

MAXIMUM TEST



User's Manual



Thank you for choosing a Meat&Doria product

MaximumTest is a portable digital tool specifically designed for the analysis and emulation of analogue and PWM signals and drives, which characterise the electronic and electromechanical components of modern motor vehicles

WARNING!

MaximumTest is intended for use by qualified personnel only, after reading the safety warnings in this user manual.
To use MaximumTest, you must register and activate the device.

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SAFETY WARNINGS

Precautions for operators and the device



Before using MaximumTest, carefully read the instructions and safety warnings contained in this user manual. Further information is provided on page 17.



To keep the MaximumTest functions up to date, you can check for the latest firmware version via the USB port, using the appropriate executable utility for Windows. The product is subject to continuous improvement, so changes may be made without notice.



Take care when removing the wiring from the engine compartment and the instrument, observe the polarity of the power cable, use the specified wiring (depending on the type of component to be tested), do not force the connectors, do not immerse MaximumTest in liquids, do not use MaximumTest with wet hands.

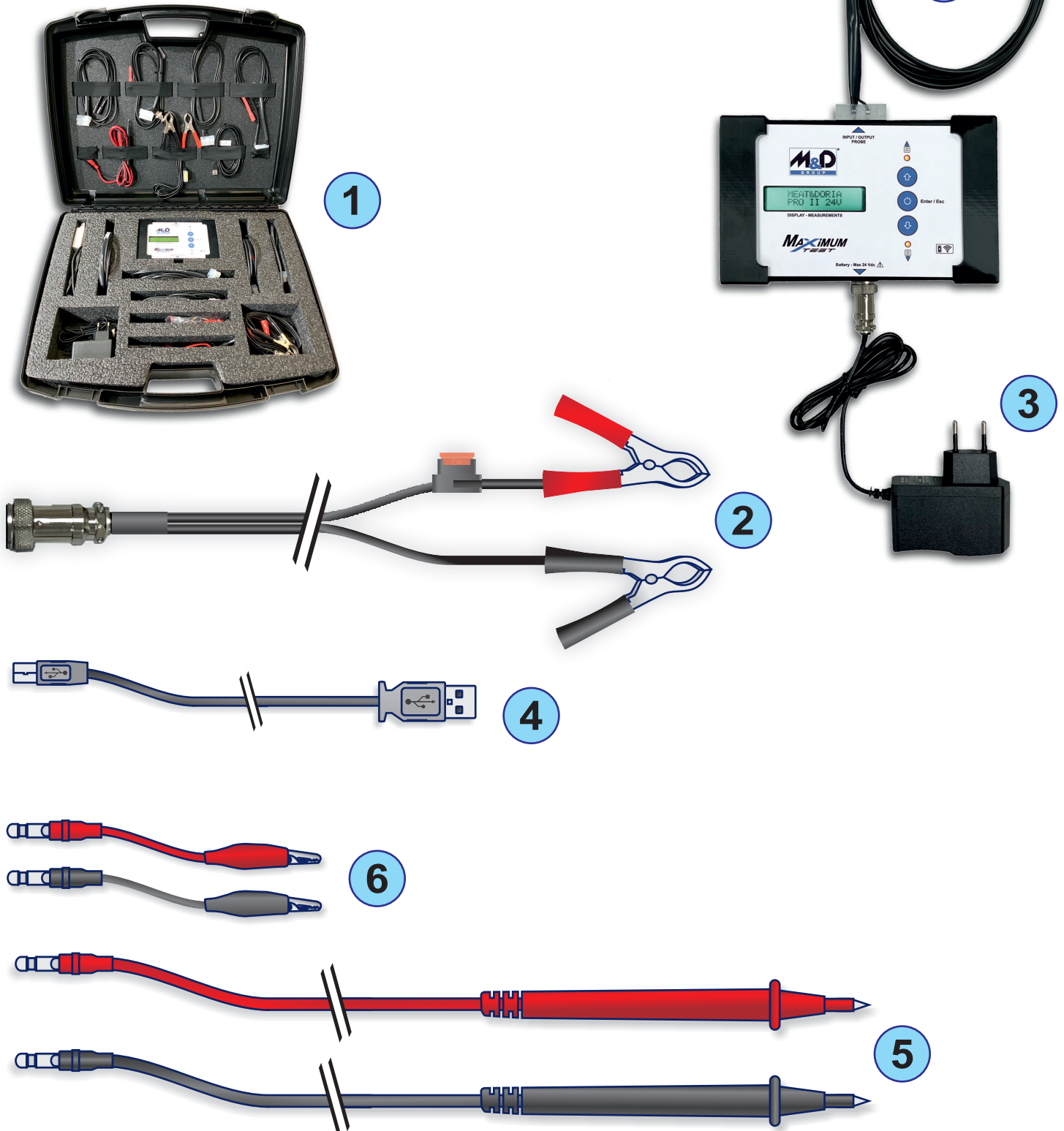


If you encounter the following technical problems, do not use the device and contact the authorised Meat&Doria service centre or your dealer:

- The connection cables are damaged.
- Liquid has been spilled on the device.
- The device is malfunctioning.

MAXIMUM TEST EQUIPMENT

- (1) Preformed case with cable holder (MXD006)
- (2) Car battery power cable (MXD004)
- (3) 220V battery charger (MXD005)
- (4) Mini USB cable (MXD003)
- (5) Terminals with tips (MXD002)
- (6) Terminals with crocodile clips (MXD001)
- (7) Test cables (see functions on the following pages)



MAIN FUNCTIONS OF MAXIMUM TEST

(1) UP-DOWN BUTTONS: scroll up/down through the menu items and adjust parameters (voltage, frequency, duty cycle, etc.) according to the selected function.

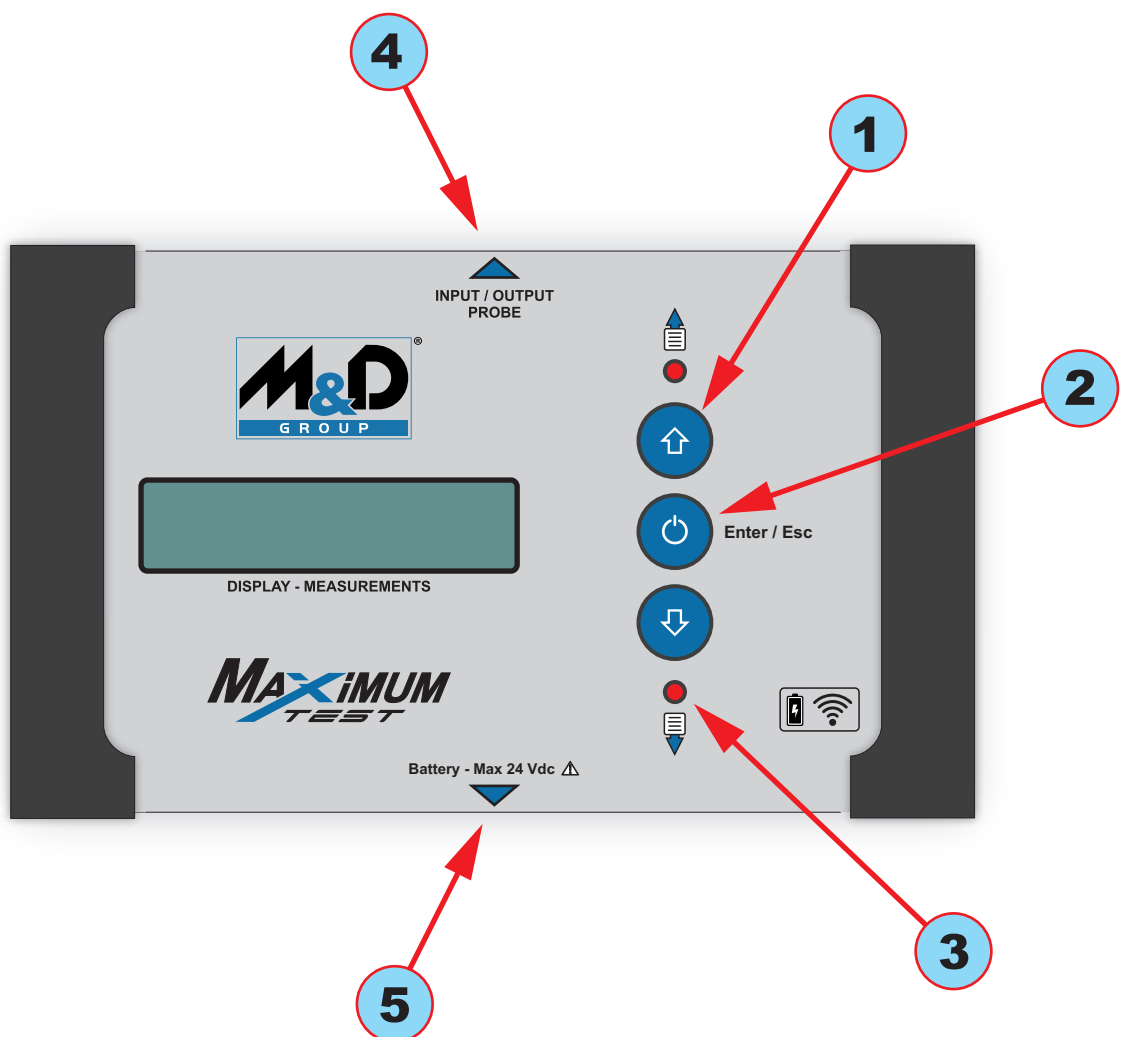
(2) ENTER/ESC/ONOFF BUTTON: press this button (for at least 2 seconds) to turn on the instrument; press and hold to exit (back) the current menu and return to the previous one. Press and hold in the main menu to turn off the instrument.

(3) LEDs: the LEDs indicate the possibility of scrolling up or down through the menu items (**upper LED on:** there are items above; **lower LED on:** there are items below).

(4) WIRING CONNECTOR INPUT: Test wiring input (depending on the test to be performed).

(5) POWER WIRING INPUT: Input for the wiring to power the MaximumTest from the vehicle battery.

N.B. Some wiring (with power activation) specifically requires connection to the vehicle battery in order to function.



POWER SUPPLY AND RECHARGING

- MaximumTest is equipped with an **internal** rechargeable lithium-ion battery.
- The supplied battery charger (220V) can be connected to the lower power connector (round), or the **power cable** (red/black clamps) can be used for **direct connection** to the vehicle battery (12V or 24V).
- MaximumTest has an 'auto-off' system. If the instrument is used with the internal battery, it will automatically **turn off after** 60 seconds if no wiring is connected, or after 5 minutes if wiring is connected.

WIFI-WEBAPP FUNCTIONALITY:

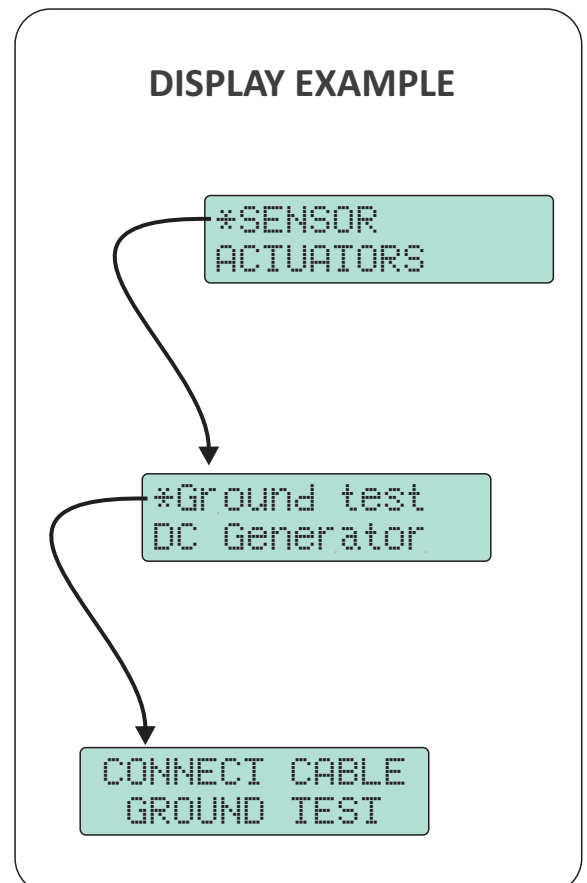
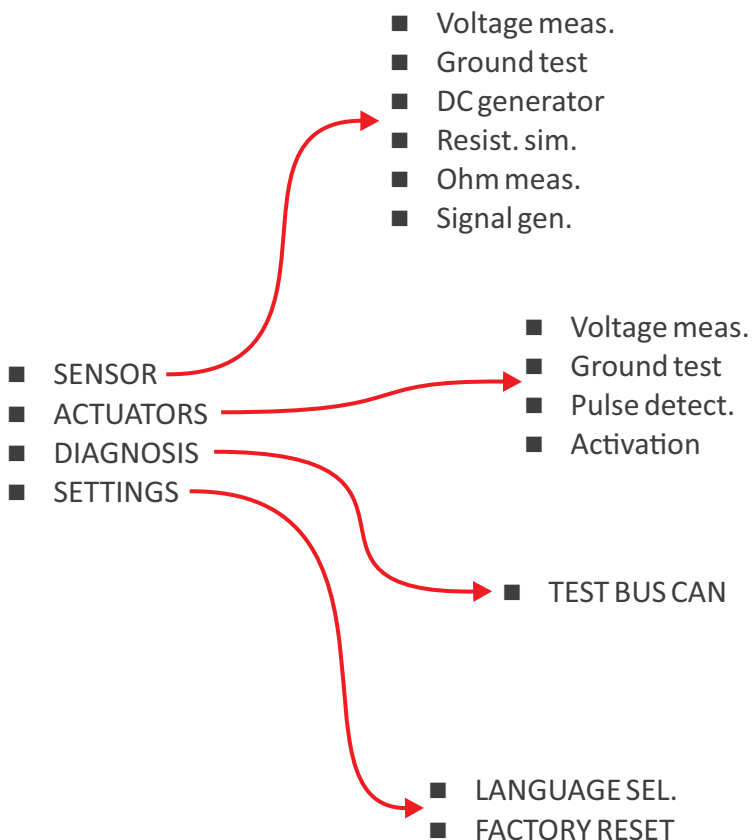
- To access the MaximumTest webapp, switch on the instrument and select the 'MAXIMUMTEST_xxxx' Wi-Fi network (where xxxx is the serial number of the device) on your smartphone, then consent to access the network if requested.

FIRMWARE UPDATES:

- The MaximumTest firmware can be updated via the USB port using the dedicated Windows utility.

MENU FUNCTIONS

- Turn on the MaximumTest, wait a few seconds, then select the desired function from the MENU using the UP and DOWN arrow keys, then select an available test (symbol *), then proceed with the Enter key and then insert the wiring indicated on the display.



MXC001 CABLE - PWM Multimeter

Acquisition wiring, with voltage measurement and ground-referenced PWM signal analysis functions.



Applications

This type of wiring is typically used on board vehicles to detect voltages (maximum and minimum), frequencies and PWM signals.

Features

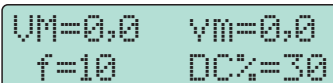
VM = maximum voltage peak detected	0.0 - 100.0V
Vm = minimum voltage peak detected	0.0 - 100.0V
f = signal frequency	0.0 - 20,000Hz
d.f. = signal duty factor/cycle	PWM 0% - 100%

Use

Connect the MXC001-PWM Multimeter cable. MaximumTest automatically recognises the function and displays the message 'ANALOG AND PWM SIGNAL ANALYSIS'.

Connect the probe or crocodile clip to the component to test its operation. The measured values will appear on the display.

If the measurement is taken on a component where the detection is a frequency, the display will also show the frequency (f) values in Hz and the Duty Cycle (DC) values as a percentage.



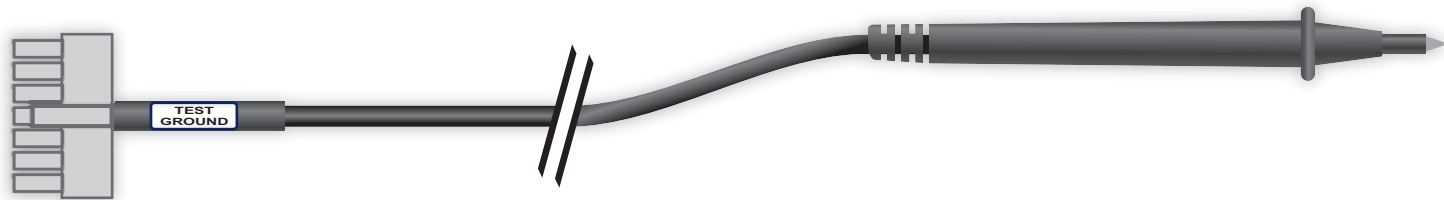
```
VM=0.0  Vm=0.0
f=10    DC%=30
```

WARNING!

This wiring requires connection to the vehicle ground. Use MaximumTest with the MXD004 cable connected to the vehicle battery.

MXC002 CABLE - Ground Test

Acquisition wiring for checking the correct status of the ground, both mechanical (bodywork) and electronic (components), with display of the test result: GROUND OK; GROUND FAIR; GROUND NOT OK



Use

Connect the MXC002-Ground Test cable, MaximumTest automatically recognises the function and displays the message 'GROUND TEST'.

Connect the probe or crocodile clip to the component or ground point to be tested, and the measured values will appear on the display.

GROUND TEST

V_{end}=_____
OPEN CIRCUIT

V_{end}=0.01
GROUND OK

V_{end}=0.50
DISCRETE GROUND

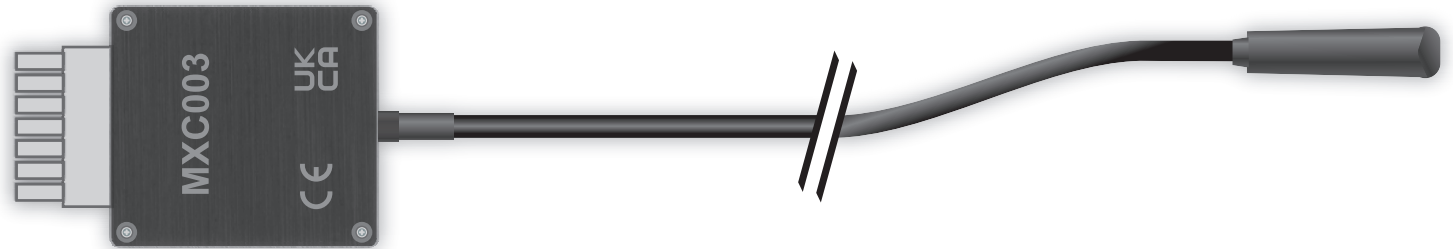
V_{end}=1.10
BAD GROUND

WARNING!

This wiring requires connection to the vehicle ground. Use MaximumTest with the MXD004 cable connected to the vehicle battery.

MXC003 CABLE - Pulse Sense Inductive

Detection wiring (without electrical contact but only placed on the component) for checking the signals of inductive components (which generate a magnetic field) with the operating frequency shown on the display.



Use

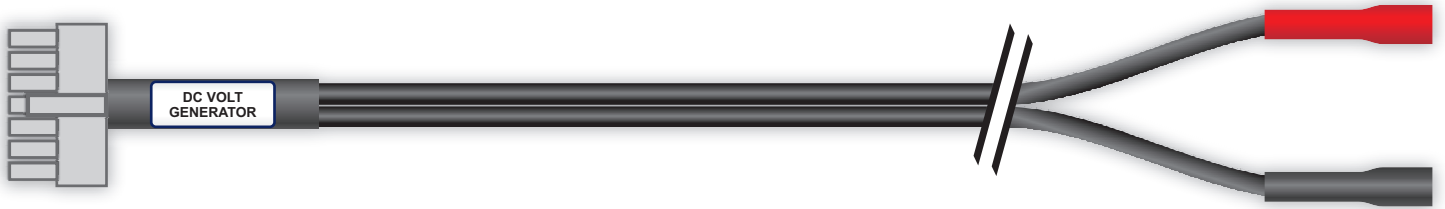
Connect the MXC003-Pulse Sense Inductive cable, MaximumTest automatically recognises the function and displays the message 'PULSE DETECTOR ACTIVATED'.

Place the end of the magnetic sensor on the component to be tested, MaximumTest prepares to acquire the frequency in pulses per second.

PULSES/SEC=0

MXC004 CABLE - DC Volt Generator

Emulation wiring, with the function of generating continuous voltage from 0V to 12V for simulating the output of analogue sensors with negative ground.



Features

V= variable voltage from 0V to 12V with 0.1V steps

Use

Connect the MXC004-DC Volt Generator cable, MaximumTest automatically recognises the function and displays the message 'DC VOLTAGE GENERATOR'.

Connect the probe or crocodile clip to the component to generate the DC voltage output, use the UP and DOWN buttons to increase or decrease the value, the measured values will appear on the display.

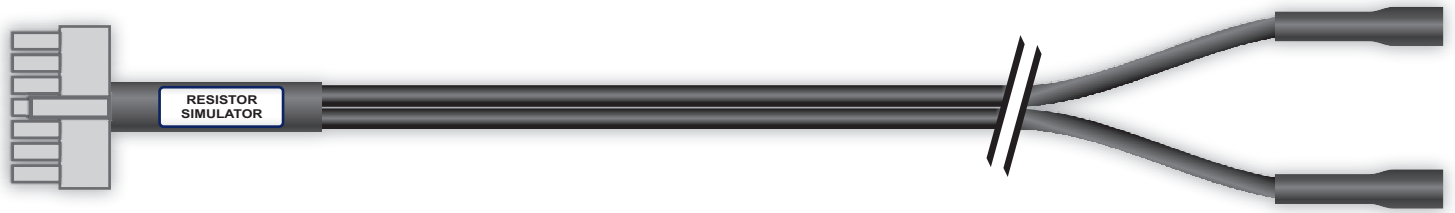
Applications

This type of wiring can be used both on board the vehicle and on the bench. Its function is to supply power to electronic components with voltage values from 0V to 12V in 0.1V steps.

```
V_out=5.0  
V_inPut=0.0
```

MXC005 CABLE - Resistor Simulator

Emulation wiring, with the function of simulating a variable (digital) resistance from approximately 1000 to approximately 25,000 for the simulation of sensors (e.g. engine temperature sensor, etc.).



Features

R = Variable resistance from 1000 to 25,000 in steps of approximately 2000.

Use

Connect the MXC005 - Resistor Simulator cable, MaximumTest automatically recognises the function and displays the message 'EMULATOR RESISTANCE VAR.'.

Connect the probe or crocodile clip to the component to generate the DC voltage output, use the UP and DOWN buttons to increase or decrease the value, the measured values will appear on the display.

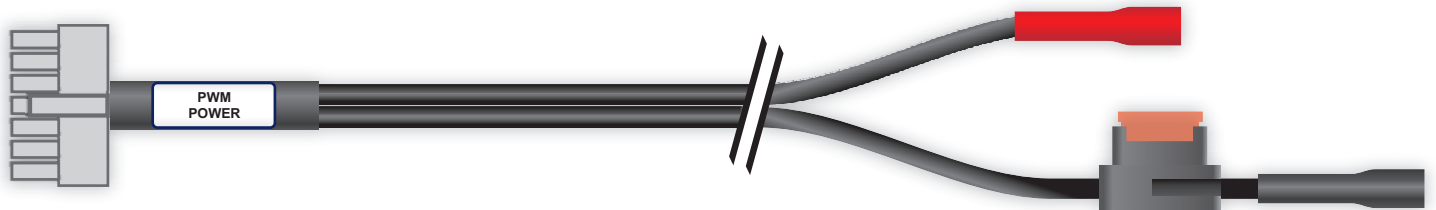
Applications

This type of wiring can be used both on board the vehicle and on the test bench. Its function is to simulate a variable resistance between values of approximately 100 Ohm and approximately 25,000 Ohm.

Res_ohm=10000

MXC006 CABLE - PWM Power

Wiring for generating PWM power signals with ground activation, for controlling inductive electromechanical loads (solenoids, injectors, etc.). Protection on the positive power supply (+12V direct battery) via 20A in-line fuse.



Applications

This type of wiring can be used both on the vehicle and on the test bench. The menu also includes a specific function for activating petrol and diesel injectors.

N.B. An optional accessory is required for the piezoelectric injector activation function: MCX012 Piezo Activator.

Features

F = variable activation frequency from 1Hz to 1000Hz

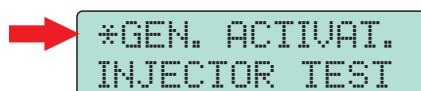
d.f. = variable duty factor/cycle (1% to 99%).

WARNING! This wiring requires connection to the vehicle ground. Use MaximumTest with the MXD004 cable connected to the vehicle battery.

Use

Connect the MXC006 - PWM Power cable. MaximumTest automatically recognises the function and displays the high-power PWM signal emulation indication: 'GENERIC ACTIVATOR' for independent management of the generated signal, or in the specific guided function 'INJECTOR TEST'.

Select the activation mode using the UP and DOWN buttons; the asterisk indicates the available selection. Confirm by pressing the ENTER button.



Generic Activation

When **GENERIC** activation is selected, the manually adjustable parameters are shown on the display.

By repeatedly pressing the ENTER button, you can move between the three available settings. Use the UP and DOWN buttons to change the parameters.

PWM OFF, no activation active until you switch to the **PWM ON** position

```
*PWM OFF  VI=0,0
f=100      DC%=50
```

f, you can set the desired frequency between 1Hz and 1,000Hz.

```
PWM OFF  VI=0,0
*f=100    DC%=50
```

DC%, you can set the desired DUTY CYCLE between 1% and 99%.

```
PWM OFF  VI=0,0
f=100     *DC%=50
```

Note:

We recommend proceeding as follows:

- Connect the component to be tested.
- Set the frequency and duty cycle values.
- Activate the PWM ON function.

Injector activation

When **INJECTORS** activation is selected, the display shows the list of available components:

- DIRECT PETROL - Direct injection injectors
- INDIRECT PETROL - Indirect injection injectors
- DIESEL COIL - Diesel coil injectors
- PIEZO DIESEL INJECTORS - Piezoelectric diesel injectors (requires Piezo Activator cable, MXC012)
- GAS INJECTORS - Gas injectors, LPG/methane



After selecting the injector type with the ENTER button, you can set the activation duration from a minimum of 10 seconds to a maximum of 900 seconds using the UP and DOWN buttons.

```
ACTIV. DURATION
10 3
```

Once the activation duration has been set, you can move between the settings by repeatedly pressing the ENTER button. By selecting the frequency, you can set a value from 1Hz to 100Hz.

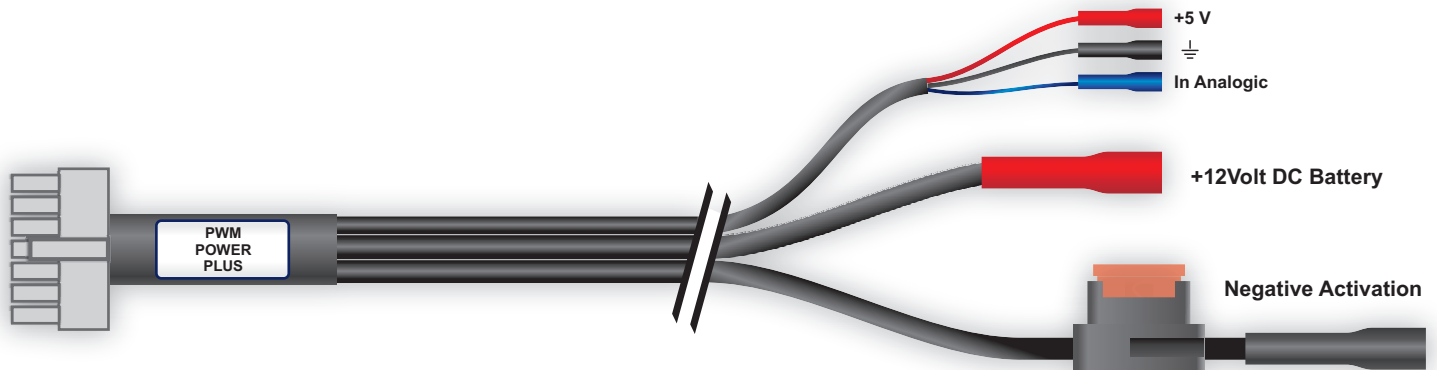
```
PWM OFF PETROL
*f=1          DIR.
```

By moving to the PWM OFF position and using the UP and DOWN buttons, you can switch to the 'countdown' mode for the seconds set previously.

```
*PWM 10s PETROL
f=1          DIR.
```

MXC007 CABLE - PWM Power Plus (5 wires)

Wiring for generating power PWM signals with ground activation, for controlling inductive electromechanical loads (solenoids, injectors, etc.). Includes terminal (blue) for analogue signal acquisition and protection on the positive power supply (+12V battery) via 20A in-line fuse.



Features

F = variable activation frequency from 1Hz to 1000Hz.
d.f. = variable duty factor/cycle (1% to 99%).
Vi = input voltage (0V to 5V).

Use

Connect the MXC007 - PWM Power Plus cable. MaximumTest automatically recognises the function and displays the high-power PWM signal emulation indication: 'GENERIC ACTIVATOR', for independent management of the generated signal, or in the specific guided function 'INJECTOR TEST'.

Select the activation mode using the UP and DOWN buttons; the asterisk indicates the available selection. Confirm by pressing the ENTER key

Applications

This type of wiring can be used both on the vehicle and on the bench. It allows you to generate a PWM power signal to activate various electromechanical components and simultaneously detect the response (analogue input blue terminal), testing their correct operation.

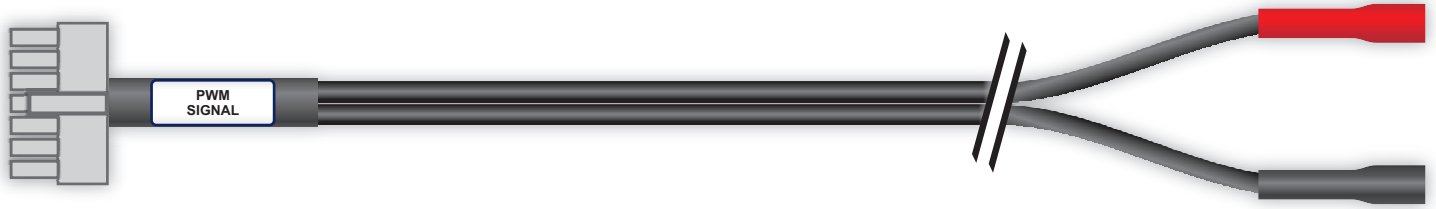
N.B. An optional accessory is required for the piezoelectric injector activation function: MCX012 Piezo Activator.

The MaximumTest menu also includes a specific function for activating petrol and diesel injectors. To perform these tests, use the same navigation methods indicated in the PWM Power cable (MXC006).

WARNING! This wiring requires connection to the vehicle ground. Use MaximumTest with the MXD004 cable connected to the vehicle battery.

MXC008 CABLE - PWM Signal

The wiring allows you to generate PWM waveforms with negative ground, thus emulating sensors with digital output, or controlling low-power electronic actuators.



Applications

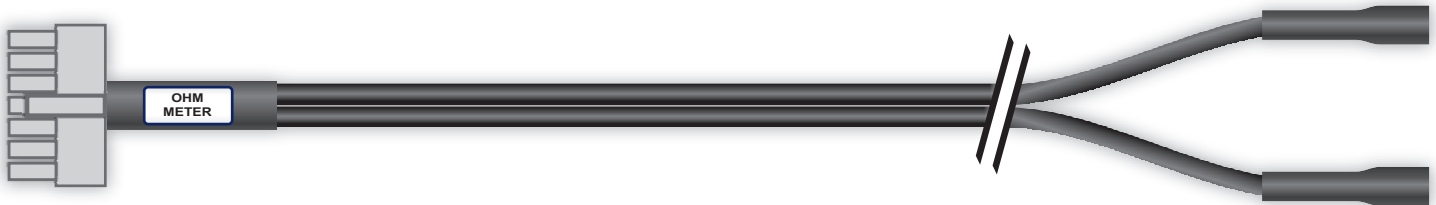
Connect the MXC008 - PWM Signal cable. MaximumTest automatically recognises the function. Use this wiring (typically on board the vehicle) to supply PWM signals with a maximum current of 1 A to the control unit inputs.

Features

V = signal amplitude	0V - 12.0V (variable in 0.1V steps)
F = signal frequency	0Hz - 20,000Hz
d.f. = signal duty factor/cycle	1% - 99%

MXC009 CABLE - OHM Meter

Acquisition cabling, with resistance detection function, can be used both on board the vehicle and on the test bench.



MXC010 CABLE - DC Volt Generator Plus

The cabling allows you to generate a variable PWM voltage and simultaneously detect the response of the component.



Applications

Connect the MXC010 - DC Volt Generator Plus cable. MaximumTest automatically recognises the function. Use this wiring (typically on board the vehicle) to supply a variable PWM voltage.

Features

V= signal amplitude 0V - 12.0V (variable in 0.1V steps)

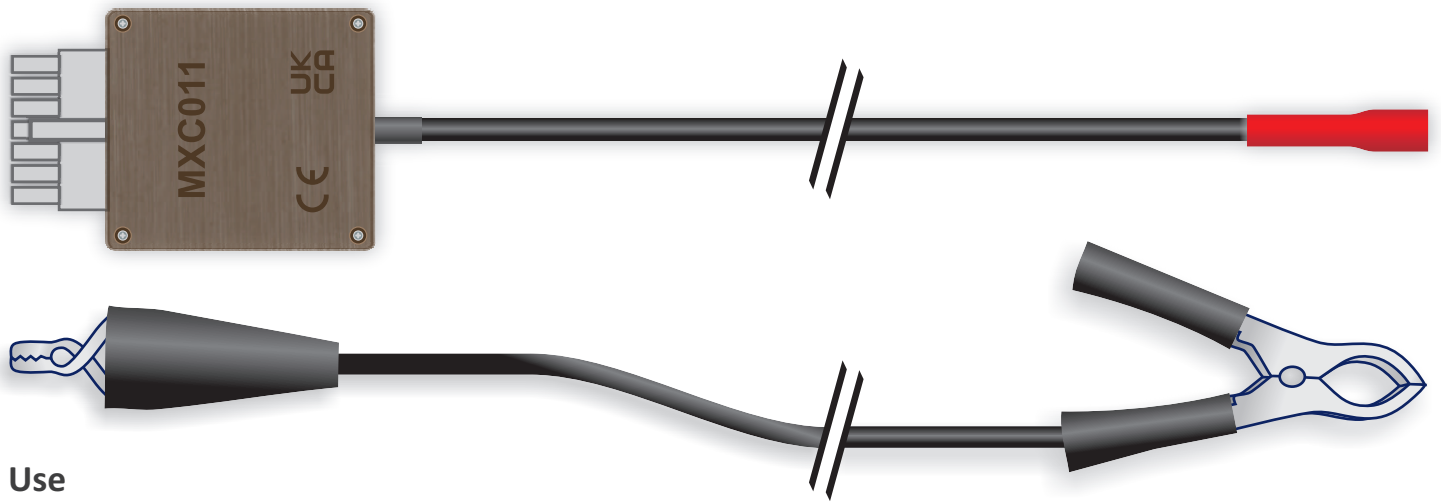
Use

Use the wiring to test/simulate the following sensors:

- Intake air pressure sensor
- Absolute pressure sensor
- Air conditioning pressure sensor

MXC011 CABLE - Glow Plug Test (with clamp cable)

Wiring for testing glow plugs with simultaneous measurement of current absorption.



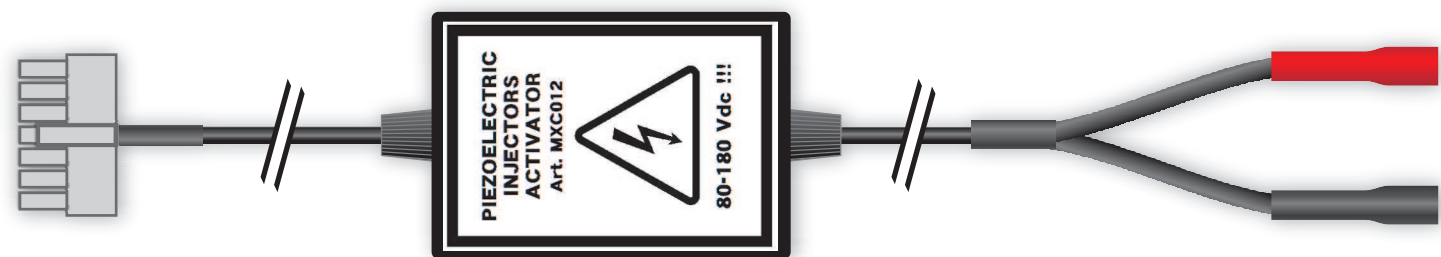
Use

Connect the MXC011 - Glow Plug Test cable, MaximumTest automatically recognises the function. The wiring can be used both on the vehicle and on the bench.

Its function is to activate diesel glow plugs at any voltage and check their operation.

MXC012 CABLE - Piezo Activator

Wiring for testing piezoelectric injectors.



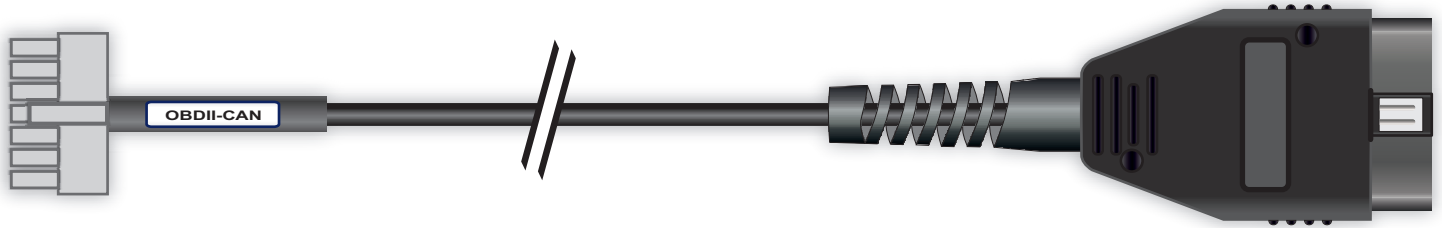
Use

Connect the MXC012 - Piezo Activator cable, MaximumTest automatically recognises the function. The wiring is typically used on the test bench.

Its function is to activate piezoelectric injectors and check their operation.

MXC013 CABLE - Diagnostic CAN EOBD

Wiring for CAN network analysis via the vehicle's EOBD socket.



Features

- Supply voltage check
- Ground check
- Average voltage check of CAN-H and CAN-L
- CAN network resistance check

Use

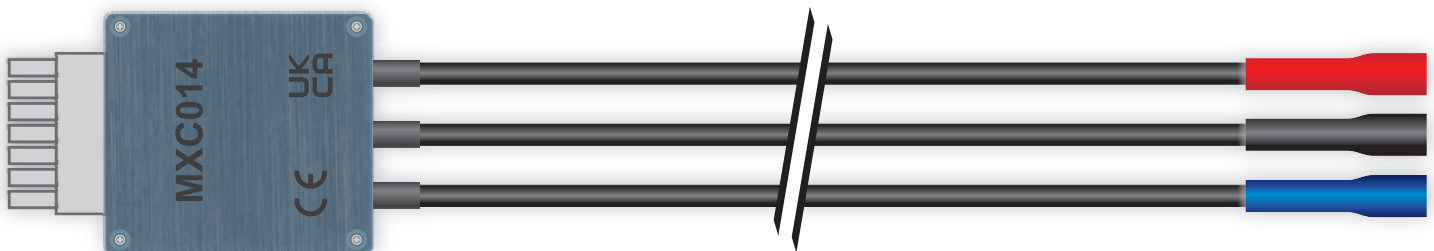
Connect the MXC013 - Diagnostic CAN EOBD cable. MaximumTest automatically recognises the function of the wiring, which must only be used in the vehicle's EOBD socket.

WARNING! DO NOT use the MXD004 power cable to connect to the vehicle battery.

MXC014 CABLE - HV Coil Test

Emulation wiring.

The wiring activates the ignition coils for actual operation testing.



Use

Use the wiring to test/simulate the following coils:

- Traditional coils
- Integrated coils
- Pencil coils

GENERAL TERMS AND WARRANTY

■ Rights and responsibilities

All rights reserved. Copying, modifying and dismantling, even partially, of the electronic parts and software (if included or supplied with the product) is prohibited. Total or partial reproduction of this manual, in any form (paper or digital), is not permitted. However, printing for the exclusive use of the end user and specialised operators is permitted.

■ Responsibility for use

Meat&Doria accepts no responsibility for the improper use of the MaximumTest device or for use that does not comply with the purposes and methods described in this manual. Furthermore, the company is not liable for any damage to persons, animals or property in the following cases:

- Damage to the product caused by external factors or failure to comply with current regulations;
- Modifications made to the product without the express written authorisation of the manufacturer.

■ Product updates

The product may be subject to technical changes and improvements. Meat&Doria reserves the right to update or modify the information contained in this manual without prior notice.

■ Warranty - Definition

Warranty means the free replacement or repair of parts of the device that are defective due to manufacturing faults.

■ Warranty - Scope of application

The following general warranty conditions apply to contractual relationships between Meat&Doria and its retailers, unless already regulated by specific agreements/contracts currently in force.

- These conditions are to be considered inclusive and in lieu of legal warranties for conformity defects and exclude any other possible liability of the retailer and manufacturer arising from the products supplied. In particular, the requirements of Legislative Decree 24/2002 (Directive 1999/44/EC) are not to be considered applicable to the supply relationships between Meat&Doria and its retailers, as they apply to the supply of goods to consumers, i.e. to any natural person who, in the contract, acts for purposes unrelated to any entrepreneurial or professional activity carried out. The purchaser may not therefore make any claims other than those provided for in these warranty conditions, for compensation for damage, price reduction or termination of the contract. Once the warranty period has expired, no claims may be made against the retailer or the manufacturer.

■ Warranty - Duration

The following general warranty conditions apply to contractual relationships between Meat&Doria and its retailers, unless already regulated by specific agreements/contracts currently in force.

- 12-month warranty from the date of activation of the MaximumTest device.
- 6-month warranty on components replaced during repairs.
- Products with extended warranty: please refer to the specific documentation.

■ Warranty - Exclusions

The above warranty is provided on condition of full payment of the price, and therefore, the purchaser cannot claim it if, for any reason, they have suspended payment. The warranty does not cover any parts that are defective due to:

- Negligence or carelessness in use (failure to follow the instructions for operating the device);
- Incorrect installation or maintenance;
- Repairs or maintenance carried out by unauthorised personnel;
- Transport damage;
- And all circumstances not attributable to manufacturing defects in the device.

The following are excluded from the warranty/early replacement:

- consumables (e.g. parts subject to natural wear and tear);
- products/components not accompanied by a serial number.

The warranty is excluded in all cases of improper use of the device and if the device is not subjected to the periodic checks specified in the relevant instructions.

Meat&Doria declines all responsibility for any damage that may, directly or indirectly, affect persons, property or pets as a result of failure to comply with all the requirements indicated in the specific instructions and concerning, in particular, the warnings regarding the installation, use and maintenance of the device.



Waste Electrical and Electronic Equipment Directive (WEEE)

In the European Union, this label indicates that this product must not be disposed of with household waste. It must be deposited at a suitable facility capable of performing recovery and recycling operations. The product complies with the requirements of Directive 2012/19/EU.



Recycling of packaging

The packaging must be disposed of in accordance with the regulations in force in your country. In this way, you will contribute to the protection of the environment.



Note regarding the CE Declaration of Conformity

This document declares that the device complies with the essential requirements contained in the European Directives cited in the manufacturer's original declaration.



Note regarding the UKCA Declaration of Conformity

The UKCA (UK Conformity Assessed) marking is the mark representing product conformity in the United Kingdom, which currently corresponds to the requirements contained and declared in the current CE declaration for the device.



ESD/EF Warning

The product may contain a microcomputer for signal processing and control functions. In extremely rare cases, it may lock up due to intense interference, disturbances from an external source, or static electricity.



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www.meat-doria.com