



SEAWARD
ELECTRICAL SAFETY TESTING
& MEASURING.

SOLAR UTILITY PRO USER MANUAL



seaward.com

TESTED. TRUSTED... WORLDWIDE

LIMITED WARRANTY & LIMITATION OF LIABILITY

SEAWARD Electronic Limited guarantees this product to be free from defects in material and workmanship under normal use and service for a period of 2 years, provided the instrument is serviced and calibrated by an authorised agent in accordance with the manufacturer's instructions. The period of warranty will be effective at the day of delivery.

Manufacturer does not provide any warranty for the following:

- Any normal wear and tear.
- Errors or damage caused by: (i) misuse or not using your product in accordance with the user guide, such as if the product has been exposed to moisture, to dampness or to extreme thermal or environmental conditions or to rapid changes in such conditions, to corrosion, to oxidation, to spillage of food or liquid or to influence from chemical products, (ii) using your product with, or connecting it to, any product, accessory, software, or service not manufactured or supplied by the manufacturer, (iii) any products combined with your product by a third party, (iv) damage or errors caused by hacking, cracking, viruses, or other malware, or by unauthorised access to services, accounts, computer systems or networks; or (v) other acts beyond the manufacturer's reasonable control.

This Warranty is not valid:

- If your product, or the software it runs on, has been (i) opened, modified, or repaired without the manufacturer's authorisation, or (ii) repaired with unauthorised spare parts;
- If you have not installed the latest software updates that are publicly available for your product within a reasonable time of their release; or
- If you refuse to give possession of the product to the manufacturer for repair and investigation.

(c) Copyright 2019

All rights reserved. Nothing from this edition may be multiplied, or made public in any form or manner, either electronically, mechanically, by photocopying, recording, or in any manner, without prior written consent from SEAWARD Electronic Limited. This also applies to accompanying drawings and diagrams.

Due to a policy of continuous development SEAWARD Electronic Limited reserves the right to alter the equipment specification and description outlined in this publication without prior notice and no part of this publication shall be deemed to be part of any contract for the equipment unless specifically referred to as an inclusion within such contract.

TABLE OF CONTENTS

Limited Warranty & Limitation of Liability	2
Introduction	4
1. User Notes	4
2. Safety Notes	4
3. Accessories	6
3.1. Standard Contents	6
3.2. Optional Accessories / Replacement Parts	6
4. Unit Description	7
4.1. Identifying Parts of the Solar Utility Pro	7
4.2. LCD display	8
5. Using the Solar Utility Pro	9
5.1. Power ON/OFF Solar Utility Pro	9
5.2. Battery Condition Check	9
5.3. Setting the Date and Time	9
5.4. Voltage and Current Measurement	10
5.5. Saving Results	11
5.6. Recalling Results to the Display	11
5.7. Clearing the Memory	11
5.8. Auto Shutdown	11
5.9. Error Messages	12
6. Use with the Solar Survey 200R	13
6.1. Pairing with the Survey 200R	13
6.2. Put the Survey 200R into Transmit Mode	13
6.3. Un-Pairing from the Survey 200R	13
6.4. Normal Operation	14
7. Transferring Data to a PC	14
8. Specifications	15
8.1. Open Circuit Voltage Measurement (PV Terminals)	15
8.2. Short Circuit Current Measurement	15
8.3. Maximum Power Rating	15
8.4. General Specifications	15
9. Environmental Conditions	16
10. Maintenance	16
10.1. Preparing to Work on the Solar Utility Pro.	16
10.2. Securing the Solar Utility Pro	17
10.3. Cleaning the Solar Utility Pro	17
10.4. Recharging the Batteries	17
10.5. Service and Calibration.	18

INTRODUCTION

The Solar Utility Pro is a battery powered, multi-function solar photovoltaic installation test instrument capable of performing open circuit and short circuit tests required by IEC 62446, including:

- Open circuit module, string or array voltage
- Voltage polarity
- Short circuit module, string or array current

1. USER NOTES

This instrument and its operating instructions are intended for use by adequately trained personnel. Appropriate PPE should be worn at all times when using the Solar Utility Pro. Electrically insulated gloves should be used when performing tasks on live circuits above 50V. Arc-flash PPE selection should be based on an incident energy analysis.

The following symbols are used in these operating instructions and on the Solar Utility Pro.



Warning of electrical danger!

Indicates instructions must be followed to avoid danger to persons.



Important, follow the documentation!

This symbol indicates that the operating instructions must be adhered to in order to avoid danger.

2. Safety Notes



In order to ensure safe operation of this instrument, all notes and warnings in these instructions must be observed at all times.



All test leads must be securely attached to the PV system under test. Always use the solar PV connectors supplied or alligator clips to connect test leads to the PV system under test. Test probes must not be used without alligator clips.



Never disconnect the test leads whilst any measurement is active. This may result in electrical arcing and may damage the Solar Utility Pro.



Do not attempt to turn off the Solar Utility Pro while tests are active.



The Solar Utility Pro is intended for use in a dry environment only.



The PV test terminals maximum rating: 1500V DC open circuit voltage, 40A short circuit current, 45kW DC power. Do not exceed this rating. The DC supply must be isolated from earth/ground during testing. **See section 8.3 for maximum power ratings.**



Never use a sharp tool in order to remove the batteries from the instrument, always use the supplied ribbon. Damaged batteries may lead to the battery becoming hazardous which may cause a risk of fire.



Check the Solar Utility Pro and all associated cables and leads before operating the equipment. Do not use if there are signs of damage. Only use the test leads supplied with the Solar Utility Pro.



Do not touch any exposed metal parts of the solar PV installation during testing.



Always ensure that the circuit under test is electrically isolated from all other external influences such as the dc inverter before attempting a measurement.



Do not leave the Solar Utility Pro permanently connected to a PV installation. Always disconnect all test leads immediately after use.



Before removing the Solar Utility Pro battery cover ensure that all test leads have been disconnected from the instrument. Electric shock danger!



Do not operate the Solar Utility Pro without the battery cover securely in place.

Where safe operation of the Solar Utility Pro is no longer possible it should be immediately shut down and secured to prevent accidental operation. It must be assumed that safe operation is no longer possible:

- if the instrument or leads show visible signs of damage or
- the instrument does not function or
- onscreen messages warn against further use or
- after long periods of storage under adverse environmental conditions.



If the Solar Utility Pro is being used to determine the presence or absence of hazardous voltages, always prove the operation of voltage measurement function before and after use by means of a known voltage source or proving unit.



The Solar Utility Pro is not intended for continuous use. When the Solar Utility Pro is not being used disconnect it from the system under test.



If the Solar Utility Pro is used in a manner not specified by this document then the protection provided by the equipment may be impaired.



Do not open the instrument, no user serviceable parts (apart from the batteries).



The lead sets supplied with the Solar Utility Pro can be used on 1500V systems that are isolated from earth. Always ensure that the appropriate PPE is used when connecting and disconnecting the lead sets.



Always use PROTECTED 18650 Li-ion batteries. Using UNPROTECTED 18650 Li-ion batteries could lead to damaged batteries or damage within the Solar Utility Pro.

3. Accessories

3.1 Standard Contents

The Solar Utility Pro test kit is supplied with the following items:

- 1 x Solar Utility Pro unit
- 1 set 1.2 M red and black MC4 test lead with test probe and alligator clip
- 1 set of 2M red and black MC4 extension leads
- 1 x SS200R Irradiance meter kit
- 1 x SS200R Irradiance meter clamp
- 1 x Seaward PV Hold-all bag
- 3 x 18650 Protected Lithium ion batteries
- 1 x Battery charger
- 2 x Dust cover
- 1 x UK mains lead
- 1 x Schuko mains lead

3.2 Optional Accessories / Replacement Parts

- 1 set 1.2 M red and black MC4 test lead with test probe and alligator clip
- 1 set of 2M red and black MC4 extension leads
- 1 x SS200R Irradiance meter
- 1 x SS200R Irradiance meter clamp

4. Unit Description

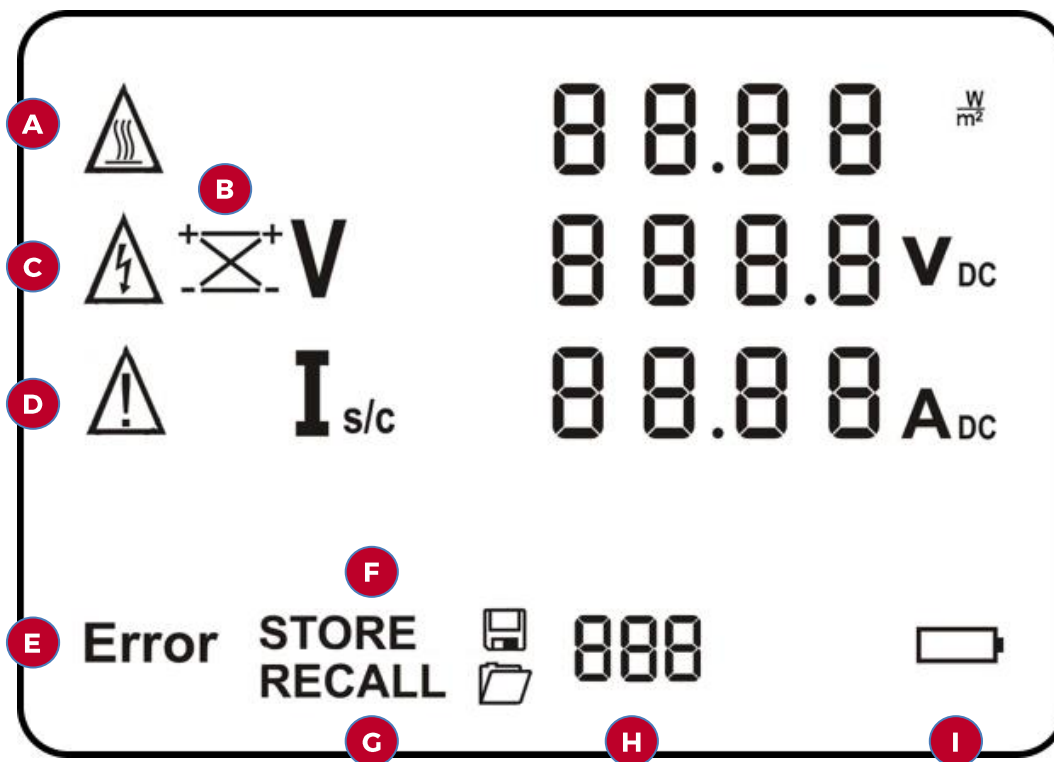
The Solar Utility Pro is a battery power multi-function PV installation test instrument.

4.1 Identifying Parts of the Solar Utility Pro



1. LCD Display
2. Save key
3. Recall key
4. Transmit key
5. USB socket
6. Test key
7. Battery cover
8. +ve PV input
9. -ve PV input

4.2 The LCD Display





- A. Caution – hot surface. If this icon appears, the Solar Utility Pro must be disconnected immediately from the PV system until the icon is no longer shown on the LCD.
- B. Solar module polarity indicator – indicates the polarity of the DC voltage applied to the PV test terminals e.g. correct or reversed
- C. Caution – hazardous voltage detected.
- D. Caution – refer to operating instruction. When this icon is active, the operating instructions must be followed to avoid risk of danger.
- E. Error – Refer to the specific error codes for further details.
- F. STORE – LCD data is being stored in the on-board memory
- G. RECALL – the data shown on the LCD has been recalled from the on-board memory.
- H. User Memory display – indicates the memory location of the results stored or recalled on the LCD.
- I. Battery status icon.

5. Using the Solar Utility Pro

Note: Please ensure the batteries are fully charged before first use; see section 10.4 for more information.

5.1 Power ON/OFF Solar Utility Pro

To turn the Solar Utility Pro on or off, press and hold the  and  keys simultaneously for approximately 2s.

5.2 Battery Condition Check

The Solar Utility Pro automatically performs battery condition checks whilst idle and during measurements. When the battery level is low, the battery symbol icon will appear on the Solar Utility Pro display. The Solar Utility Pro will continue to function, however the batteries should be recharged or replaced.

Note: When the battery symbol icon is flashing all tests will be inhibited and the batteries must be recharged immediately as described in section 10.4.

5.3 Setting the Date and Time

Turn off the Solar Utility Pro.

Press and hold the  and  keys simultaneously select the .


The date format and time format is shown as follows:

MM.DD = month (1-12). Day (1-31)

YYYY = year

HH.mm = hours (0-23).minutes (0-59)

SS = seconds (0-59)

Use the  key to navigate to the field that you wish to change.

A flashing field shows the field that can be set.

Use the  key and the  key, to decrease or increase the value, respectively.

Note: with each change, the seconds field is set to zero.

Turn off the device to save the setting.

Note: If the Solar Utility Pro has established a Solarlink™ connection to the Survey 200R, the date/ time of the Solar Utility Pro will automatically be synchronized to the date/ time of the Survey 200R. The Survey 200R real-time clock is the master and the Solar Utility Pro the slave.

5.4 Voltage and Current Measurement



All test leads must be securely attached to the PV system under test. Always use the solar PV connectors supplied or alligator clips to connect test leads to the PV system under test. In order to reduce the risk of electrical arcing, test probes without alligator clips should not be used. Only use true MC4 connectors.



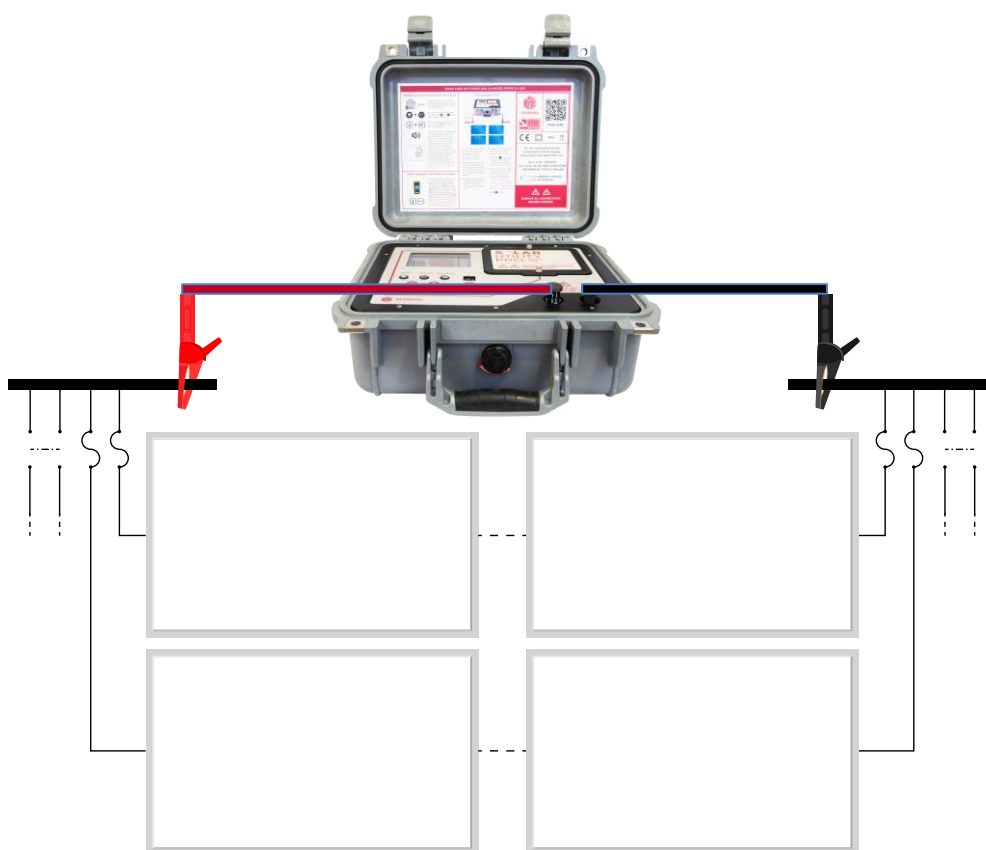
Never disconnect the test leads whilst any measurement is active. This may result in electrical arcing and may damage the Solar Utility Pro



Always ensure that the circuit under test is electrically isolated from any mains supply.




Do not attempt to turn off the Solar Utility Pro while tests are active.



Connect the Solar Utility Pro securely to the PV module(s) or system as shown, using the supplied test leads. The Solar Utility Pro will automatically detect any DC voltage connected to the PV test socket inputs and display the measured voltage.

If the PV voltage polarity is reversed, the polarity indicator will flash a cross next to the voltage icon.

If the incoming voltage is $>30\text{v}$ then the shock hazard icon will flash.

Press the  button and the Solar Utility Pro will automatically measure the short circuit current.

The measurement results will remain on the LCD for 20 seconds or until a key is pressed.

Note: If the DC voltage polarity is incorrect or the voltage is $<5\text{V}$ or $>1500\text{V}$ the Test key will be disabled until the problem is corrected.





5.5 Saving Results

The Solar Utility Pro can store up to 999 complete sets of measurements.

Press the  button to store all measured values on the display.



If there is sufficient memory space to store a set of readings, then the Save icon will appear, and the readings will be stored in the next available memory location. If there is insufficient memory space then the buzzer will sound. If there are no valid readings on the display then nothing will be stored.

5.6 Recalling Results to the Display

To recall test results select the  button, this displays the user memory location indicator and displays the measured values stored in that location. Note, the location number is shown on the bottom of the LCD display. After the first press of the  button, the memory location can be incremented by selecting  or decremented by selecting .

Press and hold the  button to download data to a PC via the USB port.

5.7 Clearing the Memory

Press the  and  keys together to clear all the user memory locations. Note, once deleted (cleared) from the memory, data cannot be recovered.

5.8 Auto Shutdown

After 1 minute of being idle the Solar Utility Pro will turn itself off in order to conserve battery power. This auto shutdown period can be extended as follows:

Turn the Solar Utility Pro unit off

Press and hold the  key, then briefly select the  and  keys together. Keep holding the  key.

The display will show "OFF" on line 1, and the turnoff time on line 2 (in minutes)

Keep holding the  key and select the  key. Each press of the  key will increment the turnoff time.

Increment beyond 10 to set the time back to 1 minute

5.9 Error Messages

Under certain conditions, the Solar Utility Pro may indicate an error message.

5.9.1 User serviceable error codes

Error message	Remedy
H0E	The electronics within the Solar Utility Pro have reached the maximum safe temperature. This can occur after repeated short circuit current measurements at high current levels. Allow the unit to cool down before further use.
HISC HICU	The DC short circuit current has exceeded the maximum rated value of 40A. The measurement sequence has been aborted.
HIOC	High Open Circuit Voltage (ie > 1500V), check supply voltage, if above 1500V cease testing.

5.9.2 Non user serviceable error codes

Error message	Remedy
CAL	The Solar Utility Pro is not correctly calibrated. Return the unit to an authorised Service Agent.
Er 1,2	Return the unit to an authorised Service Agent.
H0EF	Return the unit to an authorised Service Agent.
FEE	Return the unit to an authorised Service Agent.
FUSE	Return the unit to an authorised Service Agent.
DISCONNECT	Disconnect the Solar Utility Pro from the PV system immediately
DO NOT USE	Do not use the Solar Utility Pro. Return the unit to an authorised Service Agent.
rL 1,2,3 or 4	Return the unit to an authorised Service Agent.

6. Use with the Solar Survey 200R

6.1 Pairing with the Survey 200R

Make sure there are no other units operating nearby.

Turn off both the Solar Utility Pro and Survey 200R unit.

On the Survey 200R, press and hold the ON/OFF keys, keep both keys pressed.

On the Solar Utility Pro, press and hold the  and , keep both buttons pressed.

The Survey 200R will now send its "Pairing" signal. When the Solar Utility Pro detects this signal, it will remember the serial number of the Survey 200R, and will look for that particular serial number in all future communications.

When the Solar Utility Pro has successfully paired, it will beep and display "connected". This should normally happen within a couple of seconds.

Note: The top line of the Solar Utility Pro display will now show the W/m² icon.

6.2 Put the Survey 200R into Transmit Mode

The Survey 200R can be put in and out of transmit mode by pressing and holding the temperature key, and then momentarily pressing the OK (Hold) key.



When in transmit mode there will be a flashing icon above the temperature key.

Note: When in transmit mode the auto shut down feature is disabled. You must remember to turn the Survey 200R off in order to save battery power.

6.3 Un-Pairing from the Survey 200R

Make sure there are no other units operating nearby.

Turn the Solar Utility Pro off.

On the Solar Utility Pro, press and hold the  and  keys, keep both buttons pressed for about 10 seconds. The Solar Utility Pro will then beep and clear its screen. The unit is now no longer paired to any Survey 200R. Note that the W/m² on the top line of the LCD will display will no longer be displayed.

6.4 Normal Operation

When the Solar Utility Pro has been paired with a Survey 200R, the top line of the display is used to show the irradiance value measured by the Survey 200R.

The Survey 200R must be put into transmit mode as described above.


When the Solar Utility Pro is in range of the Survey 200R it will display the Survey 200R irradiance value and display it on the top line of the LCD.

When an Auto test is performed, the Solar Utility Pro captures the irradiance, ambient temperature and module temperature measurements from the Survey 200R. Press Save and all these values will be stored along with any measurements made using by the Solar Utility Pro.

7. Transferring Data to a PC

Connect the Solar Utility Pro to PC using the USB cable. (This will create a COM port on the PC).

Run the Seaward Solar Datalogger application on the PC. Select the correct COM port. (Use the Help menu – Trouble shooting guide, to help finding the correct COM port).

Press and hold the  key on the Solar Utility Pro. After a few seconds the Solar Utility Pro will transfer all its stored data to the PC.

By default the Datalogger application will save the data in CSV format. This can be opened using Microsoft Excel. Note that each row of data will have the readings from the Survey 200R where applicable.

8. Specifications

8.1 Open Circuit Voltage Measurement (PV Terminals)

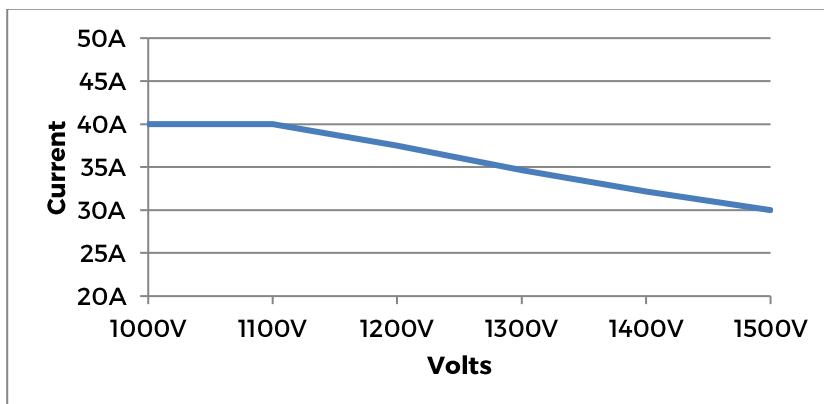
Display Range	0.0VDC – 1500VDC
Measuring Range	5.0VDC – 1500VDC
Resolution	0.1VDC max
Accuracy	±(0.5% + 2 digits)

8.2 Short Circuit Current Measurement

Display Range	0.00ADC – 40.00ADC
Measuring Range	0.50ADC – 40.00ADC
Resolution	0.01ADC
Accuracy	±(1% + 2 digits)

8.3 Maximum Power Rating

Maximum Power Rating 45kW



Voltage	Current
<=1000V	40.0A
1100V	40.0A
1200V	37.5A
1300V	34.6A
1400V	32.2A
1500V	30.0A

8.4 General Specifications

Dimensions	340mm x 300mm x 152mm (L x W x H, Closed)
Closed)	13.4" x 11.8" x 6.0" (L x W x H, Closed)
Weight	5.0kg (11.0lbs)
Power Source	3x 3.7V Protected Li-ion batteries
Communication	USB Download
Display	Custom LCD with backlight
On-board Memory	Up to 999 datasets
Storage Environment	-25°C to +65°C (-13°F to 149°F)
Operating Conditions	0°C to 40°C (32°F to 104°F)
Environmental Protection	IP 40 open, IP64 closed

USB download to PC
Wireless "Solarlink" to Survey 200R

via DataLogger Utility (CSV format)
Frequency 433MHz, range 30m/100ft or
Frequency 915MHz, range 30m/100ft

9. Environmental Conditions

The Solar Utility Pro has been designed to perform tests and measurements in a dry environment.

Overvoltage category IEC 61010, 1500V on systems without a **RATED MEASUREMENT CATEGORY**

Pollution degree 2 according to IEC 61010-1.

Protective system IP40 according to IEC 60529.

Electromagnetic compatibility (EMC). Interference immunity and emitted interference conforming to IEC 61326-1.

Operating temperature range of 0°C to 40°C, without moisture condensation.

The Solar Utility Pro can be stored at any temperature in the range -25°C to +65°C (relative humidity up to 90%). The batteries should be taken out of the instrument for storage.

Operating Altitude 0 to 2000 metres

10. Maintenance



Before removing the Solar Utility Pro battery cover ensure that all test leads have been disconnected from the instrument. Electric shock danger!



Do not operate the Solar Utility Pro without the battery cover securely in place.

10.1 Preparing to Work on the Solar Utility Pro.

Make sure the Solar Utility Pro leads and accessories are disconnected, before opening the instrument;

Power the unit off.

Disconnect all of the test leads from the unit.

10.2 Securing the Solar Utility Pro

Under certain conditions safe operation of the Solar Utility Pro can no longer be assumed:

- Displayed warning message or instructions advising against further use.
- Visible damage of the instrument case.
- Incorrect measurement results.
- Recognisable abuse to the instrument due to prolonged storage under improper conditions.
- Recognisable abuse to the instrument due to extraordinary transportation stress.
- The battery compartment shows signs of electrolyte leakage.

In these cases, the Solar Utility Pro should be immediately switched off, disconnected from any test or measurement function and secured to prevent any further use.



Should the Solar Utility Pro become faulty please remove the batteries and secure the instrument so that it can no longer be used. Ship the Solar Utility Pro back to a Seaward authorised dealer.

Do not return the batteries with Solar Utility Pro

10.3 Cleaning the Solar Utility Pro

Clean the external case of the Solar Utility Pro with a clean dry cloth.

Avoid using solvents and abrasive scouring agents to clean the external case of the Solar Utility Pro.

Check the battery contacts and compartment are free of electrolytic contamination.

Any contamination of the battery contacts or compartment should be cleaned with a dry cloth.

10.4 Recharging the Batteries



Before opening the Solar Utility Pro ensure that it is disconnected from all voltage sources! Electric shock danger!

Disconnect all the test leads from the unit

Power the unit off.

Release the two captive screws in the battery compartment cover.

Remove the battery compartment cover.

Remove the discharged batteries from the battery compartment.

Place the discharged batteries in the supplied battery charger and fully charge.

Fit the fully charged batteries in the battery compartment, taking care to ensure that the correct polarity is observed.

Relocate the battery cover over the battery compartment and fasten in position with the battery cover captive screws.

10.5 Service and Calibration.

To maintain the specified accuracy of the measurement results, the instrument must be recalibrated at regular intervals by either the manufacturer or an authorised Seaward Service Agent. We recommend a recalibration period of one year.



Should the Solar Utility Pro become faulty please remove the batteries and secure the instrument so that it can no longer be used. Ship the Solar Utility Pro back to a Seaward authorised dealer.

Do not return the batteries with Solar Utility Pro

For help or advice on Service and Calibration contact:

Service Department
Seaward Electronic
Bracken Hill
South West Industrial Estate
Peterlee
Co Durham SR8 2SW
England
Tel: 0191 5878739 / 0191 5878737
Email: service@seaward.com

For help or advice on Service and Calibration, in North America contact:

Service, Calibration and Repair
Seaward Group USA
6304 Benjamin Road
Suite 506
Tampa, FL 33634
United States
Tel: 813 886 2775
Fax: 813 886 2754
Email: service@seaward-groupusa.com

Part Number 416A567 | Revision 2.2