BLUESPARK	**MAINTENANCE INSTRUCTION** **INI0026B_WASP275** **Operational check**	

Written by : Jérome Boussard	**Approved by :** Michael Delchambre

PURPOSE OF THE DOCUMENT

The purpose of this document is to describe how to properly test the WASP 275, with the RED and DUL tools.

RELEASE HISTORY

Version and date	Nature of the modification
Version A dated on 07/01/2015	First edition
Version B dated on 15/09/2015	Assembly update for scope accessories

TABLE OF CONTENTS

1 IDENTIFICATION & TRACEABILITY

Record the serial number of the assets in the "Manual Measurements" popup of the software WASP 275 Test BSE v1.2.

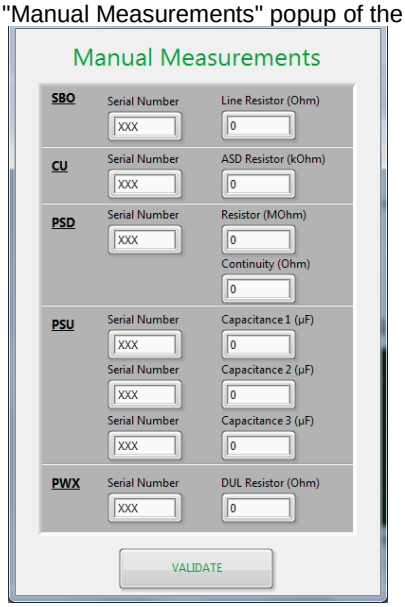


Figure 1: Popup window for manual measurements

2 SAFETY

Electrical Hazard

The assets may contain electrical energy. Follow instruction INI0004 to prevent risk. If this procedure is not followed exactly as indicated, it may cause damages to the equipment and/or harm the operator.

Do not try to perform maintenance on any section when it is mechanically or electrically connected to another section or power source.

The asset must be stored with its caps on the tool. Do not attempt to handle a PSU without caps until the asset has been de-energized as per INI0004.

After each operation, the PSU must be shorted out to ensure it is de-energized.

Mechanical Hazard

Assets are heavy and should be handled with care. Use available handling tools to reduce physical strain.

Ensure a safe zone is defined for the duration of all testing.

3 BEFORE TESTING

3.1 Requirements

3.1.1 Related documents

- INI0004 Safety instruction

3.1.2 Spare parts

No spare parts are required to achieve operations

3.1.3 Tools

3.1.3.1 Electrical tools

- Safety - Common test box DCT0037B for detail
- Surface box DCT0018B for detail
- WASP 275 test box DCT0038B for detail
- Computer with software (WASP Test BSE v1.2, NIMAX v9)

3.1.3.2 Mechanical tools

- Field tool box DCT0040B for detail
- 6 Tool stands

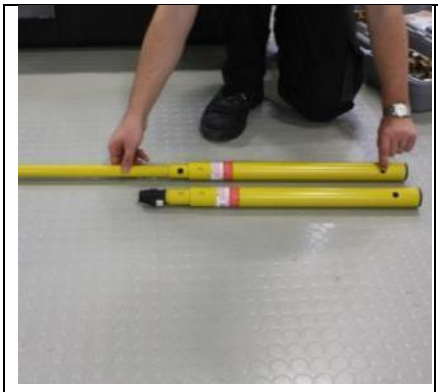
3.1.4 Consumable products

- Grease Chemsearch Thread Eze Ultra (must meet or exceed ISO-L-XBDGA0/1)
- Ethylic alcohol
- Lint-free cloth

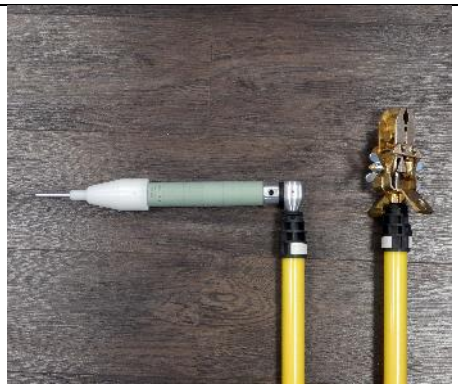
3.2 Safety Box preparation

- Prepare the HV measurement tool from the Safety box, as per INI0004
- Check the HV gloves as per INI0004

3.2.1 HV sticks preparation

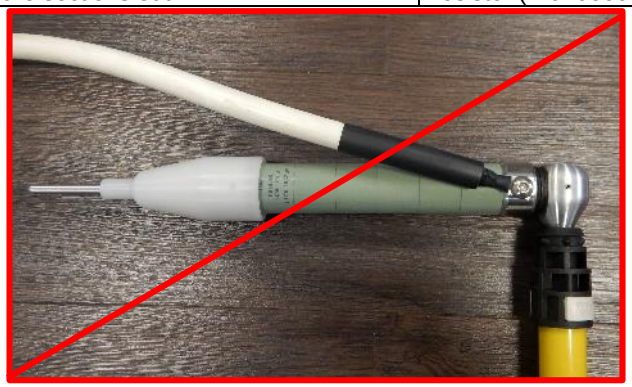


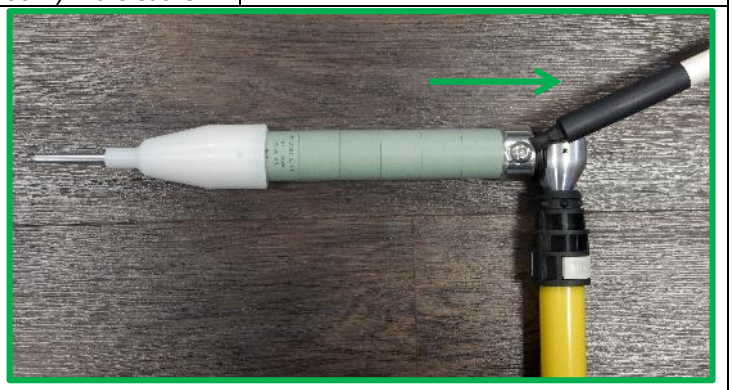
Extend the sticks (MP0000001000-A) by pressing the button while pulling the sections out.



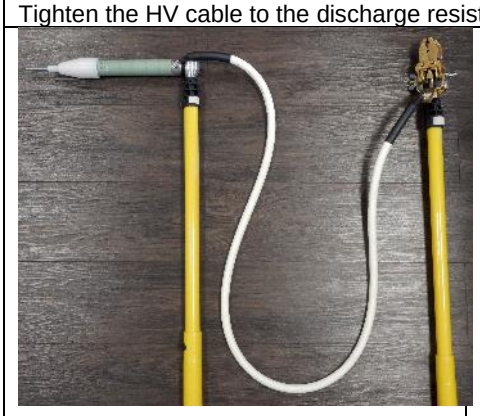
Insert the ground clamp (MP0000004000-A) and the discharge resistor (IA9190001000-A) in the sticks.

Tighten the HV cable (IA9690003000-B) to the ground clamp.





Tighten the HV cable to the discharge resistor. The cable must lie to the rear of the discharge resistor.



Using an ohmmeter, measure the resistance between the discharge resistor's pin and ground clamp. The expected value is between 3600 and 4400 Ω.

3.3 SBO preparation

- Open the SBO front cover.
- Connect the AC INPUT cable and the USB cable (do not turn on the power supply) as per Figure 2.

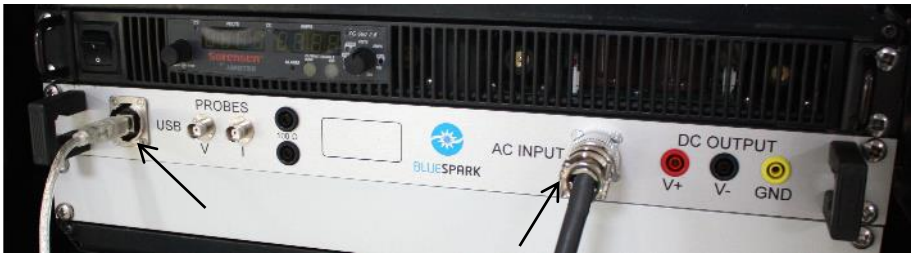


Figure 2

- Connect the USB cable from the SBO to the computer.
- Ensure the SBO is properly grounded through the electrical outlet or via the yellow ground output on the front of the SBO (the yellow/green ground wire must be connected to the housing of the CUP).

3.4 Communication verification

The power supply of the SBO can be powered off during this verification.
Only one SBO maximum must be connected to the computer in order to prevent communication errors.

- Launch the NIMAX software on the computer. Click on “peripherals & interfaces”. Both NI USB6008 (SBO) and Picoscope connections must be present, as per Figure 3

Figure 3

- Do not close the NIMAX software, just minimize the window to proceed with tests.

Note: this may not apply with Windows 8 OS. Picoscope connection may appear as "LPTx" in the serial & parallel sub.

3.5 First inspection

Look at the general status of the assets

- Are there bumps, flat spots or burrs on the housings.
- Look for oil leakage at each end of the PSUs. No oil should be present.
- Are there parts missing (screws, pins, coupler, cap)

Report any issue into the comment area of the software as per Figure 4.

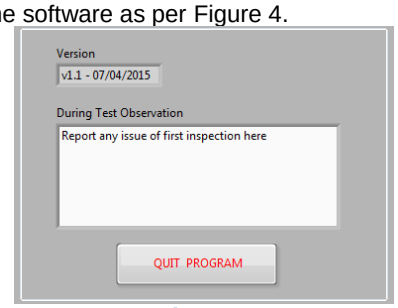


Figure 4

4 SBO VERIFICATION

4.1 Preliminary line resistor test

- Using the ohmmeter, measure the resistance between the connectors of the line resistor (Figure 5). The expected value is between 95 and 105 Ω.

Figure 5

- Record the value in the "Manual Meas." popup of the software (Figure 1). If the value is out of range (red spot), consult troubleshooting section or a supervisor.

4.2 SBO CC test

- Launch the software WASP 275 TEST BSE on the computer.
- Fill the parameters of the test as per Figure 6:
  - HV Probe/RED Coefficient (default 1860)
  - Path for the report files
  - Name for the test
  - Operator
  - Any helpful information (assets SN will be entered later)

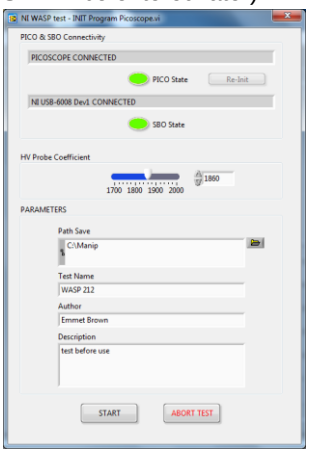


Figure 6

- Install a shunt between the V+ output and the V- output of the SBO, as per Figure 7 & Figure 8

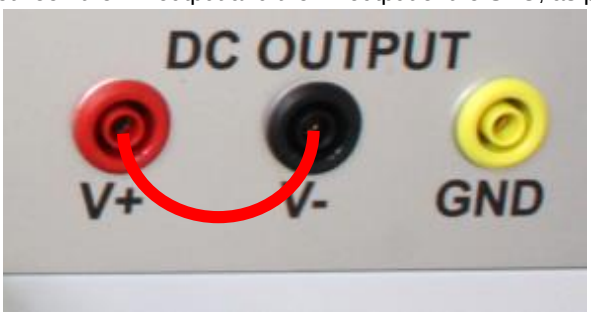
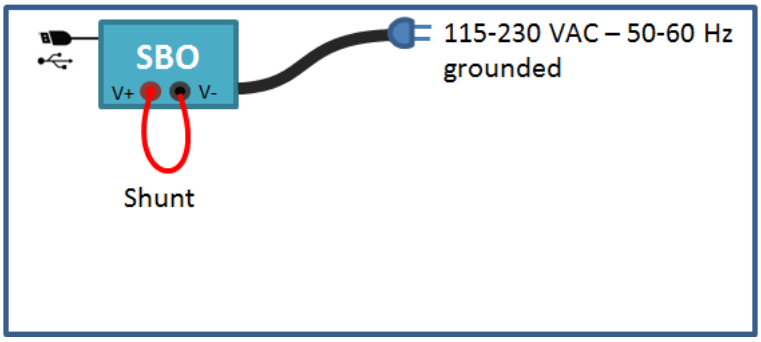


Figure 7

EE2000002000-A

Figure 8

- Confirm the area is clear of all personnel and all the connections are sound.



- Enable the SBO output by pressing the MAIN button (green light=on).
- Select the SBO CC test as per Figure 9 and then press the LAUNCH button.
  On the right of the window, you can check the status of the operations during the tests.

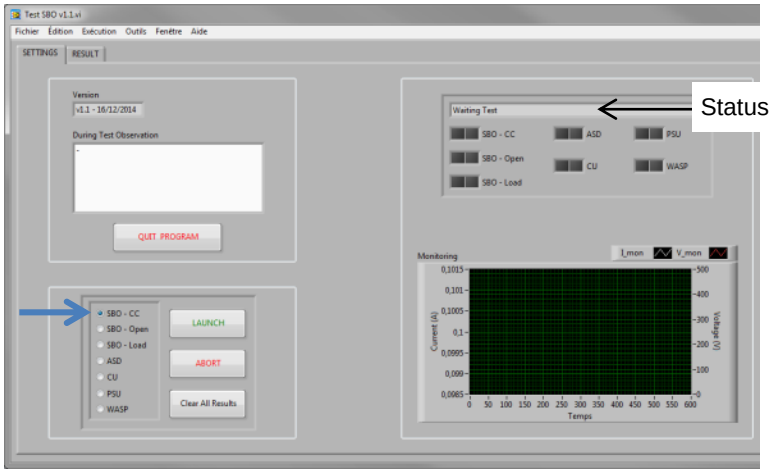


Figure 9

- The SBO CC test is progressing (~10 seconds). The expected values are:
  - Voltage 0-0.5 V
  - Current 2.5-2.8 A

Figure 10

- Green spot will confirm that the test is passed (Figure 11)

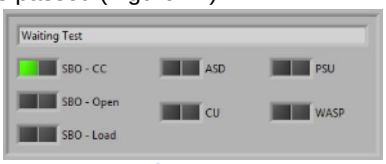


Figure 11

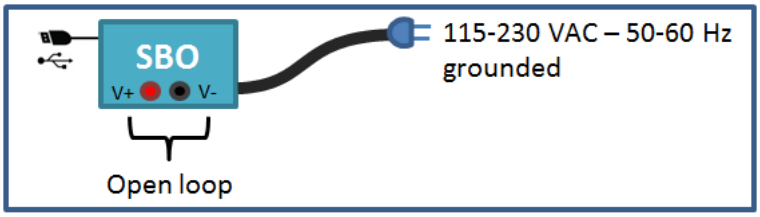
- In any case, disable the SBO output by pressing the MAIN button (light off).
- Remove the shunt between the V+ output and the V- output of the SBO.
- If the values are out of range (red spot), consult troubleshooting section or a supervisor.

4.3 SBO open test

- Ensure the SBO outputs have no connection as per Figure 12.

Figure 12

- Confirm the area is clear of all personnel.



- Enable the SBO output by pressing the MAIN button (green light=on).
- Select the SBO Open test in the software and then press the LAUNCH button
- The SBO Open test is progressing (~10 seconds). The expected values are:
  - Voltage 490-510 V
  - Current 0-0.1 A

Figure 13

- Green spot will confirm that the test is passed (Figure 14)

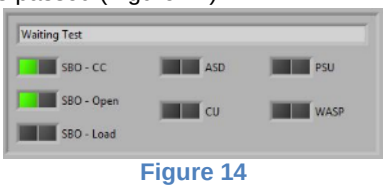


Figure 14

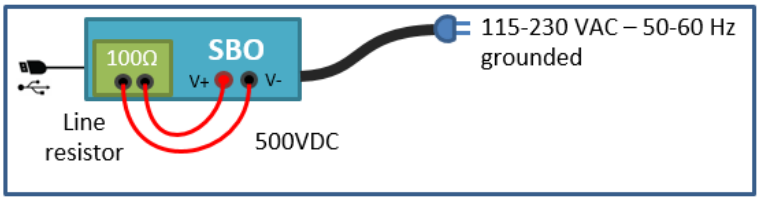
- In any case, disable the SBO output by pressing the MAIN button (light off).
- If the values are out of range (red spot), consult troubleshooting section or a supervisor.

4.4 SBO load test

- Connect the banana plugs of the line resistor to the SBO as per Figure 15.

Figure 15

- Confirm the area is clear of all personnel and all the connections are sound.



- Enable the SBO output by pressing the MAIN button (green light=on).
- Select the SBO Load test in the software and then press the LAUNCH button
- The SBO Load test is progressing (~10 seconds). The expected values are:
  - Voltage 250-270 V
  - Current 2.5-2.8 A

Figure 16

- In any case, disable the SBO output by pressing the MAIN button (light off).
- Green spot will confirm that the test is passed (Figure 17)

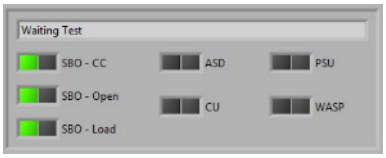


Figure 17

- Disconnect the resistor's connectors from the SBO.

If one of the tests fails (red spot), consult troubleshooting section or a supervisor.

Remove the power cable from the SBO and store it in a secure place before any operation

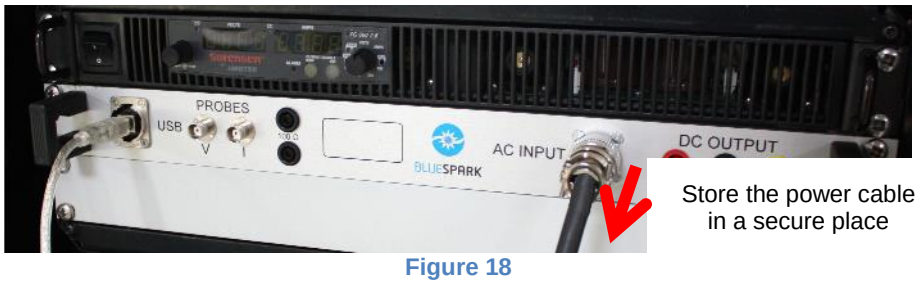


Figure 18

5 CUP SAFETY VERIFICATION

5.1 Preliminary CUP test

- Place the CUP on 2 tool stands.
- Remove the lower cap of the asset (Figure 19)

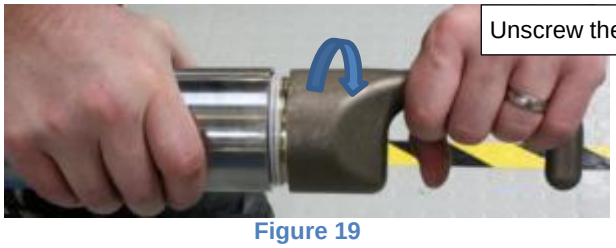


Figure 19

- Using the ohmmeter, measure the resistance between the output pin and the housing (Figure 20). The expected value is between 5 and 7 kΩ.

Figure 20

- Check the presence and the status of the electrical contact inside the lower cap (Figure 21). If it's not correct, replace it. Install only a clean lower cap on the CUP.

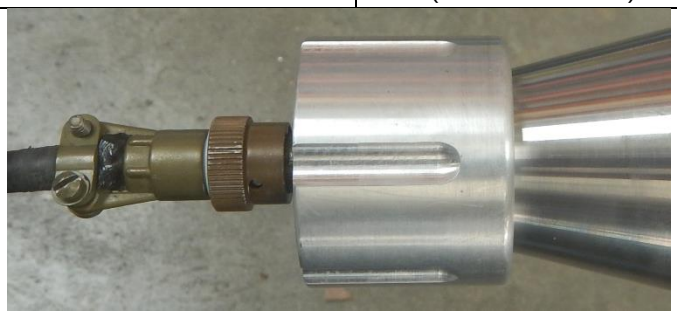
Figure 21

5.2 CUP preparation

On the CUP, remove the upper cap only.

Place a ground clamp (ML0100005000-A) around the CUP and hold the grounding braid (EE2000007100-A).

Hand tighten the TI test connector (IA9390005000-A) to the CUP.



Connect the cable to the connector.

Clamp MP0000004000-A

Fix the grounding braid to the building ground (screws and washers, clamps…). Ensure there's no paint or corrosion. Limit the length of the braid to 4 meters maximum.

- Connect the red banana of the cable in the V+ output and the black banana in the V- output.

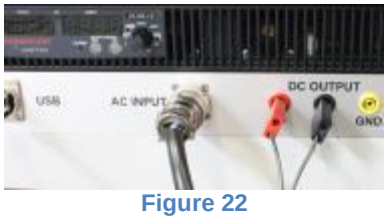
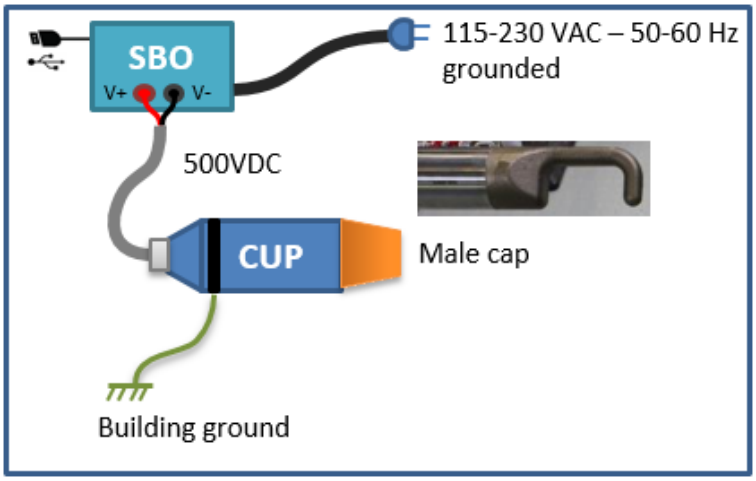


Figure 22

5.3 ASD test

- Confirm the area is clear of all personnel, all the connections are sound, and the lower tool cap is installed on the CUP.



Item	Legend	Picture	Part Number
	Grounding braid		EE2000007100-A
	TI TEST CONNECTOR		IA9390005000-C
	Grounding clamp		ML0100005000-A
	Male cap		IA0130001200-D
	USB cable► Computer		EE9000012000-A

- Enable the SBO output by pressing the MAIN button (green light=on).
- Select the ASD test as per Figure 23, and then press the LAUNCH button.

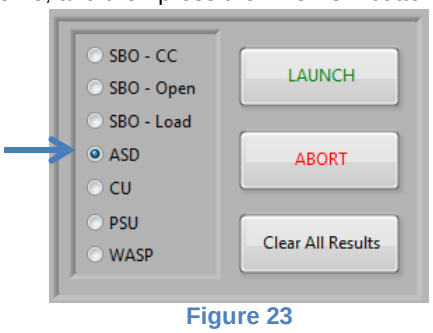


Figure 23

- A warning popup will appear as per Figure 24.

Figure 24

- By staying between 1 and 2 meters away from the CU, you should be able to hear the ASD relay switching every 2 seconds.

/!\ Electrical hazard. Always keep the safety distance from the asset.

- After 30 seconds, the test will stop and a popup will appear as per Figure 25.

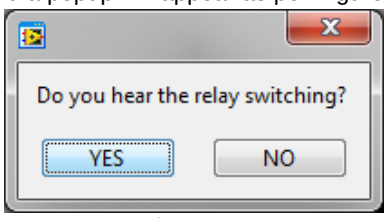


Figure 25

- Disable the SBO output by pressing the MAIN button (light off).

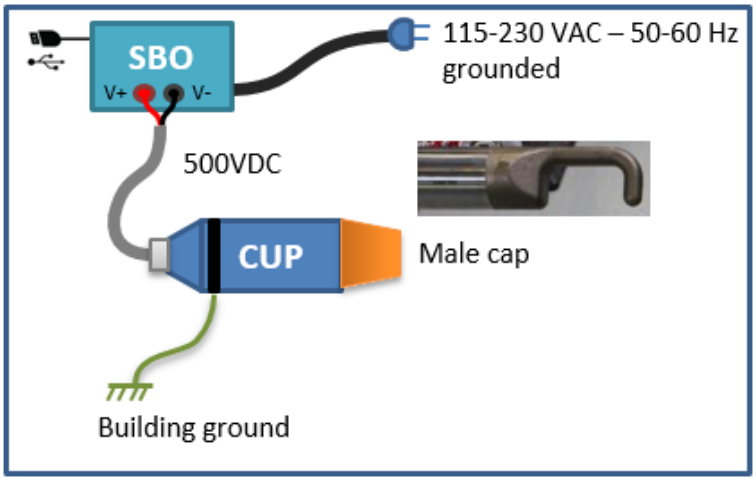
If the test fails, consult troubleshooting section or a supervisor.

Remove the power cable from the SBO and store it in a secure place before any operation

Figure 26

5.4 CU test

- Confirm the area is clear of all personnel, all the connections are sound, and the lower tool cap is installed on the CUP.



Item	Legend	Picture	Part Number
	Grounding braid		EE2000007100-A
	TI TEST CONNECTOR		IA9390005000-C
	Grounding clamp		ML0100005000-A
	Male cap		IA0130001200-D
	USB cable► Computer		EE9000012000-A

- Enable the SBO output by pressing the MAIN button (green light=on).

- Select the CU test as per Figure 27, and then press the LAUNCH button.

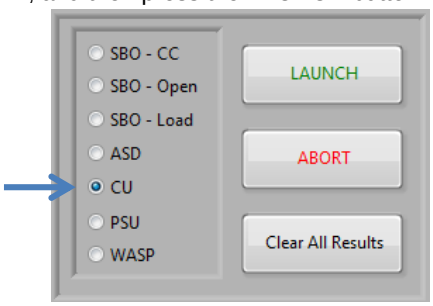


Figure 27

- A warning popup will appear as per Figure 28.

Figure 28

- By validating the popup, the CU test is progressing (~10 seconds).
- Green spot will confirm that the test is passed (Figure 29)

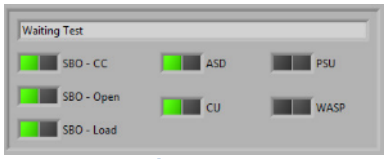


Figure 29

- In any case, disable the SBO output by pressing the MAIN button (light off).

If the test fails (red spot), consult troubleshooting section or a supervisor.

Remove the power cable from the SBO and store it in a secure place before any operation

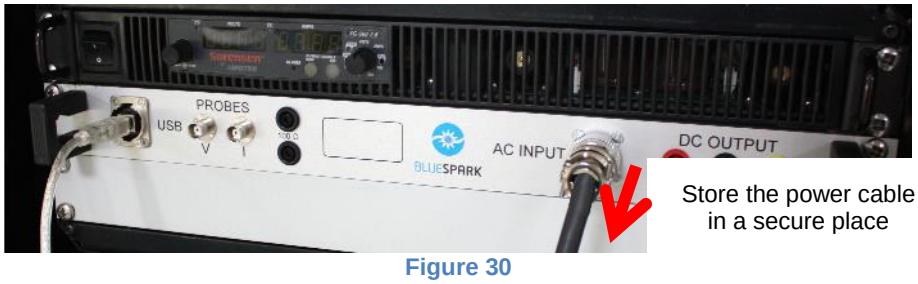


Figure 30

6 PSU TEST

6.1 Preliminary RED test

- Plug the red dolphin clip of the Megohmmeter on the output pin of the device.
- Plug the black dolphin clip of the Megohmmeter on the housing.

/!\ Electrical hazard. Ensure no one is in contact /around the device and the work space.

- Turn on the Megohmmeter and place on the 1000V scale. Press the measure button until the display is stabilized.

Figure 31

- The expected value is between 951 and 1051 MΩ
- Turn off and remove Megohmmeter clamps.

6.2 RED to CUP connection

- Connect the RED to the CUP paying attention to the key orientation.

	
Screw them together using the pin wrench 275 on the bronze collar	Connect the RED's to the "V" probe of the SBO

6.3 Preliminary PSD test

- Remove both caps of the asset.
- Plug the red dolphin clip of the Megohmmeter on the output pin of the device.
- Plug the black dolphin clip of the Megohmmeter on the housing.

/!\ Electrical hazard. Ensure no one is in contact /around the device and the work space.

- Turn on the Megohmmeter and place on the 1000V scale. Press the measure button until the display is stabilized. The expected value is between 63 and 70 MΩ

Figure 32

- Turn off and remove Megohmmeter clamps.
- Record the value in the "Manual Meas." popup of the software. If the value is out of range (red spot), consult troubleshooting section or a supervisor.
- Using a standard ohmmeter, check the continuity across the device. The expected value must be <0.5 Ω

Figure 33

- Record the value in the "Manual Meas." popup of the software. If the value is out of range (red spot), consult troubleshooting section or a supervisor.

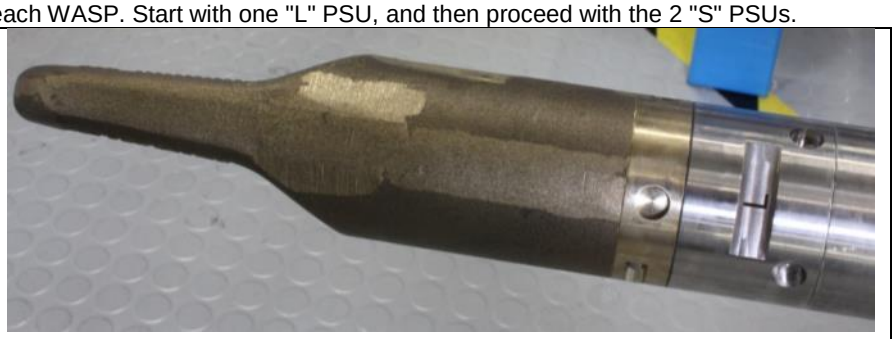
6.4 PSD to RED connection

- Connect the PSD to the RED paying attention to the key orientation.
- Screw them together using the pin wrench 275 on the bronze collar as per Figure 34.

Figure 34

6.5 Preliminary PSU test

There are two versions of PSU for each WASP. Start with one "L" PSU, and then proceed with the 2 "S" PSUs.

	
Remove the lower cap.	Remove the upper cap using the C-spanner wrench 275 (IP0938002000-A)

		
Using the sticks to short-circuit the asset.	Using HV gloves, connect the HV probe's ground dolphin to the PSU housing.	Use the HV probe from the multimeter to confirm the absence of voltage at the pin.

- Using a multimeter, measure the capacitance of the device between the pin and the housing as per Figure 35. The expected value is between 770 and 830 nF.

Figure 35

- Record the value in the "Manual Meas." popup of the software. If the value is out of range (red spot), consult troubleshooting section or a supervisor.

6.6 PSU-L to PSD connection

- Connect the PSU-L and the PSD paying attention to the key orientation.
- Screw them together using the pin wrench 275 on the bronze collar as per Figure 36.

Figure 36

6.7 PSU to PSU connection

- Check the first PSU-S as per chapter 6.5.
- Connect the PSU-S with the PSU-L.
- Repeat this operation for the second PSU-S.
- Connect a female test plug without HV cable to the third PSU as per Figure 37.

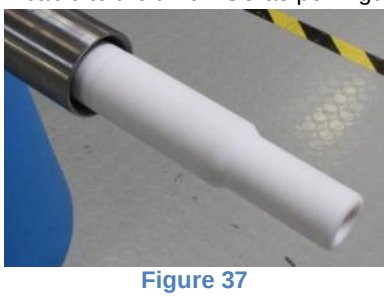
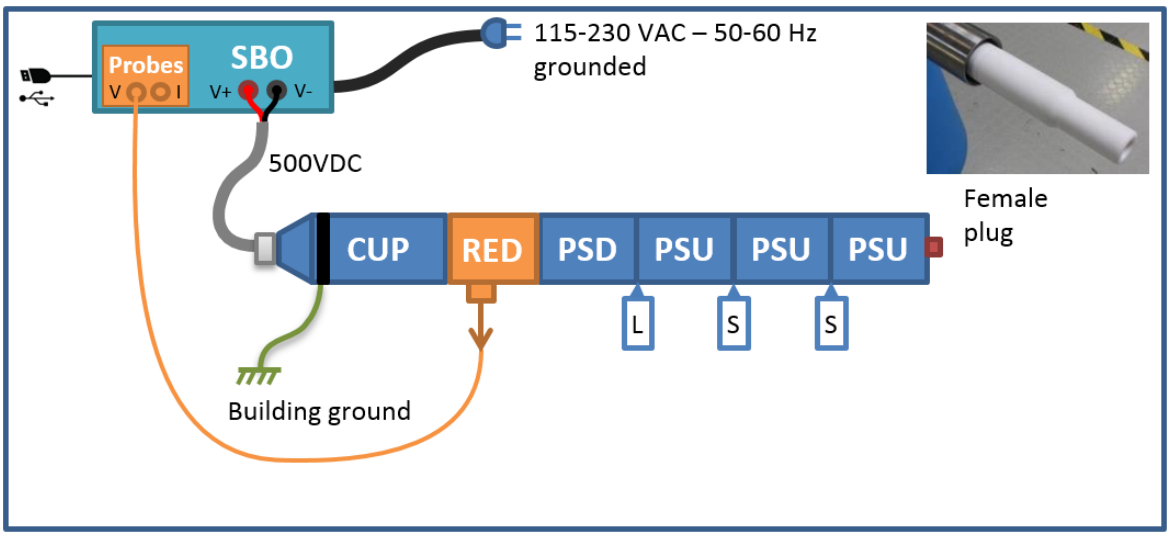


Figure 37

6.8 PSU Test

- Verify all the connections are secure and that the area is clear of all personnel.



Item	Legend	Picture	Part Number
	Grounding braid		EE2000007000-A
	TI TEST CONNECTOR		IA9390005000-C
	Grounding clamp		ML0100005000-A
	Female test plug		IA9293003000-B
RED	RED ► Probe V		IA9239001000-B
	USB cable► Computer		EE9000012000-A

- Enable the SBO output by pressing the MAIN button (green light=on).
- Select the PSU test in the software, and then press the LAUNCH button.

- A warning popup will appear as per Figure 38.

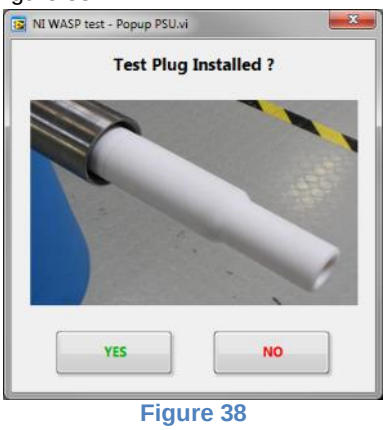


Figure 38

- By validating the popup, the PSU test is progressing (~65 seconds). High and low voltage boundaries of the CU are checked, as well as discharge time into the PSD, and PSUs status (abnormal load time).
- Green spot will confirm that the test is passed (Figure 39)

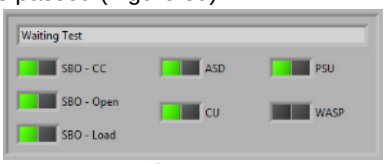


Figure 39

- In any case, disable the SBO output by pressing the MAIN button (light off).

If the test fails (red spot), consult troubleshooting section or a supervisor.

Remove the power cable from the SBO and store it in a secure place before any operation

Figure 40

7 WASP COMPLETE TEST

7.1 PWX and Current probe

- Unplug the Female test plug from the PSU

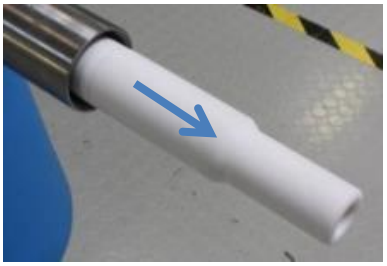


Figure 41

Using the sticks to short-circuit the asset.

Using HV gloves, connect the HV probe's ground dolphin to the PSU housing.

Use the HV probe from the multimeter to confirm the absence of voltage at the pin.

Remove both caps from the PWX.
Connect the PWX to the PSU.

Connect the Current probe 275 (IA9330003200-C) to the PWX.
Connect the BNC to the "I" probe on the SBO.

7.2 Preliminary DUL test

- Remove the cap of the asset.
- Using a multimeter, measure the resistance of the DUL between the pin and the body as per Figure 42. The expected value must be <1 Ω.

Figure 42

- Record the value in the "Manual Meas." popup of the software. If the value is out of range (red spot), consult troubleshooting section or a supervisor.

7.3 DUL to current probe connection

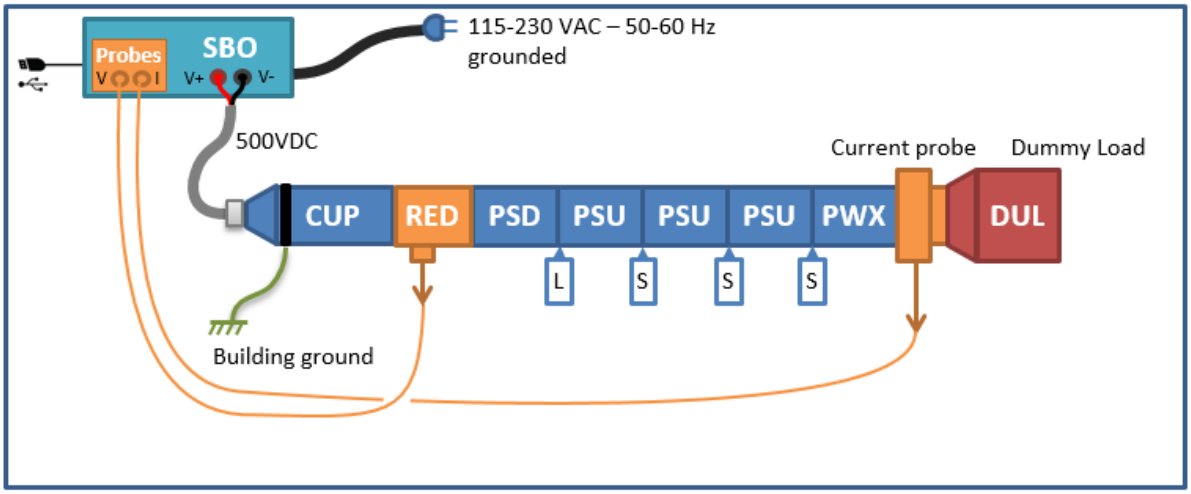
- Connect the DUL to the current probe paying attention to the key orientation.
- Screw them together using the pin wrench 275 on the bronze collar as per Figure 43.

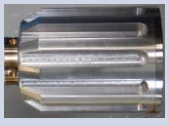
Figure 43

7.4 WASP Test

Do not proceed to more than 100 shots (one complete test) without cooling down the DUL. After every complete test (100 shots), the DUL must cool down for 30 minutes at ambient temperature (45 °C maximum) before using it again.

- Verify all the connections are secure and that the area is clear of all personnel.



Item	Legend	Picture	Part Number
	TI TEST CONNECTOR		IA9390005000-C
	Grounding braid		EE2000007000-A
	USB cable► Computer		EE9000012000-A
	Grounding clamp		ML0100005000-A
RED	RED ► Probe V		IA9239001000-B
	Current probe ► Probe I		IA9230003200-C
DUL	DUmmy Load		IA9330002000-B

- Select the WASP test in the software, and then press the LAUNCH button.
- Enable the SBO output by pressing the MAIN button (green light=on). The WASP test is progressing (~7 minutes).
- Green spot will confirm that the test is passed (Figure 44)

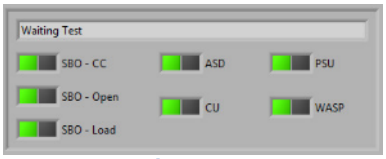


Figure 44

- In any case, disable the SBO output by pressing the MAIN button (light off)

If the test fails (red spot), consult troubleshooting section or a supervisor.

Remove the power cable from the SBO and store it in a secure place before any operation

Store the power cable in a secure place

Figure 45

- Press the QUIT PROGRAM button in the software. This will save the report file in the path mentioned above.
- Switch off the power supply.

8 AFTER TESTING

8.1 Surface box

- Verify that the power supply is powered off.
- Disconnect the SBO from the main power.
- Remove the power supply cable from the SBO.
- Disconnect the cable between SBO and CUP (let the cable on the CUP).
- Remove the USB cable between SBO and computer.
- Store the cables into the SBO and lock the covers.

8.2 CUP cable

- Disconnect the power cable from the top of the CUP
- Install the cap on the CUP
- Store the cable into the Safety-Common box.

8.3 Measurement equipment

- Disconnect the BNC cables from the SBO, RED and Current Probe
- Store the BNC cables into the Safety-Common box.
- Store the Megohmeter into the Field Tool Box

8.4 WASP Disassembly

- After checking its outside temperature make it handleable, remove the DUL from the WASP. Install its cap and store in the WASP 275 Test Box.
- Remove the current probe. Install a cap on the BNC plug (Figure 46) and store in the WASP 275 Test Box.

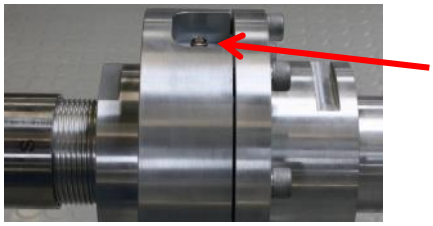


Figure 46

- Remove the PWX from the WASP.
- Install the caps on the PWX and store the asset.

		
Use the sticks to short-circuit the PSU	Using HV gloves, connect the HV probe's ground clip to the housing of the PSU	Use the HV probe from the multimeter to confirm the absence of voltage into the PSU

- Install a male cap on the PSU
- Disconnect the asset
- Install a female cap on the PSU and store the asset.

Do not install directly a male cap on the upper asset, use the sticks to short circuit the PSU as described above.

- When all the PSUs are stored, install a male cap on the PSD.
- Disconnect the PSD. Install a female cap on the PSD and store the asset.
- Install a male cap on the RED.
- Disconnect the RED. Install a female cap on the RED and store the asset.
- Install a male cap on the CUP, remove ground cables and store the asset
- Dismount the sticks and store them in the Safety-Common Box.

9 TROUBLESHOOTING

	Problem	Possible cause	Solution
SBO test	The test doesn't run	Power supply is not running	Press the MAIN button
	SBO CC test fails	The shunt cable is out of order Failure of the power supply	Replace shunt Replace SBO
	SBO open test fails	Failure of the power supply	Replace SBO
	CU BT test fails	Failure of the power supply	Replace SBO
CU test	ASD test fails	The relay of the ASD is out of order	Replace CUP
	CU BT test fails	The CUP is out of order	Replace CUP
PSU test	PSU test fails	Communication problem with SBO	Check USB cable and shielding.
	PSU test fails	The probe is not connected	Verify RED's connectivity
	PSU test fails	The PSD is out of order	Replace PSD
	PSU test fails	a PSU is out of order	Replace the upper PSU first. **Short circuit every PSU!**
WASP test	WASP test fails	PWX is set too high	Try with an PWX set for ambient temperatures
	WASP test fails	voltage output is out of range	PWX's setting is incorrect
	WASP test fails	a PSU is out of order	Replace the upper PSU first. **Short circuit every PSU!**
	WASP test fails	poor stability of the PWX	Change PWX