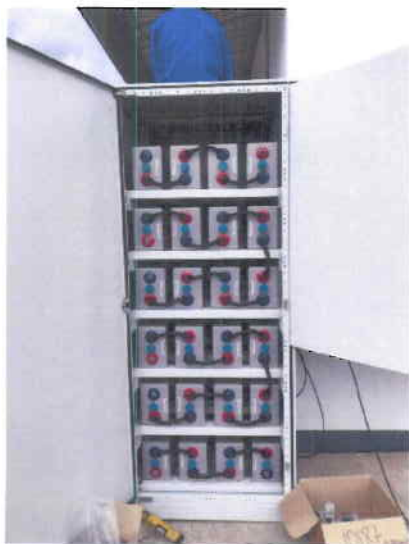
FAC Signatures/Approval:

| FAC APPROVED BY: | Name: | Signature: |
|-------------------------|-------------------|------------|
| Site Representative | IBRAHIM K. AAHEKE | |
| GSOL Representative | Oscar Ditlevsen | |
| UNDP Representative | Marian Lopez | |
| UNDP/PSU Representative | Blessing Kabasa | |



Annexes







System Test Report

1. General Data

Project Nr.: 10265
Customer: UNDP (GP600497 Namibia)
System ID: 2017MP100062
Q.C. Passed: [X] Yes [] No
Signature: [Handwritten Signature]

GSOL ENERGY GLOBAL A/S



2017MP100062

www.gsolenergy.com

2. System information

Inverter: No. of Inverters: 1, Voltage (L-N): 230 VAC, Inverter type & size: V. Quattro 8kVA, DC Cable dimension: 25 mm2, AC-Out Cable dim.: 2x6 mm2, AC-In Cable dim.: 2x6 mm2, Max DC Amp: 210, Firmware version: 2653-413, Charger type: MPPT 250/100-TR, DC fuse: 125A, DC OVP DENHguard, Max AC Amp /phase: 34, AC OVP - out, Lynx Ve.Can, Max DC Amp: 32A, Clusters: 1, Ah per cluster: 729 C10, Inverter type & size: 729 C10, Grid Feedback allowed: [] Yes [X] No, Existing Grounding rod: [] Existing Grounding rod, Cable dim.: 6 mm2, Monitor ID: f45eab69603

3. System testing - installation

Fixation: [X] All elements firmly installed, [X] Bolts used at: INVERTER
Cabling: [X] Cables laid with respect to bending radius (max 5 x diameter) and orientation, [X] Cable fixators at every 30 cm max
Marking: Cable polarity marked: [X] Red/Black, [] Cable marking system, [X] AC-in / AC-out marked, [X] Battery connection marked, LABEL RED/BLACK

4. System testing - Function

Inverter: [X] All lights showing Normal operation, AC test level: 2000 W, [X] Listed system voltage and phase verified
Inverter Program: [X] UPS / Prioritise Grid, Voltage (L-N): 230 VAC, [] Custom trigger for cyclic operation, AC-In Power trigger lvl: W, Battery trigger lvl: Udc, AC-In Power block lvl: W, Battery block lvl: Udc, [X] Trigger parameters verified, [] PV inverter Frequency shifting, Grid Feedback activated?: [X] No, [] Yes from Chargers, [] Yes from PV Inverters
NOTES: System tested with 500Wp per charger

System charging: [X] By Chargers, [X] By Grid/Genset, [] By PV inverter
Safety: Battery Breaker functional: [X] Yes, [] No
System Grounding: [X] Grounding ok
Monitor: Color Monitor: [X] All devises showing, [] Activated on Web-portal, [X] Two-way com enabled, Battery Monitor: [X] Battery Ah set

5. Comments / Written notes



FINAL ACCEPTANCE AND COMPLIANCE TESTS SOLAR PV SYSTEMS NAMIBIA S4H GP 600497

| | |
|---|--|
| Site Name or ID: Klein Aub Clinic | Inspection date: 10.01.2017 |
| GSOL Representative: Mr. Heinrich Steuber | Note: Grid connected System (public power) |

FAC Test Description:

- The main objective of the Final Acceptance Test is to assure the purchaser that all the components of the System are installed in right quantity, and the System met the relevant requirements.
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- Batteries not functional.
- PV panels not functional.
- Delivery not complete.

Severity Level 2 Defects List:

- All other snags identified on site as per the table on page 3.



| BILL OF QUANTITY / COMPONENT | PART NUMBER | QUANTITY | CHECKED (GSOL) | APPROVED (CUSTOMER) |
|--|---------------|----------|----------------|---------------------|
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| Victron SmartSolar MPPT 250//100-TR | SCC125110210 | 1 | ✓ | ✓ |
| Victron Lynx Distributor | LYN060102000 | 1 | ✓ | ✓ |
| Victron Lynx Power In | LYN020102000 | 1 | ✓ | ✓ |
| Victron Lynx Shunt VE.Can | LYN040102100 | 1 | ✓ | ✓ |
| Victron Color Control GX | BPP000300100R | 1 | ✓ | ✓ |
| BAE Cell 6 PVV 900 PPOL horizontal batteries | 2089017 | 24 | ✓ | ✓ |
| EGing Solar 250Watt Poly, Alu panel | 02250P05 | 24 | ✓ | ✓ |
| Circuit breaker B 16A 1 pole | 2622758039 | 2 | ✓ | ✓ |
| Circuit breaker C 32A 1 pole | 2122721414 | 2 | ✓ | ✓ |
| Outdoor cabinet for batteries and inverter w/cooling | SBC-DK | 1 | ✓ | ✓ |



| SEVERITY LEVEL 1 SNAGS – SERVICE AFFECTING SNAGS: | PASS | FAIL | CLEARED |
|---|------|------|---------|
| Power System operational? Supplying power to equipment | X | | ✓ |
| Power System tested in hybrid mode, stable in all modes: generator/mains, solar and battery (not related to generator issues) | X | | ✓ |
| All Solar chargers functional? Charging batteries when solar energy available. | X | | ✓ |
| All Inverters functional? Supplying load to AC equipment. | X | | ✓ |
| All Solar panels functional? | X | | ✓ |
| Battery operation to be verified? | X | | ✓ |
| Delivery complete? | X | | ✓ |
| SEVERITY LEVEL 2 SNAGS –NON - SERVICE AFFECTING SNAGS: | PASS | FAIL | CLEARED |
| Installation is as per agreed layout design. | X | | ✓ |
| The visual inspection of equipment is free from any damage. | X | | ✓ |
| All connections (cabling and coopers) correct gauge and securely terminated. | X | | ✓ |
| Solar structure properly mounted on the roof or ground. | X | | ✓ |
| All solar panels firmly fixed on roof or ground structure. | X | | ✓ |
| All equipment labeled. | X | | ✓ |
| No alarms present on power system. | X | | ✓ |
| System log files to be verified. | X | | ✓ |
| System Voltage Calibration and readings to be checked & verified. | X | | ✓ |
| Load & Battery Current Calibration to be checked & verified | X | | ✓ |
| Battery Breaker to be tested & verified. | X | | ✓ |
| Load Breakers to be tested & verified. | X | | ✓ |
| Battery rack properly installed | X | | ✓ |
| Batteries free from damages and acid leakages properly installed on rack. | X | | ✓ |
| Check earth connections to Power system and Solar panels | X | | ✓ |
| Staff training performed. | X | | ✓ |



| DESCRIPTION | VALUE | COMMENTS |
|--|---------|--|
| Min. AC Load during FAC visit: | 0,03 kW | |
| Max. AC Load during FAC visit: | 1,25 kW | Clinic A/C unit and cabinet cooling active |
| Current from Solar chargers: | 62 A | Can go from 0 to 100A |
| Battery voltage: | 57V | |
| Generator Rating: | N/A | No genset present |
| Equipment Room Temperature at FAC visit: | 30 °C | Cabinet set to 26 °C |
| Battery voltage to switch on Mains: | 49 V | |
| AC Current available from mains: | 32 A | Limited by programming and breaker |

| SNAGS LIST – TO BE CLEARED | RESPONSIBLE | CLEARED |
|---|-------------|---------|
| Installation Complete – no pending installation related action. | | |
| | | |
| | | |

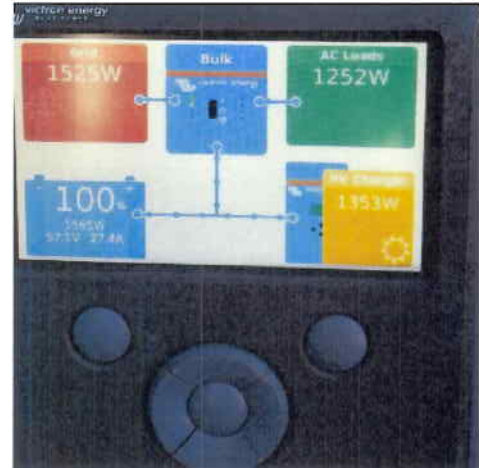
FAC Summary:

| FAC APPROVED BY: | Name: | Signature: |
|-------------------------|--------------------------|------------|
| Site Representative | Klewyn Felice Christians | |
| GSOL Representative | Henrich Sørensen | |
| UNDP Representative | Blessing Kabara | |
| UNDP/PSU Representative | Miriam Lopez | |



Annexes







System Test Report

1. General Data

Project Nr.: 10263
 Customer: UNDP (GP600497 Namibia)
 System ID: 2017MP100064
 Q.C. Passed Yes No
 Signature: *[Handwritten Signature]*

GSOL ENERGY GLOBAL A/S



2017MP100064

www.gsolenergy.com

2. System information

Inverter
 No. of Inverters: 1
 Voltage (L-N): 230 VAC
 DC Cable dimension: 25 mm²
 AC-Out Cable dim.: 2x6 mm²
 AC-In Cable dim.: 2x6 mm²
 Max DC Amp: 210
 Firmware version: 2653-413
 Inverter type & size: V. Quattro 8kVA
 1-phase or 3-phase
 DC fuse: 200 A
 AC relay/junction Amp:
 Max AC Amp /phase: 34
 AC OVP - out
 Charger
 No. of chargers: 1
 DC Cable dimension: 25 mm²
 Firmware version: 2.04
 Charger type: MPPT 250/100-TR
 DC fuse: 125A DC OVP DENHguard
 DC Coupling Distributor Power-In
 AC Coupling Type GEG AC Amp size: 32A
 Type Multicluster
 Battery Battery bank voltage: 48 V
 PV Inverter No. of PV-Inverters:
 AC Cable dimension:
 Grid Feedback allowed Yes No
 Firmware version:
 Grounding New Grounding rod Existing Grounding rod Cable dim. 6 mm²
 Monitoring Battery monitor Color Monitor Other 2.11 Monitor ID: f45eab69d112

3. System testing - Installation

Fixation All elements firmly installed Bolts used at: INVERTER
 Cabling Cables laid with respect to bending radius (max 5 x diameter) and orientation
 Cable fixators at every 30 cm max
 Marking Cable polarity marked: Red/Black Cable marking system
 AC-in / AC-out marked LABEL RED / BLACK
 Battery connection marked

4. System testing - Function

Inverter All lights showing Normal operation AC test level: 2000 W
 Listed system voltage and phase verified
 Inverter Program UPS / Prioritise Grid Voltage (L-N): 230 VAC
 Custom trigger for cyclic operation
 AC-In Power trigger lvl: W Battery trigger lvl: Udc
 AC-In Power block lvl: W Battery block lvl: Udc
 Trigger parameters verified
 PV inverter Frequency shifting
 Grid Feedback activated? No Yes from Chargers Yes from PV inverters
 NOTES: System tested with 500Wp per charger

System charging By Chargers By Grid/Genset By PV inverter
 Safety Battery Breaker functional Yes No
 System Grounding Grounding ok
 Monitor Color Monitor: All devises showing Activated on Web-portal
 Two-way com enabled
 Battery Monitor: Battery Ah set

5. Comments / Written notes