3P-Active GT / Machine

A 1322

3P-Active GT / Machine Plus

A 1422

Instruction manual

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CE Mark on your equipment certifies that it meets requirements of all subjected EU regulations.

Hereby, Metrel d.d. declares that the A 1322, A 1422 is in compliance with subjected EU directive. The full text of the EU declaration of conformity is available at the following internet address https://www.metrel.si/DoC.

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1 Preface

Congratulations for purchasing and using METREL 3P-Active GT / Machine (Plus) adapter accessory with METREL test and measuring instruments.

The A 1322 / A 1422 enables testing of different types of three-phase electrical equipment.
Features:

- All tests on 3-phase electrical equipment can be carried, including live leakage tests, power, portable RCD testing and polarity + active polarity test,
- Simple connection to the PAT tester,
- Simple test procedures, same as for single phase equipment,
- Adapter is compatible with most of METREL PATs and machine testers,
- A 1322 can be supplied from both 1-phase or 3-phase earthed power supply systems.

In addition, A 1422 enables testing of electrical safety of welding machines according to IEC / EN 60974-4:

- All appropriate tests (continuity of protective circuit, insulation tests, leakage and touch leakage tests, no-load voltage test) on 1 and 3-phase welding machines can be carried out.

Highlights:

- Support for new types of PRCDs and PRCD protected equipment.
- The accessory is automatically detected by the PAT tester. The test sequence for 3 phase equipment is automatically set on base of entered test code and input mains voltage.

A 1322 and A 1422 are three-phase accessories intended for using only with METREL appliance testers.

2 Safety and operational considerations

2.1 Warnings and notes

In order to reach high level of operator's safety while carrying out various tests and measurements as well as to keep the test accessory and equipment undamaged, it is necessary to consider the following general warnings:

- ⚠ **Warning means »Read the Instruction manual with special care to safety operation«. The symbol requires an action!**
- **If the A 1322 / A 1422 is used in a manner not specified in this Instruction manual or the manual of target test equipment, the protection provided by the A 1322 / A 1422 and equipment may be impaired!**
- **Read this Instruction manual carefully, otherwise use of the A 1322 / A 1422 may be dangerous for the operator, for test equipment or for the tested object!**
- **Do not use the A 1322 / A 1422 if any damage is noticed!**
- **Consider all generally known precautions in order to avoid risk of electric shock while dealing with hazardous voltages!**
- **Tested appliance must be disconnected from any supply system and discharged!**
- **Service intervention is allowed to be carried out only by a competent authorized person!**
- **Do not touch free male connectors during the (active) polarity test.**
- ⚠ **Use only earthed 1- phase or 3- phase mains supply system to power A 1322 / A 1422 adapter! PE must have low impedance to earth, recommended is < 0.3 Ω.**
- **Pay attention that tested appliance can be normally activated when it is connected to test socket of A 1322 / A 1422.**
- **Do not connect 3-phase appliances to the A 1322 / A 1422 test sockets in case the A 1322 / A 1422 is single phase supplied, this could lead to abnormal operation and/or damages of the 3-phase tested appliance.**
- **Do not connect mains voltage on EB, W1 and W2 terminals.**

2.2 Standards applied

The instrument is manufactured and tested according to the following regulations, listed below.

Electromagnetic compatibility (EMC)

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

Safety (LVD)

EN 61010 -1	Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements
EN 61010 -2 -030	Safety requirements for electrical equipment for measurement, control and laboratory use – Part 2-030: Particular requirements for testing and measuring circuits

Application

A 1322 and A 1422	
VDE 0701 - 0702	Prüfung nach Instandsetzung, Änderung elektrischer Geräte – Wiederholungsprüfung elektrischer Geräte - Allgemeine Anforderungen für die elektrische Sicherheit
IEE Code of Practice	Code of Practice for In-service Inspection and Testing of Electrical Equipment
EN 50699	Recurrent Test of Electrical Equipment
EN 50678	General procedure for verifying the effectiveness of the protective measures of electrical equipment after repair

A 1422	
IEC/EN 60974 - 4 VDE 0544 - 4	Arc welding equipment - Part 4: Periodic inspection and testing

Note about EN and IEC standards:
Text of this manual contains references to European standards. All standards of EN 6xxxx (e.g. EN 61010) series are equivalent to IEC standards with the same number (e.g. IEC 61010) and differ only in amended parts required by European harmonization procedure.

3 Description

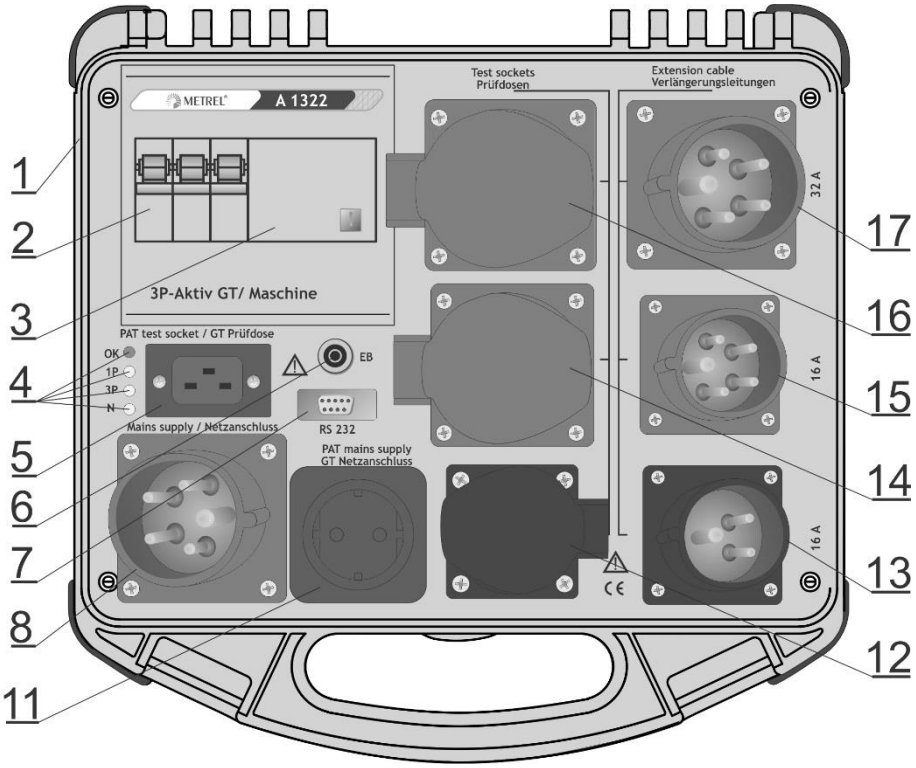


Figure 3.1: A 1322 front panel

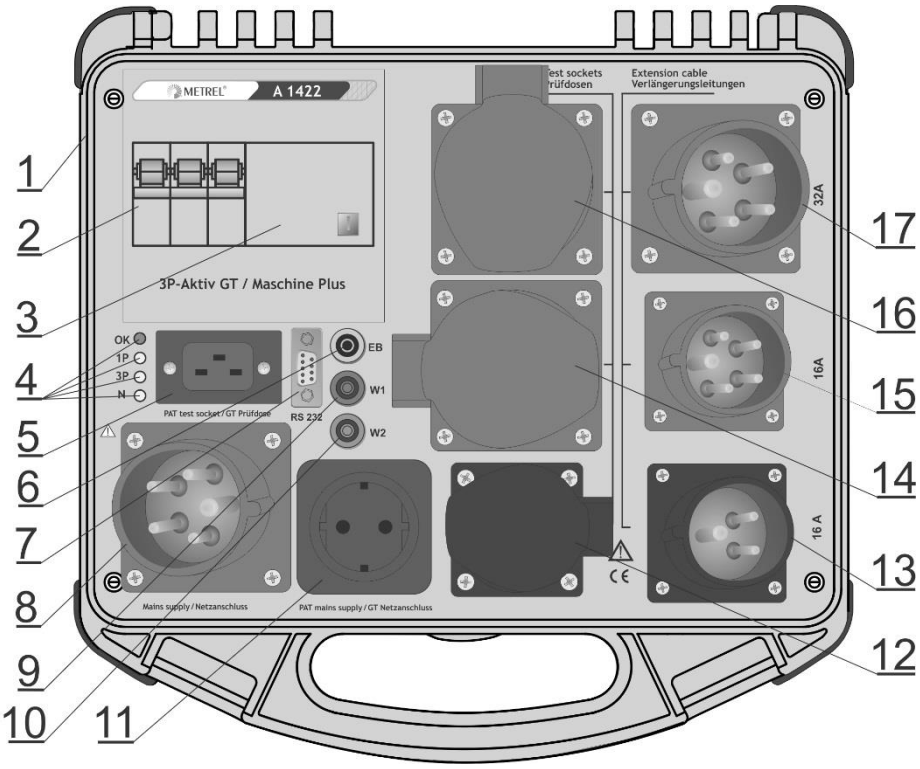


Figure 3.2: A 1422 front panel

Legend:

1	Plastic case.	
2	Circuit breaker.	
3	Contactor for enabling testing with mains supply (functional, power, leakage, PRCD).	
4	Status indicators, (OK, 1P, 3P, N) see chapter *4.5 Status indicators and Messages*.	
5	PAT test socket. (For connection to appliance tester test socket.) ⚠ **Never connect it to mains supply socket!**	
6	EB connection to the master instrument. See chapter *4.1 Connections* for more information.	
7	RS 232 connector for communication with master instrument.	
8	Power supply plug connector, for power supply options see chapter *4.2 Power supply considerations*. ⚠ **Never operate the A 1322 / A 1422 at other mains supply as defined in chapter 4.2 and supply voltages other as defined in chapter 8.2.**	
9	W1	Test socket for connection of welding output of welding machine (A 1422 only).
10	W2	Test socket for connection of welding output of welding machine (A 1422 only).
11	Supply socket for master instrument. The socket is controlled via circuit breaker (2) **Note**: The master instrument can be supplied from the socket of the A 1322 / A 1422 or directly from any other wall socket with proper voltage and grounding.	
12 13 14 15 16 17	Test sockets - **16**: 3-phase 32 A appliance; **17 + 16**: 32 A 3-phase cord, - **14**: 3-phase 16 A appliance; **15 + 14**: 16 A 3-phase cord, - **12**: single phase 16 A appliance; **13 + 12**: 16 A single phase cord. ⚠ **Sockets 12, 14, 16 are intended for test purpose only! Never use the A 1322 / A 1422 for power supply distribution!** ⚠ **Do not connect external supply to any of test sockets and/or plugs.**	

4 Operation

The A 1322 / A 1422 operates in conjunction with the master instrument (PAT or Machine tester).
Following is the list of applicable testers; in this manual they are referred as a master instrument:

- MI 3360 OmegaGT XA
- MI 3325 MultiservicerXD.

Connecting to MI 3360 and MI 3325 is described in their respective manuals.

4.1 Connections

Required and optional connections between A 1322 / A 1422 and the master instrument are shown in the following figure.

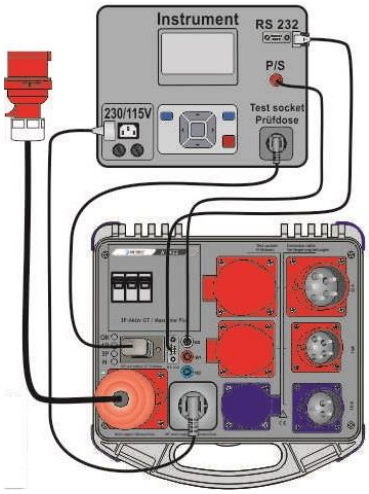


Figure 4.1: Connection of MI 3360 instrument

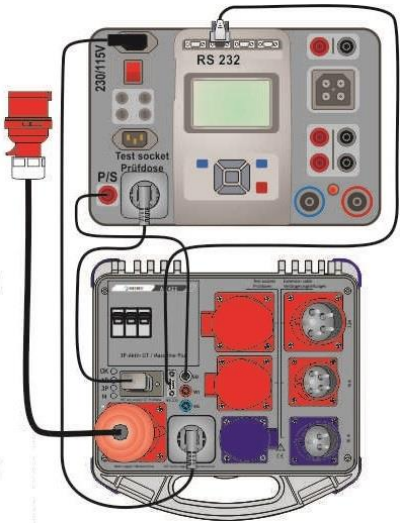


Figure 4.2: Connection of MI 3325 instrument

Required connections are:

- Measuring connection between PAT test socket (5) on A 1322 / A 1422 and mains test socket of the master instrument, and
- RS232 communication interface between the A 1322 / A 1422 (7) RS232 port and 3-phase adapter RS232 connector on the master instrument.

Optional connections:

- when measuring prolongation cords and PRCDs via test sockets 13,15,17 the EB(6) should be connected to the P/S terminal on the master instrument. The connection is used for earth bond and polarity tests.
  The EB(6) connection is not intended for measuring earth bond of appliances not connected to sockets 13,15,17, touch current, insulation resistance S, substitute leakage current S. For this tests the P/S terminal on the master instrument shall be used (no connection to the EB(6) socket on the A 1322 / A1422).
- The master instrument can be optionally supplied via power supply socket (1). It is recommended to use this connection, especially if no external 230 V wall

socket is available. The voltage on supply socket (11) is turned on/off with the fuse/circuit breaker (2) on A 1322 / A 1422.

4.2 Power supply considerations

The 3-phase 32 A socket (8) of A 1322 / A 1422 is intended for connection to mains supply. A 1322 / A 1422 can be connected to single-phase and 3-phase mains supply. The figure below shows connections of supply cords for both possibilities.

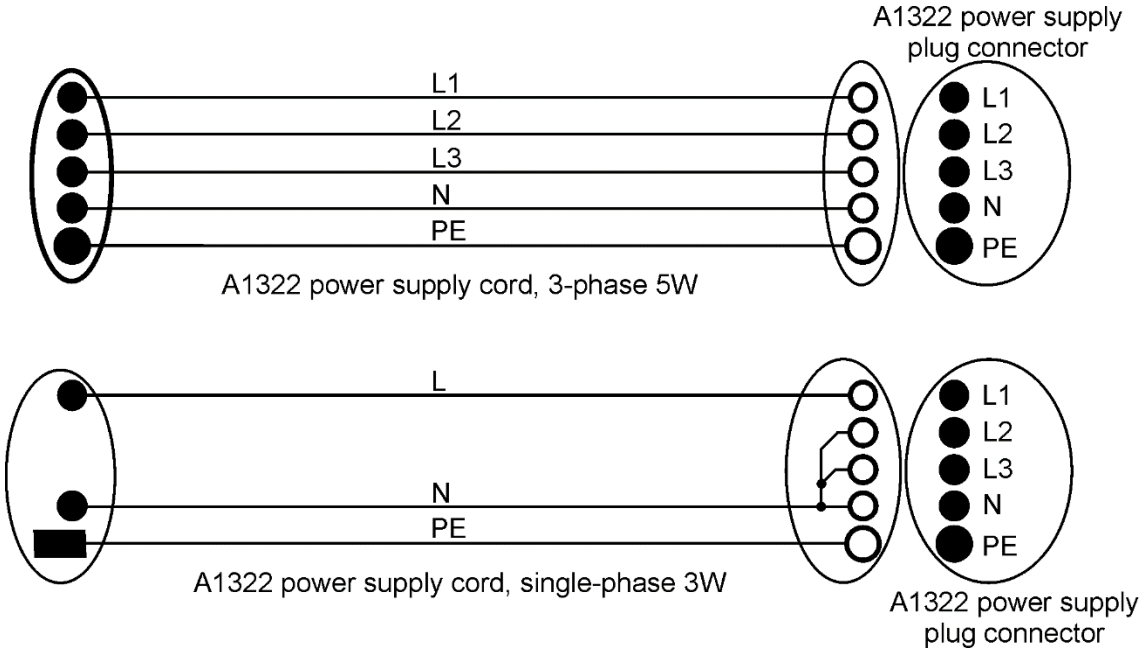


Figure 4.3: Mains supply cable for single-phase supply and 3-phase supply

The A 1322 / A 1422 works in TN/TT supply systems with distributed N and/or NPE and rated supply voltages U_{L-N} / U_{L-L} 230/400 V and/or 120/208 V.

Operation on 3-phase system without N conductor

The A 1322 / A 1422 can also be supplied in 3-phase 4W system (without N conductor). In this case the master instrument cannot be supplied from the A 1322 / A 1422 and shall be connected to an external 1-phase wall socket.

Some tests cannot be performed successfully:

- Active tests/measurements (differential and touch leakages, active polarity, PRCD testing and functional test) on 16 A (3 pole: L+N+PE) test socket.
- Active polarity test on 5 pole (L1+L2+L3+N+PE) 16 A and 32 A test sockets.
- PRCD testing on all test sockets.

4.3 Working with the adapter

Master instrument automatically recognize properly connected 3P- Active GT / Machine (Plus) adapter A 1322 / A 1422.
To establish connection, following procedure shall be applied:

Item	Comment
‣ Connect A 1322 / A 1422 and the master instrument via RS232 interface.	See *chapter 4.1 Connections*
‣ Connect the master instrument test socket and the A 1322 / A 1422 PAT test socket.	See *chapter 4.1 Connections*
‣ Connect the master instrument mains cord to the output power supply socket on A 1322 / A 1422.	See *chapter 4.1 Connections*
‣ Connect A 1322 / A 1422 to mains supply.	
‣ Turn on fuse/circuit breaker on A 1322 / A 1422.	The adapter beeps.
‣ Turn on the master instrument.	
‣ Select the test function.	See Instruction manual of the master instrument.
‣ Measuring system is now ready for testing.	 appears on the master instrument screen for indication of connected A 1322 / A 1422.
‣ Connect tested equipment to the proper test socket/plug	See c*hapters: 5 Measurements / 6 Measurements with A 1422 (according to IEC / EN 60974-4)* for proper connection of appliances / welding machines to a measuring system.
‣ Press Start on the master instrument to start the test sequence.	See Instruction manual of the master instrument.

4.4 Instrument data of the adapter

A 1322 / A 1422 adapter data (serial number, hardware and firmware version, etc.) can be read on the master instrument screen, if RS-232 data connection is established. Data is available from General settings / About menu of the master instrument. Master instrument data appear on the screen first, followed by adapter data. Refer to master instrument Instruction manual for more information.

Figure 4.4: MI 3360 instrument data

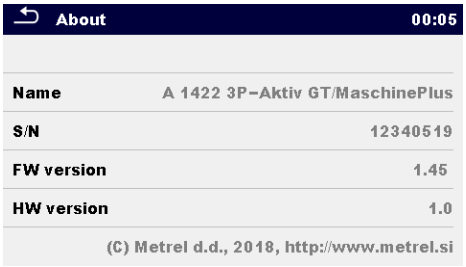


Figure 4.5: A 1322 / A 1422 adapter data

4.5 Status indicators and Messages

Status indicators
Four LEDs on 3P- Active GT / Machine (Plus) adapter A 1322 / A 1422 indicates its status as described in following table:

LED indicator	Description	
OK	**Continuous**:	The A 1322 / A 1422 adapter is ready for use.
	Blinking:	Hardware error.
1P	Single-phase supply system status **Continuous**: A single-phase supply voltage is applied. **Blinking**: Warning for improper power supply voltage condition: Possible causes are: - L and N wire crossed, - No earth connection or other wiring problem on supply socket, - Incorrect mains voltage. **Warning:** › **The A 1322 / A 1422 must be properly earthed!** See *4.2 Power supply considerations.*	
3P	3-phase supply system status **Continuous**: A 3-phase supply voltage is applied **Blinking**: Warning for improper power supply voltage condition: Possible causes are: - No earth connection or other wiring problem on supply socket, - L and N wire crossed when instrument is connected to 1-phase supply system, - Incorrect mains voltage.	

	Blinking at start-up 3-phase supply voltage is applied. Check phase rotation. **Warning:** › **The A1322 / A 1422 must be properly earthed!** See *4.2 Power supply considerations.*
N	Power supply Neutral conductor status **Light on:** Power supply system with N conductor. **Light off:** No N conductor in the incoming power supply system.

Messages

When A 1322 / A 1422 adapter is connected to the master instrument and single test measurement is selected, its status is indicated with coloured icon on the master instrument screen:

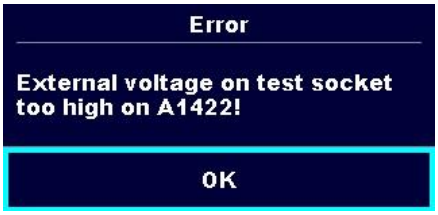
Green icon: A 1322 / A 1422 adapter is ready to perform selected test or measurement

Grey icon: Communication error or required A 1322 / A 1422 adapter is not connected

Red icon: Selected test / measurement in not supported with A 1322 / A 1422 adapter

Warning messages

After single measurement test is started, A 1322 / A 1422 adapter checks for proper test connection with master instrument and safety conditions on test sockets. Test connection failure or dangerous conditions are reported and presented on the master instrument screen with the following messages:

	**DANGER!** **Voltage on test socket (16A or 32A) is higher than approximately 25 V (AC or DC)!** Disconnect the test probe from the DUT and determine why external voltage was detected!
	**Master instrument Test socket and PAT test socket of the A 1322 / A 1422 are not connected properly.** Check the test connection.

Refer to master instrument Instruction manual for more details on symbols and messages appearing on master instrument screen, when test or measurement is selected and executed.

5 Measurements

5.1 Continuity - Earth bond resistance measurement

📖 Refer to master instrument Instruction manual, chapter **Single test measurements**, subchapter **Continuity** for detailed information.

Procedure:

Item		Comment
‣	Prepare test system.	See *chapter 4.3 Working with the adapter.*
‣	Compensate test leads resistance (if necessary).	See *chapter 5.1.1 Compensation of test leads resistance.*
‣	Connect power supply plug of tested appliance into proper test socket.	See *Figure 5.1.*
‣	Connect P/S probe of the master instrument to the accessible conductive part of the CLASS I appliance.	
‣	Prepare and start measurement on the master instrument.	
‣	Wait until measurement is finished or stop the measurement.	
‣	Check result(s).	
‣	Store result(s).	Optional

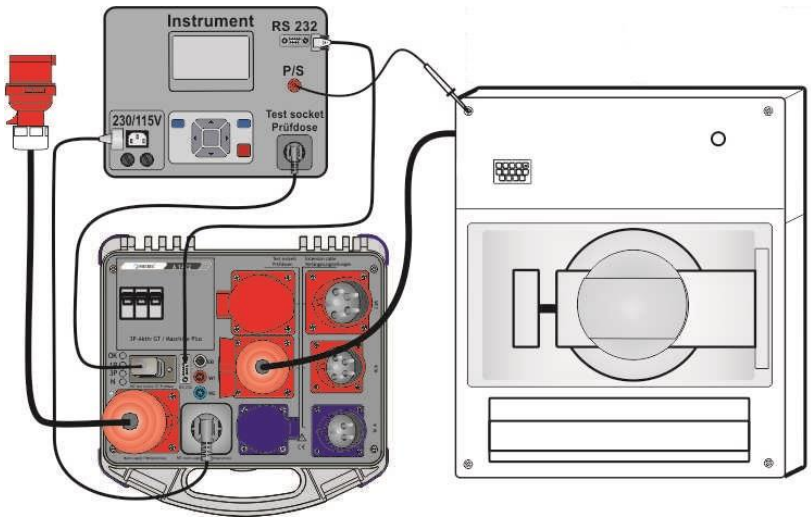


Figure 5.1: Continuity - Earth bond resistance test connection

Note:

‣ Consider displayed warnings before starting measurement!

5.1.1 Compensation of test leads resistance

Test leads compensation enables to eliminate the influence of test leads resistance and instrument's internal resistance.

Compensation of test leads resistance procedure:

Item	Comment
‣ Prepare test system.	See *chapter 4.3 Working with the adapter.*
‣ Connect test lead to P/S terminal on the master instrument.	See *Figure 5.1*.
‣ Connect test lead probe to the PE pin of the test socket (32A 5p, 16A 5p or 16A 3p).	See *Figure 5.1*.
‣ Select Continuity function from the Single test menu of the Master instrument.	
‣ Select test current (200 mA, 4 A, 10 A or 25 A).	Regarding the type of cord.
‣ Start test leads compensation procedure.	Refer to master instrument Instruction manual for details.

5.2 Insulation resistance (Riso, Riso-S) and Substitute leakage current (Isub, Isub-S) measurements

📖 Refer to master instrument Instruction manual, chapter **Single test measurements**, subchapters **Insulation resistance** and **Sub-leakage current** for detailed information.

Procedure:

Item	Comment
‣ Prepare test system.	See *chapter 4.3 Working with the adapter.*
‣ Connect power supply plug of tested appliance into proper test socket (Riso, Isub, Class I appliance) or	See *Figure 5.2.*
‣ Connect power supply plug of tested appliance into proper test socket. ‣ Connect P/S probe to accessible isolated conductive part of the appliance. (Riso-S, Isub-S, Class I or Class II appliance).	See *Figure 5.2.*
‣ Prepare and start measurement on the master instrument.	
‣ Wait until measurement is finished or stop the measurement.	
‣ Check result(s).	
‣ Store result(s).	Optional

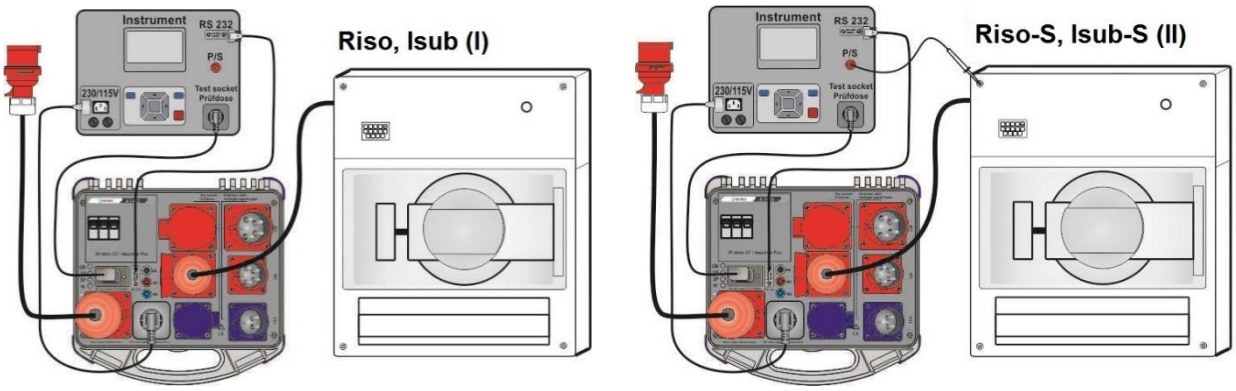


Figure 5.2: Insulation resistance and Substitute leakage current test connections (left figure - Class I appliance, right figure - Class II appliance)

Notes:

- Consider any warning on the display before starting the measurement!
- When P/S probe is connected during the test, then the current through it is also considered.
- Do not touch or disconnect the DUT during the insulation resistance measurement or before it is fully discharged!
- Substitute leakage current may differ substantially from that of conventional leakage current test because of the way the test is performed. For example, the difference in both leakage measurements will be affected by the presence of neutral to earth noise suppression capacitors.

5.3 Differential leakage current measurement

📖 Refer to master instrument Instruction manual, chapter **Single test measurements**, subchapter **Differential leakage** for detailed information.

Leakage current is measured via power supply cord of tested appliance.

Procedure:

Item		Comment
‣	Prepare test system.	See *chapter 4.3 Working with the adapter.*
‣	Connect power supply plug of tested appliance into proper test socket.	See *Figure 5.3*.
‣	Start measurement on the master instrument.	
‣	Wait until measurement is finished or stop the measurement.	
‣	Check result(s).	
‣	Store result(s).	Optional

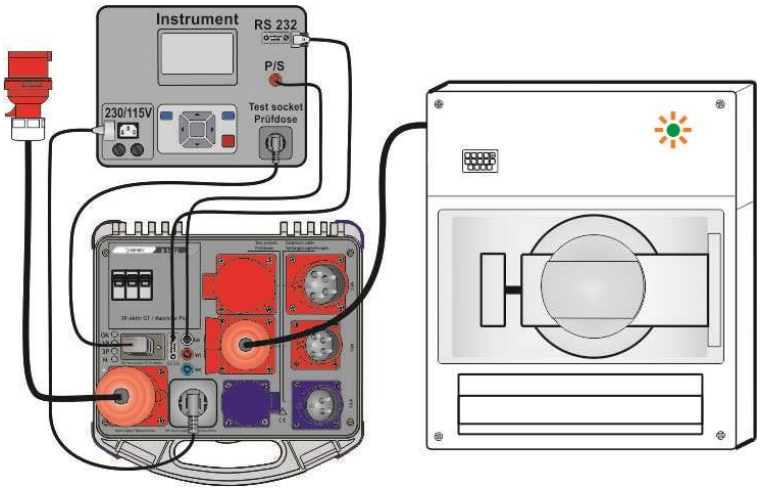


Figure 5.3: Differential leakage current measurement

Warning:

- During the test, DUT is powered as for normal operation. Pay attention on possible electric shock, and danger of rotating or moving parts!

Note:

- Consider any displayed warning before starting measurement!

5.4 Touch leakage current measurement

📖 Refer to master instrument Instruction manual, chapter **Single test measurements**, subchapter **Touch leakage** for detailed information.

Procedure:

Item		Comment
›	Prepare test system.	See *chapter 4.3 Working with the adapter.*
›	Connect power supply plug of tested appliance into proper test socket.	See *Figure 5.4.*
›	Connect probe to accessible isolated conductive part of the appliance.	
›	Start measurement on the master instrument.	
›	Wait until measurement is finished or stop the measurement.	
›	Check result(s).	
›	Store result(s).	Optional

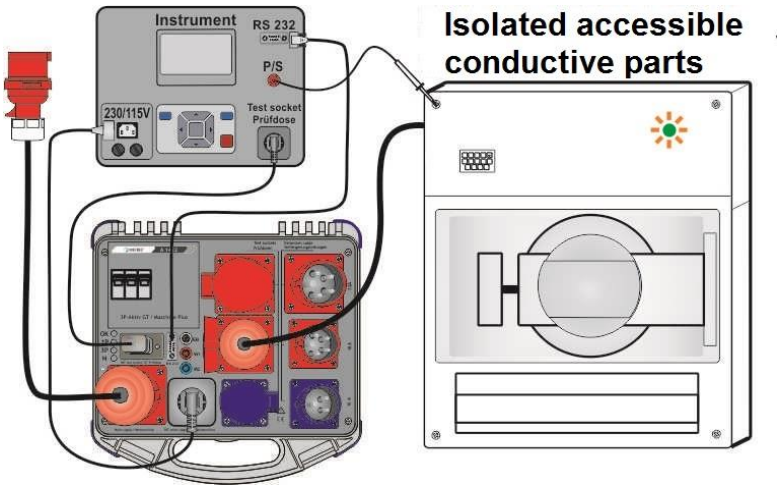


Figure 5.4: Touch leakage measurement

Warning:

- During the test, DUT is powered as for normal operation. Pay attention on possible electric shock, and danger of rotating or moving parts!

Note:

- Consider any displayed warning before starting measurement!

5.5 Polarity / Active Polarity test

📖 Refer to master instrument Instruction manual, chapter **Single test measurements**, subchapter **Polarity test** for detailed information.

The Polarity test verifies integrity of extension cords, cable reels with distribution sockets and similar.
The standard (normal) polarity test is suitable for cords without built-in active protection. In case that tested item is equipped with active switch (RCD or similar) that requires voltage for normal operation, the active polarity test shall be applied.

Procedure:

Item	Comment
‣ Prepare test system. ‣ Connect P/S terminal on master instrument to the EB terminal on the A 1322 / A 1422.	See *chapter 4.3 Working with the adapter.*
‣ Connect tested power cord to proper test sockets.	See *Figure 5.5 and Figure 5.6.*
‣ Select test mode [normal or active] and other test parameters on the master instrument.	Regarding the type of cord.
‣ Start measurement on the master instrument.	
‣ If Active polarity, turn on switch on protected cord.	To turn on the active switch.
‣ Wait until measurement is finished.	
‣ Check result(s).	
‣ Store result(s).	Optional

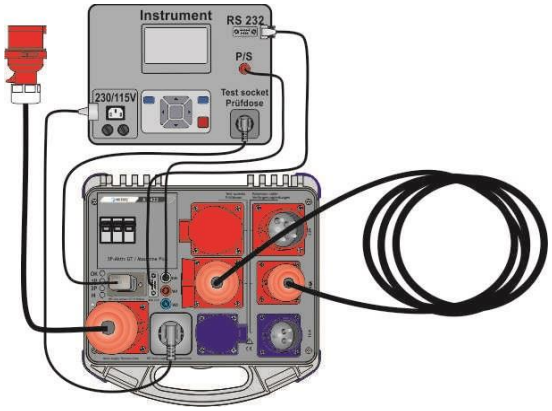


Figure 5.5: Normal polarity test

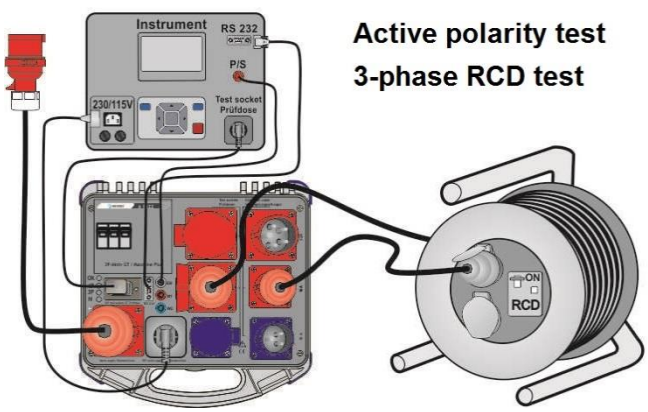


Figure 5.6: Active polarity test

Warning:

- Do not touch free male connectors during the (active) polarity test.

Note:

- Consider any displayed warning before starting measurement!

5.6 3-phase PRCD test

📖 Refer to master instrument Instruction manual, chapter **Single test measurements**, subchapter **PRCD test** for detailed information.

This test verifies that the PRCD protection works properly.

Procedure:

Item	Comment
- Prepare test system. - Connect P/S terminal on master instrument to the EB terminal on the A 1322 / A 1422.	See *chapter 4.3 Working with the adapter.*
- Connect tested PRCD to proper test sockets.	See *Figure 5.7.*
- Start measurement on the master instrument.	
- Turn on PRCD.	
- Wait until measurement is finished.	
- Check result(s).	
- Store result(s).	Optional

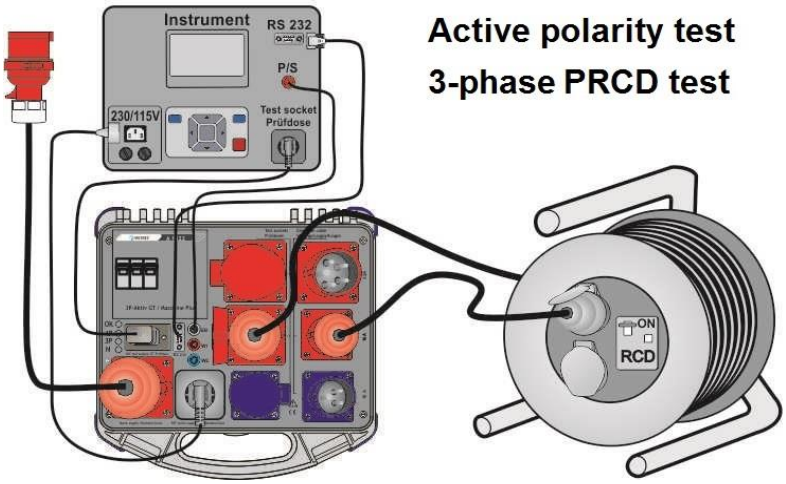


Figure 5.7: 3-phase PRCD test connection

Warning:

- Do not touch free male connectors during the test.

Note:

- Consider any displayed warning before starting measurement!

5.7 Power

🕮 Refer to master instrument Instruction manual, chapter **Single test measurements**, subchapter **Power** for detailed information.

Power test is intended for testing operation of the appliance and measurement of power consumption.

Procedure:

Item	Comment
‣ Prepare test system.	See *chapter 4.3 Working with the adapter.*
‣ Connect power supply plug of tested appliance into proper test socket.	See *Figure 5.8.*
‣ Start measurement on the master instrument.	
‣ Wait until measurement is finished or stop the measurement.	
‣ Check result(s).	
‣ Store result(s).	Optional

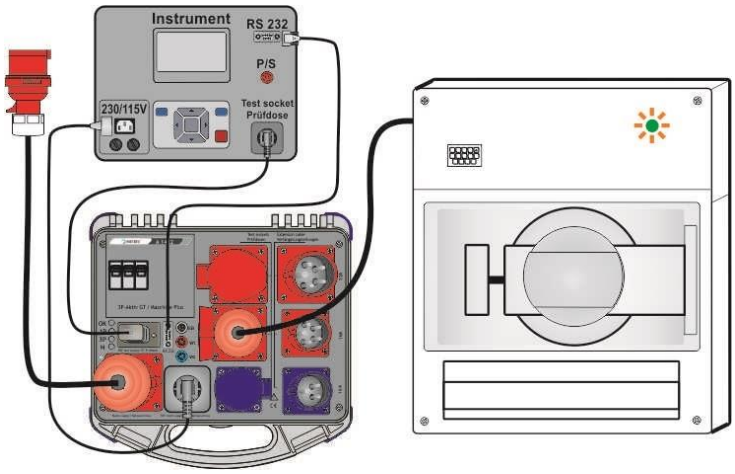


Figure 5.8: Power test connection

Warning:

- During the test, DUT is powered as for normal operation. Pay attention on possible electric shock, and danger of rotating or moving parts!

Note:

- Consider any displayed warning before starting measurement!

6 Measurements with A 1422 (according to IEC / EN 60974-4)

6.1 Insulation resistance (supply circuit to protective circuit)

🕮 Refer to master instrument Instruction manual, chapter **Single test measurements**, subchapter **Insulation resistance - Riso (Welding equipment)** for detailed information.

Procedure:

Item	Comment
‣ Prepare test system.	See *chapter 4.3 Working with the adapter.*
‣ Connect power supply plug of tested welding machine into proper test socket.	See *Figure 6.1.*
‣ Select Riso (Rw) test function on the master instrument.	
‣ Set Test parameter to LN-PE.	
‣ Start measurement.	
‣ Wait until measurement is finished or stop the measurement.	
‣ Check result(s).	
‣ Store result(s).	Optional

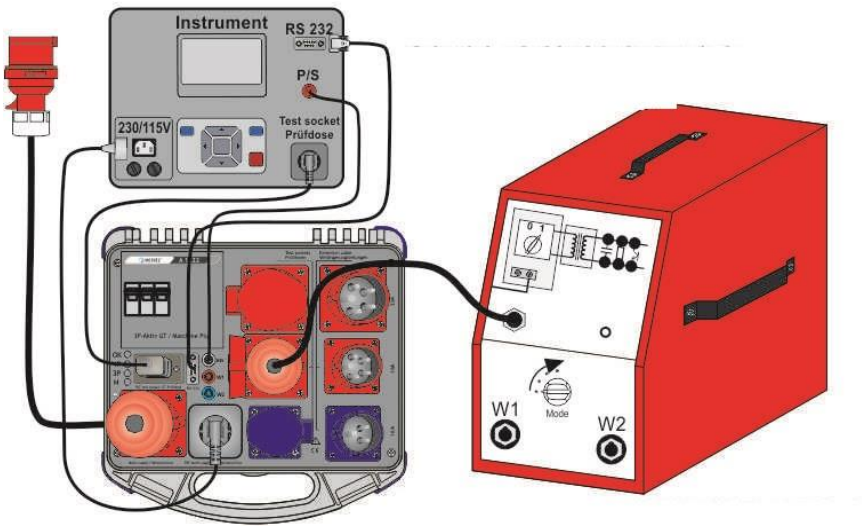


Figure 6.1: Insulation resistance (supply circuit to protective circuit) measurement

Notes:

- Consider any warning on the display before starting the measurement!
- Do not touch or disconnect the DUT during the insulation resistance measurement or before it is fully discharged!

6.2 Insulation resistance (welding circuit to protective circuit)

📖 Refer to master instrument Instruction manual, chapter **Single test measurements**, subchapter **Insulation resistance Riso (Welding equipment)** for detailed information.

Procedure:

Item	Comment
‣ Prepare test system.	See *chapter 4.3 Working with the adapter.*
‣ Connect power supply plug of tested welding machine into proper test socket. ‣ Connect welding terminals to W1 and W2 terminals on A 1422.	See *Figure 6.2.*
‣ Select Riso (Rw) test function on the master instrument.	
‣ Set Test parameter to W-PE.	
‣ Start measurement.	
‣ Wait until measurement is finished or stop the measurement.	
‣ Check result(s).	
‣ Store result(s).	Optional

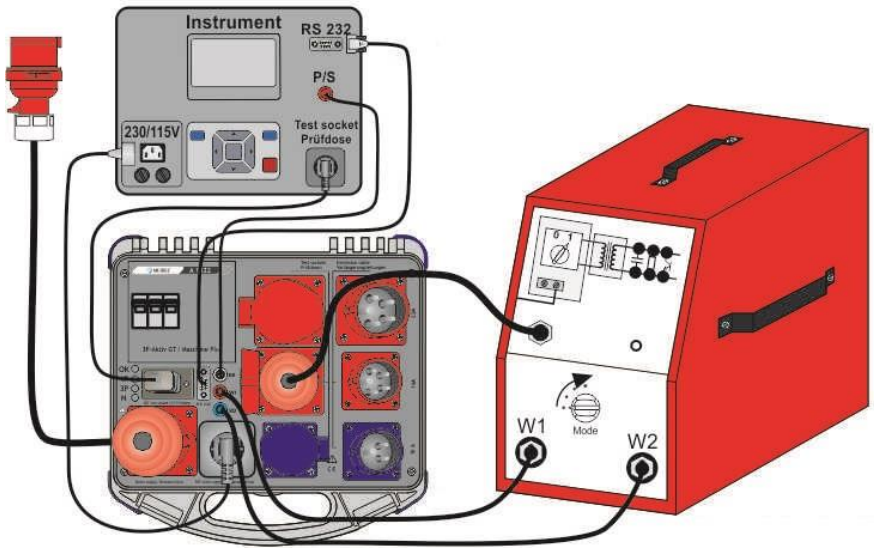


Figure 6.2: Insulation resistance (welding circuit to protective circuit) measurement

Notes:

- Consider any warning on the display before starting the measurement!
- Do not touch or disconnect the DUT during the insulation resistance measurement or before it is fully discharged!

6.3 Insulation resistance (supply circuit to welding circuit)

📖 Refer to master instrument Instruction manual, chapter **Single test measurements**, subchapter **Insulation resistance - Riso (Welding equipment)** for detailed information.

Procedure:

Item		Comment
‣	Prepare test system.	See *chapter 4.3 Working with the adapter.*
‣	Connect power supply plug of tested welding machine into proper test socket.	See *Figure 6.3.*
‣	Connect welding terminals to W1 and W2 terminals on A 1422.	
‣	Select Riso (Rw) test function on the master instrument.	
‣	Set Test parameter to LN-W.	
‣	Start measurement.	
‣	Wait until measurement is finished or stop the measurement.	
‣	Check result(s).	
‣	Store result(s).	Optional

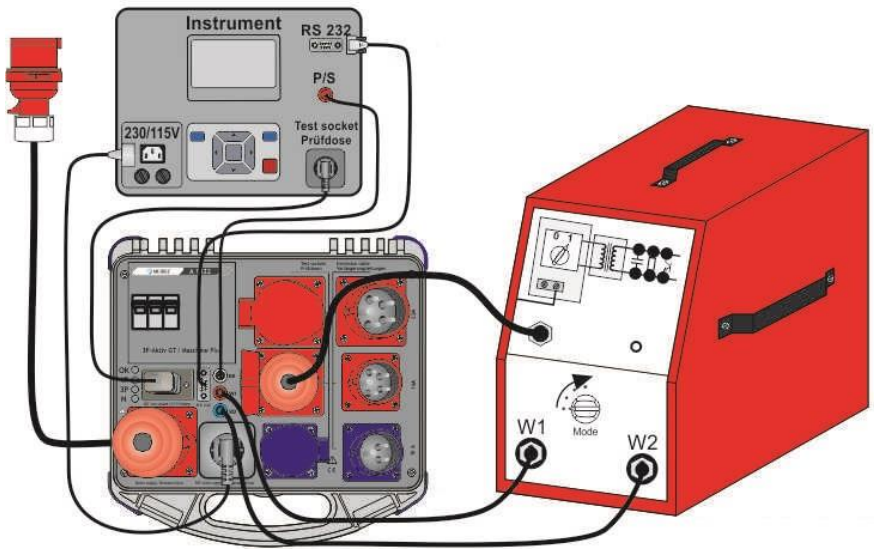


Figure 6.3: Insulation resistance (supply circuit to welding circuit) measurement

Notes:

- Consider any warning on the display before starting the measurement!
- Do not touch or disconnect the DUT during the insulation resistance measurement or before it is fully discharged!

6.4 Insulation resistance (supply circuit of Class II equipment to accessible surfaces)

📖 Refer to master instrument Instruction manual, chapter **Single test measurements**, subchapter **Insulation resistance - Riso (Welding equipment)** for detailed information.

Procedure:

Item		Comment
▸	Prepare test system.	See *chapter 4.3 Working with the adapter.*
▸	Connect power supply plug of tested welding machine into proper test socket.	See *Figure 6.4.*
▸	Connect P/S probe to accessible isolated conductive part of the welding machine.	
▸	Select Riso (Rw) test function on the master instrument.	
▸	Set Test parameter LN (Class II)-P/S.	
▸	Start measurement.	
▸	Wait until measurement is finished or stop the measurement.	
▸	Check result(s).	
▸	Store result(s).	Optional

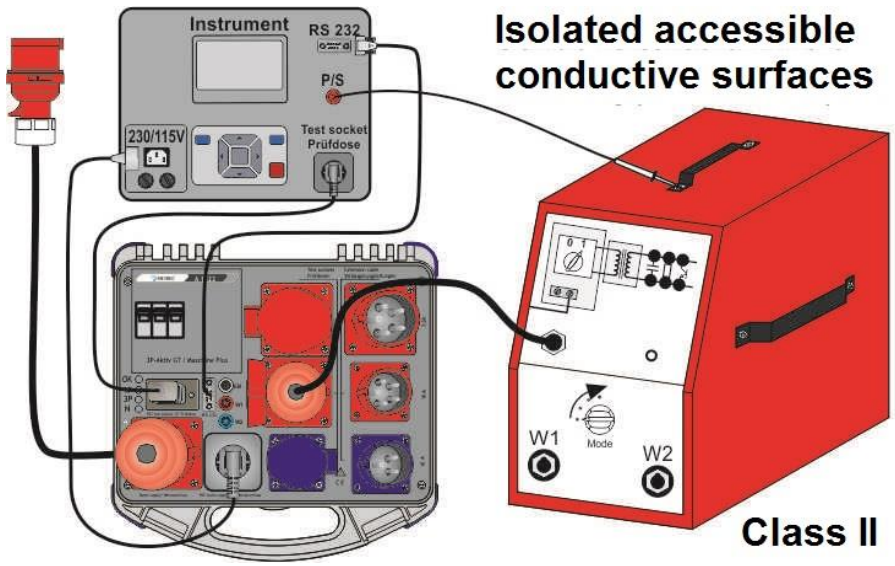


Figure 6.4: Insulation resistance (supply circuit of Class II equipment to accessible surfaces)

Notes:

- Consider any warning on the display before starting the measurement!
- Do not touch or disconnect the DUT during the insulation resistance measurement or before it is fully discharged!

6.5 Welding circuit leakage current

📖 Refer to master instrument Instruction manual, chapter **Single test measurements**, subchapter **Welding circuit leakage – Ileak (W-PE)** for detailed information.

Procedure:

Item		Comment
›	Prepare test system.	See *chapter 4.3 Working with the adapter.*
›	Connect power supply plug of tested welding machine into proper test socket.	See *Figure 6.5.*
›	Connect welding terminals to W1 and W2 terminals on A 1422.	
›	Enable L-N change parameter on the master instrument (for single-phase welding machines).	Optional
›	Start measurement.	
›	Wait until measurement is finished or stop the measurement.	
›	Check result(s).	
›	Store result(s).	Optional

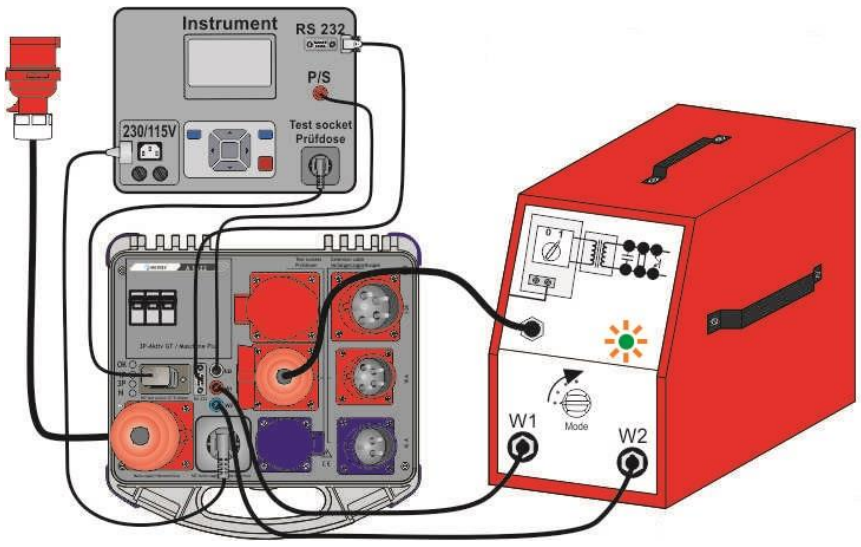


Figure 6.5: Welding circuit leakage current measurement

Warning:

› During the test, DUT is powered as for normal operation. Pay attention on possible electric shock!

Note:

› Consider any displayed warning before starting measurement!

6.6 Primary leakage current

📖 Refer to master instrument Instruction manual, chapter **Single test measurements**, subchapter **Primary leakage** for detailed information.

Procedure:

Item	Comment
› Prepare test system.	See *chapter 4.3 Working with the adapter.*
› Connect power supply plug of tested welding machine into proper test socket.	See *Figure 6.6.*
› Enable L-N change parameter on the master instrument (for single-phase welding machines)	Optional
› Start measurement.	
› Wait until measurement is finished or stop the measurement.	
› Check result(s).	
› Store result(s).	Optional

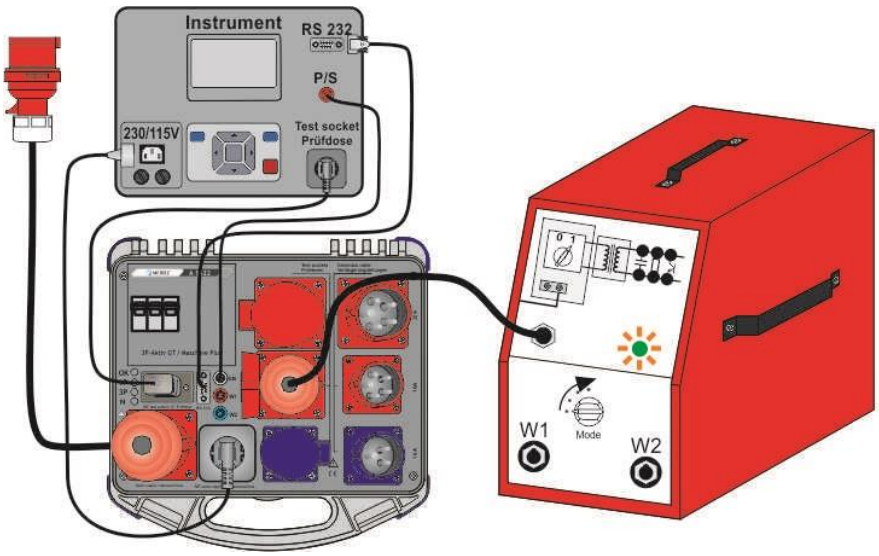


Figure 6.6: Primary leakage current measurement

Warning:

› During the test, DUT is powered as for normal operation. Pay attention on possible electric shock!

Note:

› Consider any displayed warning before starting measurement!

6.7 No-load voltage

📖 Refer to master instrument Instruction manual, chapter **Single test measurements**, subchapter **No-load voltage** for detailed information .

Procedure:

Item	Comment
› Prepare test system.	See *chapter 4.3 Working with the adapter.*
› Connect power supply plug of tested welding machine into proper test socket. › Connect welding terminals to W1 and W2 terminals on A 1422.	See *Figure 6.7.*
› Set Welding output type (a.c. or d.c.), Rated no-load voltage and limits on the master instrument.	Optional
› Start measurement.	
› Wait until measurement is finished.	
› Check result(s).	
› Store result(s).	Optional

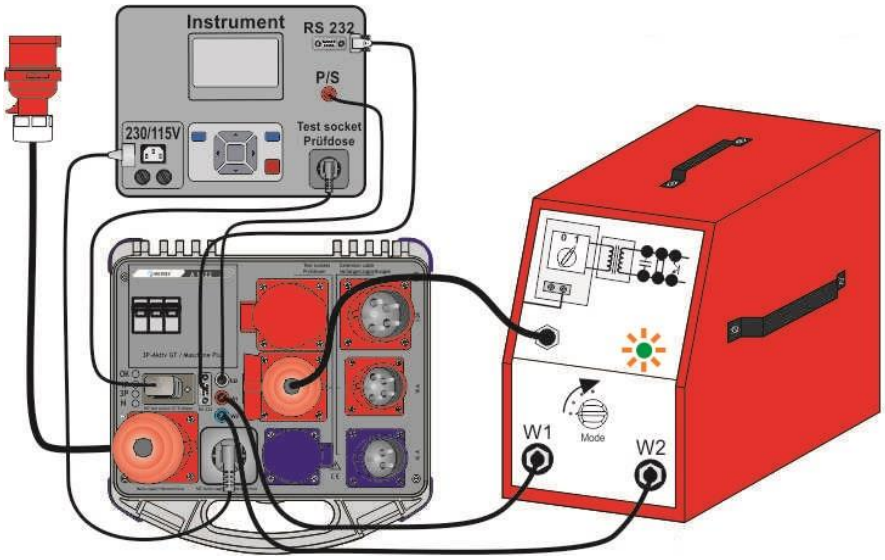


Figure 6.7: No-load voltage measurement

Warning:

› During the test, DUT is powered as for normal operation. Pay attention on possible electric shock!

Notes:

› Consider any displayed warning before starting measurement!
› The No-load voltage should be checked in all operating modes of the welding machine.

7 Maintenance

Unauthorized person is not allowed to open the 3P-Active GT / Machine (Plus) adapter A 1322 / A 1422. There are no user replaceable components inside the adapter.

7.1 Cleaning

No special maintenance is required for the housing. To clean the surface of the 3P-Active GT / Machine (Plus) adapter, use a soft cloth slightly moistened with soapy water or alcohol. Then leave the A 1322 / A 1422 to dry totally before use.

Warnings:

- Do not use liquids based on petrol or hydrocarbons!
- Do not spill cleaning liquid over the adapter!

7.2 Service

For repairs under warranty, or at any other time, please contact your distributor.

8 Technical specifications

8.1 Test functions

8.1.1 Continuity

Test terminals ..... Test socket (A 1322 / A 1422: 16A-5p, 32A-5p or 16A-3p), P/S probe of master instrument

📖 For detailed specification, refer to master instrument Instruction manual, chapter **Technical specifications**, subchapter **Continuity.**

8.1.2 Insulation resistance (including S-probe)

Test terminals (Riso)..... Test socket (A 1322 / A 1422: 16A-5p, 32A-5p or 16A-3p)
Test terminals (Riso-S)..... Test socket (A 1322 / A 1422: 16A-5p, 32A-5p or 16A-3p), P/S probe of master instrument

📖 For detailed specification, refer to master instrument Instruction manual, chapter **Technical specifications**, subchapter **Insulation resistance (Riso, Riso-S).**

8.1.3 Substitute leakage current (including S-probe)

Test terminals (Isub)..... Test socket (A 1322 / A 1422: 16A-5p, 32A-5p or 16A-3p)
Test terminals (Isub-S) ..... Test socket (A 1322 / A 1422: 16A-5p, 32A-5p or 16A-3p), P/S probe of master instrument

📖 For detailed specification, refer to master instrument Instruction manual, chapter **Technical specifications**, subchapter **Sub-leakage Current, Substitute Leakage Current – S.**

8.1.4 Differential leakage current

Differential leakage current

	Range	Resolution	Accuracy
Idiff	0.00 mA ... 9.99 mA	0.01 mA	±(5 % of reading + 5 D)

Frequency response complies to EN 61010 – Figure A1.
Duration*..... Off, 2 s, 3 s, 5 s, 10 s, 30 s, 60 s, 90 s, 120 s, 180 s
H Limit(Idiff)*..... Off, Custom, 0.25 mA … 15.0 mA
Test terminals ..... Test socket (A 1322 / A 1422: 16A-5p, 32A-5p or 16A-3p)
Additional error ..... 0.01 mA / A
* Parameters and limits are set on master instrument.

8.1.5 Touch leakage current

Test terminals ..... Test socket (A 1422: 16A-5p, 32A-5p or 16A-3p), P/S terminal on master instrument)

📖 For detailed specification, refer to master instrument Instruction manual, chapter **Technical specifications**, subchapter **Touch leakage current**.

8.1.6 Polarity / active polarity

Mode* ..... **Normal polarity**
Test voltage ..... < 60 V (AC and DC)
LN cross* ..... Allowed, not allowed (for single phase extension cords)
Status* ..... On, Off
Fault detections ..... Pass, L open, N open, PE fault, LN cross, LN short, NPE short, L1 open / L1PE short, L2 open / L2PE short, L3 open / L3PE short, L1L2 cross, L1L3 cross, L2L3 cross, L1N cross, L2N cross, L3N cross, L1L2 short, L1L3 short, L2L3 short, L1N short, L2N short, L3N short, Multiple fault.
Test terminals ..... Test socket (A 1322 / A 1422: 16A-5p, 32A-5p or 16A-3p), Test plug (A 1322 / A 1422: 16A-5p, 32A-5p or 16A-3p)

Mode* ..... **Active polarity**
Test voltage ..... Mains supply voltage, over-current protection
Wiring map* ..... Standard, L1-L2-L3-N-PE, L2-L3-L1-N-PE, L3-L1-L2-N-PE, L3-L2-L1-N-PE, L2-L1-L3-N-PE, L1-L3-L2-N-PE, L1-L2-L3-PE, L2-L3-L1-PE, L3-L1-L2-PE, L3-L2-L1-PE, L2-L1-L3-PE, L1-L3-L2-PE, L1-N-PE, L2-N-PE, L3-N-PE, Rotation 123 (N), Rotation 321 (N), Rotation 123, Rotation 321.
Status* ..... On, Off
Fault detections ..... Pass, L open / LPE short, N open, PE fault, LN cross, LN short, NPE short, L1 open / L1 short, L2 open / L2 short, L3 open / L3 short, L1L2 cross, L1L3 cross, L2L3 cross, L1N cross, L2N cross, L3N cross, L1L2 short, L1L3 short, L2L3 short, L1N short, L2N short, L3N short, Multiple fault.
Test terminals ..... Test socket (A 1322 / A 1422: 16A-5p, 32A-5p or 16A-3p), Test plug (A 1322 / A 1422: 16A-5p, 32A-5p or 16A-3p)

* Parameters and limits are set on master instrument.

8.1.7 3-phase portable RCD

Portable RCD trip-out time (AC, A, F type PRCD)

	Range	Resolution	Accuracy
$t_{\Delta N}$	0.0 ms … 300.0 ms (½×$I_{\Delta N}$, $I_{\Delta N}$)	0.1 ms	±3 ms
	0.0 ms … 150.0 ms (2×$I_{\Delta N}$)		
	0.0 ms … 40.0 ms (5×$I_{\Delta N}$)		

Portable RCD trip-out current (B and B+ type PRCD)

	Range	Resolution	Accuracy
I_{Δ}	0.2×$I_{\Delta N}$ … 2.2×$I_{\Delta N}$	0.05×$I_{\Delta N}$	±0.1×$I_{\Delta N}$

Test currents ($I_{\Delta N}$)*..... 10 mA, 15 mA, 30 mA, 100 mA, 300 mA
Test current multiplier*..... ½×$I_{\Delta N}$, $I_{\Delta N}$, 5×$I_{\Delta N}$ (AC, A)
Test current shape* ..... sine-wave (AC), pulsed (A, F), smooth DC (B, B+)
Phase* ..... 0° (+), 180° (-), both (+, -)
Test mode* ..... single, auto
Design* ..... 2 pole, 3 pole, K/Di (varistor), S (3 pole)
Test terminals ..... Test socket (A 1322 / A 1422: 16A-5p, 32A-5p or 16A-3p),
Test plug (A 1322 / A 1422: 16A-5p, 32A-5p or 16A-3p)
Misc ..... DC offset for pulsed (A, F) test current typical 6 mA

* Parameters and limits are set on master instrument.

8.1.8 Power

Active power

	Range	Resolution	Accuracy
P	0.00 kW … 24.00 kW	0.01 kW	±(5 % of reading + 5 D)

Apparent power

	Range	Resolution	Accuracy
S	0.00 kVA … 24.00 kVA	0.01 kVA	±(5 % of reading + 5 D)

Reactive power

	Range	Resolution	Accuracy
Q	0.00 kvar … 24.00 kvar	0.01 kvar	±(5 % of reading + 5 D)

Power factor

	Range	Resolution	Accuracy
PF	0.00 … 1.00	0.01	±(5 % of reading + 5 D)

Duration*..... Off, 2 s, 3 s, 5 s, 10 s, 30 s, 60 s, 90 s,120 s, 180 s
H limit (P)* ..... Off, Custom, 10 W …3.50 kW
L limit (P)* ..... Off, Custom, 10 W …3.50 kW
Test terminals ..... Test socket (A 1322 / A 1422: 16A-5p, 32A-5p or 16A-3p)
* Parameters and limits are set on master instrument.

8.1.9 Insulation resistance LN-PE (supply circuit to protective circuit) (according to IEC/ EN 60974-4)

Insulation LN-PE

	Range	Resolution	Accuracy
Riso	0.00 MΩ … 19.99 MΩ	0.01 MΩ	±(3 % of reading + 2 D)
	20.0 MΩ … 99.9 MΩ	0.1 MΩ	± 5 % of reading
	100.0 MΩ … 199.9 MΩ	0.1 MΩ	± 10 % of reading

Output voltage

	Range	Resolution	Accuracy
Um	0 V … 600 V	1 V	±(3 % of reading + 2 D)

Operating range (acc. to EN 61557-2)... 0.08 MΩ … 199.9 MΩ
Nominal voltage Uiso* ..... 500 V (- 0 %, + 10 %)
Short circuit current..... max. 2.0 mA
Limit (Riso)*..... Off, Custom, 2.50 MΩ, 5.00 MΩ
Duration*..... Off, 2 s, 3 s, 5 s, 10 s, 30 s, 60 s, 90 s, 120 s, 180 s
Test terminals: ..... Test socket (A 1422: 16A-5p, 32A-5p or 16A-3p) (L1, L2, L3, N terminals shorted), Test socket (A 1422: 16A-5p, 32A-5p or 16A-3p) (PE terminal)
* Parameters and limits are set on master instrument.

8.1.10 Insulation resistance W-PE (welding circuit to protective circuit) (according to IEC/ EN 60974-4)

Insulation W-PE

	Range	Resolution	Accuracy
Riso	0.00 MΩ … 19.99 MΩ	0.01 MΩ	±(3 % of reading + 2 D)
	20.0 MΩ … 99.9 MΩ	0.1 MΩ	± 5 % of reading
	100.0 MΩ … 199.9 MΩ	0.1 MΩ	± 10 % of reading

Output voltage

	Range	Resolution	Accuracy
Um	0 V … 600 V	1 V	±(3 % of reading + 2 D)

Operating range (acc. to EN 61557-2)...0.08 MΩ … 199.9 MΩ
Nominal voltage Uiso* .....500 V (- 0 %, + 10 %)
Short circuit current.....max. 2.0 mA
Limit (Riso)*.....Off, Custom, 2.50 MΩ, 5.00 MΩ
Duration*.....Off, 2 s, 3 s, 5 s, 10 s, 30 s, 60 s, 90 s, 120 s, 180 s
Test terminals: .....W1, W2 terminals shorted (A 1422), Test socket (A 1422: 16A-5p, 32A-5p or 16A-3p) (PE terminal)

* Parameters and limits are set on master instrument.

8.1.11 Insulation resistance LN-W (supply circuit to welding circuit) (according to IEC/EN 60974-4)

Insulation LN-W

	Range	Resolution	Accuracy
Riso	0.00 MΩ … 19.99 MΩ	0.01 MΩ	±(3 % of reading + 2 D)
	20.0 MΩ … 99.9 MΩ	0.1 MΩ	± 5 % of reading
	100.0 MΩ … 199.9 MΩ	0.1 MΩ	± 10 % of reading

Output voltage

	Range	Resolution	Accuracy
Um	0 V … 600 V	1 V	±(3 % of reading + 2 D)

Operating range (acc. to EN 61557-2)...0.08 MΩ … 199.9 MΩ
Nominal voltage Uiso* .....500 V (- 0 %, + 10 %)
Short circuit current.....max. 2.0 mA
Limit (Riso)*.....Off, Custom, 2.50 MΩ, 5.00 MΩ
Duration*.....Off, 2 s, 3 s, 5 s, 10 s, 30 s, 60 s, 90 s, 120 s, 180 s
Test terminals: .....Test socket (A 1422: 16A-5p, 32A-5p or 16A-3p) (L1, L2, L3, N terminals shorted), (W1, W2 terminals on A 1422 shorted)

* Parameters and limits are set on master instrument.

8.1.12 Insulation resistance LN-P (supply circuit of class II equipment to accessible surfaces) (according to IEC/ EN 60974-4)

Insulation LN-P

	Range	Resolution	Accuracy
Riso	0.00 MΩ … 19.99 MΩ	0.01 MΩ	±(3 % of reading + 2 D)
	20.0 MΩ … 99.9 MΩ	0.1 MΩ	± 5 % of reading
	100.0 MΩ … 199.9 MΩ	0.1 MΩ	± 10 % of reading

Output voltage

	Range	Resolution	Accuracy
Um	0 V … 600 V	1 V	±(3 % of reading + 2 D)

Operating range (acc. to EN 61557-2)...0.08 MΩ … 199.9 MΩ
Nominal voltage Uiso* .....500 V (- 0 %, + 10 %)
Short circuit current.....max. 2.0 mA
Limit (Riso)*.....Off, Custom, 2.50 MΩ, 5.00 MΩ
Duration*.....Off, 2 s, 3 s, 5 s, 10 s, 30 s, 60 s, 90 s, 120 s, 180 s
Test terminals: .....Test socket (A 1422: 16A-5p, 32A-5p or 16A-3p) (L1, L2, L3, N terminals shorted), P/S terminal on master instrument

* Parameters and limits are set on master instrument.

8.1.13 Welding circuit leakage current Iw (according to IEC/ EN 60974-4)

Welding circuit leakage current

	Range	Resolution	Accuracy
Iw	0.00 mA … 14.99 mA	0.01 mA	±(5 % of reading + 5 D)

Frequency response complies to EN 60974-4 – Figure 1.
Duration*.....Off, 2 s, 3 s, 5 s, 10 s, 30 s, 60 s, 90 s, 120 s, 180 s
Change*.....Yes, No
Delay* .....0.2 s, 1 s, 2 s, 3 s, 4 s, 5 s
Limit (Iw)*.....Off, Custom, 3.50 mA, 5.00 mA, 10.00 mA
Test terminals .....Test socket (A 1422: 16A-5p, 32A-5p or 16A-3p), (W1 and W2 terminals on A 1422)

* Parameters and limits are set on master instrument.

8.1.14 Primary leakage current I diff (according to IEC/ EN 60974-4)

Primary leakage current

	Range	Resolution	Accuracy
Idiff	0.00 mA … 14.99 mA	0.01 mA	±(5 % of reading + 5 D)

Frequency response complies to EN 60974-4 – Figure 2.
Duration*.....Off, 2 s, 3 s, 5 s, 10 s, 30 s, 60 s, 90 s, 120 s, 180 s
Change*.....Yes, No
Delay* .....0.2 s, 1 s, 2 s, 3 s, 4 s, 5 s
Limit (Idiff)* .....Off, Custom, 0.25 mA … 15.0 mA
Test terminals .....Test socket (A 1422: 16A-5p, 32A-5p or 16A-3p)
Additional error .....0.01 mA / A

* Parameters and limits are set on master instrument.

8.1.15 No load voltage (according to IEC/ EN 60974-4)

No load voltage Up (a.c. peak or d.c. peak)

	Range	Resolution	Accuracy
Up	0.0 V … 199.9 V	0.1 V	±(5 % of reading + 5 D)

No load voltage readout Urms (a.c. r.m.s.)

	Range	Resolution	Accuracy
Urms	0.0 V … 139.9 V	0.1 V	±(5 % of reading + 5 D)

Measurement circuit according to EN 60974-4 – Figure 4.

W-output*..... a.c., d.c.
Rated no-load voltage* ..... Custom, -, 20 V … 99 V
Limit (Up)*..... $U_0p \pm 15$ %
Limit H (Up)* ..... a.c. output: Off, 68 V, 113 V, 141 V
d.c. output: Off, 113 V, 141 V
Limit (Urms)*..... Off, 48 V, 80 V, 100 V
Test terminals ..... Test socket (A 1422: 16A-5p, 32A-5p or 16A-3p),
Test terminals W1 / W2

* Parameters and limits are set on master instrument.

8.2 General data

Supply voltage single-phase	230 V ± 10 %
Supply voltage 3-phase	230/400 V ± 10 % 120/208 V ± 10 %
Maximum test current	32 A, 40 A max (10 min)
Overvoltage category	300 V CAT II
Protection classification	I
Pollution degree	2
Protection degree	IP 20 (connectors)
Protection degree	IP 66 (closed and locked cover)
Altitude	< 2000 m
Case	Shock proof plastic, portable
Dimensions (w × h × l)	335 mm × 160 mm × 335 mm
Weight	7.2 kg

Measuring category

Test sockets	CAT II 300 V
W1, W2	No CAT, Ud.c. < 200 V or Upeak < 200 V, (Transient overvoltage: 1500 V)
EB	No CAT, Umax < 6 Va.c. (No transient)

EMC

Emission	Class B (portable equipment used in controlled EM environments: domestic, commercial, light industry)
Immunity	Controlled electromagnetic environment

Reference conditions

Reference temperature range	15 °C … 35 °C
Reference humidity range	35 %RH … 65 %RH

Operation conditions

Working temperature range	0 °C … 40 °C
Maximum relative humidity	85 %RH (0 °C … 40 °C), non-condensing
Operation	Indoor use

Storage conditions

Temperature range	-10 °C … +60 °C
Maximum relative humidity	90 %RH (-10 °C … +40 °C) 80 %RH (40 °C … 60 °C)