

# Electrical safety tester SXS16 “Solar”



- ▶ Dielectric strength test up to 10kVDC
- ▶ Insulation resistance from 1MΩ up to 20GΩ
- ▶ Ground continuity test from 10mΩ to 1500 mΩ under 32A (up to 40A and 100 A in option)
- ▶ Detection of DUT connection for production line testing
- ▶ Built in RS232C interface and good/bad contact
- ▶ ETHERNET, PLC or IEEE488-2 interfaces in option
- ▶ 10 parameters sets storage

The SXS solar perform easily and simply all the electrical safety tests according to the main standards for photovoltaic solar panel: EN 61215, EN 61646, EN 61730-2 and UL1703.

The SXS solar is a combination of a dielectric strength tester, a megohmmeter and a ground continuity tester. This version of SXS is typically dedicated for solar panel testing and has been developed in accordance to international standards and customer needs

## Technical Characteristics

### DIELECTRIC STRENGTH TEST FUNCTION

#### Output voltage

- 0.1 to 10kV DC
- Accuracy:  $\pm (2\% + 50V)$  of the preset value between 100VDC and 10000VDC, for a current  $< 100\mu A$  with the detection modes:  $\Delta I$ , IMAX, FIMAX or  $\Delta I + IMAX$ ,  $\Delta I + FIMAX$

#### Voltage reading

- On a digital kilovoltmeter connected on the output terminals
- Accuracy:  $\pm (1\% + 10 VDC)$  according to UL 1703
- Display: 2000 counts

#### Current

- Nominal current: max. 1000  $\mu A$

#### Current reading

- On a shunt resistor inserted in the test circuit
- Accuracy:  
 $\pm (1\% + 0.2\mu A)$  Range 1 (0.1  $\mu A$  to 100  $\mu A$ )  
 $\pm (1\% + 2\mu A)$  Range 2 (100  $\mu A$  to 1000  $\mu A$ )
- Display: 2000 counts

### Breakdown detection

- DELTATEST detector adjusted for  $\Delta I = 1mA \pm 10\%$  with 10  $\mu sec. \pm 20\%$ .
- Total insensitivity to current due to the resistance and the capacitance of the device under test
- IMAX and FIMAX detection by maximum current adjustable from 0.1  $\mu A$  to 100  $\mu A$  by 0.1  $\mu A$  steps and 100  $\mu A$  to 1000  $\mu A$  by 1  $\mu A$  steps.
- DELTATEST, FIMAX and IMAX mode combination

### IMIN threshold function

- Detects whether the SXS16 is properly connected to the specimen under test
- Adjustable from 0.1 to 1000  $\mu A$

### Breakdown indication

- By visual (LCD screen and LED) and sound signal
- Breakdown voltage and current are stored on the LCD display

### Timer

- Hold time: 1 to 999 sec.
- Rise and fall time adjustment between 2 to 60 sec.

### Storage

- 10 test parameters (voltage, threshold, time . . .) sets can be stored

**MEGOHMMETER FUNCTION****Measurement range**

- 1 MΩ to 20GΩ
- The maximum insulation resistance is given by :  
(UTEST/1500) x 20GΩ

**Accuracy**

- ± (1.5% + 1U)
- Display: 2000 counts

**Threshold**

- Low limit and High limit (making D.U.T. detection possible) adjustable from 1MΩ to 1000MΩ by 1MΩ steps and 1GΩ to 20GΩ by 10MΩ steps.

**Measurement voltage**

- Adjustable by 10VDC step from 500VDC to 1500VDC
- Accuracy: ± (1% + 2V)
- Short circuit: ≤ 1mADC

**Insulation per surface**

- Measuring insulation resistance per surface of the DUT with threshold adjustable from 1 to 2000 MΩ.m<sup>2</sup>

**Measurement time**

- Adjustable from 1 to 999 sec. or permanent
- Rise and fall time adjustment between 1 to 60 sec.

**Storage**

- 10 test parameters (voltage, time, threshold...) sets can be stored

**GROUND CONTINUITY FUNCTION****Measurement range**

- 10mΩ to 1500mΩ
- Display possible in voltage drop according to the EN60204 standard

**Accuracy**

- (2% + 0,010 Ohm)
- Display: 1500 counts

**Threshold**

- High and low limits adjustable from 10mΩ to 1500mΩ
- Threshold adjustable in volt according to EN60204 standard

**AC current**

- 5 to 32A AC by 1A step, with load regulation (40A in option)
- Accuracy: ± (1% + 0.5A)
- Current can be progressively applied from 5A to the maximum test value
- Open circuit voltage: 6V AC or < 12V AC sinus
- Frequency: Mains power supply (50 or 60Hz)

**Measurement time**

- Current rise time from 2 to 999sec.
- Hold time from 1 to 999 sec. or permanent

**Storage**

- 10 test parameters (current, threshold, time...) sets can be stored

**DC current (with external power supply)**

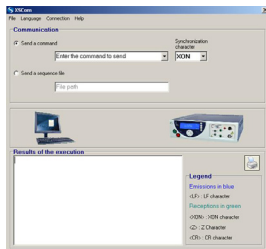
- 100A DC by a 0-10 V command.
- Accuracy: ± (1% + 0.5A)



## REMOTE CONTROL SOFTWARE

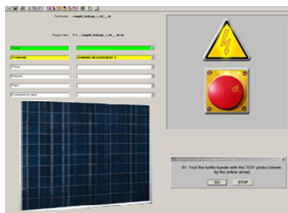
### XSCOM

- Control software routine which lets you communicate with the XS in order to setup the communication or your software routine.



### Application software

- SXSPRO: powerful software controlling the XS series according to your application



## PROTECTIONS

### Instrument

- By slow blow fuse

### Operator

- No HV or current on the outputs as long as the safety interlocks is open
- Red green lamp to indicate HV presence
- Double hardware safety loop which can be used with safety bloc devices

### Device under test

- Fast breakdown detection
- Output terminal shorted and capacitors discharged ( $t < 1$  sec. per  $\mu\text{F}$ )

## General Characteristics

### Presentation

- Table top unit
- Metal case

### Dimensions

- Height : 131 mm
- Width : 440 mm
- Depth : 450 mm

### Weight

- 15kg

### Power

- 230V or 115V  $\pm 15\%$  single phase, from 47 to 63Hz
- Consumption : 70 to 600VA depending on test

### Operating temperature

- 0°C to +45°C

### Storage temperature

- -10°C to +60°C

### Pollution Degree

- 2

### Over-voltage category

- CAT II

### Safety Class

- Class I (earth connection)

# Guide for quotation

## THE INFORMATION WE NEED

- APPLICATION** ➤ what is your device under test?
- STANDARD** ➤ which standard are you following for the production of your devices?
- TESTS\*** ➤ which tests have to be done, according to the standard you follow?
- PRESENTATION** ➤ typically for production or automatic use, the following options could be needed: automatic switching matrix (ref. EXS) 4 wire detection for 100% sample detection (ref. XS-108), 19 inches rack mount kit (ref. KRXS), rear outputs (ref. XS-05), interfaces (Ethernet, RS232, IEEE488, PLC) and software (ref. XS-96), but also cable without any ending for easy integration (ref. C0177)
- typically for laboratory or manual use, remote control probes or pistols, safety cages are typical

The SXS solar is not intended to be used with a FXS; the leakage current test is not required by standards.

\* List of possible tests:

- CONTINUITY** ➤ which resistance do you have to test under which current? How many points of continuity do you have to do?
- INSULATION** ➤ which resistance minimum do you have to measure under which voltage?
- HIPOT** ➤ which DC voltage do you have to test?

## ONCE WE HAVE THIS INFORMATION, WE CAN PROVIDE YOU AN ACCURATE QUOTATION

Example:

- APPLICATION** ➤ you are testing solar panels
- STANDARD** ➤ you follow EN 61215, EN 61646, EN 61730-2 and if you are working with US market, you also follow the UL1703
- TESTS\*** ➤ in the standards above are mentioned that the following tests have to be done: ground continuity test, insulation test and hipot test
- PRESENTATION** ➤ you decide to fully automatic your testing with equipment to be set up / results to be sent back through your Ethernet network; you do not want any cables on the front panel; you can then order: SXS16, XS-108, XS-05, KRXS, C0002-00LXX, XS-100 Ethernet interface
- CONTINUITY** ➤  $R < 100 \text{ m}\Omega$  under  $I = 2.5 \times I$  rating DUT
- INSULATION** ➤  $R > 400 \text{ M}\Omega$  if Modul Area  $< 0.1 \text{ m}^2$   
 $R > 40 \text{ M}\Omega \cdot \text{m}^2$  if Modul Area  $> 0.1 \text{ m}^2$   
Under 500 VDC
- HIPOT** ➤ 500 VDC or 1000 VDC + 2xUs or 2000 VDC + 4xUs during 1 minute.

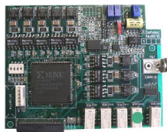


# Options

## XS-02

PLC interface

- START contact
- PASS and FAIL contacts
- FAULT contact
- END OF TEST contact



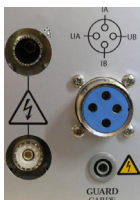
## XS-03

0-10 Volts input and output

- 0-10 V input to control the high voltage
- 0-10 V output for the voltage and the current

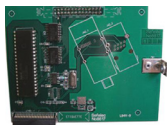
## XS-05-01

Disconnectable rear panel output : accessories have to be ordered separately (typically C0309-XX and C0177)



## XS-06

IEEE488-2 (Talker-Listener) interface



## XS-19

Extension to 30 memories per function instead of the 10 by default

## XS-100

Ethernet interface

## XS-104

40A instead of 32A for ground continuity; accessories not provided (See ref. C0183-40-XX and TE81-XS-40-XX)

## EXS 3200-HV-HC

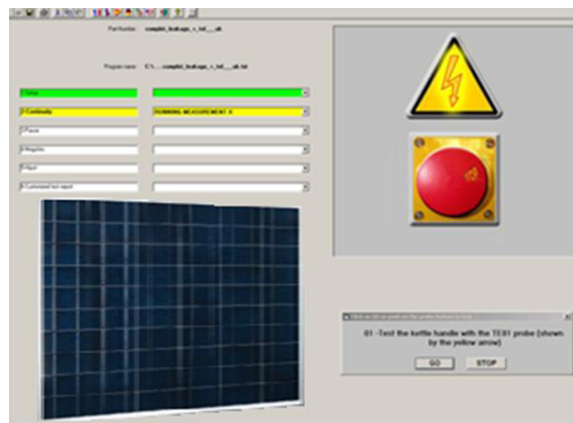
High voltage and high current matrix is available in order to fully automatic your test process / see EXS datasheets



## SOFTWARE

### XS-96

Interactive SXSPRO software (English, French, Spanish, German) to fully control the test process (lot management, user team management, bar code reader, data base connexions (MS Access), traceability (MS Excel, MS Word), reporting (MS Word), images and sounds management for optimal communication with user)



## Optional accessories

## C0001-00-LXX

Ground continuity - 40A crocodile cable for connexion onto the solar panel frame (for SXS16 / manual tests)

- Starting : high current banana plug
- Ending large crocodile clip (with 1 flat side)
- Length : XX stands for the length, to be defined at time of order (maximum length : 10 meters for max. 30A, 5 meters for max. 40A)



## C0001-01-LXX

Ground continuity - 40A crocodile cable for connexion onto the solar panel frame (for EXS switching matrix / automatic tests)

- Starting : high current Harting Sub-D DIN 41 652 T1
- Ending large crocodile clip (with 1 flat side)
- Length : XX stands for the length, to be defined at time of order (maximum length : 10 meters for max. 30A, 5 meters for max. 40A)



## C0002-00-LXX

Hipot - high voltage cable in Y without probe for fix connexion onto the solar panel J-Box connectors (connectors have to be provided and mounted by the customer)

- 8 kVDC max cable in Y without probe for fix connexion
- Starting : high voltage connectors (on XS instrument)
- Ending : 2 free endings high voltage cables for connexion to the J-Box, ending by a resistor (on those resistors are mounted the opposite connectors from the J-Box)
- Length : XX stands for the length, to be defined at time of order (maximum length : 10 meters)



## TE54

Test probe (hipot + insulation) – 1.8 meter (ref. TE54-XX for longer length)



## TE86-XS

Test pistol (hipot + insulation up to 2GΩ) - 2.5 meters



## TE81-XS-40-XX

2 wires probe with remote control button and green/red led, for 40A option ref. XS-104 - XX stands for the length, to be defined at time of order (maximum length : 10 meters)



## C0183-40-XX

One 2 wires cable ending with crocodile clip, for 40A option ref. XS-104 - XX stands for the length, to be defined at time of order (maximum length : 10 meters)



## C0210

Return pistol - same as C0175 but with a pistol at the end - 2 meters (hipot + insulation) (ref. C0210-XX for longer length)



## C0175

Black ground return lead ending with banana – 2 meters (ref. C0175-XX for longer length)





## Optional accessories

C0160-XS

Red-green lamp to indicate the high voltage presence



A010-XS

Operator security module with 2 buttons



A011-XS

Remote control foot switch



KRXS

19" rack mounting adaptation kit



## Calibration

XS-91-5

• Hipot calibration kit



XS-91-3

• Insulation calibration kit



XS-91-4

• Ground continuity calibration kit



XS-91-6

• Ground continuity 40A calibration kit

## Default simulation box

SD50

• It simulates some faults to check that the equipment is working well before its use



# The Sefelec advantages

**QUALITY** - As well for test laboratories as for production lines, the XS series has one of the best specifications and accuracy on the market, in addition to the fact it can work 24 hours a day.

**USER SAFETY** - The XS series is the only device of this type on the market to be equipped with a double hardware safety loop, conform to the famous IEC 204 standard. It insures an optimal user safety, while manipulating an equipment that is dangerous for operator and can give death.



**TIME / MONEY SAVINGS** - With its fastness in testing and detecting, the XS series lets you reduce costs in production + the "4wire Hipot detection" (ref. XS-108 & 109) guarantee 100% sample detection even with the non capacitive samples. This is Sefelec exclusivity.

Also, our range of switching matrix (ref. EXS3200 series) lets you automate your production processes and limit human mistakes, human risks towards high voltage, improve fastness, productions times, with automatic traceability.



- Test report for XD Transformer
- The following tests have been performed
- Test parameters are available for each test

**TRACEABILITY** - With its wide range of interfaces and interactive software (ref.XS-96), traceability to databases and reporting becomes standard and easy to use. Also some internal firmware counters are available inside our XS range (option); you can question them at distance through Ethernet from anywhere in the world, for checksum purposes and be sure your production has well been tested.

Serial number	Date	Time	Model	Operator name	Global
S8BQ213	06/08/2003	14:50:22	XD Transformer	Mazeran	PASS
S8BQ214	06/08/2003	14:50:48	XD Transformer	Mazeran	FAIL
S8BQ215	06/08/2003	14:51:10	XD Transformer	Mazeran	PASS
S8BQ216	06/08/2003	14:51:34	XD Transformer	Mazeran	FAIL
S8BQ217	06/08/2003	14:51:58	XD Transformer	Mazeran	PASS
S8BQ218	06/08/2003	14:52:22	XD Transformer	Mazeran	PASS
S8BQ219	06/08/2003	14:52:46	XD Transformer	Mazeran	PASS
S8BQ220	06/08/2003	14:53:10	XD Transformer	Mazeran	PASS

**TEST GUARANTEE & CALIBRATION** - This is essential to start a day of production being sure your tester can detect good/bad D.U.T. properly. Our range of dummy boxes (ref. SD series) is made for this: they will simulate you can indeed detect good or bad products.

Calibration is recommended once a year and with our calibration boxes range (ref. XS-91 series), it becomes easy and there is no need anymore to send the unit back for calibration: you save money (shipment, calibration cost), time (travel time, calibration time, you choose the optimal period for the calibration so it does not affect your production process), + you limit the risk of damages during transportation.



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