

User's guide for MT-MOTEUR-E-BSI

Training Engine

PETROL ENGINE WITH INDIRECT INJECTION



EXOTEST®
EDUCATION

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1.USER FILE

1.1 USER AND INSTRUCTION MANUAL

Installing and starting up engine rig MT-MOTEUR-E-BSI.

Depending on the school's internal organisation, the engine rig will be located in the engines and vehicles area. This type of system is considered as a machine with moving components and hot parts.

Before starting, it is essential to unplug the model from the mains supply, and to check that the exhaust system is properly connected and the hood closed.

Switch ON the master cutout switch then, on the control panel, turn the ignition key to the start position. When the engine starts, the parameters can be viewed on the instrument cluster and on the built-in screen.

1.7.1. Environment

The engine rig should be used on a level surface, in a dry place away from dust, steam and combustion fumes.

To allow correct use, the machine requires approximately 400 to 500 lux of light.

The machine may be placed in a practical exercise room. Its operating noise level does not exceed 70 decibels.

The engine rig controls are protected against potential user error.

1.7.2. Calibrating and maintaining the engine rig

Engine rig structure

Calibration: factory setting

Maintenance frequency: none

Cleaning: use a soft, clean cloth and a window cleaning product

Check:

- ✓ Lock operation every month
- ✓ Gas strut operation every year

Engine

Change the oil and replace the oil filter every two years or every 200 hours (used oil and filters must be reprocessed by an authorised centre).

Change the coolant every five years (used coolant must be reprocessed by an authorised centre).

Check the levels every month.

Visually inspect the hoses (coolant and fuel) every month.

N.B. The unit displayed on the cluster corresponds to tenths of an hour.

Fluid changes

Preliminary conditions: The engine must be cold, the engine rig brake on, the mains connector unplugged, the ignition key turned to Stop and the master switch in the OFF position.

- Engine oil: access the drain plug via the flap on the drip tray. An easier passage is provided under the rig on the timing side. Oil is added after removing the cap at the top of the engine (capacity: 3.8 litres of 5W30 grade oil).
- Coolant: drain by removing the hose at the bottom of the cooling radiator. The coolant is retrieved via the flap on the drip tray. Bleed the system on filling (capacity ≈ 6 litres).

Access to the expansion tank is located under the yellow flap (photo below). This flap is opened with the hood closed by loosening the retaining screw to release the flap which can then be swivelled. It is important to put the flap back into its original position and secure it.



Fuel

The fuel tank must only be filled by the trainer.

Before filling, turn the ignition key to the Stop position, unplug from the 230 V mains supply and switch OFF the master cutout. Check that there is no current by turning the ignition switch to “Start” – if nothing happens, then there is no current.

Only use unleaded (95) fuel.

Number of work stations and position of user

The engine rig is considered as a single work station.

The rig user will stand throughout the practical exercise.

Lockout/Tagout procedure

Turn the ignition key to the Stop position.

Unplug from the 230 V mains supply unless the trainer wishes to recharge the battery.

Switch OFF the master cutout.

Check that there is no current by turning the ignition switch to “Start” – if nothing happens, then there is no current.

Remove the ignition key and place it in a lockable cabinet.

Check that the hood is closed.

Leave the trainer to handle the engine rig.

Place a notice on the engine rig control panel indicating that it is locked out.

Residual risk

Only the trainer shall top up the fuel tank, applying the appropriate rules.

For the entire duration of the practical session, the trainee shall work on the front of the model.

The control panel should only be opened by certified and authorised persons.

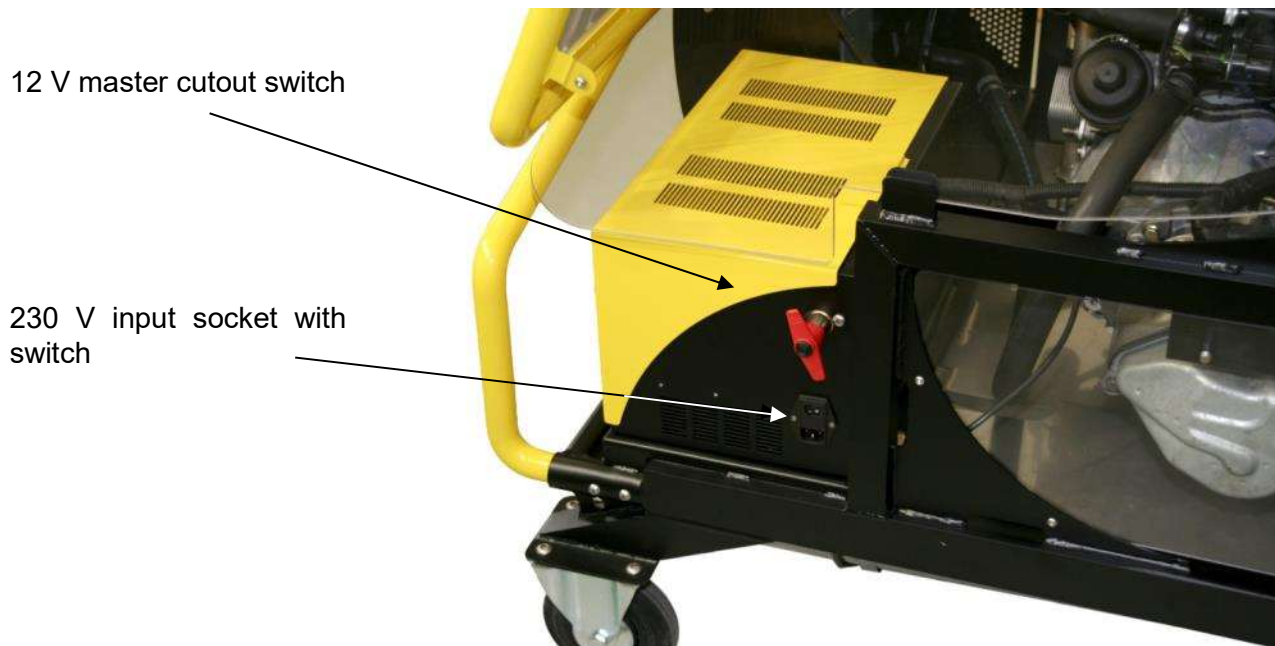
Transporting the engine rig

The model must be switched off and disconnected before transport. Ensure that nothing is left on the shelves.

Only the trainer shall move the engine rig in the workshop.

1.2 Electrical part (230 V/12 V)

Photo of the 230 V power supply part of the engine rig



If you need to change the battery, replace it with an equivalent maintenance-free battery in terms of size, power, etc. Dispose of the old battery by recycling it in compliance with the requirements applicable in your region.

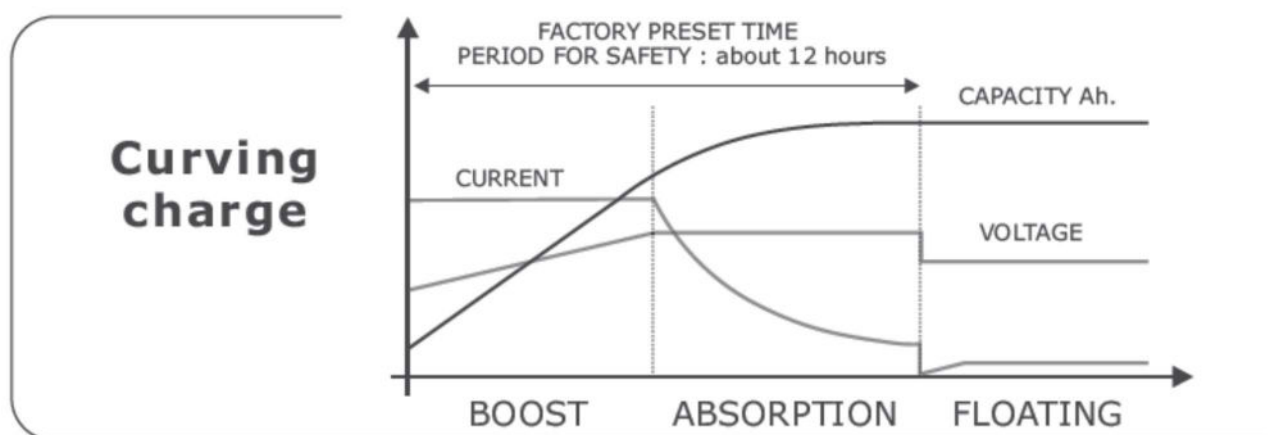
1.7.3. Battery charger technical characteristics

230 V/12 V battery charger integrated into the battery compartment of the engine rig.

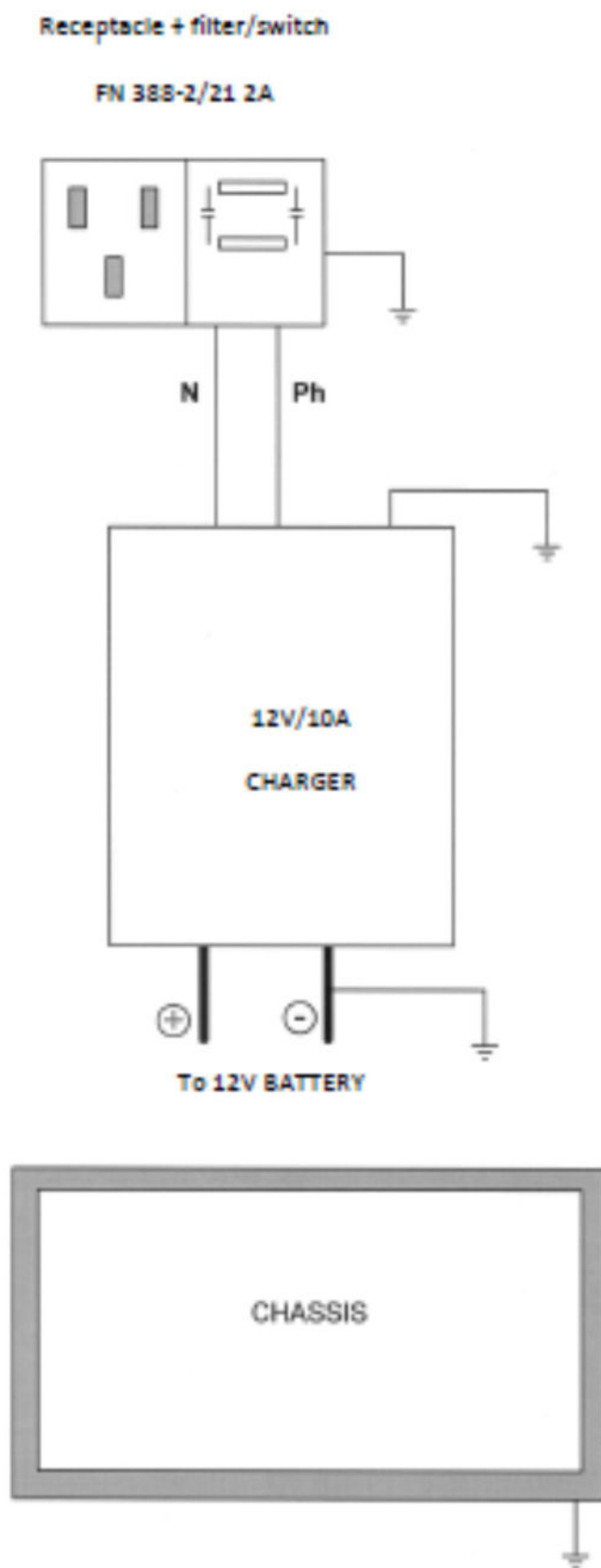


- The charger is fully automatic and constantly monitors the battery's state of charge.
- The time taken to complete each charging phase depends on many parameters (nominal power of the charger, level of discharge, age of the battery, ambient temperature, etc.).
- It is strongly recommended to keep the charger permanently connected to the battery.

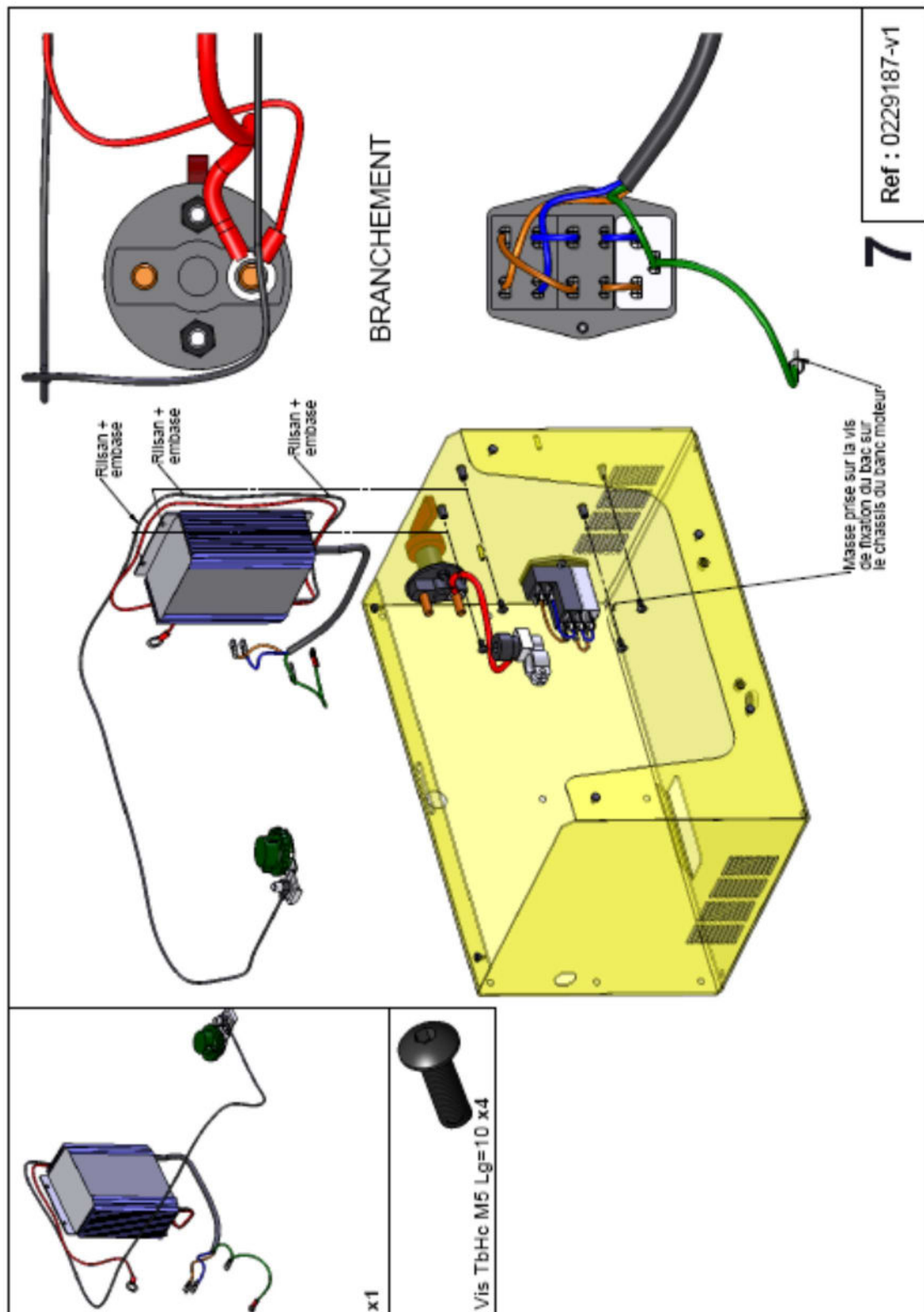
- Extruded aluminium casing, anodised for corrosion resistance. The aluminium end plates are coated with epoxy paint.
- Mains input voltage: 230 V $-15\%/+10\%$
- Frequency: 50–60 Hz
- Output voltage:
 - U bat $\pm 2\%$
 - 1 or 2 independent outputs (depending on model)
- Output current: I bat $\pm 10\%$
- Charging curve: 2, selectable via an external switch (open lead acid, sealed/AGM/gel)
- Working temperature: -20°C to 50°C
- Ventilation:
 - Natural (no fan). Full power available from -20°C to $+25^{\circ}\text{C}$, then auto-regulated (no cutout).
- Electronic protection against:
 - Transient output short-circuits
 - Discharge of the battery back to the charger
 - Mains surges
- Fuse protection:
 - Internal: mains input overload
 - External: reverse polarity (resettable fuse)
- Storage temperature: -25°C to $+70^{\circ}\text{C}$
- Relative humidity: 90%
- Protection rating: IP 54
- Dimensions: 150 x 110 x 55 mm
- Weight: 0.85 kg
- Ventilation:
 - Natural (no fan)
- Full power available from -20°C to $+25^{\circ}\text{C}$, then auto-regulated (no cutout).
- Electronic protection against:
 - Transient output short-circuits
 - Discharge of the battery back to the charger
 - Mains surges
- Fuse protection:
 - Internal: mains input overload
 - External: reverse polarity (resettable fuse)



1.7.4. Electrical diagram of 230 V part

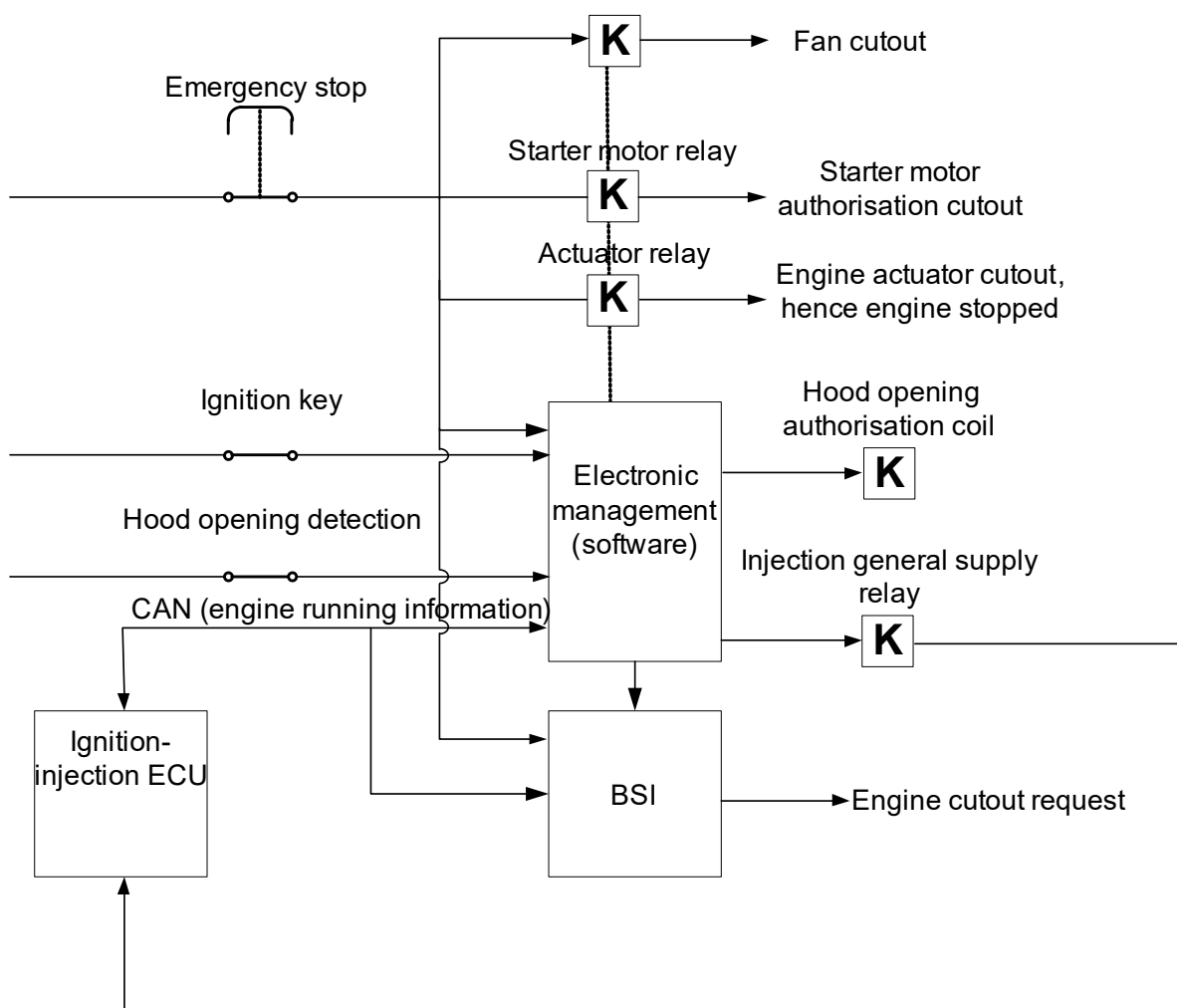


1.7.5. Wiring diagram of 230 V part



1.3 Emergency stop

The emergency stop button cuts out the engine actuator circuit, the fan, starter motor authorisation and the injection supply relay, and transmits an engine cutout request to the BSI (see diagram below).



1.4 Engine rig



PSA petrol engine TU5JP4: capacity 1600 cm³, Bosch ME 7.4.5 indirect injection.

1.7.6. Fuel supply

Fuel is supplied by the vehicle's in-tank pump and gauge system.
Level indication on the instrument panel.
Filler cap with anti-siphon system.
Filling operation described in the instruction manual.



1.7.7. Electrical system

All wiring harnesses comply with carmakers' requirements.

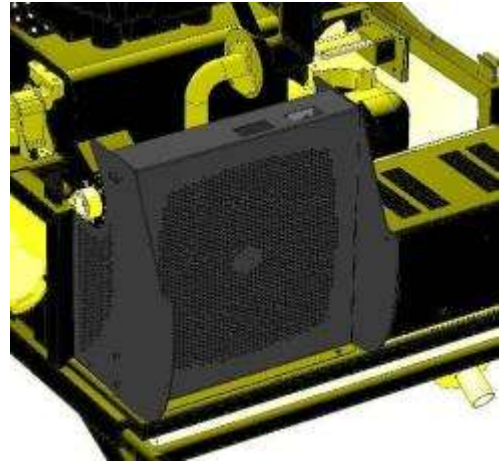


The electrical supply is placed in an enclosed housing at the front of the chassis. It contains:

- The vehicle battery
- A battery cutout switch
- An automatic battery charger
- The 230 V socket for the charger power supply

1.7.8. Cooling

The cooling system, mounted at the front of the rig, is identical to the vehicle's. It comprises a radiator, motor-driven fan, various hoses and an expansion tank.



1.7.9. Parking brake



There is just one, on the right-hand rear wheel. It must be applied when the engine rig is in use or in storage.

1.7.10. Safety

The chassis-mounted training engine is a vehicle component taken out of its environment. It is considered as a machine.

EXXOTEST therefore protects the moving parts and hot parts (over 55°C) in compliance with the "Machinery Directive".

The transparent hood covers the entire engine. It is hinged and held by gas struts.

The closed position ensures maximum safety while the engine is running by ensuring full visibility.

The open position offers broad access to the engine to facilitate the various operations.

The hood has an electric lock that is actuated from the control panel.

The electrical supply system is protected by a removable hood.

A drip tray is provided in case of leaks or operator error.

The engine has an emergency stop button in case of incident.

1.7.11. Lock



Secure door lock with electric opening and manual closing system.

Release procedure

Turn the ignition key to the hood opening mode, then press the button with the red LED for two seconds. The LED goes out. Stand in front of the hood, press down and guide it as it opens.



Important: The opening of this electric lock is actuated from the control panel. If the engine is hot ($>90^{\circ}\text{C}$), a timer will not allow the hood to be opened until the engine coolant temperature has fallen below 90°C .



1.7.12. Chassis

The light, robust chassis, designed by EXXOTEST, is made from high-strength tubular steel coated with epoxy paint. The assembly is mounted on 160 mm dia. casters (two fixed and two directional with brakes) for easy movement.

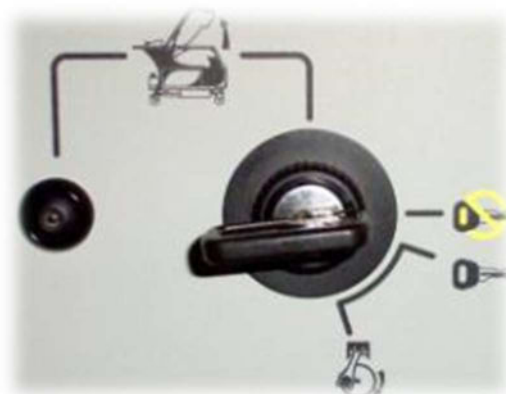


Solidworks® design

1.7.13. Control panel

Key switch

With 0, Ignition, Start and Hood opening positions.



Accelerator lever

Analog instrument cluster with tachometer, coolant temperature, fuel gauge, indicators and time/date display.

16-pin diagnostic connector for a diagnostics tool.

High-resolution screen for displaying engine information from the CAN and optional sensors.



1.5 Diagnostic procedure

As this engine is mounted in PSA Group vehicles, it is possible to communicate with the the injection ECU via either the Citroën or the Peugeot marque.

- For Peugeot:
The vehicle is a 207
VIN: VF3WCNFUC000000000
RPO No. 10099

- For Citroën:
The vehicle is a remodelled C3
VIN: VF7FCNFUC000000000
RPO No. 999



DECLARATION DE CONFORMITE



Manufacturer Name: **ANNECY ELECTRONIQUE SAS**
Street: **1, rue Callisto - Parc Altaïs**
Town: **74650 CHAVANOD**
Country: **FRANCE**

represented by the signatory below, declares that the following product:

| Product reference | Description | Make |
|-------------------|----------------------|----------|
| MT-MOTEUR-E-BSI | Petrol Engine TU5JP4 | EXXOTEST |

complies with all requirements of European directives relating to the design of Electrical & Electronic Equipment (EEE) and the management of Waste Electrical & Electronic Equipment (WEEE) in the EU:

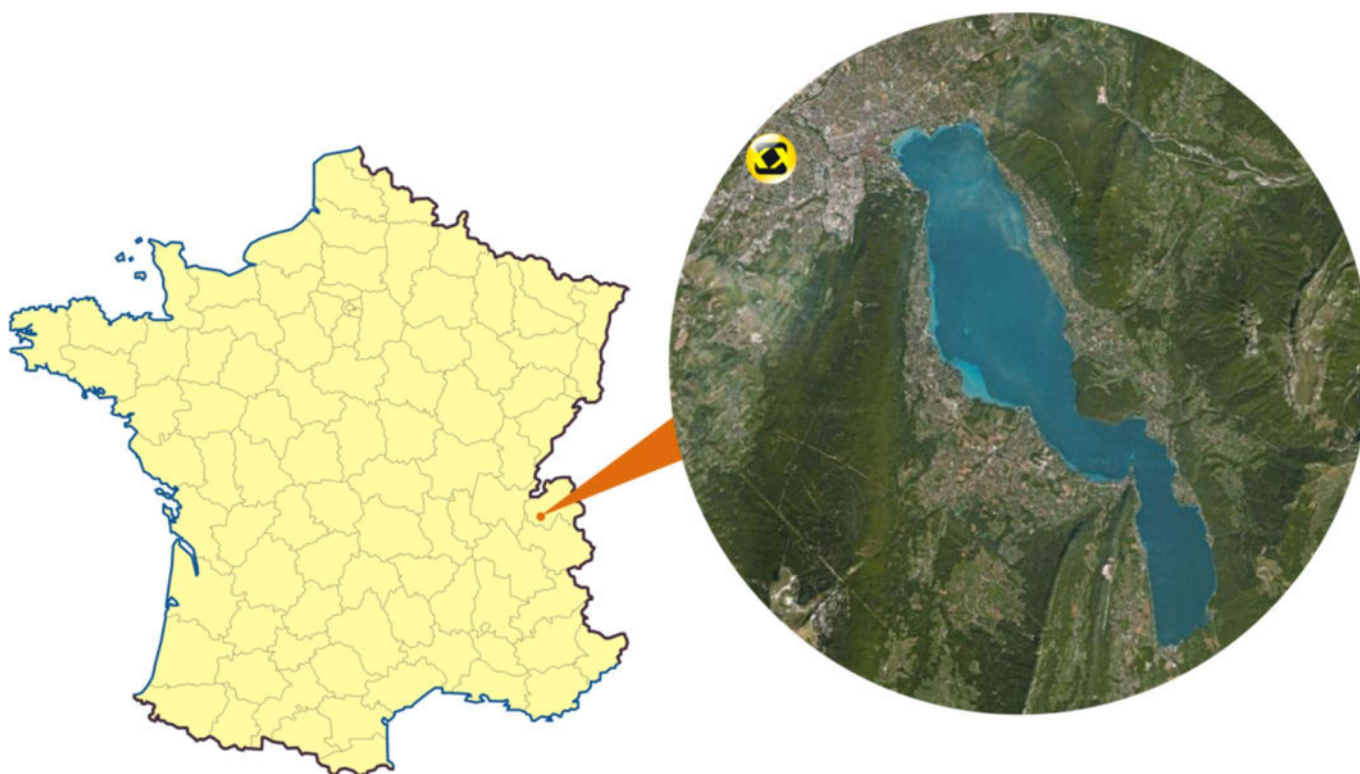
- Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE)
- Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (ROHS)
- Electromagnetic Compatibility Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004.

The product has been manufactured in accordance with the requirements of European directive:

- Directive 2006/95/EC of the European Parliament and of the Council of 12 December 2006 on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.

Signed in Chavanod on 06/07/2015

Stéphane Sorlin, Chairman



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Original Instructions

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ANNECY ELECTRONIQUE, Designer and Manufacturer of Exxotest and Navylec equipment.

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