

Instruction manual

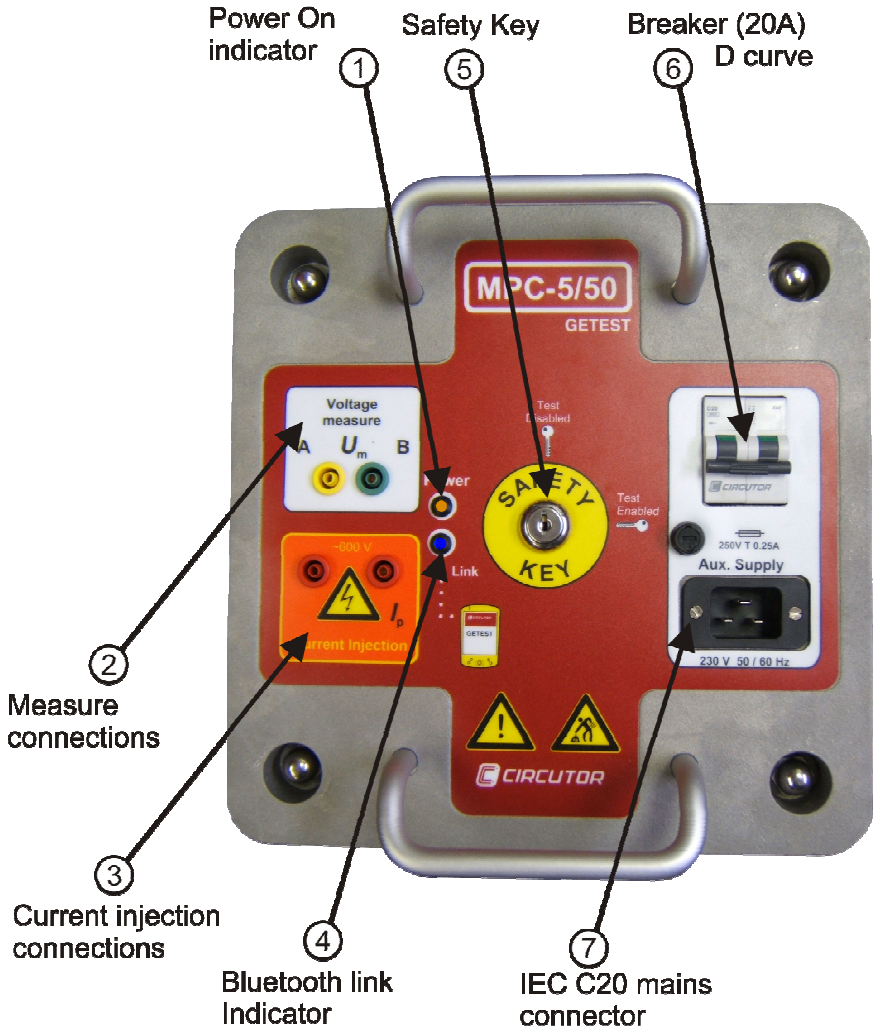


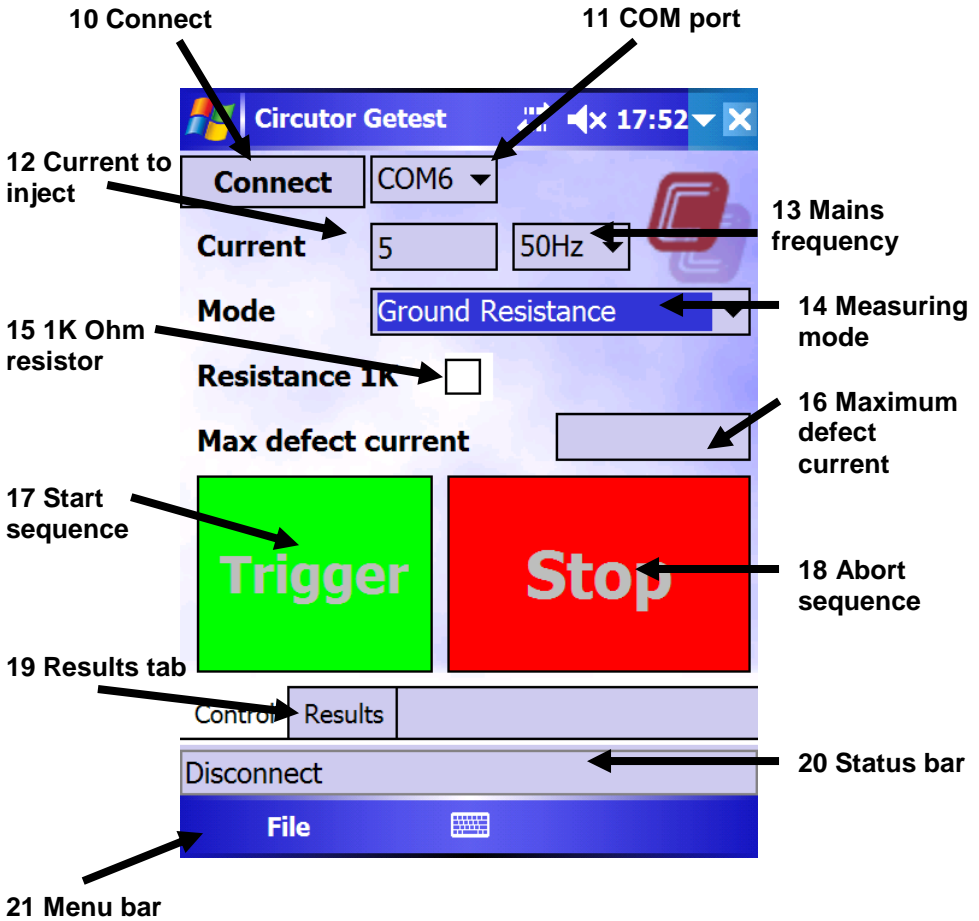
Getest

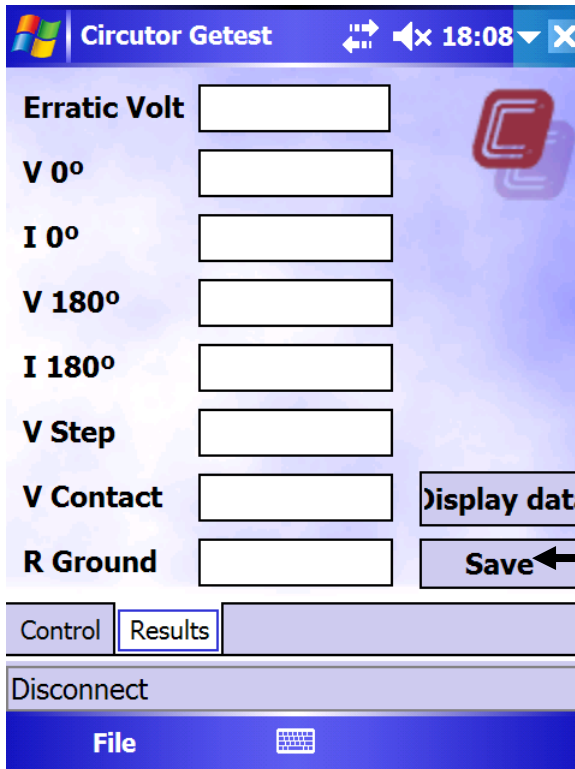
 **CIRCUTOR**

Features

- Step and contact meter, based on injection of current during 1 mains cycle
- Supply up to 50A to a 12Ohms load. Maximum voltage of 600VAC
- Maximum power equivalent to 30KVA, weighting only 45kg
- Remote controlled with bluetooth link. Software can be easily upgraded and customized. Can be controlled using almost any Windows based device. PDAs are recommended
- Data storage, easy to transfer to PC.
- The use of a Windows based device to control the MPC allows to use all the power of Windows software, and to avoid carrying other tools, like calculators, notepads...
- Works on 50 and 60Hz networks
- Detects non-resistive grounds, and self-adjust to measure properly
- Measures step voltage, contact voltage and ground resistance
- Up to 10mV accuracy true RMS volt meter. Auto-scale, up to 700V AC
- Up to 10mA accuracy true RMS current meter. Auto-scale, up to 100A AC
- Several safety protections makes almost impossible to cause damage to persons
- Short-circuit protected outputs (25VAC output, limited to 35A)







Safety



Electrical Shock

This device may generate voltages that may be harmful to the body or cause death. Several protections are included in the device, reducing the risk of electroshock to a minimum, but basic safety precautions must be taken.

Ensure that nobody is inside the area of influence of the injection of current, and that nobody is handling the wires before starting the current injection sequence.

In the case of initiating the sequence (pressing “START” button in the PDA device), sequence can be aborted at any moment:

- by pressing the “STOP” button
- by moving the safety key to the “Disabled” position
- by breaking the Bluetooth link (either removing the PDA battery or any other possible way)
- by switching off the circuit breaker

Safety key and circuit breaker are not hardware/software dependant, as they act directly on the mains supply (breaker) or the current output (safety key), so even in case of an highly improbable software/hardware failure, those ones will avoid the current injection.

If sequence is not aborted, MPC device will perform a first 25V trigger. If resistance found is bigger than 120 Ohms, a message will appear on the PDA screen warning the user, and asking whether to continue or not. Taking into account that body resistance in normal conditions is about 1Kohm, this warning is a basic protection feature.

In case of continuing the sequence, new MPC will only apply current during 20ms. As per IEC 60479-1, this voltage shouldn't cause ventricular fibrillation, even under water wet conditions, while touching the conductive parts with the palms of the hands, but medical assistance may be required.



Remember that this device may generate lethal voltages. Operator safety protections are required. In case of risk or device malfunction, do not doubt to abort the triggering sequence.

Heavy weight



Weight of the device is 45kg. This weight may be harmful to the body if not lifted by trained persons, or if lifted improperly. Device have 2 ergonomic handles, and the recommendation is to be carried by 2 persons.

As well, the device includes 2 electrodes. These electrodes weight 25kg each one. This weight may harm the person if not carried and lifted with care and by untrained people.

Operation instructions

1.- Plug measure connections (2) and current connections (3) depending on the measure that is going to be performed.

2.- Plug the mains connector (7) to the MPC and to the mains outlet. Device is designed for AC 230V 50Hz/60Hz. Please ensure that the voltage is correct before plugging the mains connector. In case of overvoltage, a F250mA fuse will protect the device.

Note:

Plug the device to a line or generator able to supply the required power:

Power required > 600V x current to inject

Recommended power line circuit breaker I_n should be, at least, 50A curve B, 30A curve C, or 16A curve D, as per EN60898. In case of using lower capacity circuit breakers, MPC won't be able to supply the maximum power.

Wiring cross-section and length may limit the maximum capacity of the MPC. Even when the MPC, due to its current injection system, does not need high current capacity wiring and connectors, we do recommend to use the bigger cross-section possible, in order to minimize voltage losses that will affect the MPC maximum capacity. As an example, we show the maximum earth resistance we can inject 5A, 10A, 25A and 50A, depending on the supply cord used:

Wiring	R máx 5A	R máx 10A	R máx 25A	R máx 50A
3x1.5mm ² , 2m	120Ω	60Ω	24Ω	12Ω
3x1.5mm ² , 25m	120Ω	58Ω	20,5Ω	8,5Ω
3x1.5mm ² , 50m	116Ω	54Ω	17Ω	4,5Ω
3x2.5mm ² , 2m	120Ω	60Ω	24Ω	12Ω
3x2.5mm ² , 25m	120Ω	60Ω	22,5Ω	10Ω
3x2.5mm ² , 50m	119Ω	57Ω	20Ω	7,5Ω

If using a rolled extension cord, it is mandatory to extend it completely before performing the test. It is recommended to use the maximum cross-section possible, and the minimum cable length.

3.- Switch on the circuit breaker (6). The red led will light.



4.- Turn the safety key to the “ENABLED” position. The device is ready.



5.- Load the MPC software in the PDA. Select the language

6.- Select the bluetooth serial port (10) and click “Connect”(11) (usually, COM6). The status bar(20) will show “connecting” and “ready” when connected. If after a couple of second, the text “Disconnected” appears on the status bar, it will indicate a problem in the bluetooth link. A recommendation is to soft-reset (push with the PDA stylus the reset button) the PDA. If the problem persists, switch off and on the MPC circuit breaker, and try again. Link is checked every second, in case of link failure, software will return to the disconnected state, and MPC will stop doing actions. MPC link led will light while PDA is connected to the MPC.



7.- Type the current in (12) and select the measure to be performed (14), depending on the connections done in step 1. Current required depends on country legislation. Usually, you have to inject 1% of maximum installation current, and, at least, 5A for distribution transformer station, and 50A for substations and power plants

8.- Type the Maximum Defect Current (16) in order to calculate the step and contact voltage. Select to measure with a 1K resistor (15), if required. Step and contact voltages are calculated using this formula:

If erratic voltage is lower than 10% of injected voltage

$$V = \frac{V0^{\circ} \times I_{\max \text{ defectcurrent}}}{I0^{\circ}}$$

If erratic voltage is higher than 10% of injected voltage

$$V = \sqrt{\frac{V0^{\circ 2} + V180^{\circ 2}}{2}} - V_{\text{erratics}}^2 \times \frac{I_{\max \text{ defectcurrent}}}{I0^{\circ}}$$

Note: erratic voltage is automatically measured, warning the user in case of value over 50V AC

9.- Press “Start” to initiate the sequence. The sequence consists in:

- a) Warning alarm
- b) Connecting current output contactor
- c) Measuring erratic voltage
- d) Test at 25VAC
- e) Apply voltage to reach required current
- f) Increase voltage if current not reached
- g) Apply current in 180° phase
- h) Display results

A warning or error will appear if:

- contactor fails
- erratic voltage is over 50VAC
- output is short-circuited
- resistance found is higher than 120 Ohms
- do not have enough power for reaching requested current for the measured ground resistance
- cannot reach requested current. Possibility to interpolate results
- mains supply drops when applying the current (too high mains wiring impedance)

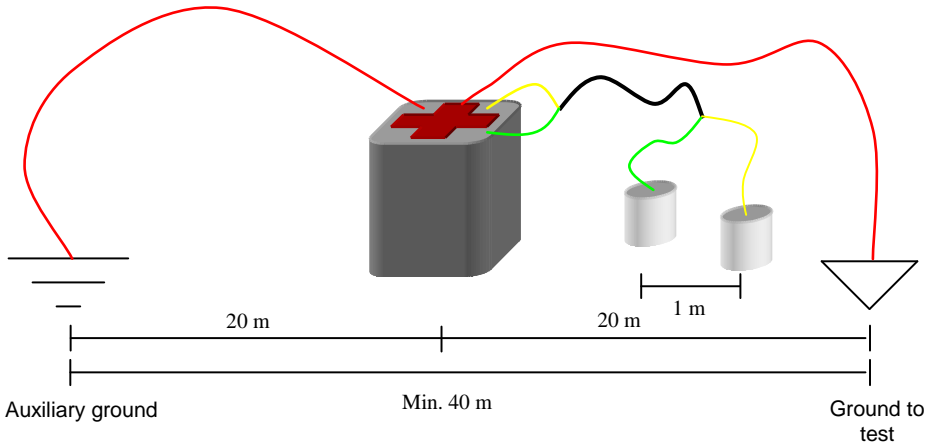
10.- Display results on “DISPLAY” tab (19)

11.- Results can be saved to a file, by pressing the “Save” button, or by using the pop-up menu “File” (21)

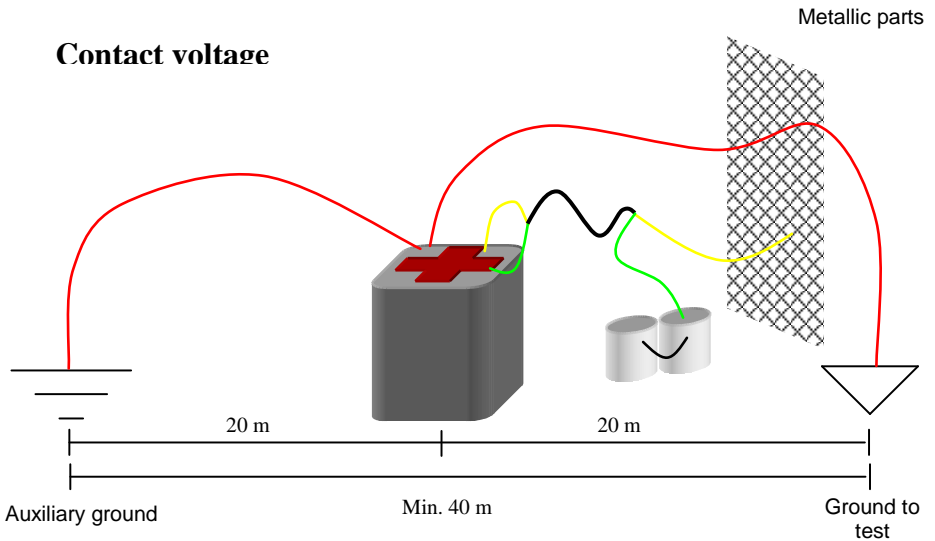


Connections

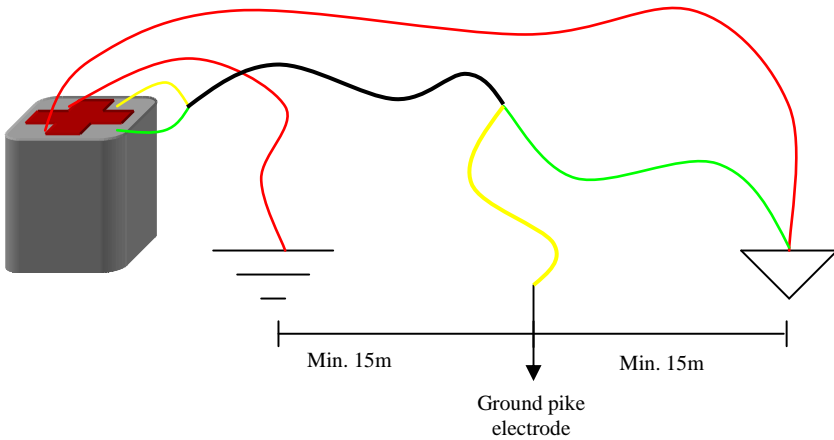
Step Voltage



Contact voltage



Ground Resistance



Note about auxiliary ground:

The auxiliary ground must be good enough for performing a proper measurement. Take into account that a bad auxiliary ground will add a resistance in series to the circuit, lowering the performance of the MPC unit, and therefore, reducing the capacity of injecting current to the ground.

Corrosion on auxiliary ground terminals are a common cause of problems.

As well, a too dry terrain will affect the auxiliary ground. Pouring water over the surroundings of the auxiliary ground or the ground pike electrode may solve the issue (safety measures should be taken to avoid shortcircuit when using/carrying water on electrical installations)

Connecting to a PC

Using a PDA to control the MPC unit allows to store all data in the PDA memory, and transfer them to a PC for processing or reporting.

- 1.- Install Microsoft ActiveSync™. The Software can be downloaded from Microsoft™ website. This program is the PDA connection manager.
- 2.- Connect the PDA to the PC. This connection can be done using the USB cable included, or using a Bluetooth link
- 3.- ActiveSync™ automatically detects the PDA and gives the user the option to synchronize several items (address book, e-mails, files). Pressing “Cancel” will allow only to exchange files with the PDA (but this is enough for our purpose)
- 4.- Open a file browser (like “Explorer”), and browse the “My PC” item. A “Mobile device” item should appear. This “Mobile device” item is the PDA memory, browse it, and copy the report files to the hard disk of the PC
- 5.- Once the file is on the PC hard disk, you are able to open it with any software for editing, processing or reporting.

Report file format:

- *Report file is formatted as a CSV (comma separated values)*
- *All data is double-quoted*
- *A 2-rows header is included, with the variable name and its unit*
- *Data included in the report file are: measuring date, erratic voltage, voltage and current at 0° and 180°, step or contact voltage or ground resistance, set current, max. defect current, measuring mode and 1K resistance indicator*

Error and warning messages

	Error message	Cause	Solution
Initialization	Error: Reading cal data. Loading default data	Corruption on calibration data. MPC unit may be out of calibration	Contact vendor, for receiving instructions for re-calibrate the instrument, if possible.
	Error: Language file not found!	Corruption on language file	Reinstall the PDA software
Communications	ERROR: COM port error	An error has occurred while connecting or transferring data	Close the application and restart the PDA and the MPC unit
	Error: Timeout opening port	Bluetooth COM port failure	Close the application and restart the PDA and the MPC unit
	Error: Port not opened	Bluetooth COM port is closed	Close the application and restart the PDA and the MPC unit
Setup	Error: Invalid current value	Typed value is invalid	Type in a correct value
	Error: Invalid file	File to open is invalid or corrupted	Open a csv, MPC file
Measuring	Error: Main contactor failure. Keeps deenergized. Check safety key	Safety key is in "disabled" position	Turn the key to the "enabled" position
	Error: Cannot reach required current. Continue extrapolating data?	MPC unit is not able to reach the requested current, due to an unidentified cause. If allowed, PDA will extrapolate the values to the requested current, but applying a lower value.	Plug the MPC unit to a mains socket connected to a mains line with lower impedance, or to a more powerful generator. Try to reduce the load.
	Danger: Main contactor failure. Keeps energized	This is a life-threatening scenario. Main contactor is broken, safety protection is overridden	Contact vendor.
	Erratic voltages higher than 50V. Continue?	This is a life-threatening scenario. Erratic voltages flowing across the ground are too high. A mains phase may be tied to ground	Contact responsible of facility under inspection.

Measuring	<p>Danger: loop resistance too high, possible connection error. Check connectons and ensure nobody is touching the injection curcuit. Continue?</p>	<p>This is a life-threatening scenario. Resistance found is too high, it may be caused by bad connections.</p>	<p>Check connection, ensure nobody is on the are or touching the connectors/electrodes/auxiliary ground, remove stain from connectors/electrodes/auxiliary ground</p>
	<p>Warning: Device may not have enough power for injecting the required current. Loop resistance is too high for the required current. Continue?</p>	<p>This is a life-threatening scenario. Load resistance is too high for requested current.</p>	<p>MPC will apply maximun power, but won't reach the requested current value</p>
	<p>Error: cannot reach required current, mains voltage drops down. Mains supply is unable to power required current. At least 20KVA are required. Continue extrapolating data?</p>	<p>You have requested more power to the device than the power that the mains line may supply. Power is equal to the ground resistance by the square of the requested current. If allowed, PDA will extrapolate the values to the requested current, but applying a lower value.</p>	<p>Plug the MPC unit to a mains socket connected to a mains line with lower impedance, or to a more powerful generator</p>
	<p>Warning: Shortcircuit found at the output. Current limited to 35 A. Check connections.</p>	<p>Measured resistance is lower than 0.1Ω</p>	<p>Check connections. It may be possible that an conductive plane is inserted in the ground.</p>
	<p>Warning: resistance found higher than 120Ohms. Check connections. Continue?</p>	<p>This is a life-threatening scenario. Load resistance is too high.</p>	<p>Check connection, ensure nobody is on the are or touching the connectors/electrodes/auxiliary ground, remove stain from connectors/electrodes/auxiliary ground</p>

Specifications

Mains supply

Voltage 230V \pm 20% 50-60Hz

Current 15A AC

Note: Required low impedance in mains supply line for getting maximum performance, as up to 320A 20ms current surges may appear when requesting maximum currents. Mains supply wire section recommended 2.5mm² or bigger, in order to have a low line resistance.

Nota2: We recommend to protect the mains power line with a circuit breaker : 50A curve B, or 30A curve C, or 16A curve D, as per EN60898

Current injection

Max output voltage: 600VAC

Max output current: 50 A.

Max power: (30KVA).

Minimum value limits:

$$I_{\max} = \sqrt{(30000/R_{\text{load}})} \quad \text{or} \quad I_{\max} = 600/R_{\text{load}}$$

Voltage meter

Type: true RMS

Input impedance: 10M Ω or 1K Ω , selectable

Resolution:

700VAC scale – 0.5VAC resolution

280VAC scale – 0.1VAC resolution

105VAC scale – 0.1VAC resolution

70VAC scale – 0.1VAC resolution

30VAC scale – 0.1VAC resolution

0.8VAC scale – 0.01VAC resolution

Max voltage: 700VAC

Scales: Auto (0.8, 30, 70, 105, 280, 700)

Accuracy : 1% reading + 2 digits

Current meter

Type : true RMS

Input impedance: less than 0.1 Ω

Resolution:

100AAC scale – 0.1AAC resolution

10AAC scale – 0.01AAC resolution

Max current: 100AAC

Scales: Auto (10, 100)

Accuracy : 2% reading + 2 digits

Resistance meter

Range : 0 - 150 Ω

Accuracy : 2.5% reading + 2 digits

Communications

UART protocol, key protected, over Bluetooth v1.2

Class I

Tx Power: +18dBm

Sensitivity: -88dBm

Regulatory approvals:

FCC Part 15 Subpart C Section 15.247

ETSI EN 300 328

ETSI EN 301 489-1

EMC compliancy

Device is compliant with EU LVD 2006/95/EC and EMC 89/336/EEC directives.

Due to the nature of the device, an injection of several amps will cause some disturbance on the mains line, but EMC directive allows this disturbance in this cases, as this phenomena is inherent to the nature of the device.

As well, depending on the quality of the mains line, mains voltage may drop a 20% during 20ms, so it is recommended not to connect mains fluctuations sensitive equipment to the same mains line as the MPC unit

Installation category

IEC61010 CAT III 600V

Connections

Mains: IEC320 C19 16A

Current injection : 4mm safety banana plug CATIV 600V 32A

Voltage meter: 4mm safety banana plug CATIV 600V 32A

Nota: Even when those connectors are specified for nominal currents up to 32A, they can handle up to 150A during 20ms, without downgrading its performance or.

Protections

ICP 20A, curve D EN60898

Internal fuse F250mA

Dimensions

Size : 28.5x28.5x34cm

Weight : 45kg. Electrodes not included



Notes

CIRCUTOR S.A.

Vial Sant Jordi s/n - 08232 -
Viladecavalls (Barcelona) Spain

Tel: (+34) 93 745 29 00

Fax: (+34) 93 745 29 14

Free Manuals Download Website

<http://myh66.com>

<http://usermanuals.us>

<http://www.somanuals.com>

<http://www.4manuals.cc>

<http://www.manual-lib.com>

<http://www.404manual.com>

<http://www.luxmanual.com>

<http://aubethermostatmanual.com>

Golf course search by state

<http://golfingnear.com>

Email search by domain

<http://emailbydomain.com>

Auto manuals search

<http://auto.somanuals.com>

TV manuals search

<http://tv.somanuals.com>