MultiServicer

MI 2170

User Manual

Version: 1.8 - HW2; Code No. 20 750 505

METREL®

Distributor:

Producer:

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CE Mark on your equipment certifies that this equipment meets the requirements of the EU (European Union) concerning safety and interference causing equipment regulations

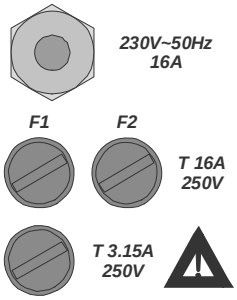
1 General presentation

1.1 Safety in use

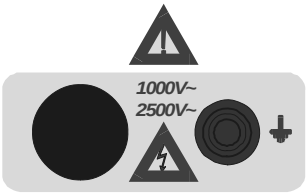
- **Disconnect all unused test leads before starting measurement; otherwise the instrument can be damaged!**
- **If the test equipment is used in a manner not specified in the User Manual, the protection provided by the equipment may be imparied.**
- **Read this instruction manual carefully, otherwise use of the instrument may be dangerous for the operator, for the instrument or for equipment under test!**
- **Use only grounded mains outlets to supply the instrument!**
- **Do not use any damaged mains outlet, damaged mains connection cable or damaged measurement leads!**
- **Service or calibration procedure must only be carried out by a competent authorized person!**
- **Only a skilled person, who is familiar with hazardous voltage operations, can handle MultiServicer!**
- **In some countries the differential leakage and touch leakage current measurements shall be executed for normal connection of tested equipment and also for the connection with changed L and N. Rotate plug connector of tested equipment and repeat the measurement for changed L and N. Consider local regulations.**

Meaning of  ,  signs on front panel:

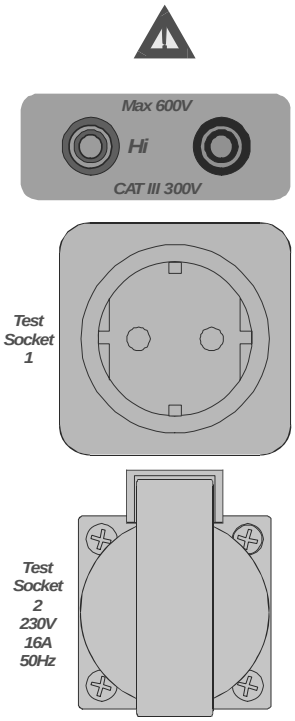
Input section ..... **Dangerous voltage** is present on Test Socket 2 immediately after switching on the instrument.
Switch off the instrument and disconnect all test cables and mains cord before replacing the fuses or opening the instrument



Withstanding terminals ..... **Dangerous voltage** may be present. **Switch off** the instrument immediately if the TEST ON led (pos.5, fig.*1*.) **does not** light after switching on HV generator and service the instrument. **Always** handle as if the test leads are energized.



Other sections of terminals .....



Disconnect all other items from the instrument except equipment under test during test.
Dangerous voltage is present on Test Socket 2 immediately after switching on the instrument.
Insulation, Continuity and Voltage Drop measurements shall be carried out only on de-energized equipment.

Note!
Dangerous voltage is permanently present on the TEST SOCKET 2 immediately after switching-on the instrument. TEST SOCKET 2 is connected in parallel to mains connector.

1.2 Warranty

Unless notified to the contrary, our instruments are guaranteed against any manufacturing or material defect. They do not bear the specification known as the safety specification. Our guarantee, which may not under any circumstances exceed the amount of the invoiced price, is for the repair of our faulty equipment only, carriage paid to our workshops. It is applicable for normal use of our instruments and does not apply to any damage or destruction caused, notably by error in mounting, mechanical accident, faulty maintenance, defective use, overload or excess voltage.

Our responsibility is strictly limited to the pure and simple replacement of the faulty parts of our equipment, the buyer expressly renounces any attempt to find us responsible for damages or losses caused directly or indirectly.

Our guarantee is applicable for twelve (12) months after the date at which the equipment is made available. The repair, modification or replacement of a part during the guarantee period will not result in this guarantee being extended.

1.3 List of measurements carried out by the instrument

MEASUREMENT	OUTPUT TERMINALS
Withstanding voltage test 2500 VAC	Sockets on yellow section
Withstanding voltage test 1000 VAC	Sockets on yellow section
Insulation resistance test 500 VDC	Hi - Lo sockets
Voltage drop test 10 A	Hi - Lo sockets
Continuity test 10 A	Hi - Lo sockets
Discharge time measurement	Hi - Lo sockets
Functional test	Test Socket 2
Differential leakage	Test Socket 2
Touch Leakage	Test Socket 2 (PE), Lo socket
Substitute Leakage	Test Socket 1
Insulation resistance test 500 V	Test Socket 1
Continuity 200 mA	Test Socket 1 (PE), Hi socket
Continuity 10 A	Test Socket 1 (PE), Hi socket

1.4 List of applicable standards

MultiServicer is designed in accordance to the following standards:

- EN 61010-1 (safety)
- EN 50081-1 (electromagnetic compatibility)
- EN 61000-6-1 (electromagnetic compatibility)

1.4.1 Measurements according to EN 60204-1

Testing of machines

Test	Function switch position	Limits
1. Verification that the electrical equipment is in compliance with the technical documentation		
2. Test of continuity of the protective bonding circuit	4	Depends on conductors material, length and cross section.
3. Insulation resistance test	3	> 1 MΩ
4. Voltage Tests	2	1 s - No break down
5. Protection against residual voltages	5	≤ 60 V in 5 s
		≤ 60 V in 1 s (plugs)
6. Functional test		
7. Retesting in case of changes or modifications		

1.4.2 Measurements according to EN 60439-1

Testing of Low-voltage switchgear and controlgear assemblies

Test	Function switch position	Limits
Type tests		
1. Verification of temperature –rise limits		
2. Verification of the dielectric properties	1 and 2	5 s – No break down
3. Verification of the short-circuit withstand strength		
4. Verification of the effectiveness of the protective circuit	4	≤ 0,1 Ω
5. Verification of clearances and creepage distances		
6. Verification of mechanical operation		
7. Verification of the degree of protection		
Routine tests		
1. Inspection of the assembly including inspection of wiring and electrical operation test		
2. Verification of the dielectric properties	1 and 2	1 s – No break down
3. Protection against residual voltages	5	≤ 120 V in 5 s
4. Checking of protective measures and of the electrical continuity of the protective circuit		
5. Verification of insulation resistance	3	> 1000 Ω/V

1.4.3 Measurements according to VDE 701 and VDE 702

Testing of electrical appliances

Test	Function switch position	Limits
1. Visual Check		
2. Test of continuity of the protective bonding circuit	11 and 12	≤ 0,3 Ω
		≤ 1 Ω
3. Insulation resistance test	10	> 0,25 MΩ
		> 0,3 MΩ (VDE 701)
		> 0,5 MΩ (VDE 702)
		> 1,0 MΩ (VDE 701)
		> 2,0 MΩ
4. Differential leakage current	7	≤ 3,5 mA
		≤ 1 mA/kW (P > 3,5 kW) (VDE 701)
		≤ 7 mA (VDE 701)
		≤ 15 mA (P > 6 kW) (VDE 701)
5. Touch leakage current	8	≤ 0,25 mA (VDE 701-240 (Entwurf – 0.5 mA))
		≤ 0,5 mA
6. Substitute leakage current	9	≤ 0,5 mA (VDE 701)
		≤ 3,5 mA (VDE 701)
		≤ 1 mA/kW (P > 3,5 kW) (VDE 701)
		≤ 7 mA
		≤ 15 mA (P > 6 kW)
7. Functional test	6	
8. Voltage Tests	2	3 s - No break down

2 Description of the instrument

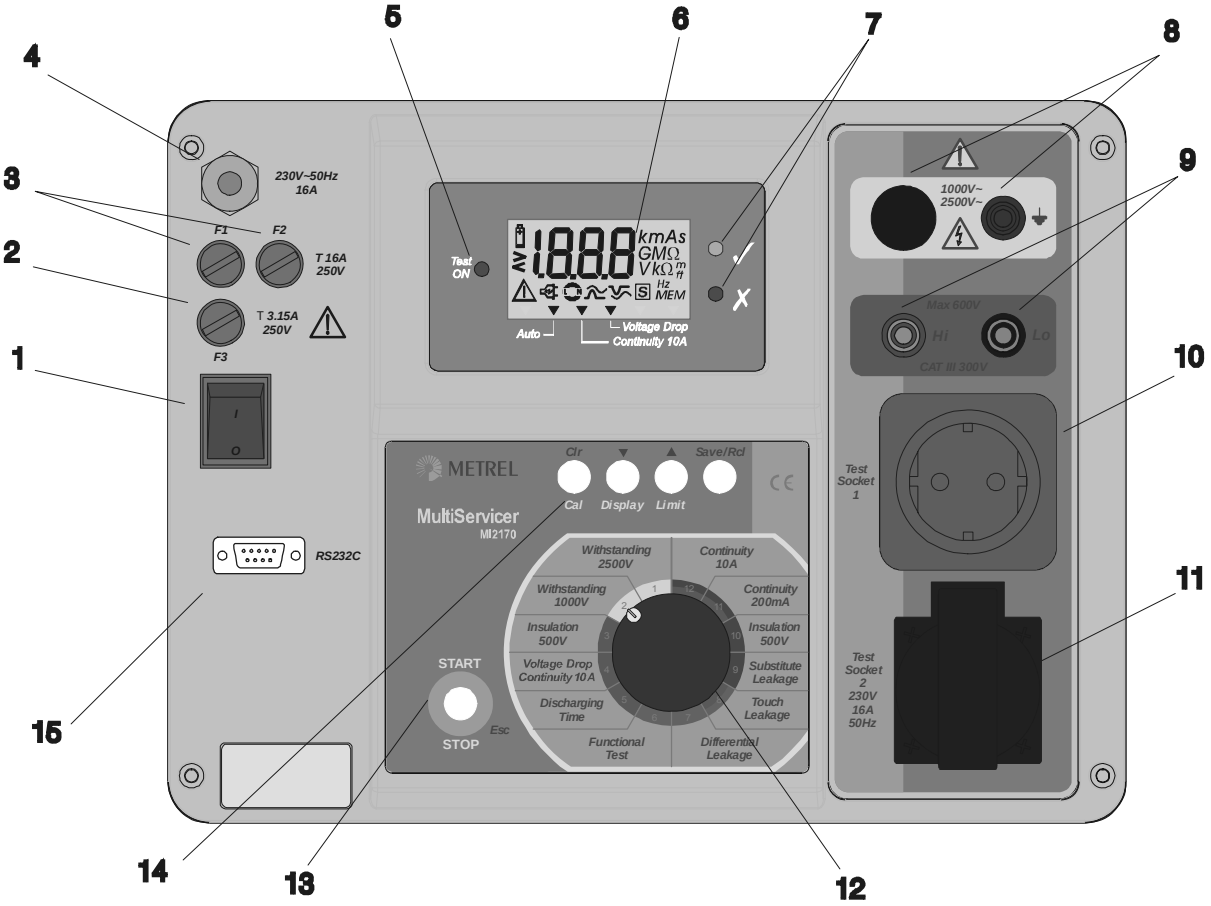


Fig. 1. Front panel layout

Legend:

1. **POWER ON/OFF switch** with indication lamp
2. **T 3.15 A 250 V fuses** protect instrument power supply
3. **T16 A 250 V 6.3x 32 fuses** protect from test socket overloading
4. **Mains supply**
5. **Test ON warning lamp**
6. **LCD custom display**
7. **Measurement result status** (pass signal **,** fail signal)
8. **Withstanding test terminals**
9. **General (Hi - Lo) test terminals**
10. **Test socket 1**
11. **Test socket 2**
12. **ROTARY SWITCH** to select desired function
13. **START/STOP key**
14. **FUNCTIONAL keys**
15. **RS 232 connector**

3 Technical specifications

3.1 Withstanding 2500 V

Test voltage readout

Range (kV)	Resolution (kV)	Accuracy
0.00 - 3.00	0.01	±(5 % of reading + 5 digit)

Withstanding current readout

Range (mA)*	Resolution (mA)	Accuracy
0.0 - 99.9	0.1	±(5 % of reading + 5 digit)

* Displayed apparent current

Output voltage / power: 2500 V / 250 W at U_{mains} 230 V, grounded
Trip out current: 2, 5, 10, 20, 50, 100 mA (accuracy ±10 %)
Trip out time: < 30 ms
Voltage shape: sinusoidal
Timer: OFF (START / STOP button must be pressed for operation; 'bep - bep' is activated every 1 s to determine test ON)
Output: socket on yellow section

3.2 Withstanding 1000 V

Test voltage readout

Displayed voltage (kV)	Resolution (kV)	Accuracy
0.00 - 1.50	0.01	±(5 % of reading + 5 digit)

Withstanding current readout

Displayed current (mA)*	Resolution (mA)	Accuracy
0.0 - 109.9	0.1	±(5 % of reading + 5 digit)
110 - 500	1	±(5 % of reading + 5 digit)

* Displayed apparent current

Output voltage / power: 1000 V / 500 W at U_{mains} 230 V, grounded
Trip out current: 5, 10, 20, 50, 100, 500 mA (accuracy ±10 %)
Trip out time: <30 ms
Voltage shape: sinusoidal
Displayed current: apparent
Timer: OFF (START / STOP button must be pressed for operation; sound signal 'bep - bep' is activated every 1 s to determine test ON)
Output: socket on yellow section

3.3 Insulation resistance 500 V =

Insulation resistance readout

Range (MΩ)	Resolution (MΩ)	Accuracy
0 - 19.99	0.01	±(5 % of reading + 5 digit)

Nominal voltage: 500V (+30% / -0%)
Short circuit current: 1.4 mA max.
Measuring current: min 1mA at 500 kΩ
Settable limits: 0.23, 0.25, 0.50, 1.00, 2.00, 5.00 MΩ
Auto discharging after test
Timer: ON, 15 seconds
Output Hi / red – Lo / black 4 mm safety sockets

3.4 Voltage drop

Voltage drop readout

Range ΔU (V)	Resolution (V)	Accuracy
0.00 – 11.99	0.01	±(5 % of reading + 5 digit)

Max. output voltage: <12 V~ at U_{mains} 240 V
Test current: > 10 A at R <330 mΩ, U_{mains} 230 V (standard test lead)
> 10 A at R <200 mΩ, U_{mains} 230 V (optional continuity extension 10 m)
Threshold values of voltage drop versus wire section:

Wire section (mm^2)	Threshold voltage drop (V)
0.5	5
0.75	5
1	3.3
1.5	2.6
2.5	1.9
4	1.4
≥6	1.0

Timer: ON, 10 seconds
Output: Hi / red – Lo / black 4 mm safety sockets

3.5 Continuity 10 A

Continuity Resistance readout

Range (Ω)	Resolution (Ω)	Accuracy (after calibration)
0.000 –1.999	0.001	±(5 % of reading + 5 digit)

Max. output voltage: <12 V~ at U_{mains} 240 V
Test current: > 10 A at R <330 mΩ, U_{mains} 230 V..(standard test lead)
> 10 A at R <200 mΩ, U_{mains} 230 V (optional continuity extension 10 m)
Threshold values: 0.100, 0.200, 0.300, 0.500, 1.000, 1.500 Ω
Timer: ON, 10 seconds
Output Hi / red – Lo / black 4 mm safety sockets

3.6 Discharging time

Discharging time readout

Range (s)	Resolution (s)	Accuracy
0.0 – 9.9	0.1	±(5 % of reading + 3 digit)

2 wires system, triggered on DC voltage falling slope
Max. working voltage: 600 V peak
Min. working voltage: 85, 170 V peak
Threshold values: 1 s, 5 s
Safe voltage level: 60 V, 120 V
Internal resistance of input: 48 MΩ
Output Hi / red – Lo / black 4 mm safety sockets

3.7 Functional test

Current readout

Range (A)	Resolution (A)	Accuracy
0.00 – 15.99	0.01	±(5 % of reading + 3 digit)

Threshold values: 0.5, 1.00, 2.00, 5.00, 10.00, 15.00 A
Timer: ON, 10 seconds
Output: Test Socket 2

3.8 Differential Leakage

Differential leakage current readout

Range (mA)	Resolution (mA)	Accuracy
0.00 – 19.99	0.01	±(5 % of reading + 5 digit)

Threshold limits: 0.25, 0.50, 1.00, 3.50, 5.00, 10.00 mA
Timer: ON, 10 seconds
Output: Test Socket 2

3.9 Touch Leakage

Touch leakage current readout

Range (mA)	Resolution (mA)	Accuracy
0.00 – 1.99	0.01	±(5 % of reading + 5 digit)

Threshold values: 0.25, 0.50, 0.75, 1.00, 1.25, 1.50 mA
Timer: ON, 10 seconds
Output: Test Socket 2 + Lo safety terminal
R_{Ameter}: 1.8 kΩ

3.10 Substitute Leakage

Substitute leakage current readout

Range (mA)	Resolution (mA)	Accuracy
0.00 – 19.99	0.01	±(5 % of reading + 5 digit)

Short circuit current: < 30 mA
Open circuit voltage: 40 V
I_{EA} displayed current is calculated to 230 V
Threshold values: 0.25, 0.50, 1.00, 3.50, 7.00, 15.00 mA
Timer: ON, 10 seconds
Output: Test Socket 1

3.11 Insulation resistance 500 V =

Insulation resistance readout

Range (MΩ)	Resolution (MΩ)	Accuracy
0 - 19.99	0.01	±(5 % of reading + 5 digit)

Nominal voltage: 500 V (+30 % / -0%)
Short circuit current: 1.4 mA max.
Measuring current: min 1 mA at 500 kΩ
Threshold values: 0.23, 0.25, 0.50, 1.00, 2.00, 5.00 MΩ
Auto discharging after test
Timer: ON, 15 seconds
Output: Hi / red – Lo / black (4 mm safety sockets)

3.12 Continuity 200 mA

Continuity Resistance readout

Range (Ω)	Resolution (Ω)	Accuracy (after calibration)
0.00 – 19.99	0.01	±(5 % of reading + 5 digit)

Max. output voltage: <12 V~ at U_{mains} 240 V
Test current: > 200 mA up to 10 Ω, U_{mains} 230 V
Threshold values: 0.20, 0.30, 0.50, 1.00, 5.00, 12.0 Ω
Timer: ON, 10 seconds
Output: Test Socket 1 (PE) + Hi / red (4 mm safety socket)

3.13 Continuity 10 A

Continuity Resistance readout

Range (Ω)	Resolution (Ω)	Accuracy (after calibration)
0.000 –1.999	0.001	±(5 % of reading + 5 digit)

Max. output voltage: <12 V~ at U_{mains} 240 V
Test current: > 10 A at R <330 mΩ, U_{mains} 230 V..(standard test lead)
> 10 A at R <200 mΩ, U_{mains} 230 V (optional continuity extension 10m)
Threshold values: 0.100, 0.200, 0.300, 0.500, 1.000, 1.500 Ω
Timer: ON, 10 seconds
Output: Test Socket 1 (PE) + Hi / red (4 mm safety socket)

3.14 General

Mains voltage ..... 230 V (+6 % - 10 %) / 50 Hz
Max. power consumption..... 600 VA (without load on TEST SOCKET)
Input current max. ..... 16 A
Display..... Custom LCD, Pass / Fail LED indication
RS232 interface..... 1 start bit, 8 data bits, 1 stop bit,
Baud rate 2400
Memories..... 62 groups per 62 memory locations
Measurement circuitry protection:

F1 T	16 A / 250 V	6.3 × 32mm (test socket protection)
F2 T	16A / 250 V	6.3 × 32 mm (test socket protection)
F3 T	3.15 A / 250 V	5 × 20 mm (general protect. of the instrument)
F4 T	20 A / 500 V	10.3 × 38 mm (Hi socket protection)

Case..... shock proof plastic / portable
Dimensions (mm) (w × h × d) .... 335 x 160 x 335
Mass (without accessories) ..... 9.5 kg
Pollution degree 2
Degree of protection (at closed cover) IP 54
Overvoltage category ..... Cat III / 300 V
Protection classification I
Working temp. range ..... 0 ^{0}C ÷ 40 ^{0}C
Ref. temp. range..... 5 ^{0}C ÷ 35 ^{0}C
Ref. humidity range ..... 40 % ÷ 80 % RH
Storage temp. range..... -10 ^{0}C ÷ 60 ^{0}C
Max. working humidity ..... 85 % RH (0 ^{0}C ÷ 40 ^{0}C)
Max. storage humidity ..... 90 % RH (-10 ^{0}C ÷ 40 ^{0}C)
80 % RH (40 ^{0}C ÷ 60 ^{0}C)

4 Measurements

General notes:

Disconnect all unused test leads before starting measurement, otherwise the instrument can be damaged!

If instrument is not grounded "Ert" (earth) message is displayed. Disconnect mains supply and connect it to grounded outlet.

For all measurements except leakage current and discharging time, if an external voltage is present on the test terminals then the following message will be displayed:

U_1 if external voltage (> 30 V) is present on test terminals **Hi – Lo** terminals
U_2 if external voltage (> 145 V) is present on **Withstanding** test terminals
I_2 if current (> 15 mA) is present on **Test socket 2**

Measurement will not be done if external voltage is present

4.1 Withstanding 2500 V

Warning !

- **Disconnect all unused test leads before starting measurement, otherwise the instrument can be damaged!**
- **Only a skilled person, who is familiar with hazardous voltage operations, can perform this measurement!**
- **Check instrument and test leads for any sign of damage or abnormality before connecting them to the instrument. DO NOT use test probes in case of any damage or abnormality!**
- **Always handle with the instrument and connected accessories as the Withstanding test sockets and leads are under the hazardous voltage!**
- **Never touch exposed probe tip, connections equipment under test or any other energized part during the measurements. Make sure that NOBODY can contact them either!**
- **Connect test probes only for measurement of withstanding, and disconnect them immediately after the test!**
- **DO NOT touch any part of test probe in front of the barrier (keep your fingers behind the finger guards on the probe) – possible danger of electric shock!**
- **Always use lowest possible trip-out current.**
- **If GND test probe is not connected, instrument doesn't start the measurement. Sign "Pro" is displayed.**

- **Instructions for using the test tip:**
  - **push the button to unlock the sleeve and touch tested object with test tip (keep the button pushed while the sleeve is not retracted upon few millimeters at least, than release it and retrieve the thumb behind the barrier).**
  - **after the measurement retract the test tip from tested object and sleeve comes automatically over the tip.**
  - **the sleeve locks itself automatically when it fully recovers the tip.**

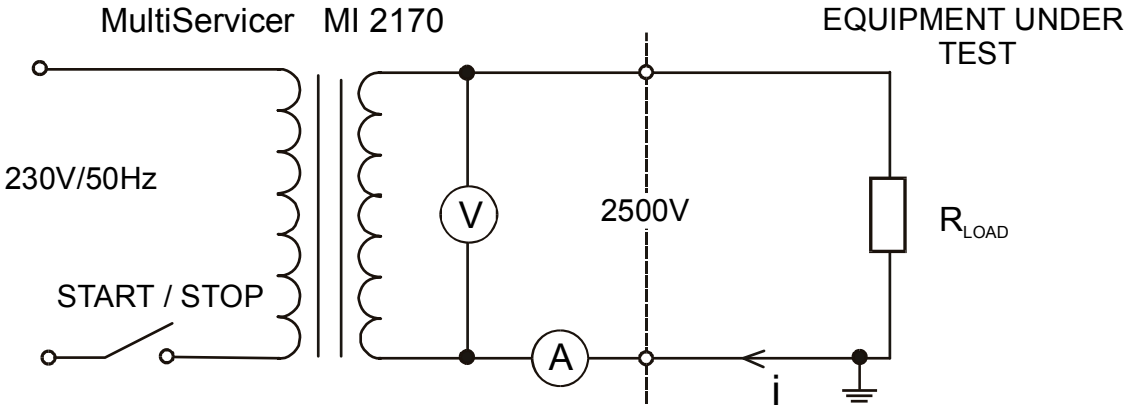


Fig. 2. Test circuitry

How to carry out the measurement

STEP 1. Set rotary switch to **Withstanding 2500 V** - position 1, the following heading is displayed:

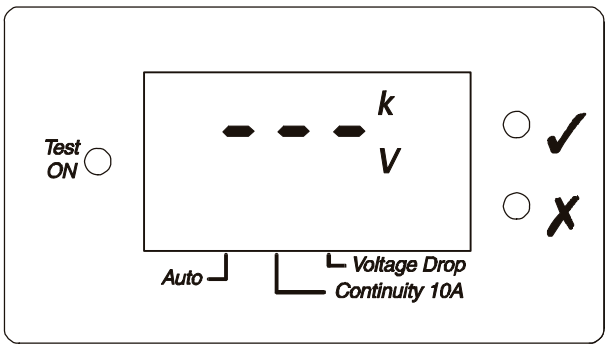


Fig. 3. Basic heading in Withstanding 2500 V

STEP 2. **S**et tripping out current:
- Press **Limit** key to view the existing value of tripping out current,
- Keep **Limit** key pressed in order to select appropriate tripping out current value.

Tripping out current values: 2, 5, 10, 20, 50, 100 mA.

If the set tripping out current is higher than 10 mA it is necessary to set it for every measurement (after the measurement limit is automatically set to 10 mA). To avoid that safety function, press button “Limit” during switching ON the instrument.
If there is a test current higher than the preset limit, then the measurement will be automatically concluded with fail signal .

STEP 3. Connect test probes to the instrument and tested item as shown in figure below. Do not forget to switch off supply voltage.

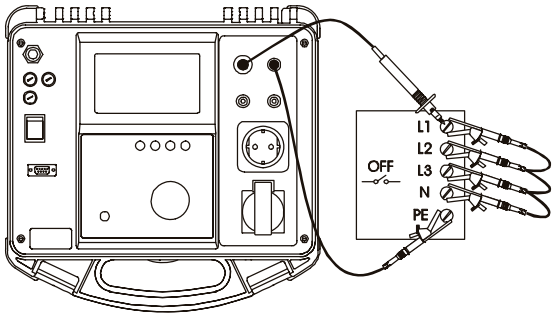


Fig. 4. Connection of test leads

STEP 4. Keep **START / STOP** key pressed to start high voltage generator and carry out the test using test probes. 2500 V appears after 3 seconds 1000 V is present. Voltage is displayed during this time.
Test ON signal lamp is ON and sound signal is beeping during measurement.

STEP 5. Release **START / STOP** key to stop high voltage generator.
The measurement will be concluded with pass signal .

STEP 6. Save displayed result for documentation purpose by pressing **Save** key. Message MEM and number of the last saved record will be displayed for a moment. Use **Display** key to switch between test current and voltage value results on display.

Note!

- **Take care when using HV test probes - hazardous voltage!**
- **If there is a test current higher than preset limit one, then HV generator trips automatically after reaching that value, preset limit value is displayed as a result in this instance.**

4.2 Withstanding 1000 V

Warning!

- **Disconnect all unused test leads before starting measurement; otherwise the instrument can be damaged!**
- **Only a skilled person, who is familiar with hazardous voltage operations, can perform this measurement!**
- **Check instrument and test leads for any sign of damage or abnormality before connecting them to the instrument. DO NOT use test probes in case of any damage or abnormality!**
- **Always handle with the instrument and connected accessories as the Withstanding test sockets and leads are under the hazardous voltage!**
- **Never touch exposed probe tip, connections equipment under test or any other energized part during the measurements. Make sure that NOBODY can contact them either!**
- **Connect test probes only for measurement of withstanding, and disconnect them immediately after the test!**
- **DO NOT touch any part of test probe in front of the barrier (keep your fingers behind the finger guards on the probe) – possible danger of electric shock!**
- **Always use lowest possible trip-out current**
- **If GND test probe is not connected, instrument doesn't start the measurement. Sign "Pro" is displayed.**
- **Instructions for using the test tip:**
  - **push the button to unlock the sleeve and touch tested object with test tip (keep the button pushed while the sleeve is not retracted upon few millimeters at least, than release it and retrieve the thumb behind the barrier).**
  - **after the measurement retract the test tip from tested object and sleeve comes automatically over the tip.**
  - **the sleeve locks itself automatically when it fully recovers the tip.**

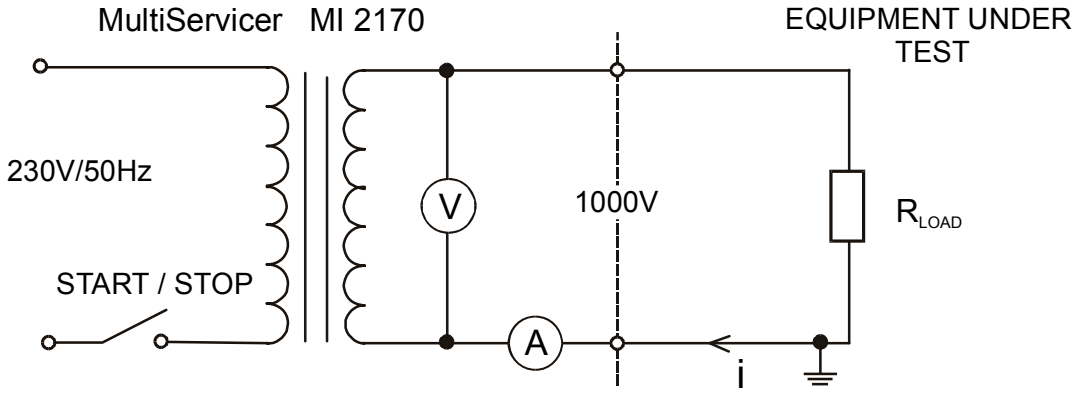


Fig. 5. Test circuitry

How to carry out the measurement

STEP 1. Set rotary switch to **Withstanding 1000 V** - position 2, the following heading is displayed:

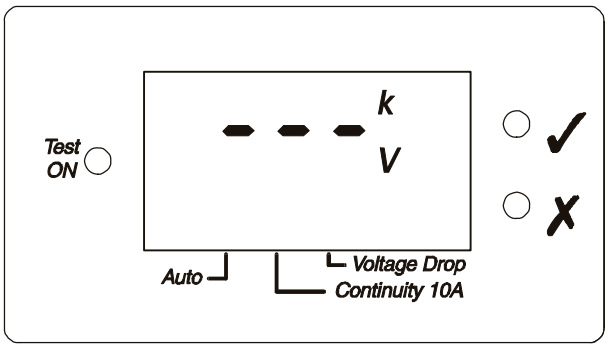


Fig. 6. Basic heading in Withstanding 1000 V

STEP 2. **S**et tripping out current:
- Press **Limit** key to view the currently set value of tripping out current,
- Keep **Limit** key pressed in order to select appropriate tripping out current value.

Tripping out current values: 2, 5, 10, 20, 50, 100, 500 mA.

If the set tripping out current is higher than 10 mA it is necessary to set it for every measurement (after the measurement limit is automatically set to 10 mA). To avoid that safety function, press button “Limit” during switching ON the instrument.

If there is a test current higher than the preset limit one, then the measurement will be automatically concluded with fail signal .

STEP 3. Connect test probes to the instrument and tested item as shown in figure below. Do not forget to switch off supply voltage.

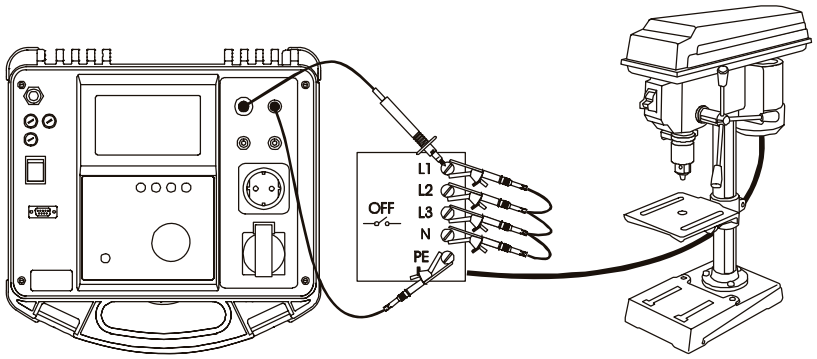


Fig. 7. Connection of test leads

STEP 4. Keep **START / STOP** key pressed to start high voltage generator and carry out the test using test probes.
Test ON signal lamp is ON and sound signal is beeping during measurement.

STEP 5. Release **START / STOP** key to stop high voltage generator.
The measurement will be concluded with pass signal .

STEP 6. Save displayed result for documentation purpose by pressing **Save** key.
Message MEM and number of the last saved record will be displayed for a moment.
Use **Display** key to switch between test current and voltage value results on display.

Note!

- **Take care when using HV test probes - hazardous voltage!**
- **If there is a test current higher than preset limit one, then HV generator trips automatically after reaching that value, preset limit value is displayed as a result in this instance.**

4.3 Insulation 500 V

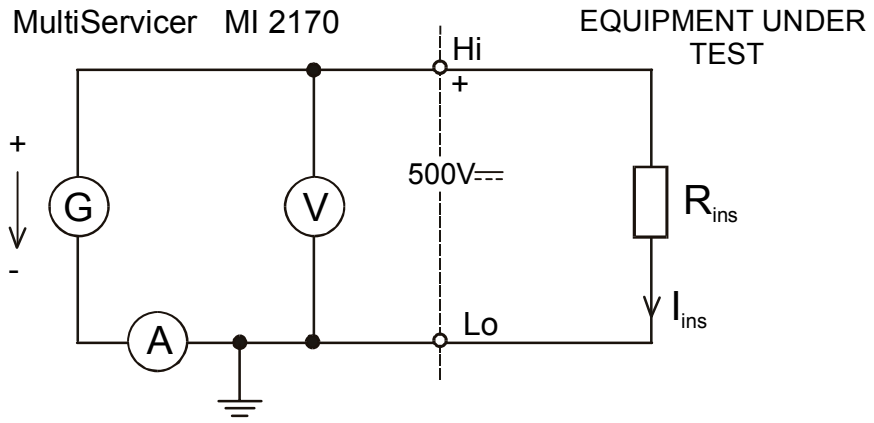


Fig. 8. Test circuitry

How to carry out the measurement

STEP 1. Set rotary switch to **Insulation 500 V** - position 3, the following heading is displayed:

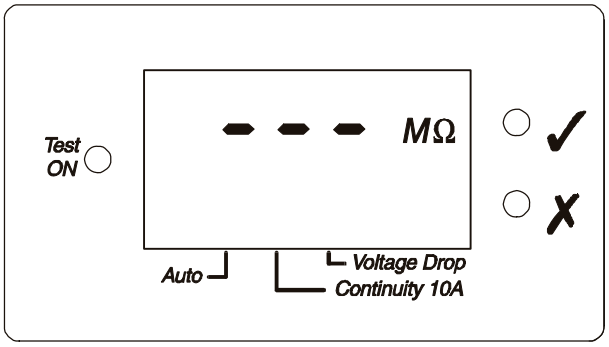


Fig. 9. Basic heading in Insulation 500 V

STEP 2. Set Insulation resistance threshold:
- Press **Limit** key to view the currently set threshold value,
- Keep pressed **Limit** key in order to select appropriate threshold value.

Resistance threshold values: 0.23, 0.25, 0.50, 1.00, 2.00, 5.00, MΩ

STEP 3. Connect test probes to the instrument and tested item as shown in figure below. Do not forget to switch off supply voltage.

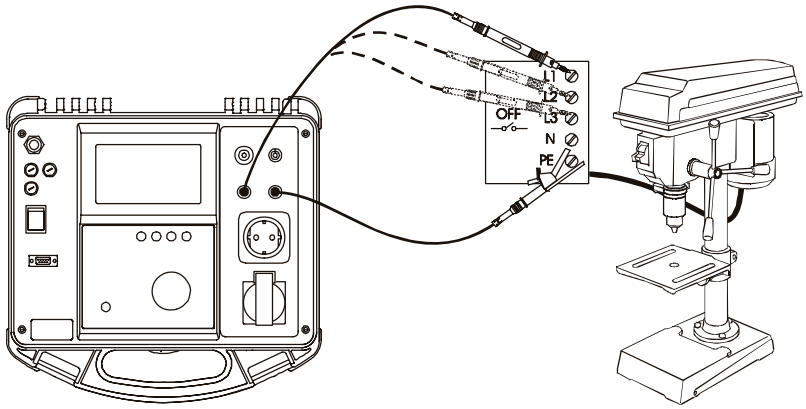


Fig. 10. Connection of test leads

STEP 4. Press **START / STOP** key to start the measurement.
Test ON signal lamp is ON during measurement.

STEP 5. Wait for timer to elapse or press **START / STOP** key again to stop the measurement.
The measurement will be concluded with pass signal or fail signal dependant on test result comparison to preset limit.

STEP 6. Save displayed result for documentation purpose by pressing **Save** key.

Note!

- **Do not disconnect the equipment under test from instrument before it is discharged.**

4.4 Voltage drop

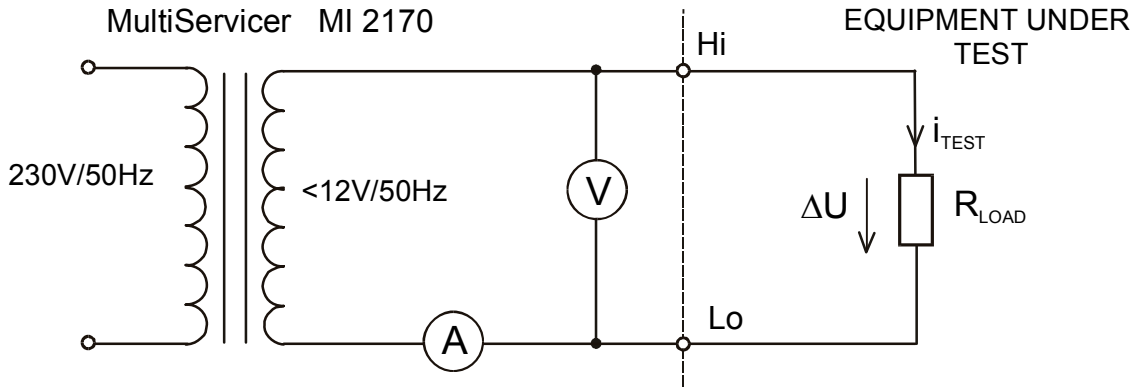


Fig. 11. Test circuitry

How to carry out the measurement

STEP 1. Set rotary switch to **Voltage drop / Continuity 10 A** - position 4**.**

STEP 2. Select **Voltage drop** function using **Display** key, the following heading is displayed: (the display key switches between Voltage drop, Voltage drop-AUTO, Continuity and Continuity-AUTO functions)

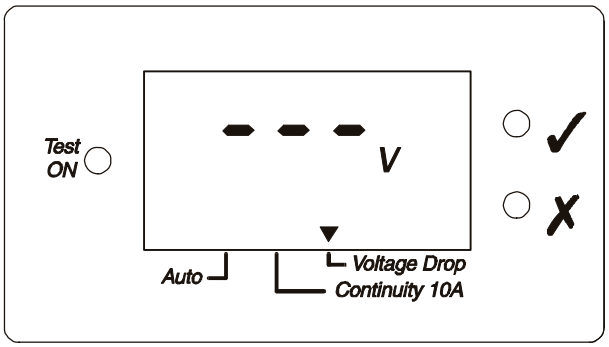


Fig. 12. Basic heading in Voltage Drop

- AUTO start option
  -Select **Voltage drop-AUTO** function using **Display** key, the following heading is displayed:

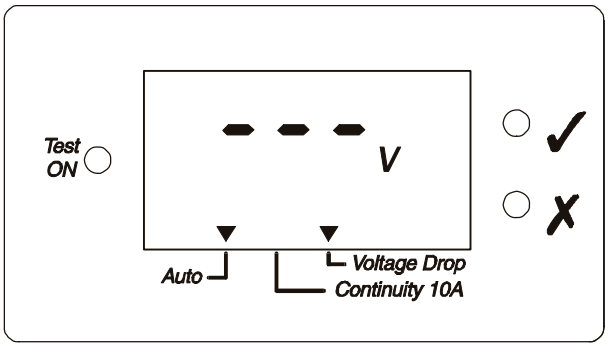


Fig. 13. Basic heading in Voltage Drop-AUTO

In this mode a small voltage is always present on the Hi - Lo test terminals after **START / STOP** key is pressed. Small current at connected terminals will activate the measurement.

STEP 3. Set voltage threshold:
- Press **Limit** key to view the currently set value
- Keep pressed **Limit** key in order to select appropriate threshold value

Voltage threshold values: 1.00, 1.40, 1.90, 2.60, 3.30, 5.00 V

STEP 4. (RECOMENDED) Short circuit the test probes in order to calibrate the resistance of the test leads.
Press **Cal** key to perform the calibration. It must be concluded with pass signal . After Calibration press **START / STOP** key with short circuited test probes and the result must be close to zero.

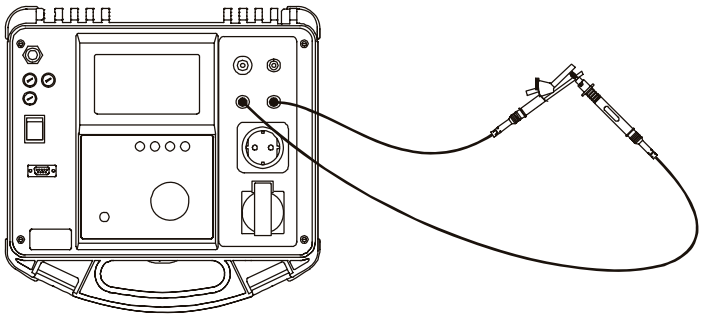


Fig. 14. Zero calibration

After calibration the leads resistance will not influence the results.

STEP 6. Connect test probes to the instrument and tested item as shown in figure below. Do not forget to switch off supply voltage.

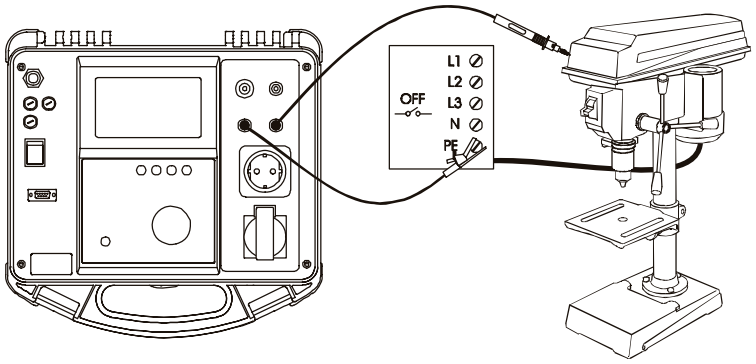


Fig. 15. Connection of test leads

STEP 6. Press **START / STOP** key to start the measurement.
Test ON signal lamp is ON during measurement.

STEP 7. Wait for timer to elapse to stop the measurement.
The measurement will be concluded with pass signal or fail signal dependant on test result comparison to preset limit.

- AUTO start option
  - you can start a new measurement by disconnecting and then connecting Hi or Lo test probe after timer elapse,
  -after timer elapse an instrument will wait for another test, the displayed result is the worse case measured result. When saving results, the displayed result is the worse measured result after last saving.
  - if that measurement is not needed promptly again, it is advisable to disconnect probes (to avoid unnecessary loading of sense circuit).

STEP 8. Save displayed result for documentation purpose by pressing **Save** key.
Message MEM and number of the last saved record will be displayed for a moment.

Note!

- **Parallel paths can adversely affect test results if equipment under test is grounded during measurement (test result is always lower than the correct one).**
- **Do not disconnect test probes before timer elapse to avoid sparking effect.**
- **Only last displayed result is saved in AUTO start option.**

4.5 Continuity 10 A

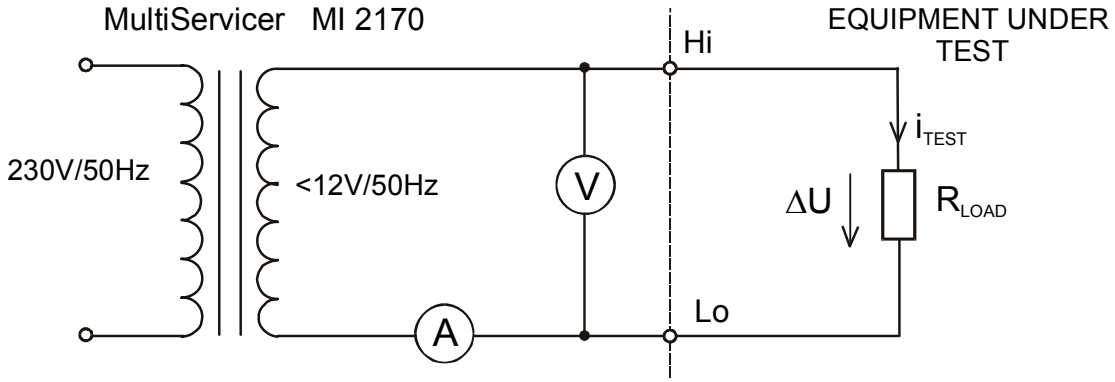


Fig. 16. Test circuitry

How to carry out the measurement

STEP 1. Set rotary switch to **Voltage drop / Continuity 10 A** - position 4**.**

STEP 2. Select **Continuity 10 A** function using **Display** key, the following heading is displayed: (the display key switches between Voltage drop, Voltage drop-AUTO, Continuity and Continuity-AUTO functions)

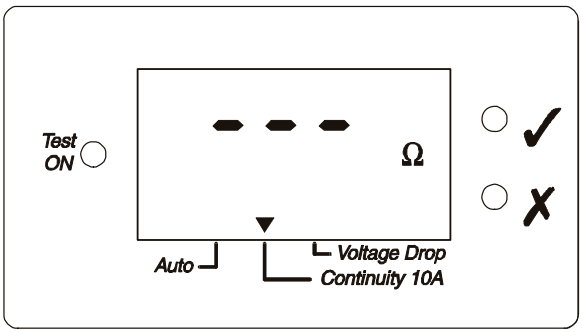


Fig. 17. Basic heading in Continuity 10 A

- AUTO start option
  -Select **Continuity 10 A -AUTO** function using **Display** key, the following heading is displayed:

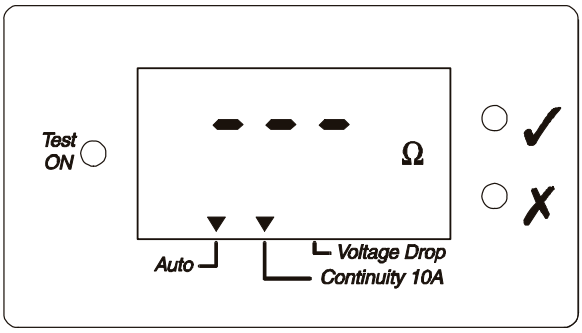


Fig. 18. Basic heading in Continuity 10 A –AUTO

In this mode a small voltage is always present on the Hi - Lo test terminals after pressed **START / STOP** key. Small current at connected terminals will activate the measurement.

STEP 3. Set resistance threshold:
- Press **Limit** key to view the currently set threshold value
- Keep **Limit** key pressed in order to select appropriate threshold value

Resistance threshold values: 0.100, 0.200, 0.300, 0.500, 1.000, 1.500 Ω

STEP 4. (RECOMENDED) Short circuit the test probes in order to calibrate the resistance of the test leads.
Press **Cal** key to perform the calibration. It must be concluded with pass signal . After Calibration press **START/STOP** key with short circuited test probes and the result must be close to zero.

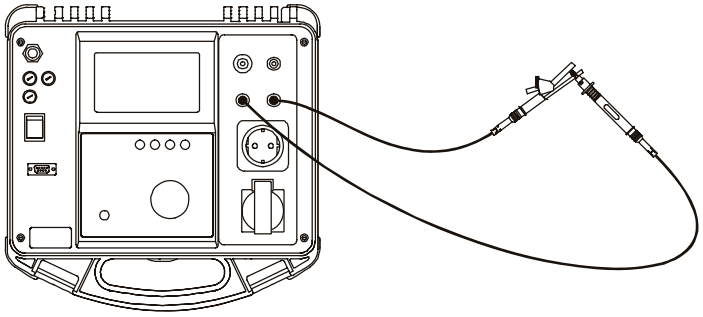


Fig. 19. Zero calibration

After calibration the leads resistance will not influence the results.

STEP 5. Connect test probes to the instrument and tested item as shown in figure below. Do not forget to switch off supply voltage.

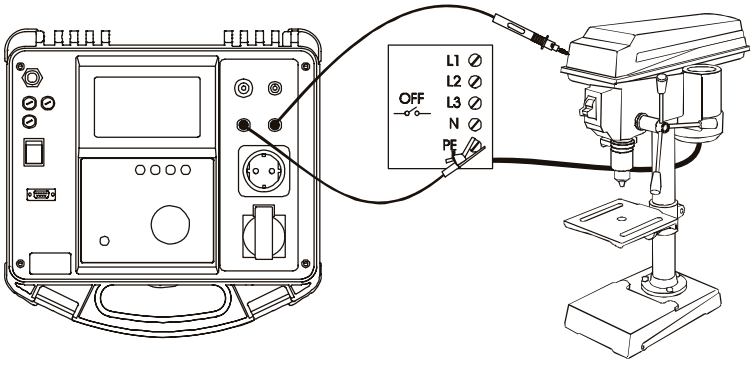


Fig. 20. Connection of test leads

STEP 6. Press **START / STOP** key to start the measurement.
- Test ON signal lamp is ON during measurement.

STEP 7. Wait for timer elapse to stop the measurement.
The measurement will be concluded with pass signal or fail signal dependant on test result comparison to preset limit.

- AUTO start option
  - you can start a new measurement by disconnecting and then connecting Hi or Lo test probe after timer elapse,
  -after timer elapse the instrument will wait for another test, the displayed result is the worse case measured result. When saving results, the displayed result is the worse measured result after last saving.
  - if that measurement is not needed promptly again, it is advisable to disconnect probes (to avoid unnecessary loading of sense circuit).

STEP 8. Save displayed result for documentation purpose by pressing **Save** key.
Message MEM and number of the last saved record will be displayed for a moment.

Note!

- **Parallel paths can adversely affect test results if equipment under test is grounded during measurement (test result is always lower than the correct one).**
- **Do not disconnect test probes before timer elapse to avoid sparking effect.**
- **Only last displayed result is saved in AUTO start option.**

4.6 Discharging time

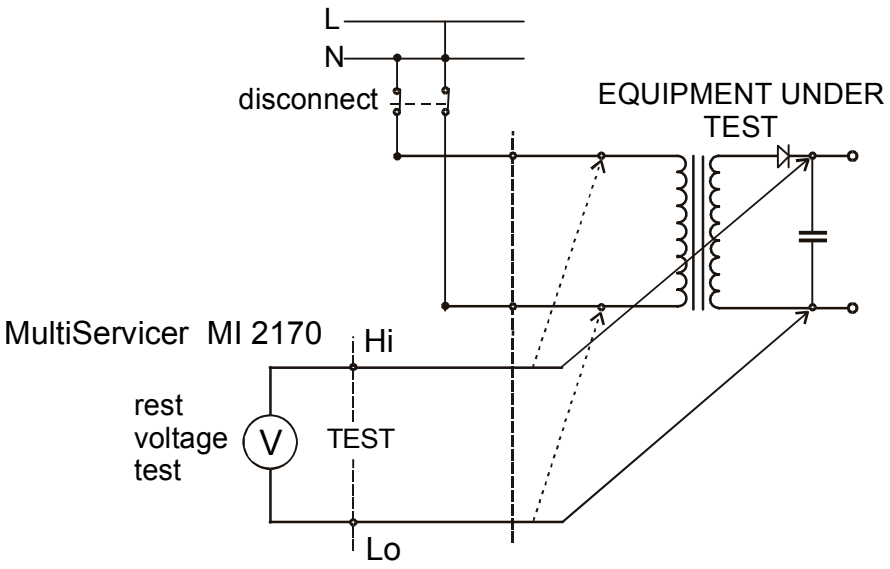


Fig. 21. Test circuitry

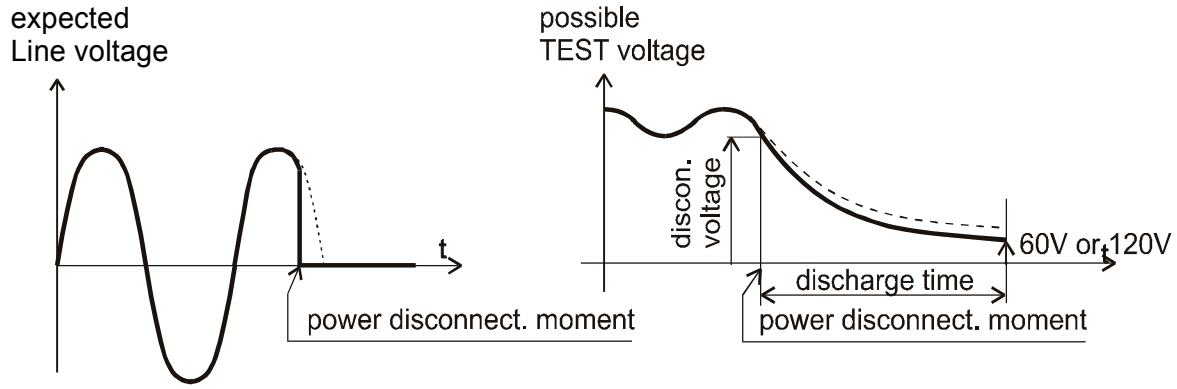


Fig. 22. Measured voltage

How to carry out the measurement

STEP 1. Set rotary switch to **Discharging time** - position 5. **Voltage** (TRMS) connected to the instrument (Hi - Lo) is displayed after a second:

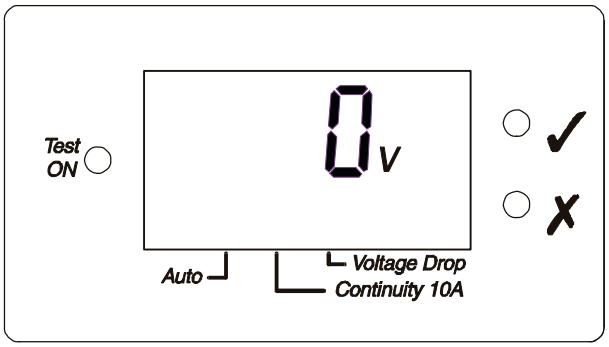


Fig. 23. Basic heading in Discharging time (TRMS voltage is displayed)

To activate voltage measurement after Discharging time measurement turn rotary switch out of position 5 and then return.

STEP 2. Select 60 V or 120 V function using **Display** key
- Press **Display** key to view the currently set function
- Keep **Display** key pressed in order to select appropriate function

STEP 3. Set Discharge time threshold:
- Press **Limit** key to view the currently set threshold value
- Keep **Limit** key pressed in order to select appropriate threshold value

Discharge time threshold values: 1, 5 s.

STEP 4. Connect test probes to the instrument and tested item as shown in figure below.

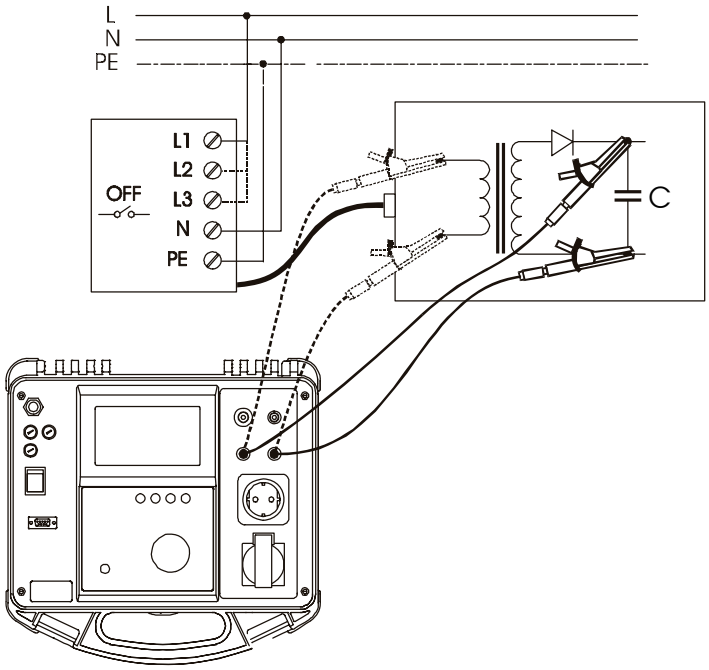


Fig. 24. Connection of test cable

STEP 5 Press **START/STOP** key to prepare the instrument for disconnecting mains voltage, **rdY** (READY) is displayed after 1s approx.
LoU message is displayed if the voltage on input mains is incorrect (check input circuit, mains voltage, disconnecting device is not properly used etc.).

STEP 6. Activate disconnecting device and wait for the result to be displayed. If the disconnection voltage is high enough to make a measurement, measurement will be performed.
If the voltage is OK then **StA** (STARTED) message is displayed.
If the voltage is not high enough then the result 0.0s with blinking pass signal is displayed, in this instance repeat measurement from STEP 4. If the result 0.0s with blinking pass signal is repeated 5 to 10 times, the result 0.0s can be accepted.
out is displayed if the disconnecting device is not activated in 10 s , or discharging time is higher then 10 s.

STEP 7. Save displayed result for documentation purpose by pressing **Save** key. Message MEM and number of the last saved record will be displayed for a moment.

4.7 Functional test

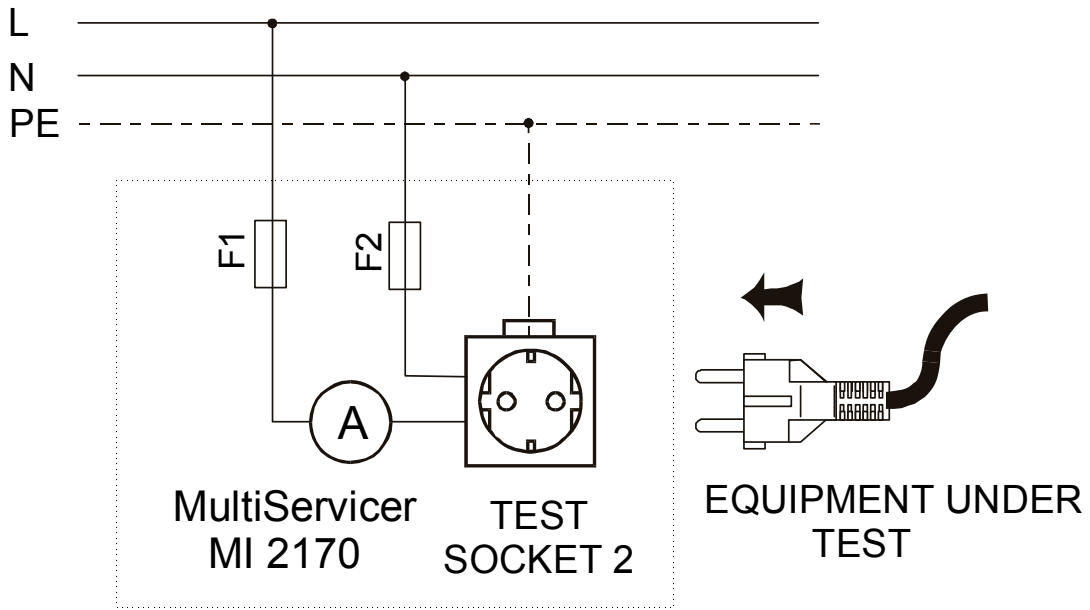


Fig. 25. Test circuitry

How to carry out the measurement

STEP 1. Set rotary switch to **Functional test** - position 6, the following heading is displayed:

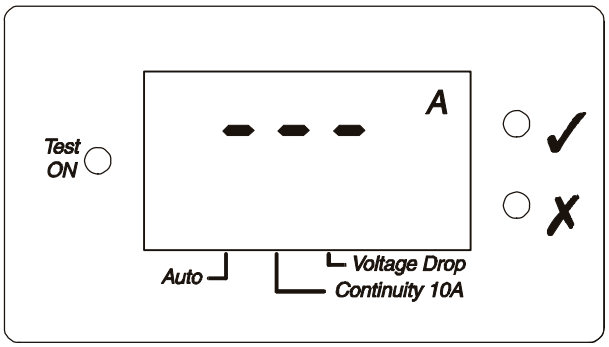


Fig. 26. Basic heading in Functional Test

STEP 2. Set current threshold:
- Press **Limit** key to view the currently set threshold value
- Keep **Limit** key pressed in order to select appropriate threshold value

Current threshold values: 0.5, 1.00, 2.00, 5.00, 10.00, 15.00 A.

STEP 3. Connect tested item to the instrument as shown in figure below.

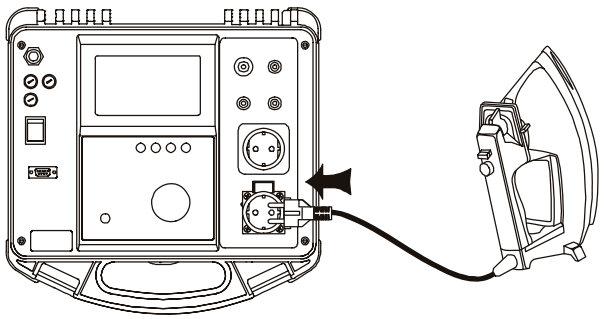


Fig. 27. Connection of CLASS I equipment

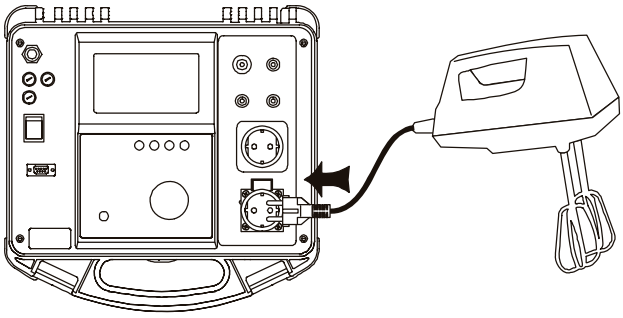


Fig. 28. Connection of CLASS II equipment

STEP 4. Press **START/STOP** key to start the measurement.
Test ON signal lamp is ON during the measurement

STEP 5. Wait for timer elapse, or press **START/STOP** key again to stop the measurement. The measurement will be concluded with pass signal or fail signal dependant on test result comparison to preset limit.

STEP 6. Save displayed result for documentation purpose by pressing **Save** key. Message MEM and number of the last saved record will be displayed for a moment.

Note!

- **Dangerous voltage is present on the TEST SOCKET 2 immediately after switching-on the instrument. TEST SOCKET 2 is connected in parallel to mains plug.**
- **Check L and N are not short circuited on your tested item before measurement.**

4.8 Differential Leakage current

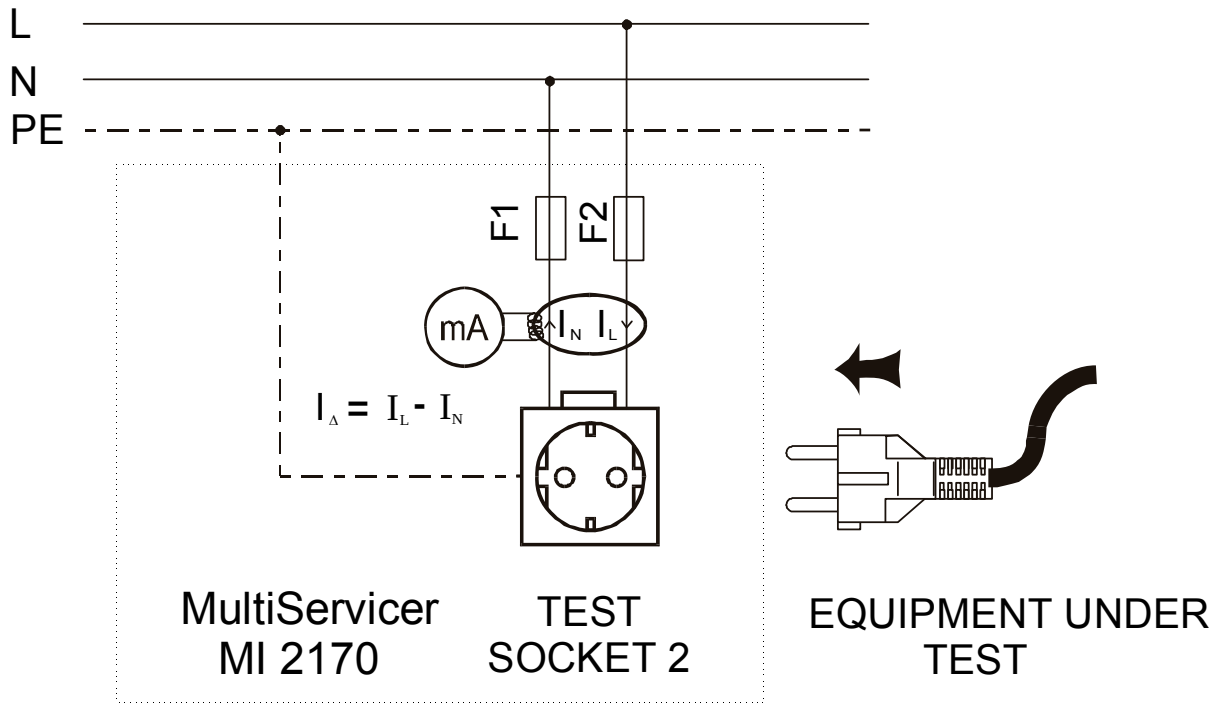


Fig. 29. Test circuitry

How to carry out the measurement

STEP 1 Set rotary switch to **Differential current -** position 7, the following heading is displayed:

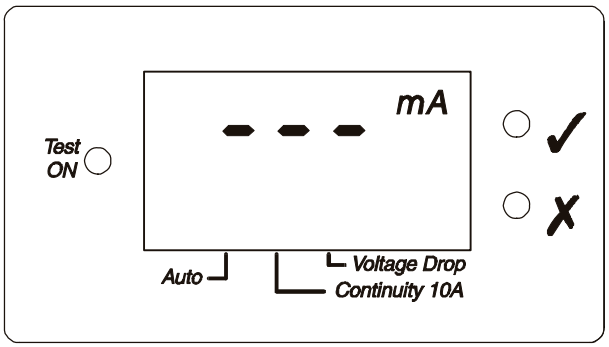


Fig. 30. Basic heading in Differential Leakage

STEP 2. Set Differential leakage current threshold:
- Press **Limit** key to view the currently set threshold value
- Keep **Limit** key pressed in order to select appropriate threshold value

Differential leakage current threshold values: 0.25, 0.50, 1.00, 3.50, 5.00, 10.00 mA.

STEP 3. Connect tested item to the instrument as shown in figure below.

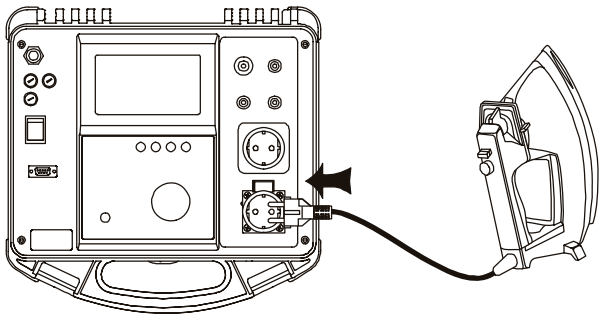


Fig. 31. Connection of CLASS I equipment

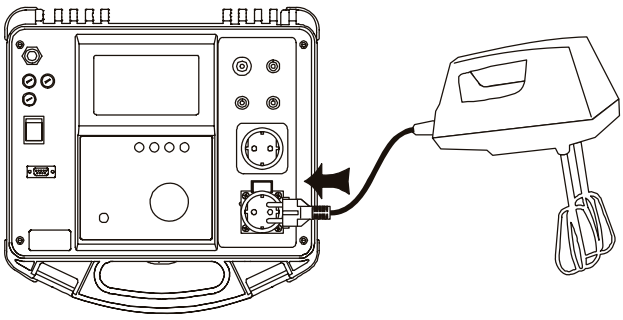


Fig. 32. Connection of CLASS II equipment

STEP 4. Press **START / STOP** key to start the measurement.
Test ON signal lamp is ON during the measurement.

STEP 5. Wait for timer elapse, or press **START / STOP** key again to stop the measurement. The measurement will be concluded with pass signal or fail signal dependant on test result comparison to preset limit.

STEP 6. Save displayed result for documentation purpose by pressing **Save** key. Message MEM and number of the last saved record will be displayed for a moment.

Note!

- **Dangerous voltage is present on the TEST SOCKET 2 immediately after switching-on the instrument. TEST SOCKET 2 is connected in parallel to mains plug.**
- **Check, that L and N are not short circuited on your tested item before measurement.**

4.9 Touch Leakage current

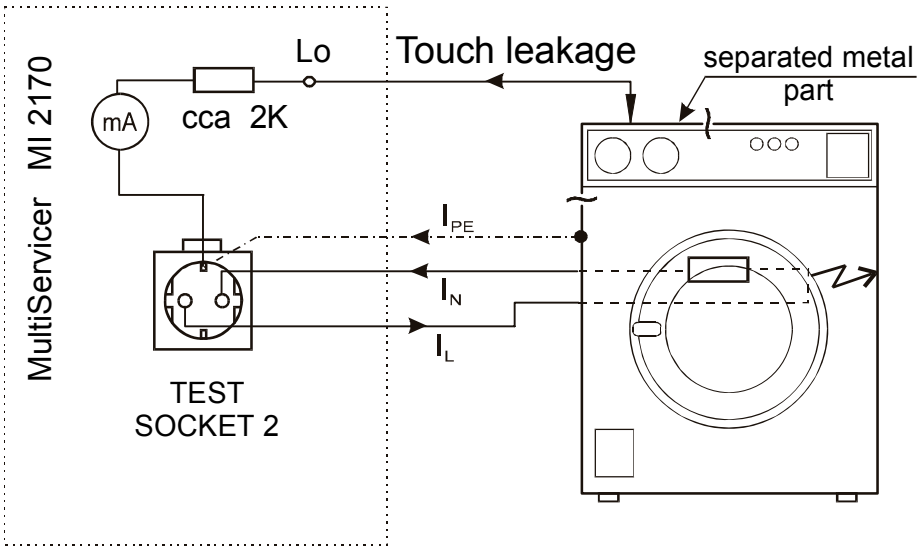


Fig. 33. Test circuitry

How to carry out the measurement

STEP 1. Set rotary switch to **Touch Leakage -** position 8, the following heading is displayed:

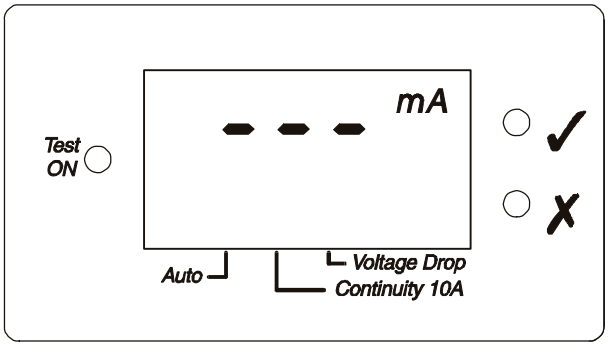


Fig. 34. Basic heading in Touch Leakage

STEP 2. Set Touch leakage current threshold:
- Press **Limit** key to view the currently set threshold value
- Keep **Limit** key pressed in order to select appropriate threshold value
Touch leakage current threshold values: 0.50, 0.75, 1.00, 1.25, 1.50 mA.

STEP 3. Connect tested item to the instrument and test probe to tested item as shown in figure below. Do not forget to switch off supply voltage when testing hard-wired equipment.

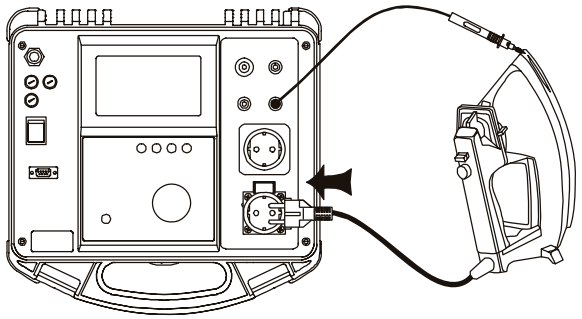


Fig. 35. Connection of CLASS I equipment

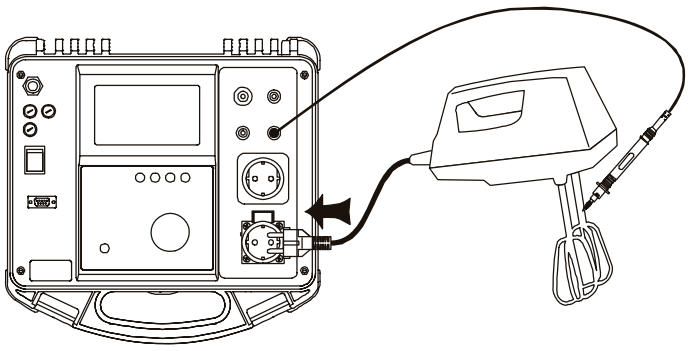


Fig. 36. Connection of CLASS II equipment

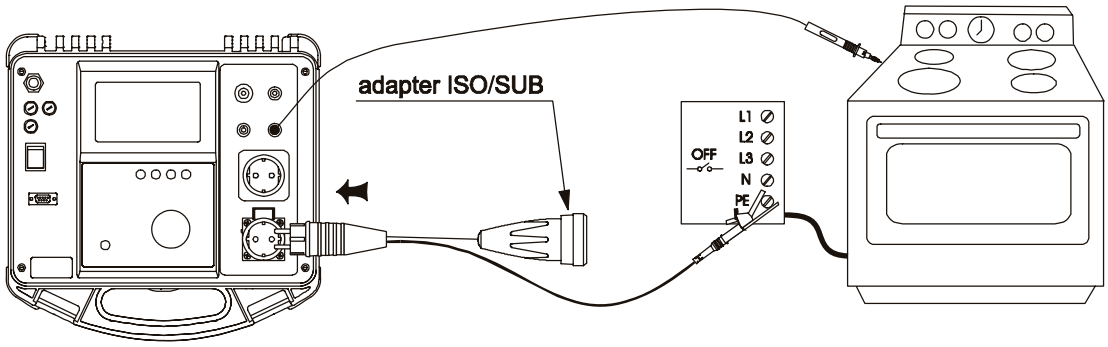


Fig. 37. Connection of hard-wired equipment

STEP 4. Press **START / STOP** key to start the measurement.
Test ON signal lamp is ON during the measurement

STEP 5. Wait for timer elapse, or press **START / STOP** key again to stop the measurement. The measurement will be concluded with pass signal or fail signal dependant on test result comparison to preset limit.

STEP 6. Save displayed result for documentation purpose by pressing **Save** key. Message MEM and number of the last saved record will be displayed for a moment.

Note!

- **Dangerous voltage is present on the TEST SOCKET 2 immediately after switching-on the instrument. TEST SOCKET 2 is connected in parallel to mains plug.**
- **Check, that L and N are not short circuited on your tested item before measurement.**

4.10 Substitute Leakage current

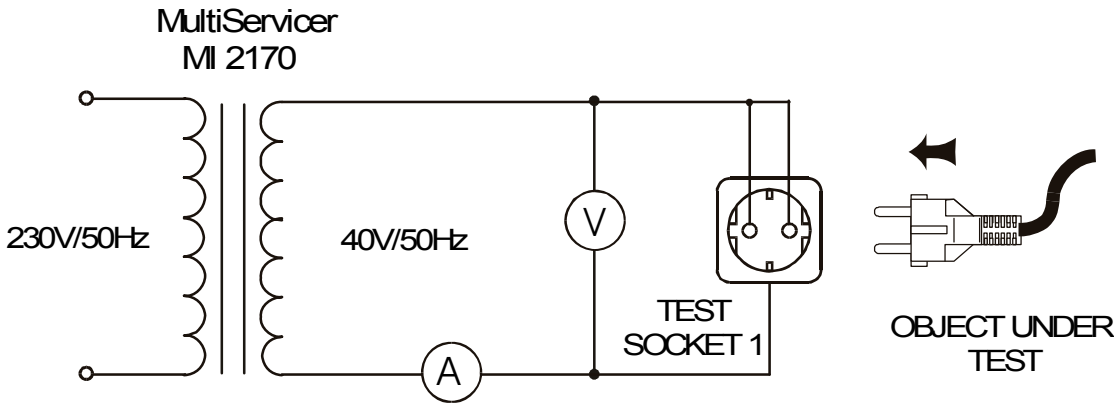


Fig. 38. Test circuitry

How to carry out the measurement

STEP 1. Set rotary switch to **Substitute Leakage -** position 9, the following heading is displayed:

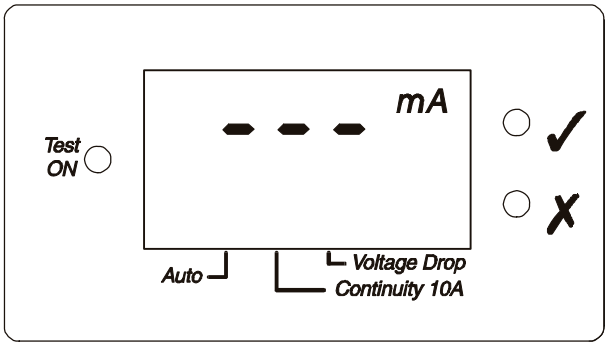


Fig. 39. Basic heading in Substitute Leakage

STEP 2. Set Substitute leakage current threshold:
- Press **Limit** key to view the currently set threshold value
- Keep **Limit** key pressed in order to select appropriate threshold value

Substitute leakage current threshold values: 0.25, 0.50, 1.00, 3.50, 7.00, 15.00 mA

STEP 3. Connect tested item to the instrument as shown in figure below. Do not forget to switch off supply voltage when testing hard-wired equipment.

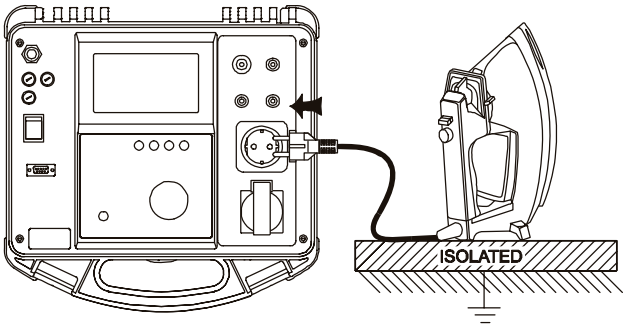


Fig. 40. Connection of CLASS I equipment

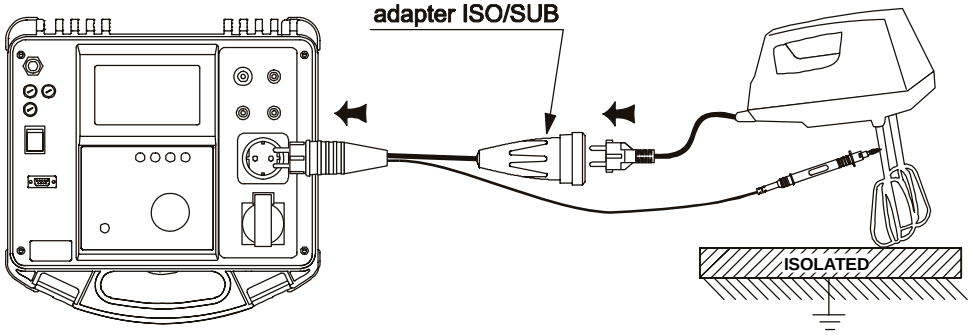


Fig. 41. Connection of CLASS II equipment

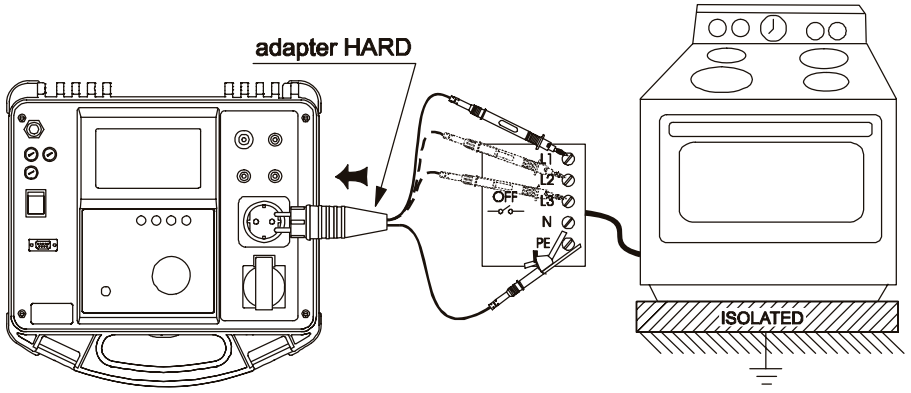


Fig. 42. Connection of hard-wired equipment

STEP 4. Press **START / STOP** key to start the measurement.
Test ON signal lamp is ON during the measurement.

STEP 5. Wait for timer elapse, or press **START / STOP** key again to stop the measurement. The measurement will be concluded with pass signal or fail signal dependant on test result comparison to preset limit.

STEP 6. Save displayed result for documentation purpose by pressing **Save** key. Message MEM and number of the last saved record will be displayed for a moment.

4.11 Insulation 500 V

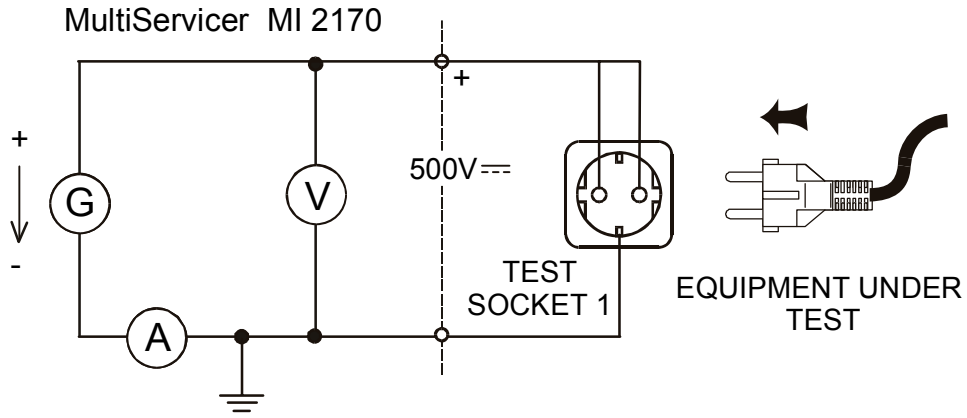


Fig. 43. Test circuitry

How to carry out the measurement

STEP 1. Set rotary switch to **Insulation 500 V** - position 10, the following heading is displayed:

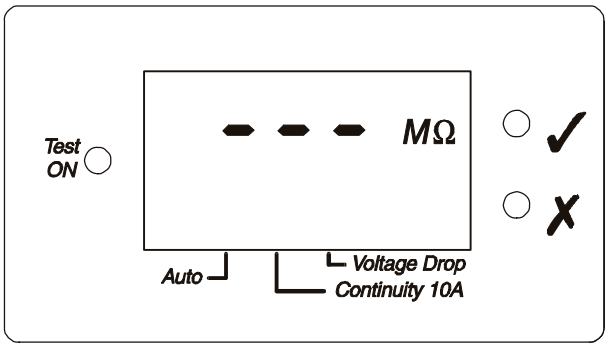


Fig. 44. Basic heading in Insulation 500 V

STEP 2. Set Insulation resistance threshold:
- Press **Limit** key to view the currently set threshold value,
- Keep **Limit** key pressed in order to select appropriate threshold value.

Resistance threshold values: 0.23, 0.25, 0.50, 1.00, 2.00, 5.00 MΩ

STEP 3. Connect tested item to the instrument as shown in figure below. Do not forget to switch off supply voltage when testing hard-wired equipment.

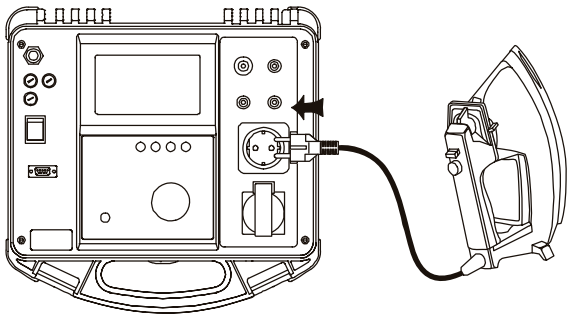


Fig. 45. Connection of CLASS I equipment

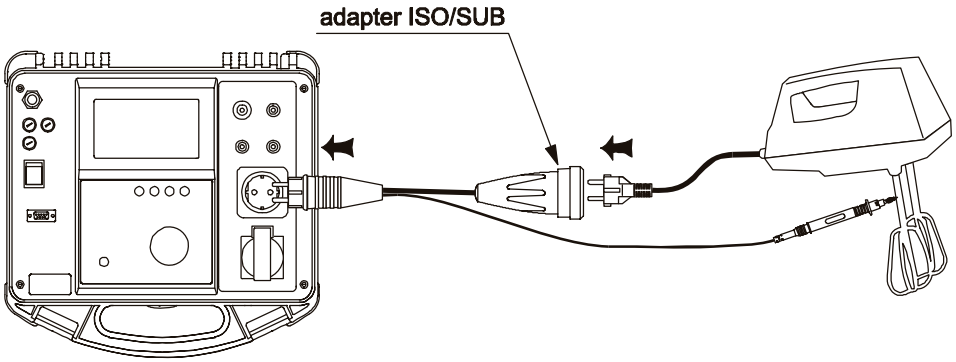


Fig. 46. Connection of CLASS II equipment

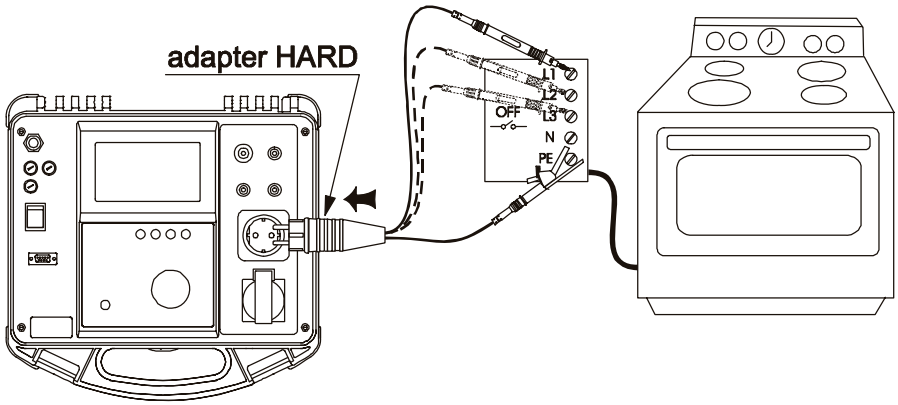


Fig. 47. Connection of hard-wired equipment

STEP 4. Press **START / STOP** key to start the measurement.
Test ON signal lamp is ON during measurement.

STEP 5. Wait for timer elapse or press **START / STOP** key again to stop the measurement.
The measurement will be concluded with pass signal or fail signal dependant on test result comparison to preset limit.

STEP 6. Save displayed result for documentation purpose by pressing **Save** key.
Message MEM and number of the last saved record will be displayed for a moment.

Note!

- **Do not disconnect the equipment under test from instrument until it is discharged.**

4.12 Continuity 200 mA

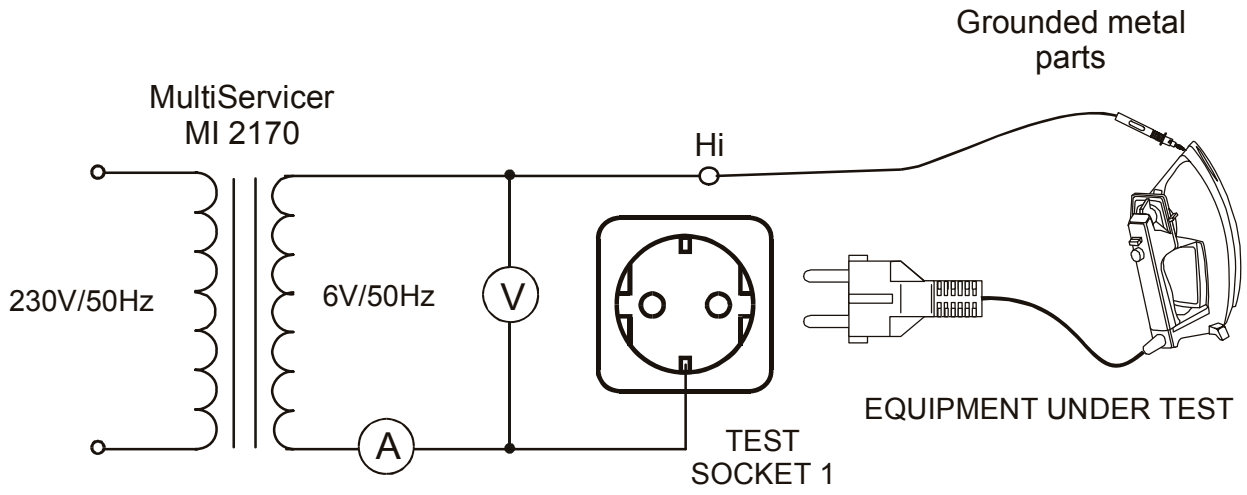


Fig. 48. Test circuitry

How to carry out the measurement

STEP 1. Set rotary switch to **CONTINUITY 200 mA** position 11, the following heading is displayed:

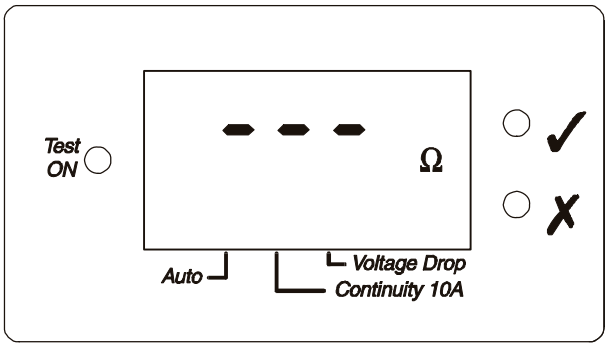


Fig. 49. Basic heading in Continuity 200 mA

STEP 2. Set resistance threshold
- Press **Limit** key to view the currently set threshold value
- Keep **Limit** key pressed in order to select appropriate threshold value
-Resistance threshold values: 0.20, 0.30, 0.50, 1.00, 5.00, 12.0 Ω

STEP 3. (RECOMENDED) Short circuit the test probes in order to calibrate the resistance of the test leads.
Press **Cal** key to perform the calibration. It must be concluded with pass signal . After Calibration press **START / STOP** key with short- circuited test probes and the result must be close to zero.

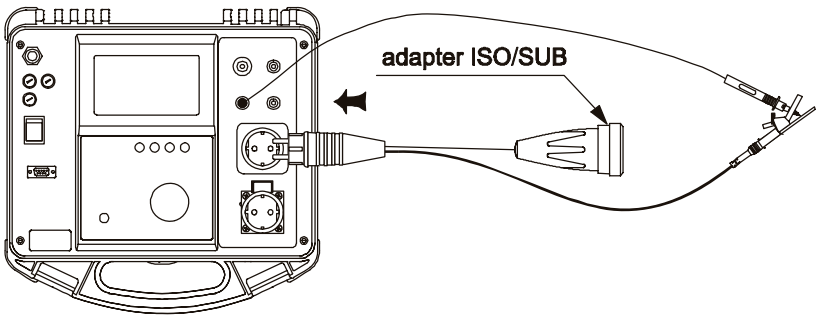


Fig. 50. Zero calibration

After calibration the leads resistance will not influence the results.

STEP 4. Connect test probes to the instrument and tested item as shown in figure below. Do not forget to switch off supply voltage when testing hard-wired equipment.

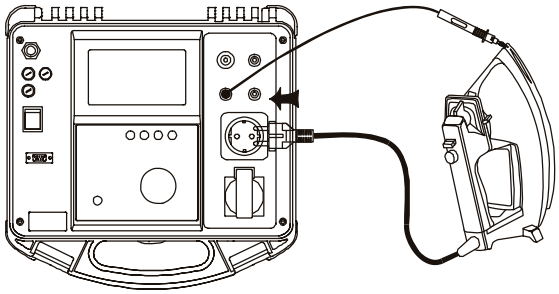


Fig. 51. Connection of CLASS I equipment

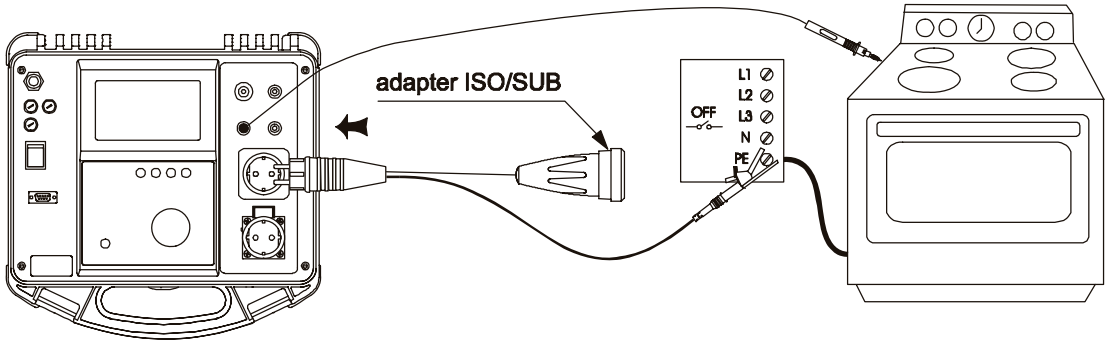


Fig. 52. Connection of hard-wired equipment

STEP 5. Press **START / STOP** key to start the measurement.
Test ON signal lamp is ON during measurement.

STEP 6. Wait for timer elapse to stop the measurement.
The measurement will be concluded with pass signal or fail signal dependant on test result comparison to preset limit.

STEP 7. Save displayed result for documentation purpose by pressing **Save** key.
Message MEM and number of the last saved record will be displayed for a moment.

Note!

- **Parallel paths can adversely affect test results if the equipment under test is grounded during measurement (test result is always less than the right one).**

4.13 Continuity 10 A

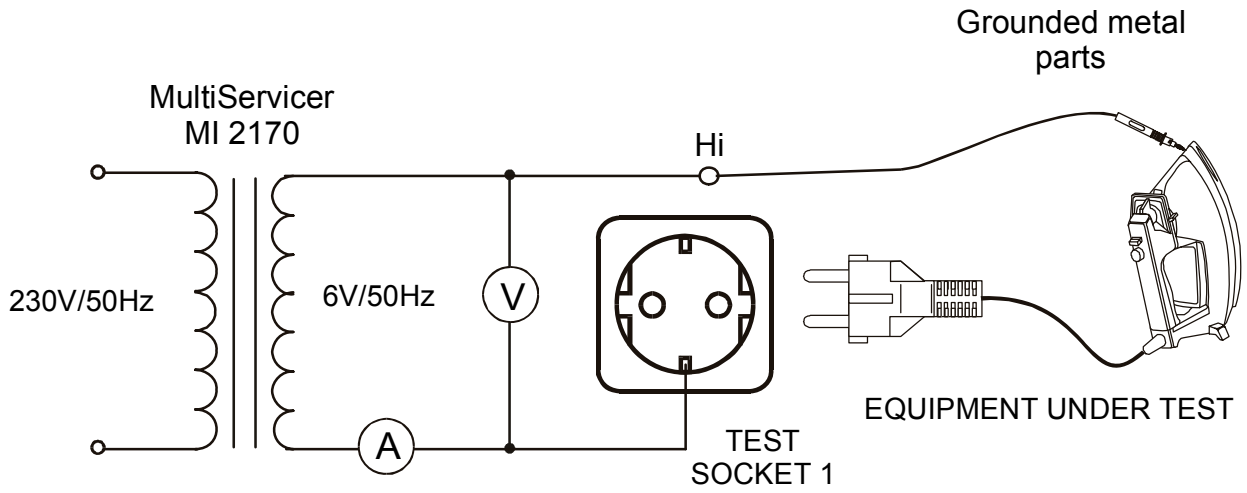


Fig. 53. Test circuitry

How to carry out the measurement

STEP 1. Set rotary switch to **Continuity 10 A** - position 12, the following heading is displayed:

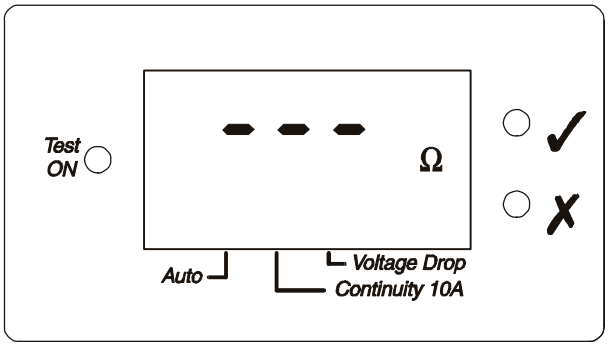


Fig. 54. Basic heading in Continuity 10 A

- AUTO start option
  -Select **Continuity 10 A -AUTO** function using **Display** key (the display key switches between Continuity and Continuity-AUTO functions), the following heading is displayed:

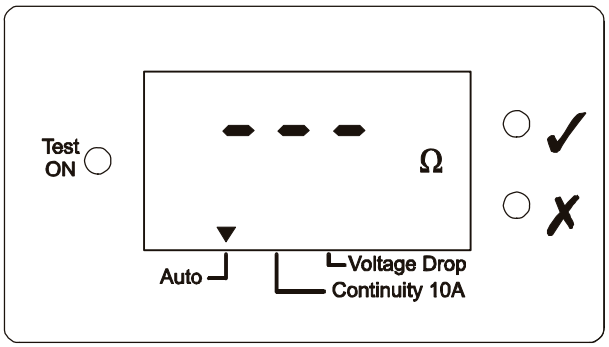


Fig. 55. Basic heading in Continuity 10 A -AUTO

In this mode a small voltage is always present on the Hi - Lo test terminals after pressed **START / STOP** key. Small current at connected terminals will activate the measurement.

STEP 2. Set resistance threshold:
- Press **Limit** key to view the currently set threshold value
- Keep **Limit** key pressed in order to select appropriate threshold value
Resistance threshold values: 0.100, 0.200, 0.300, 0.500, 1.000, 1.500 Ω

STEP 3. (RECOMENDED) Short circuit the test probes in order to calibrate the resistance of the test leads.
Press **Cal** key to perform the calibration. It must be concluded with pass signal . After Calibration press **START/STOP** key with short circuited test probes and the result must be close to zero.

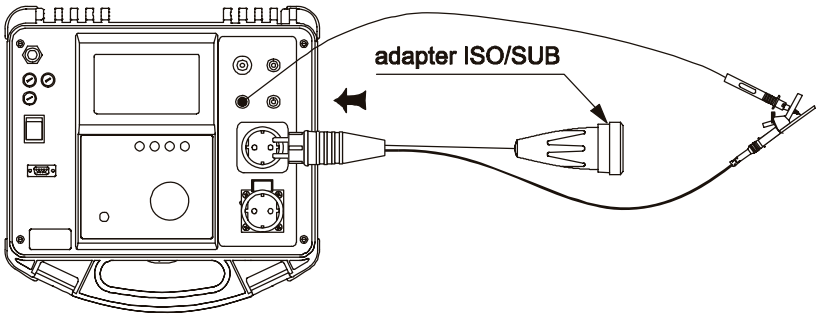


Fig. 56. Zero calibration

After calibration the leads resistance will not influence the results.

STEP 4. Connect test probes to the instrument and tested item as shown in figure below. Do not forget to switch off supply voltage.

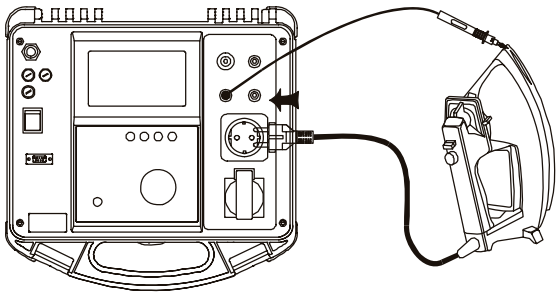


Fig. 57. Connection of CLASS I equipment

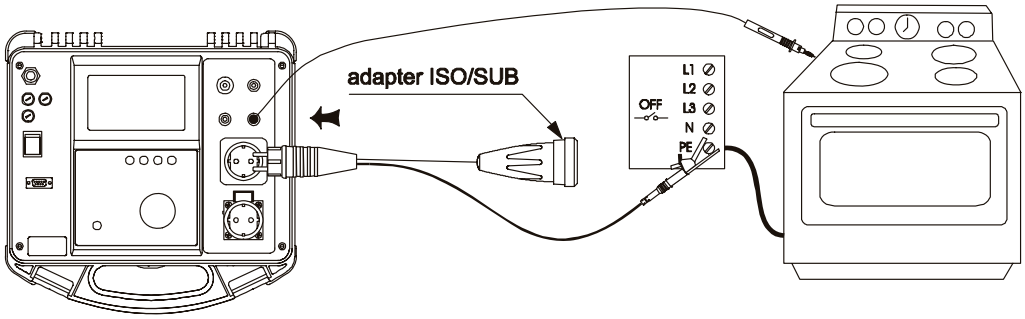


Fig. 58. Connection of hard-wired equipment

STEP 5. Press **START / STOP** key to start the measurement.
- Test ON signal lamp is ON during measurement.

STEP 6. Wait for timer elapse to stop the measurement.
The measurement will be concluded with pass signal or fail signal dependant on test result comparison to preset limit.

- AUTO start option
  - you can start a new measurement by disconnecting and then connecting Hi or Lo test probe after timer elapse,
  -after timer elapse the instrument will wait for another test, the displayed result is the worse case measured result. When saving results, the displayed result is the worse measured result after last saving.
  - if that measurement is not needed promptly again, it is advisable to disconnect probes (to avoid unnecessary loading of sense circuit).

STEP 7. Save displayed result for documentation purpose by pressing **Save** key.
Message MEM and number of the last saved record will be displayed for a moment.

Note!

- **Parallel paths can adversely affect test results if equipment under test is grounded during measurement (test result is always lower than the correct one).**
- **Do not disconnect test probes before timer elapse to avoid sparking effect.**
- **Only last displayed result is saved in AUTO start option.**

5 Operation

5.1 Storing of measurement results

The Multiservicer memory organization is divided into two levels.
The first level enables simple separation between 62 individual groups (machines).
Up to 62 measurements can be stored into any selected group, as shown on figure 59.

Group (machine) 1
Measurement 1
Measurement 2
Measurement 3
...
...
Measurement 62
Group (machine) 2
Measurement 1
Measurement 2
Measurement 3
...
...
Measurement 62
.....
.....
.....
Group (machine) 62
Measurement 1
Measurement 2
Measurement 3
...
...
Measurement 62

Fig. 59. Multiserviser memory organisation

5.2 How to store a measurement

STEP 1. After performing the measurement to be stored press **Save/ Rcl** key. The group with latest stored result is offered. Any of the 62 groups can be selected with **Up/Down** keys.

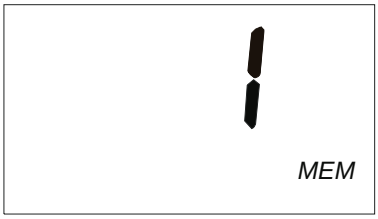


Fig. 60. Offered group for saving result

STEP 2. After setting the group is press **Save/ Rcl** key again. The successive number of the stored measurement is displayed for 0.5 seconds, than the result is stored and the instrument returns into normal operating mode. A successfull store is confirmed with a short buzzer beep.

Notes
A measurment result can be stored only once.

5.3 How to recall a measurement

STEP 1. In any instrument mode exept immediately after a performed measurement key press **Save/ Rcl** key. ***"rCL"*** is displayed for a while to confirm this action. Group (number) with latest stored result is offered.
Any of the 62 groups can be selected with **Up /Down** keys.

Fig. 61. Entering the recalling mode, offered group for recalling results

STEP 2. After the group is set press **Save/ Rcl** key again:

- The successive number of the last stored measurement is displayed for 0.5 seconds (***"r"*** + ***"successive number"***),
- The measurement code is displayed for 0.5 seconds ***("t" + "measurement code"***),
- The result is displayed.

STEP 3. Other stored result into selected group can be recalled with **Up/Down** keys, in a circular manner.

If using the **Up** key:

- the next measurement (or first stored measurement) is displayed for 0.5 seconds (***"r"*** + ***"successive number"***),
- The measurement code is displayed for 0.5 seconds (***"t"*** + ***"measurement code"***),
- The result is displayed.

If using the **Down** key:

- the previous measurement (or last stored measurement) is displayed for 0.5 seconds (***"r"*** + ***"successive number"***),
- The measurement code is displayed for 0.5 seconds (***"t"*** + ***"measurement code"***),
- The result is displayed.

- **STEP 4.**

If pressing the **Save/ Rcl** again (while measuring results are displayed) the instrument returns to group selection mode (see Step 1)
Recalling mode can be always exited with the **Start/Stop** key.

The measurement codes help to show the user which measurement is recalled:
Table of measurement codes

t1	Withstanding voltage test 2500V
t2	Withstanding voltage test 1000V
t3	Insulation resistance test, performed through Hi / Lo ports
td4	Voltage drop test
tC4	Continuity 10A test, performed through Hi/ Lo ports
t5	Discharging time test
t6	Functional test
t7	Differential leakage test
t8	Touch leakage test
t9	Substitute leakage test
t10	Insulation resistance test, performed through Test socket 1
t11	Continuity 200mA test
t12	Continuity 10A test, performed through Test socket 1 and Hi port

Notes
In case there is no measurement stored in the selected group ***"r0"*** and ***"no"*** are displayed for 0.5 seconds.

5.4 How to delete last measurement into a group

Last saved result into a group can be deleted. This option is usefull if one wants to delete the latest stored result.

STEP 1. Recall last stored measurement result in a group (the result with highest successive number). For more information refer to previous chapter *"How to recall a measurement "*.

STEP 2. After the measurement to be deleted is recalled press **Clr** key. "***Clr / rEc***" starts to blink. To confirm the delete press **Clr** key again. To cancel the delete press **Start/Stop** key.

5.5 How to clear all measurement into one group

The instrument enables to delete all stored results into one group at the same time.

STEP 1. Select the group with measurements to be deleted. For more information refer to previous chapter *"How to recall a measurement "*, step 1.

STEP 2. After the group is selected press **Clr** key. "***Clr / GrP***" starts to blink. To confirm the delete press **Clr** key again. To cancel the delete press **Start/Stop** key.

Notes
The deleting procedure can be exited anytime with the **Start/Stop** key.

5.6 How to delete all measurement (in all groups)

The instrument enables to delete all stored results into all groups at the same time.

STEP 1. .Press **Save/Rcl** key whilst switching ON the instrument. "***Clr / All***" starts to blink. To confirm the delete press **Clr** key again. To cancel the delete press **Start/Stop** key.

5.7 RS 232 Communication

To transfer the stored data to PC, RS 232 communication feature must be used.

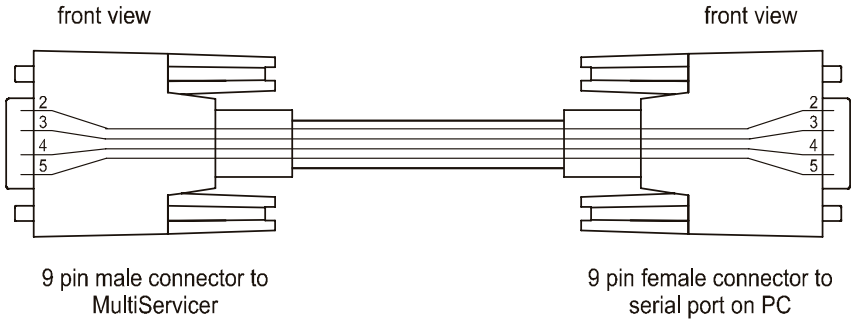


Fig. 62. RS 232 communication cable

Note!

- ***Use original RS 232 communication cable only.***

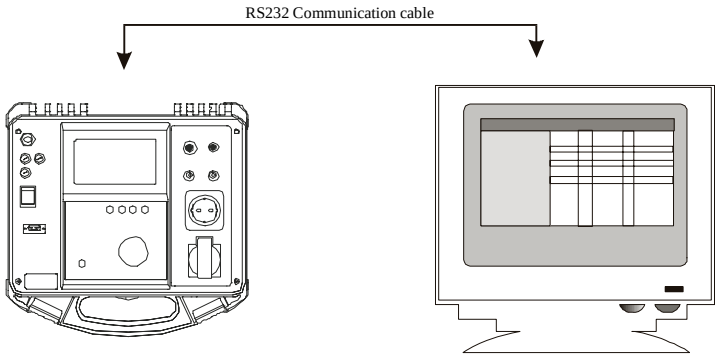


Fig. 63. Connection of MultiServicer to PC (9 or 25 pin connector)

How to transfer saved data to PC

STEP 1. Connect MultiServicer to PC as shown in fig. 62 using appropriate RS 232 communication cable.
STEP 2. Open PATlink program on your PC.
STEP 3. Choose Download data option in PATlink window.

6 Maintenance

6.1 Meteorological check

It is essential that all measuring instruments be regularly calibrated.
For occasional daily use, we recommend an annual calibration to be carried out.
When the instrument is used continuously every day, we recommend that calibration be carried out every 6 months.

6.2 After sales service

Repairs under or out of guarantee: Please return the products to your distributor.

6.3 Replacing the fuses

If there is any instrument malfunction, send the instrument to an appropriate service centre for all four fuses to be checked.
See the purpose of each fuse in paragraph 3.14.
Use original fuses only as declared in paragraph 3.14!
Properly trained service personnel only can do it!

⚠..... Disconnect all test cables and mains cord before opening the instrument.

..... Hazardous voltage may be present inside the instrument.

Properly trained service personnel should only carry out operation.

Fuse F4 is placed inside the instrument on the front panel.

7 PATLink PRO software package

7.1 Installing PATLink PRO

- PATLink PRO software is 32-bit application for Win 2000, XP and Vista platforms.
- It is recommended that you close all programs before installing PATLink PRO.
- Run the installation application from the CD (setup.exe). The wizard will guide you through the process.
- Microsoft .NET Framework 2.0 and Microsoft SQL Server Express are required to run PATLink PRO. If those applications are not already available on the computer, setup will install them.
- You may need administrative rights to perform this installation.

WARNING:

7.2 General

PATLink PRO software is used for:

- downloading memorized data,
- manual adding of measuring results,
- viewing and editing memorized data,
- creating reports of measurements,
- printing reports of measurements.

The main screen is the start point for all actions. It provides access to all functions by clicking on 'toolbar' buttons or selecting entries from application's main menu. Downloaded data is stored in the database, which is automatically loaded when the application starts.

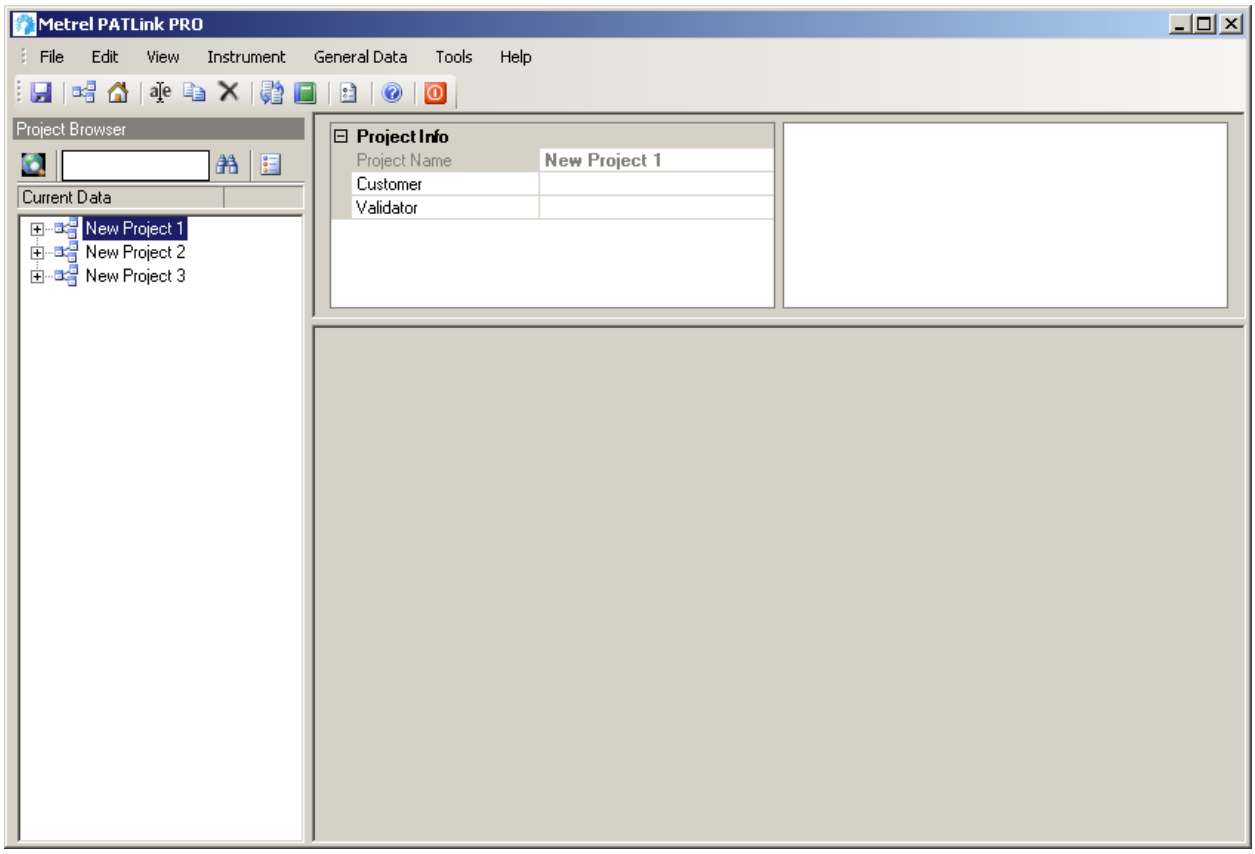


Fig. 64. Main screen

The main screen consists of main menu, toolbar, tree or table project browser (left pane), machine data (top right pane) and test results (bottom right pane).

File: This menu allows you to save data, export them to text or Microsoft Excel compatible format and toggle between current and archived data.

Edit: Standard Windows Edit menu.

View: Allows you to show/hide right panes and toggle between tree browser and table browser.

Instrument: This menu entry enables you download data from the instrument.

General Data: This menu is used for managing lists of data that can be assigned to projects: users, validators, customers.

Tools: Allows you to set application preferences and create reports.

Help: This menu contains detailed information about this software package.

7.3 Downloading data

Before downloading data from the instrument:

- connect MultiServicer to PC according to capture 5.7
- select Instrument → Get Results menu entry to display the download dialog
- select instrument type (Multiservicer) and baud rate (2400) or choose auto detection
- press Start/Stop button on Multiservicer to exit data recall view
- press Start button on the download dialog

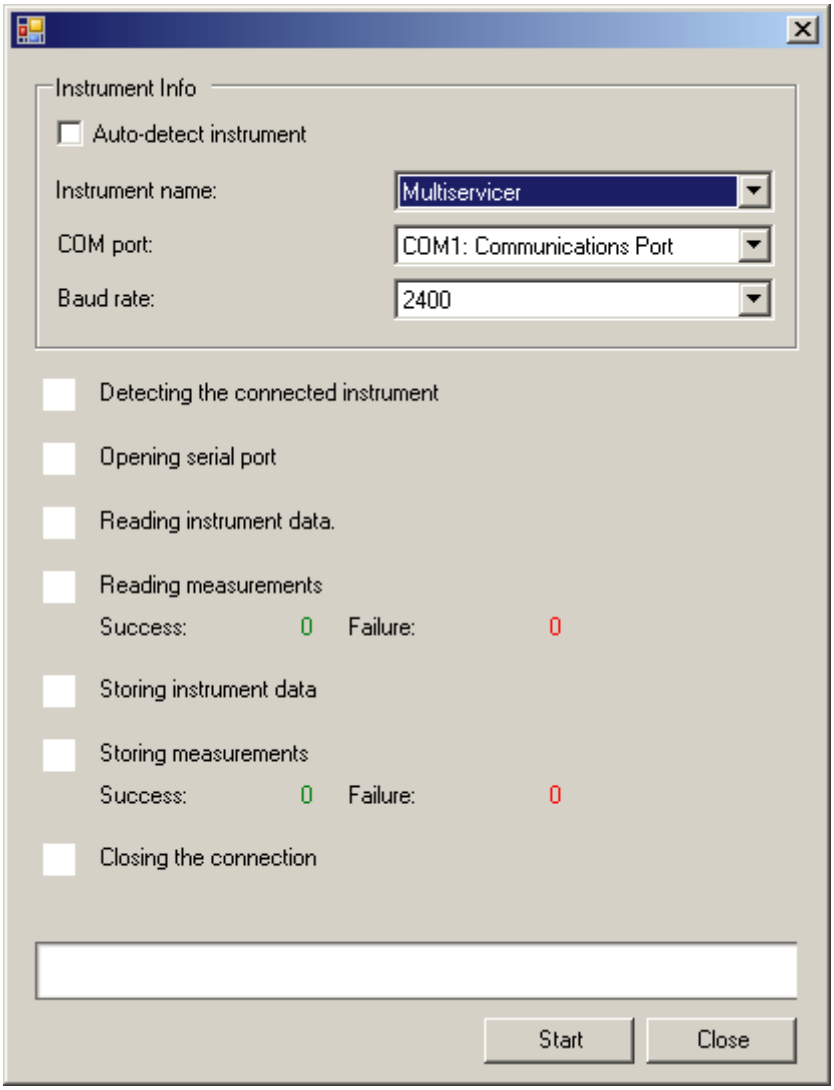


Fig. 65. Data download dialog

After downloading has been successfully finished, click Close button. A new project is created in the project browser tree. The newly downloaded data is stored into a new building inside that project.

7.4 Viewing data

To view the downloaded data select the newly created project, the new building inside that project and the machine you wish to view data for. Results can be edited or deleted.

Machines can be moved to different projects/building by dragging and dropping the machine node to the desired position in the tree browser. Additional projects and building can be created using toolbar buttons or context menu entries.

Older results can be archived. This improves application performance, as the archived results are not loaded when starting the application. If you want to see the archived machines, choose Load archive data from the File menu. To display the current results again, choose Load current data.

PATLink PRO enables you to quick search the entries in the project tree. You can also define a filter to limit the entries shown.

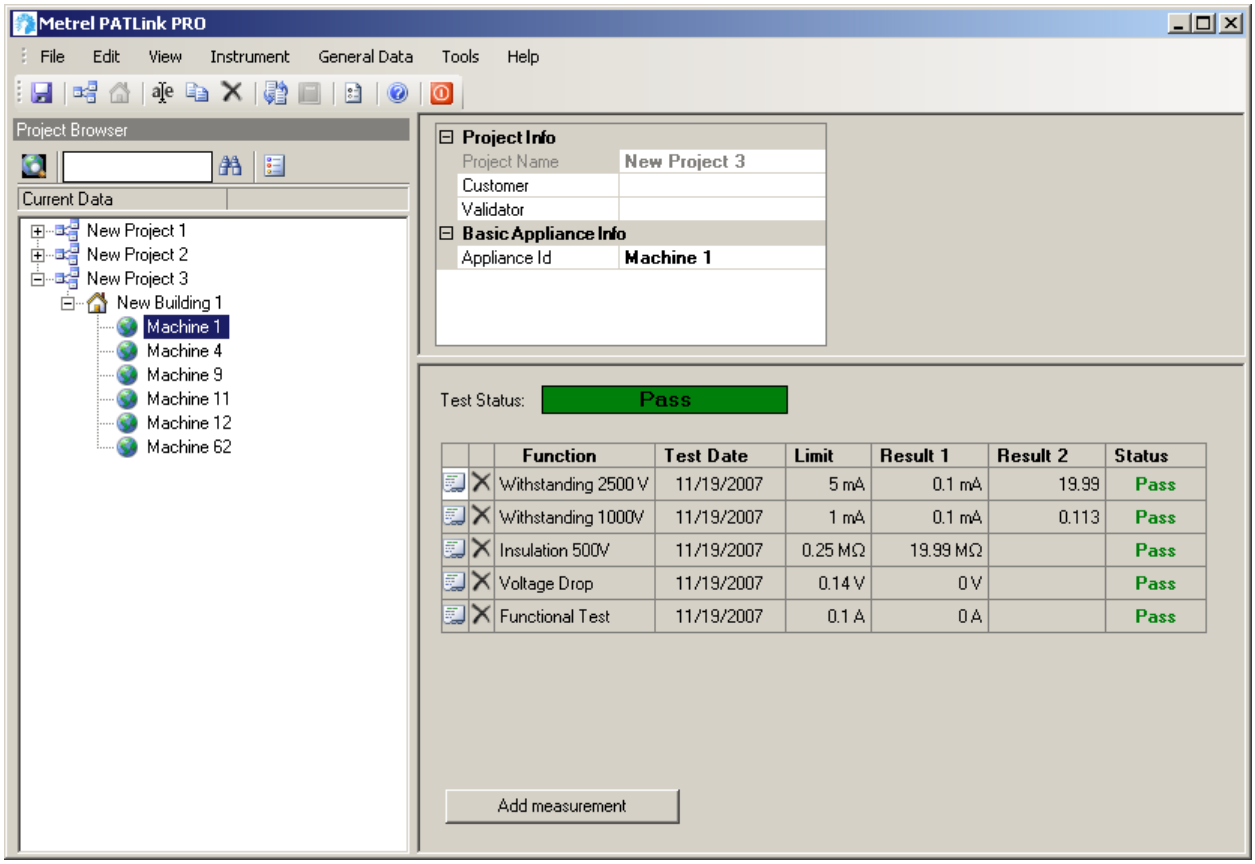


Fig. 66. Machine results

It is also possible to manually add Z_{LOOP} results, subresults and parameters to the result set.

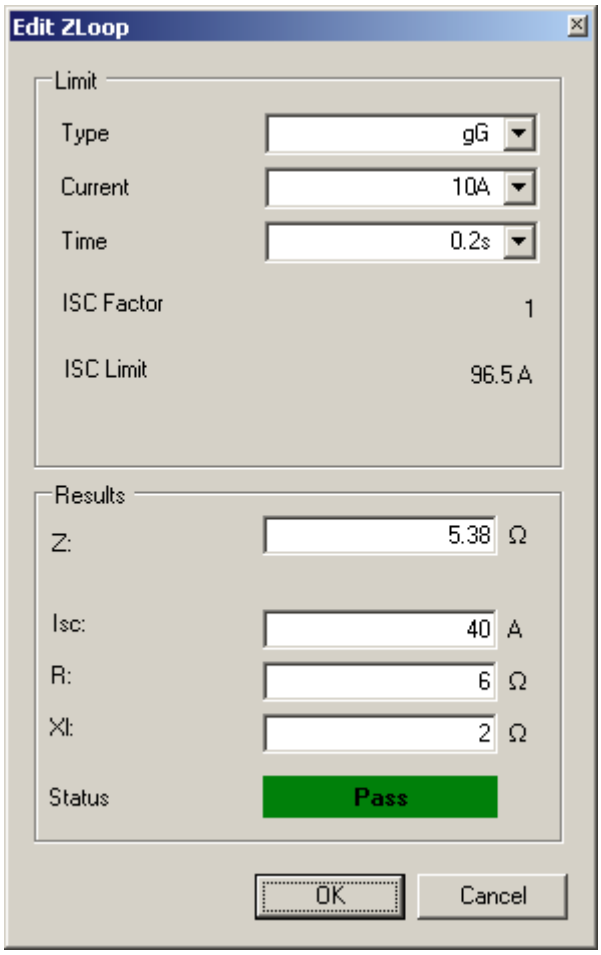


Fig. 67. Adding Z_{LOOP} measurement

7.5 Creating reports

To create a report, select the machines in the tree project browser. Selection is done with a combination of mouse clicks and the use of CTRL or SHIFT modifiers. Instead of selecting machines you can also select project or buildings. By selecting a project or a building all the machines in that object will be used in report.

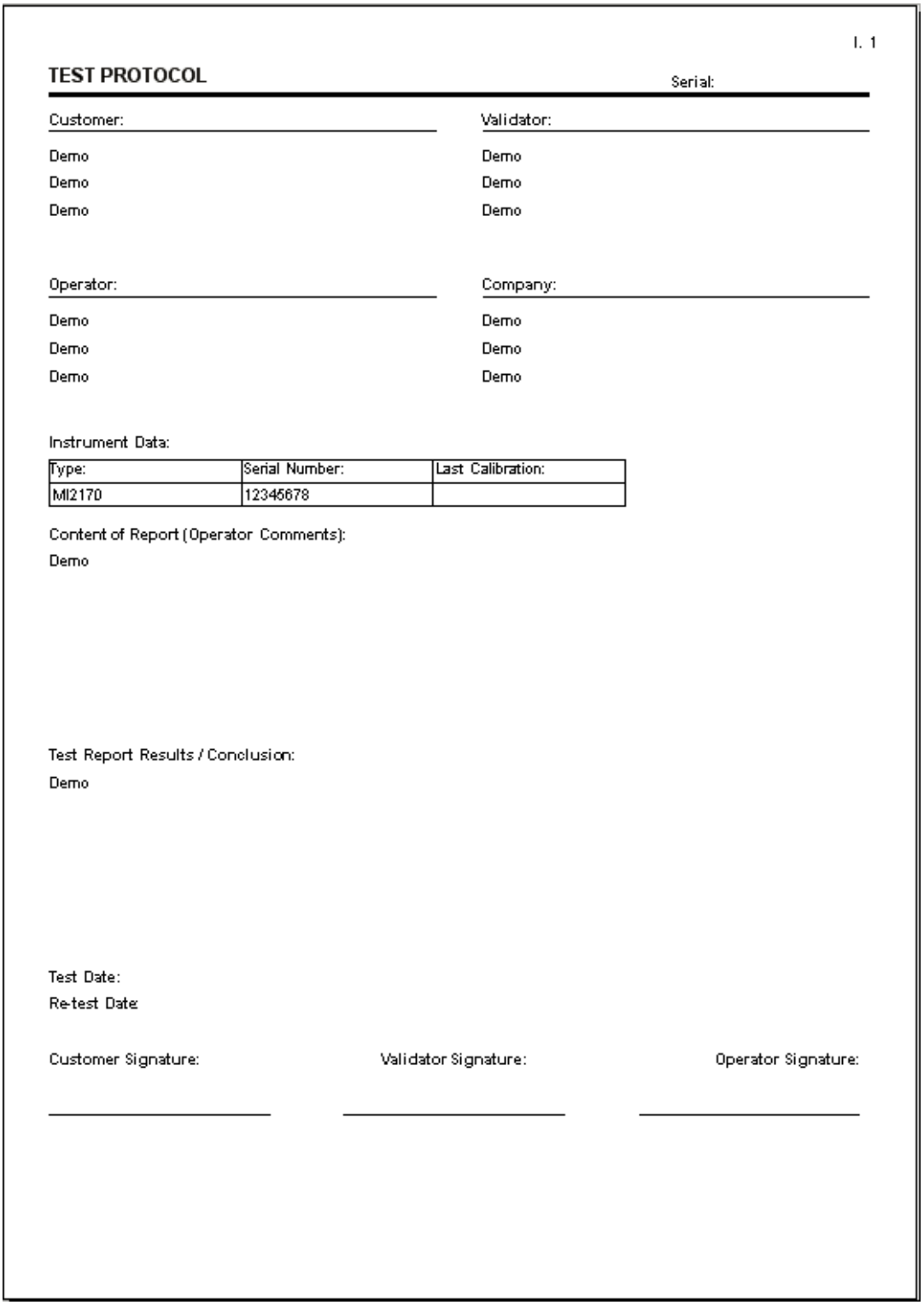
PATLink PRO offers two types of reports:

- **Lite report:** the report consists of machine measurement results
- **Pro report:** enables you to add additional info to reports: customer name, validator name, operator name, comments, testing instrument info...

Report can be created by selecting entries in project browser context menu, Tools main menu or by clicking the toolbar button.

After you have chosen the desired command, the print preview (lite report) or report dialog (pro report) is shown. The report dialog is used for entering additional information as well as editing the results. Clicking the Print button shows the preview.

Print preview enables you to see the report exactly as it will appear on the paper. The preview toolbar offers several commands for navigating, searching and zooming.



I. 1

TEST PROTOCOL Serial:

Customer: Validator:

Demo Demo
Demo Demo
Demo Demo

Operator: Company:

Demo Demo
Demo Demo
Demo Demo

Instrument Data:

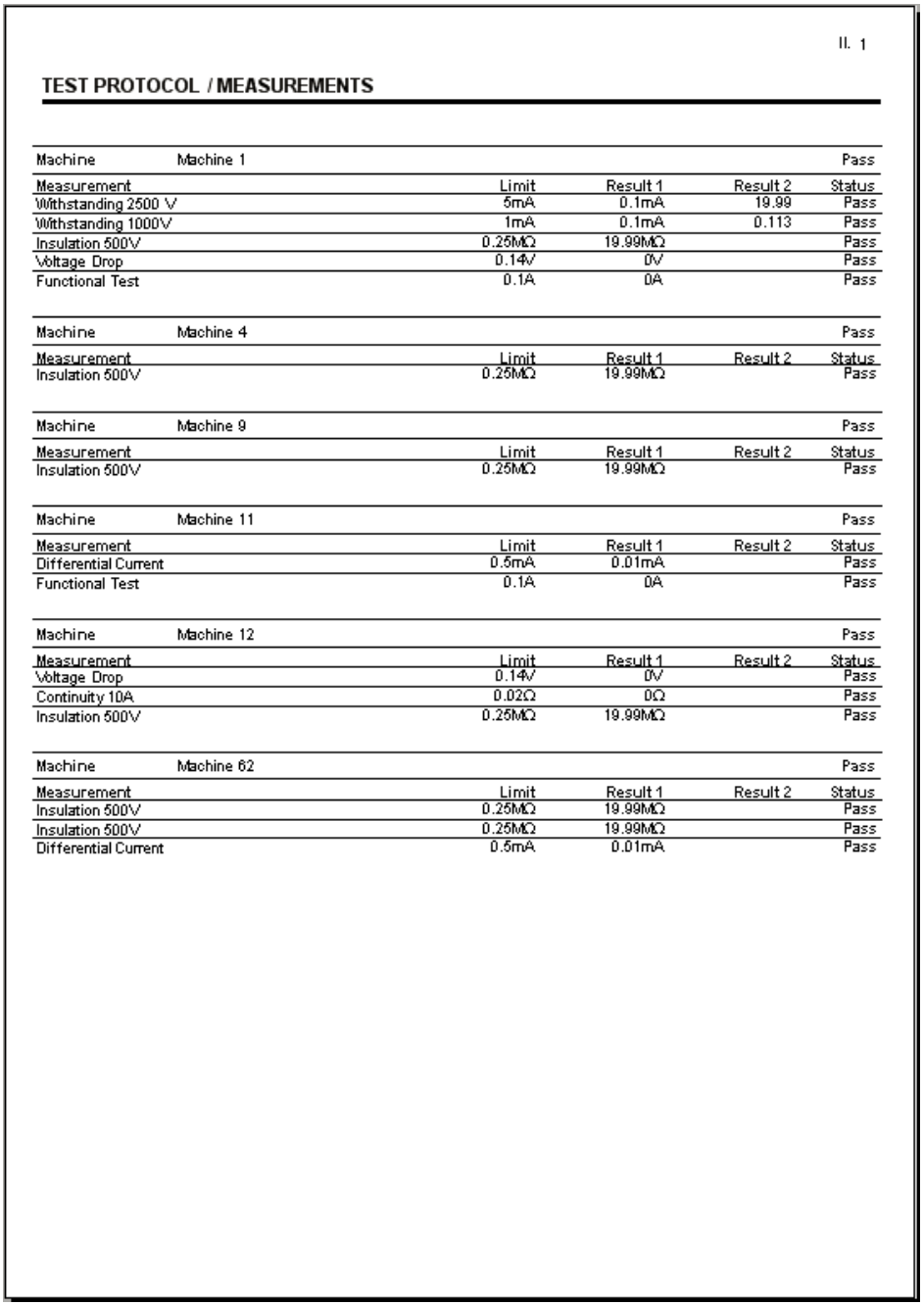
Type:	Serial Number:	Last Calibration:
MI2170	12345678	

Content of Report (Operator Comments):
Demo

Test Report Results / Conclusion:
Demo

Test Date:
Re-test Date:

Customer Signature: Validator Signature: Operator Signature:



II. 1

TEST PROTOCOL / MEASUREMENTS

Machine	Machine 1				Pass
Measurement		Limit	Result 1	Result 2	Status
Withstanding 2500 V		5mA	0.1mA	19.99	Pass
Withstanding 1000V		1mA	0.1mA	0.113	Pass
Insulation 500V		0.25MΩ	19.99MΩ		Pass
Voltage Drop		0.14V	0V		Pass
Functional Test		0.1A	0A		Pass

Machine	Machine 4				Pass
Measurement		Limit	Result 1	Result 2	Status
Insulation 500V		0.25MΩ	19.99MΩ		Pass

Machine	Machine 9				Pass
Measurement		Limit	Result 1	Result 2	Status
Insulation 500V		0.25MΩ	19.99MΩ		Pass

Machine	Machine 11				Pass
Measurement		Limit	Result 1	Result 2	Status
Differential Current		0.5mA	0.01mA		Pass
Functional Test		0.1A	0A		Pass

Machine	Machine 12				Pass
Measurement		Limit	Result 1	Result 2	Status
Voltage Drop		0.14V	0V		Pass
Continuity 10A		0.02Ω	0Ω		Pass
Insulation 500V		0.25MΩ	19.99MΩ		Pass

Machine	Machine 62				Pass
Measurement		Limit	Result 1	Result 2	Status
Insulation 500V		0.25MΩ	19.99MΩ		Pass
Insulation 500V		0.25MΩ	19.99MΩ		Pass
Differential Current		0.5mA	0.01mA		Pass

Fig. 68. Pro report

7.6 Printing and exporting reports

To print a report, click on Print button in the print preview toolbar. You can also export the report into various formats (including Adobe Acrobat PDF and Microsoft Word) that can be used as an electronic backup copy.

8 To order

8.1 Standard set:

Order No. MI 2170

Test lead 2 m, black
Test lead 2 m, red
Test tip, black
Test tip, red
Crocodile clip, black
Crocodile clip, red
HV test lead
RS 232 cable
PC SW package PATlink LITE

8.2 Optional:

ISO/SUB adapter	Order No. A 1095
HARD adapter	Order No. A 1096
Continuity extension 10m	Order No. S 2012
PC Software PATlink PRO	Order No. A 1203