



OPERATING MANUAL

DDA55+ EXTERNAL SWITCHING OPERATIONS BOX

AFJ SW04

REVISION LEVEL 4.7
© AFJ Instruments 2023

WARNING!

THE AFJ SW04 SWITCHING BOX IS A VOLTAGE OPERATED ELECTRICAL DEVICE, WHICH IS DANGEROUS TO LIFE. FOR THIS REASON ONLY TRAINED PERSONNEL ACQUAINTED WITH THE DANGERS CONNECTED WITH THIS SHOULD PUT THIS DEVICE INTO OPERATION.

LIKEWISE, SERVICE AND REPAIR WORK MAY ONLY BE CARRIED OUT BY PERSONS, PLEASE INFORM THE MANUFACTURER AND STATE THE SERIAL NUMBER OF THIS DEVICE IN CORRESPONDENCE IN THIS REGARD.

SW04 SHALL BE USED IN CONJUNCTION OF A **LISN**, AND MUST BE CONNECTED TO EARTH BEFORE IT IS CONNECTED TO THE MAINS.

SINCE THE USAGE OF LEAK CURRENT SWITCHES ON THE AC LINE POWERING A LISN IS NOT POSSIBLE, AN ISOLATION TRANSFORMER MUST BE INTERPOSED BETWEEN THE MAINS AND THE LISN ITSELF.

NOTICE:

The AFJ SW04 is supplied in proper special packaging due to its heavy weight. We strongly recommend you to save packaging for next transport.

ELECTRICAL SHOCK FIRST AID PROCEDURE

Before touching a person being electrocuted break, first switch off power supply or send away, using a non-conductive object, the wire or the part under HV in contact with the person is electrocuted. Then immediately the first aid electrical shock procedure must start.

If the victim doesn't breath, or its heart doesn't beats, immediately the electrical shock first aid procedure must be applied.

A. If the victim doesn't breath, proceed as follows:

1. Lay down on the back on a solid surface like ground or pavement (not bed or sofa), the person being electrocuted
2. Fold the head of the victim backwards keeping it straight. Lift the neck as much as possible towards height (to avoid tongue obstruct the breath way).
3. Open the mouth and lean resolutely on the mouth of the person being electrocuted and simultaneously close the nostrils with two fingers.
4. Blow into the mouth (or in to the noose, closing the mouth), in steady way until its thorax lift up again.
5. Remove the mouth to consent the victim to breath passively and observe if its thorax go down.
6. Repeat the cycle, with a rhythm of a breath every 5 second.

NOTE

If do not succeed in entering air into the victim respiratory system, check quickly the head position and the perfect air tight around the mouth.

If subsequent endeavor still doesn't succeed, put the fingers into the mouth and in the throat, to remove intruding parts.

If the helper doesn't succeed to remove intruding parts, turn the victim on a side and beat some dryly stroke between the shoulders blade, to release the respiratory channel.

After four quick breaths, stop and check if the heart beat regularly, feeling if carotid rhythm.

If the heart beat, start again the mouth breathing until victim start to breath.

B. If the carotid beating is absent or uncertain, supply the artificial circulation, through an external cardiac compression.

1. Lean the palm of the hand in the lower half of the breastbone and the other hand upon it.
2. Push down with the shoulders movement, with sufficient strength to compress the breastbone of about 4 to 5cm.
3. Lift immediately the hands after each compression to consent the natural thorax expansion
4. Repeat the compression at a rhythm of about one per second. Compression should be regular constant and uninterrupted. If the helper is alone with the victim he may alternate the mouth breath with the external cardiac compression at the rate of 2 breaths followed from 15 cardiac compressions. If the helper may be supported, the rates are of 5 cardiac compression for each breath; however after 5 cardiac compression, ASK FOR HELP. Go on with one or both method until the victim has been taken into the hospital.

After the person being electrocuted start again to breathe, check carefully about an eventual physical shock happened. The physical sock is a collapse state or prostration that interferes against the normal function of the nervous system; the symptoms are: feeble beats, cold feeling, sickness and pallor. To oppose the shock:

1. Stretch out the victim, if possible with the head lower than the foots;
2. Loosen the garments;
3. Make sure that victim has plentiful breathable air around.
4. Wind the victim with a quilt or garments as soon as possible, keeping the patient warm and calm waiting for aid arrival.

GENERAL INFORMATION

The information contained herein, are provided in connection with the usage of **AFJ SW04/32** and **AFJ SW04/100 switching boxes** only.

Such information is property of AFJ Instruments, Milan, Italy, and cannot be duplicated, copied or reproduced in whole or part, without prior written consent of the owner:

AFJ Instruments, Via Gavirate 16, 20148 – Milan, Italy

Phone: +39 02 91434850

E-mail: sales@afj-instruments.com

Website: www.afj-instruments.com

All information contained herein, are subject to change without prior notice.

All efforts have been made to ensure the accuracy of the contents of this document. However, the supplier can assume no liability whatsoever for any errors in this manual or their consequences, direct and/or indirect.

WARRANTY

Systems, options and accessories thereof, manufactured and shipped under the AFJ Instruments brand name, are warranted to be free from manufacturing defects for a period of twelve (12) months from the date of shipment.

AFJ Instruments certifies that all products are tested and inspected to comply with the published specifications originating from the Company. All calibration measurements are traceable to an independent Test House.

The Warranty is provided “Ex-Works”: therefore, AFJ Instruments will be responsible of the amendment of failures arising from ascertained manufacturing defects only.

The Warranty will not be applicable in case of mishandling, unauthorized opening of the cabinets, improper use, and unauthorized repairs. In such cases, the warranty will be terminated.

A repair under warranty will not extend the original term of validity of the warranty itself.

All products or parts thereof, to be subject to a warranty operation, shall be shipped to the appropriate AFJ Instruments Warranty Center, at Customer’s charge.

All information in this manual is given in good faith: However, AFJ Instruments shall not be liable for any loss or damage whatsoever, arising from the use of this manual, the products described herein, or any error or omission in either. All information contained herein, are subject to change without prior notice.

WORKING CONDITIONS

The allowed temperature range during use of the device is +0°C to +45°C. In cases of storage or transport this range may exceed by -20°C to +70°C.

It is possible that condense water originates inside the device due to storage or transport conditions. In this case realize a period of 2 hours for acclimatize without use.

The AFJ SW04 is to use in dry and clean rooms. Avoid conditions like dust, air-humidity, danger of explosion and aggressive chemical environment. During use a sufficient air circulation is to realize.



CE MANUFACTURER DECLARATION OF CONFORMITY

Manufacturer AFJ INSTRUMENTS SRL
Via Gavirate 16
20148 Milano
Italy

Product Types Switching Boxes models SW04/32 and SW04/100

We hereby declare that the aforementioned equipment complies with the requirements set out in the Council Directive on the Approximation of the Law of Member States relating to:

- Electromagnetic Compatibility, Directive 2014/30/EC
IEC 61326-1 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements
 - IEC 61326-1 Class B (Emission)
 - IEC 61326-1 (Immunity, laboratory)
- Low Voltage Equipment Directive (2014/35/EC) and EN 61010-1 ("Safety of Electrical Measuring Apparatus").



UKCA DECLARATION OF CONFORMITY

Manufacturer	AFJ INSTRUMENTS SRL Via Gavirate 16 20148 Milano Italy
Product Types	Switching Boxes models SW04/32 and SW04/100

We hereby declare that the aforementioned equipment complies with the relevant requirements of the below referenced specifications. The unit complies with all applicable essential requirements of the directives.

Electromagnetic Compatibility Regulations 2016

Electrical Equipment (Safety) Regulations 2016

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

EN 61326-1:2021 Electrical equipment for measurement, control and laboratory use – EMC requirements - Part 1: General requirements

- EN / IEC 61326-1 Class B (Emission)
- EN / IEC 61326-1 (Immunity, Laboratory)

EN 61010-1:2010 Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements

AFJ SW04 – SWITCHING BOX OPERATING MANUAL

TABLE OF CONTENTS

SECTION A:	GENERAL INFORMATION	PAGE:	8
	• Safety		8
	• Return Procedure		
SECTION B:	TECHNICAL DESCRIPTION	PAGE:	9
	• General		9
	• Technical Specifications		10
	• AFJ SW 04/32 Front Panel Functional Layout		11
	• AFJ SW 04/32 Rear Panel Functional Layout		12
	• AFJ SW 04/100Front Panel Functional Layout		13
	• AFJ SW 04/100 Rear Panel Functional Layout		14
SECTION C:	AFJ SW04 SETUP	PAGE:	15

SECTION A: GENERAL INFORMATION

SAFETY

This device was built and tested according to CISPR 16-1-1 and CISPR 14-1. AFJ SW04 has been supplied from the factory in a technical faultless state.

AFJ SW04 may use only on power supplies secured by fuses with prescribed safety devices.

With no safety condition as:

- Device with visible damages
- Device with loosed parts
- Device not working
- Device after storage under bad conditions (in humid or dirty rooms)

It is not allowed switch on any devices.

If a delivery back to the supplier is necessary we recommend keeping the original transport case. In such case, refer to the following Return Procedure.

RETURN PROCEDURE

To return the AFJ SW04 to AFJ Instruments, use the following procedure:

- Briefly describe the problem in writing (Service Requested form). Include the serial number of the item being returned;
- Give details regarding the observed symptom(s), and whether the problem is constant or intermittent in nature. If you have talked previously to AFJ representative about the problem, provide such information also;
- Package the unit carefully, using the original boxes and packing materials, if possible. If not, use the most protective envelope at disposal (Damages due to transport are not covered from any guarantee);
- Before return the system back to AFJ, wait for RMA number (Returned Material Authorization).

SECTION B: TECHNICAL DESCRIPTION

GENERAL

In order to get reliable and comparable test results versus the provisions set forth by the European and International regulating Authorities, when measuring distortion signals generated by the EUT and injected into the mains through its power cord, standardized and reproducible test conditions must be used.

Since the power of the EUT generated distortion signals, can be compared to the acceptable standards by measuring the signal amplitude across known impedance, an ARTIFICIAL MAINS NETWORK CIRCUIT (also called LISN, Line Impedance Stabilization Network), is used.

LISN, in conjunction with EMI receiver, has to be used to measure conducted emission measurement, both continuous and discontinuous (CLICK).

Moreover, as stated by **EN55014-1 (CISPR 14-1)**, some EUT covered by such standard have to be tested following the switching operation counting, being "the switching operation" one opening or one closing of a switch contact, independent of whether clicks are observed or not.

Examples of appliances for which the click rate N is derived from the number of Switching Operation are:

- **Thermostats;**
- **Refrigerators;**
- **Cooking ranges with automatic plates;**
- **Irons;**
- **Sewing machine speed controls;**
- **Dental drills;**
- **Slide projector change device.**

The AFJ SW04 has been developed for measurement of line-bound interference's according to CISPR 14-1 and CISPR 16-1-1. The construction uses air coils in the current path in order to avoid saturation effects with high current strengths.

The AFJ SW04 is used for the measurements in connection with the AFJ DDA55+ click analyser and any LISN brand. The continuous current load-bearing capacity is ensured by the use of large wire cross-sections for the coils. For a short period (10 minutes), twice as high currents are admissible.

The compact form of construction, despite the high current-bearing capacity, makes easy use of the AFJ SW04 for the measurement of high currents directly at the piece of use of the consumer possible. In this way, measurements of mains-borne interference's can be carried out under conditions corresponding to practice.

AFJ SW04 TECHNICAL SPECIFICATIONS

(Technical data are subject to change)

N° of lines	3 + N (L1, L2, L3, N)
Max. rated current	32A or 100A each line
Max. AC line voltage N - Lx	250V AC / 150V DC or 450V AC / 300V DC
Operating power supply	110 or 230 or 380Vac 50/60Hz
Power consumption	Max. 50VA
Interface	DB15 M/F for AFJ equipment

General Data:

Rated temperature	0°C to 45°C
Storage temperature	-20°C to +70°C
Dimensions (W x L x H)	SW04/32: 510 X 340 X 180 mm SW04/100: 510 X 340 X 180 mm
Weights	SW04/32: 2.7kg SW04/100: 4kg

AFJ SW04 supplied accessories:

- 1 x 230Vac Schuko standard power cord
- 2 x 1A fuse
- 1 x DB15 M/F terminated control cable
- 1 x 1.5m power cable (4 lines + PE) CEKON female terminated
- 1 x Certificate of calibration
- 1 x Packing list
- 1 x Service request form
- 1 x user application note

AFJ SW04/32 FRONT PANEL FUNCTIONAL LAYOUT (Reference only)

FRONT PANEL SKETCH

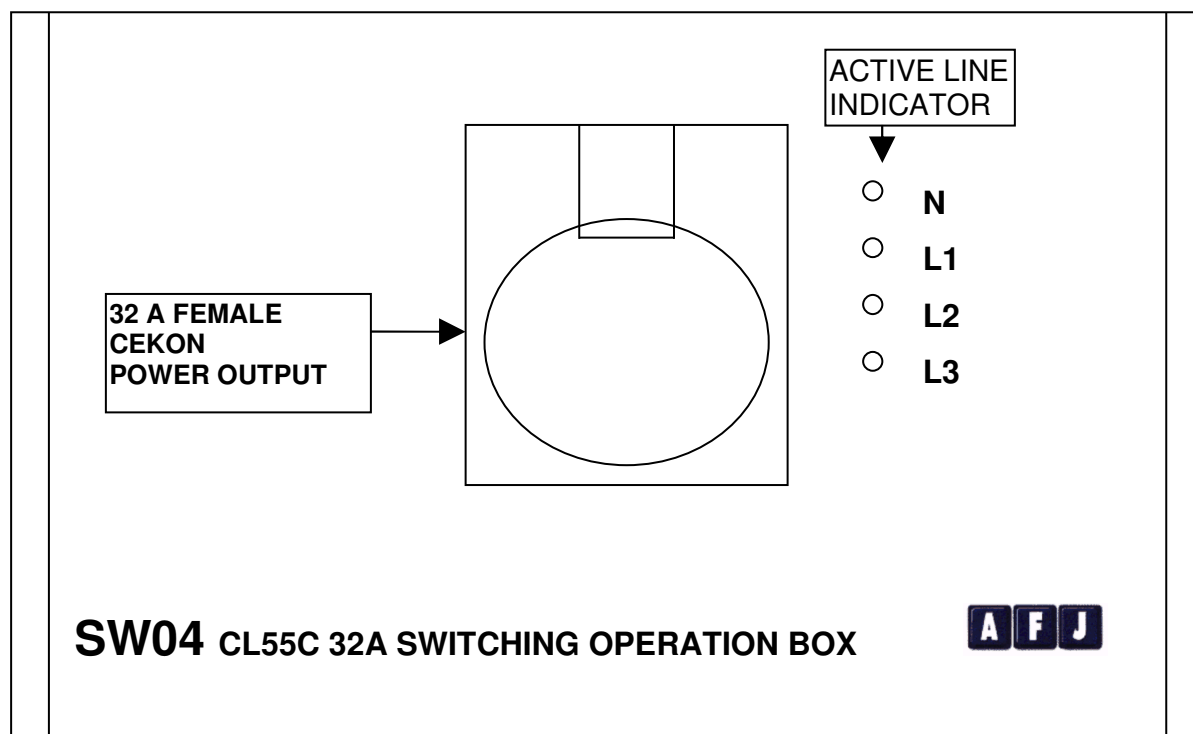


Fig. B.1



AFJ SW04/32 REAR PANEL FUNCTIONAL LAYOUT

(Reference only)

REAR PANEL SKETCH

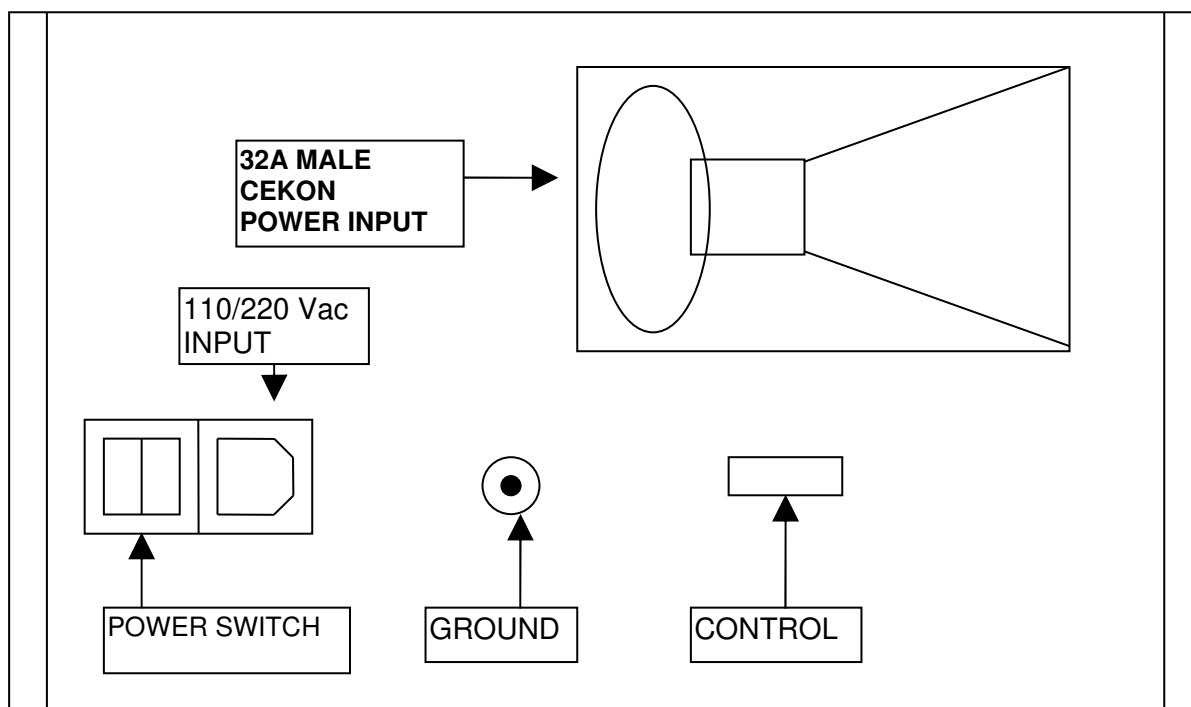


Fig. B.2



AFJ SW04/100 FRONT PANEL FUNCTIONAL LAYOUT

(Reference only)

FRONT PANEL SKETCH

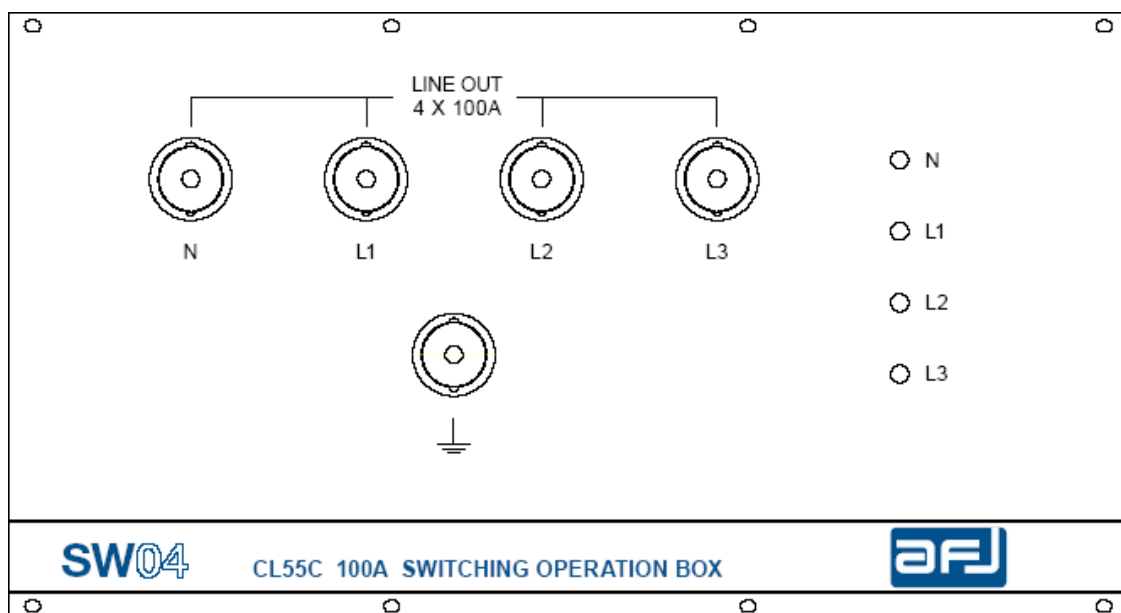


Fig. B.3



AFJ SW04/100 REAR PANEL FUNCTIONAL LAYOUT (Reference only)

REAR PANEL SKETCH

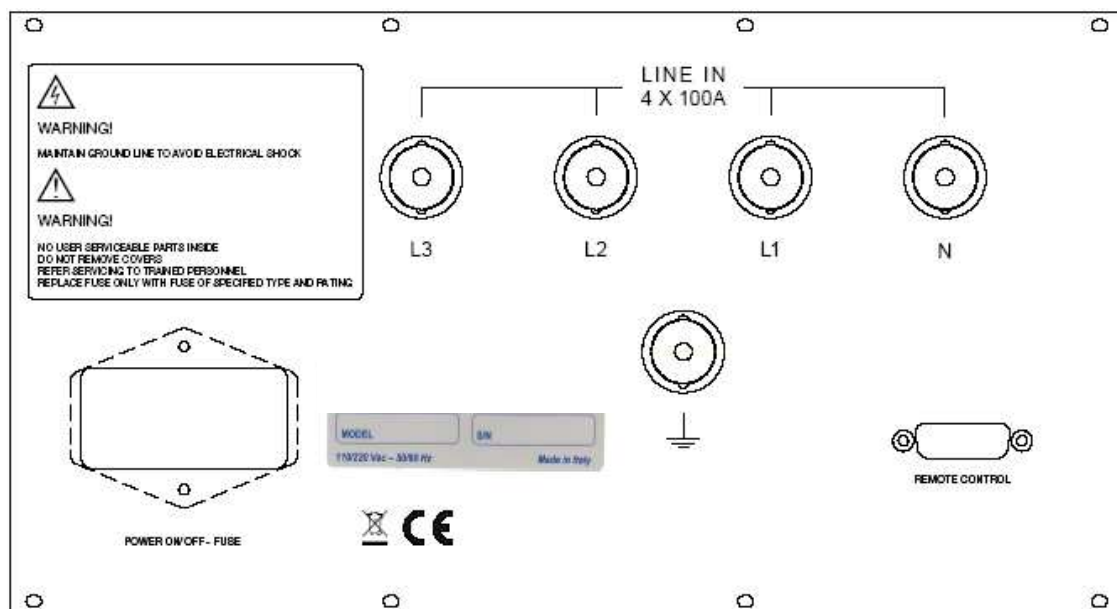


Fig. B.4



SECTION C: AFJ SW04 SET UP

In setting-up the AFJ DDA55+ - AFJ SW04 – LISN – EUT configuration to perform a test, please strictly adhere the following information.

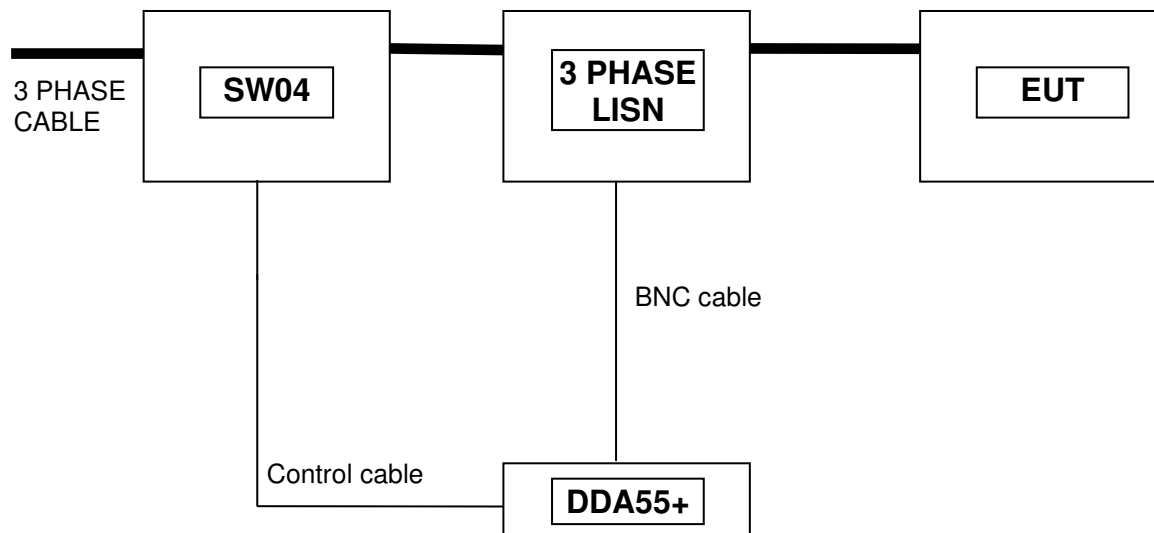


Fig. C.1

! WARNING !
CONNECT ALL EQUIPMENT IN THE TEST SETUP TO A HIGH QUALITY GROUND AS A FIRST STEP.

NOTE 1: AFJ SW04 IS PLACED BEFORE THE LISN TO AVOID UNCONTROLLED LINE IMPEDANCE VARIATION. THIS RESULTS IN NON ZERO MEASUREMENT, EVEN WITHOUT EUT CONNECTED, SINCE THE LISN ITSELF IS A LIGHT LOAD. THIS DOESN'T AFFECT THE PROPER OPERATION OF THE AFJ SW04 DEVICE.

NOTE 2: BE CAREFUL TO KEEP PIN-TO-PIN CONNECTION IN THE SW04 TO LISN POWER CABLE. THIS WILL ENSURE CONSISTENT MEASUREMENT.

PUTTING INTO USE:

1. Connect all equipment to a proper ground,
2. Connect the control cable between AFJ DDA55+ and SW04,
3. Connect the interface cable between AFJ DDA55+ and the PC,
4. Connect the EUT power input to the LISN power output,
5. Connect the LISN power input to the AFJ SW04 power output,
6. Connect the AFJ SW04 power input to the mains power outlet (NOTE: power supply must be isolated from safety differential switches by means of an insulation transformer),
7. Switch the AFJ SW04 and LISN power-on, and power-on the test equipment,
8. Connect the AFJ DDA55+ BNC 50Ω coaxial input, to the LISN BNC 50Ω coaxial output through appropriate coaxial cable
9. Using the AFJ DDA55+ software, select the appropriate line in which the current is going to be measured. This is accomplished by considering the SW04 box as an AFJ LISN, so follow related chapter in AFJ DDA55+ operating manual. This line should be the same as the one selected on the LISN.

The AFJ DDA55+ - AFJ SW04 – LISN – EUT configuration showed above is referred to a typical **3 phase test set up**.

For making single phase test it is necessary to provide an adapter for connecting three phase AFJ SW04 to single phase LISN. In this way AFJ SW04 can work with a single phase LISN (any brand): the figure below shows a typical **single phase test set up**.

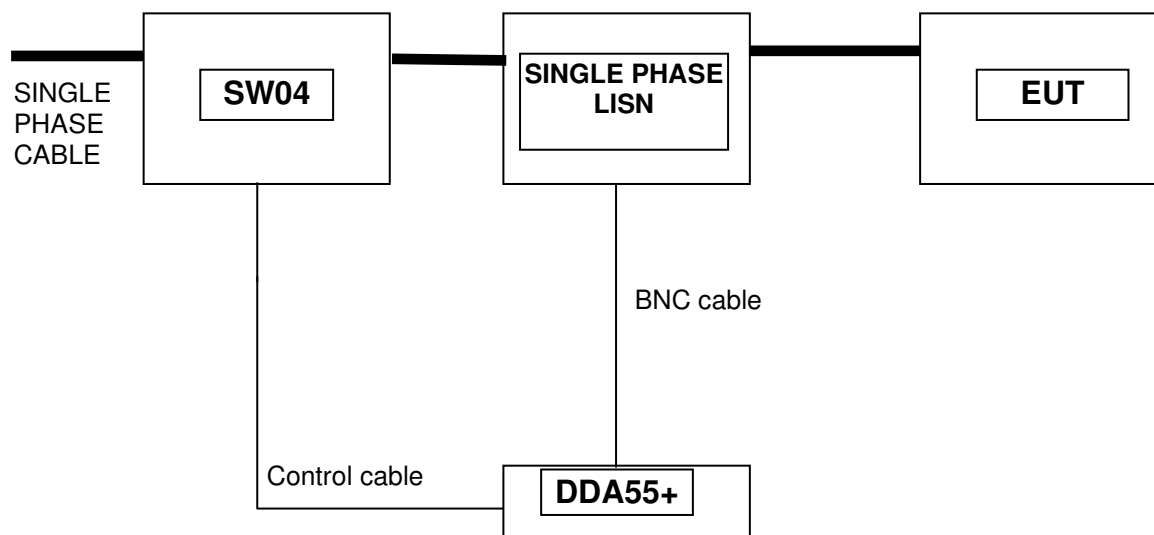
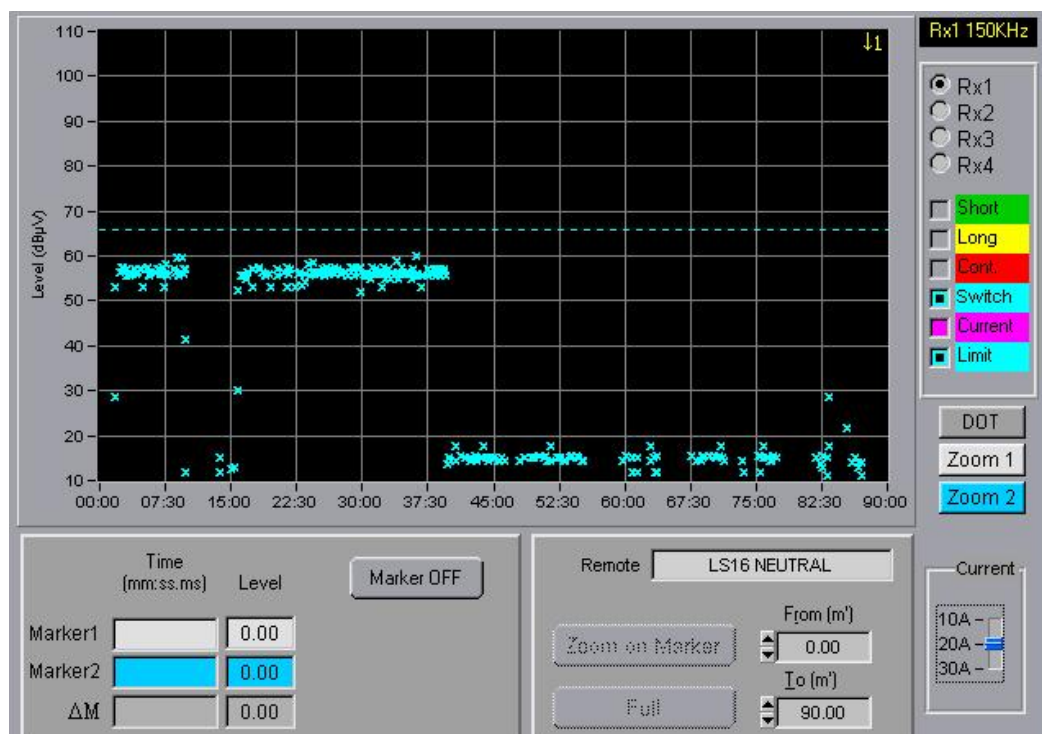
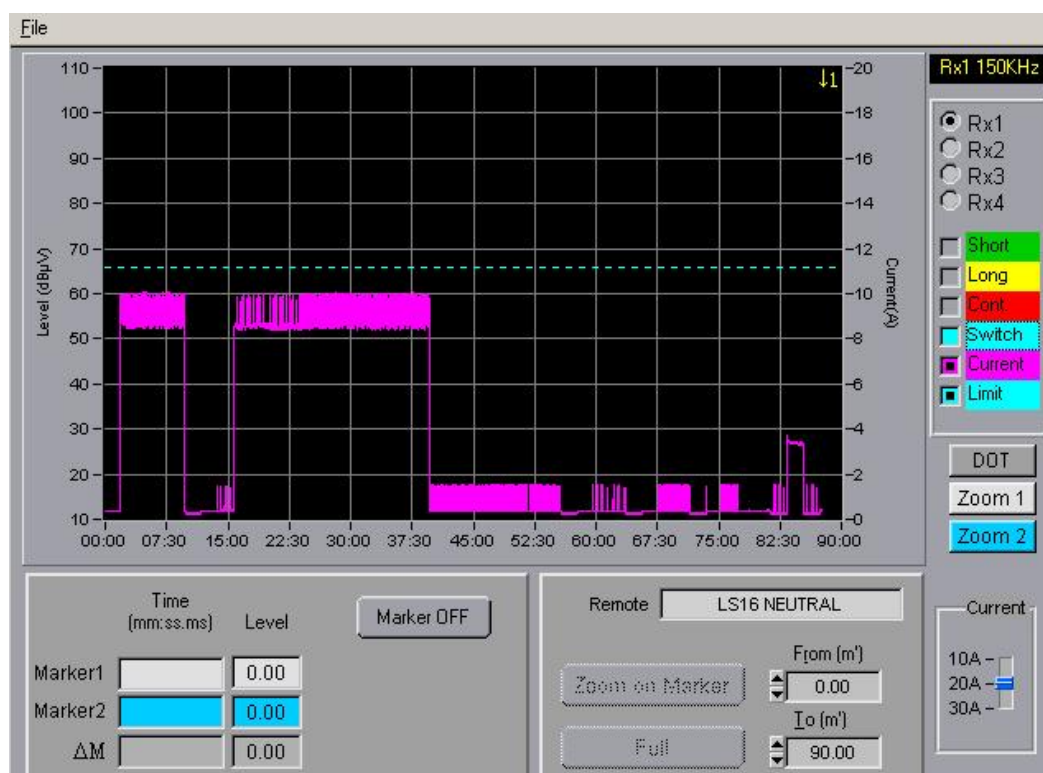


Fig. C.2

Example of AFJ DDA55+ - AFJ SW04 - LISN system, switching operation measurement report:



Switching Operation display



Current Absorption display