



## CAR-SAFETY SWITCH series 198/C

This switch is supplied in two versions: Injection/Thermotronic for injection and/or catalytic vehicles and Car-Safety for cars with carburettor. The switch control unit is built with SMD technology, it has a microprocessor, and it is fitted in a small-sized box which is smart and easy to install under the car's dashboard, using the provided screws, in a position where the driver can see it easily. The wiring connector has separate mechanical and electrical fastenings and is polarised, as required by the regulations in force. The M. 198 series is an intelligent step forward in the use of electronics for gas, thanks to the innovative solutions introduced, especially in acquiring the engine/r.p.m. for switching, in acquiring the working parameters and in the touch key. Its main features are versatility and simplicity. The product was conceived for use with LOVATO catalytic systems in the LOV U and LOV U ECO series. If used with these products, always refer to the specific wiring diagrams for individual cars.

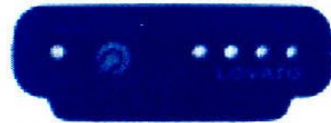
### FUNCTIONS OF THE CAR-SAFETY SWITCH

The 198C car-safety switch has the following functions:

#### a) Forced GAS operation

This is the recommended condition of use for gas vehicles.

The status LED is **green**



The switch has an automatic primer on ignition; the primer time is programmable.

If the engine stops, even with the key in, the switch sends the close signal to the solenoid valves to prevent possible gas leakage (safety-car condition) as required by current regulations.

#### b) Forced PETROL operation

To run the car regularly on petrol, proceed as follows:

if the status LED is **Green** press the key once to pass to the **filling** status.

During the filling stage, the status LED blinks, turning **red** and **green** alternately.

Wait until the end of the filling stage and press the key once again to pass to petrol.

LED DI STATO

TASTO



The status LED turns to **red**, indicating petrol operation.

In this condition, the gas solenoid valves are closed. The car runs on petrol as if there were no gas system.

### c) Switching from PETROL TO GAS

To pass from petrol to gas, proceed as follows:

press the key once to pass to the **emptying** status. In this condition, the status LED is off. Wait until the emptying stage is finished and press the key once again to pass to gas. In this condition the status LED is **green**.

### d) Level indicator

The M. 198 switch is designed with a level indicator function. There is a bar with four LEDs on the front of the switch. To indicate the Reserve, the 1<sup>st</sup> LED passes from **Green** to **Red**.

Its operation is obtained by connecting the following sensors to the control unit:

- 526016 LPG level indicator sensor (cylindrical tanks)
- 526011 LPG Reserve indicator sensor
- 526020 LPG level indicator sensor (toroidal tanks)
- 526013 CNG Reserve sensor
- 526014 CNG indicator sensor

If the LPG or CNG sensors are connected, the indication is obtained as follows: with gas in the tank, all the four LEDs are green; when the reserve is reached, the first LED turns to Red and the others go off.

## SETTING

The 198C switch is supplied by LOVATO pre-set with a primer time of 4 seconds.

### SETTING THE PRIMER TIME

In order to change the primer time, proceed as follows:

- C.1) Turn the key without starting the car and wait at least 5 seconds
- C.2) Turn off the key
- C.3) Turn on the key while keeping the button pressed
- C.4) Release the button. A sliding-scale LED on the level indicator allows one of the following primer times to be memorised:
  - 0 sec (led R)
  - 2 sec (led '1/4')
  - 4 sec (led '2/4')
  - 6 sec (led '3/4')
  - 8 sec (led '4/4')
- C.5) Press the button in correspondence with the LED which fixes and sets the desired time (when you press the key, the LED R goes on, indicating that memorisation has taken place).

### RESETTING THE PARAMETERS

If you want to re-initialise the control unit parameters, from any situation, and to



return it to the LOVATO default values, proceed as follows:

- R.1) turn the key without starting the car
- R.2) wait at least 5 seconds
- R.3) turn off the key
- R.4) turn the key without starting the car
- R.5) wait at least 5 seconds
- R.6) turn off the key
- R.7) turn the key (without starting the car) while keeping the button pressed
- R.8) the green status LED will come on blinking
- R.9) after 5 seconds, the status LED will come on passing from green to red in sequence; release the key.
- R.10) turn off the key

The switch control unit returns to the original parameters.

**ATTENTION:** we recommend connecting the Red wire to position 15 of the ignition block (prevent positive timed signals) and the Brown wire to the battery earth.

**ATTENTION:** TRAVELLING ON GAS WITH THE PETROL TANK EMPTY IS NOT RECOMMENDED. You must prevent the Petrol pump from running dry. It is therefore recommended that you keep the petrol tank at least one quarter full.

## INJECTION/THERMOTRONIC SWITCH series 198/i

This switch is supplied in two versions: Injection/Thermotronic for injection and/or catalytic vehicles and Car-Safety for cars with carburettor. The switch control unit is built with SMD technology, it has a microprocessor, and it is fitted in a small-sized box which is smart and easy to install under the car's dashboard, using the provided screws, in a position where the driver can see it easily. The wiring connector has separate mechanical and electrical fastenings and is polarised, as required by the regulations in force. The M. 198 series is an intelligent step forward in the use of electronics for gas, thanks to the innovative solutions introduced, especially in acquiring the engine/r.p.m. for switching, in acquiring the working parameters and in the touch key. Its main features are versatility and simplicity. The product was conceived for use with LOVATO catalytic systems in the LOV U and LOV U of use ECO series. If used with these products, always refer to the specific wiring plans for individual cars.

### FUNCTIONS OF THE INJECTION/THERMOTRONIC SWITCH

The 198i Injection/Thermotronic switch has the following functions:

#### a) Operation with automatic Petrol/Gas switching

This is the recommended condition for use with a gas vehicle.

If the NTC (Numerical Temperature Control) is present and the temperature is too low to permit switching:

The status LED is **red**



If NTC is not present or if the switching temperature has already been reached but the engine/r.p.m. is lower than the switching threshold, then:

The status LED is **orange**



If the switching conditions are met (regulator temperature, if the NTC is present or engine/r.p.m. set) then:

The status LED is **orange blinking**



When the switching conditions are met and deceleration occurs, the switch switches over from petrol to gas.

The status LED is **green**



If the engine stops, even with the key in, the switch will close the solenoid valves to prevent possible gas leakage (safety-car condition) as required by current regulations.



## b) Forced PETROL operation

To run the car regularly on petrol, proceed as follows:



If the status LED is **Orange** press the key once.

If the status LED is **Green** press the key once.

The status LED turns **red**, indicating petrol fuel feeding.

In this condition, the gas solenoid valves are closed. The car runs on petrol as if there were no gas system.

## c) Forced GAS operation

This function is obtained by turning the key while keeping the button pressed.

The status LED blinks **red and green** alternately.

This function should be considered an emergency solution, only to be used in the case of starting failure or malfunction of the petrol supply system.

## d) Level indicator

The M. 198 switch shows the level indicator function. There is a bar with four LEDs on the front of the switch. To indicate the Reserve, the 1<sup>st</sup> LED passes from **Green** to **Red**.



Its operation is obtained by connecting the following sensors to the control unit:

- 526016 LPG level indicator sensor (cylindrical tanks)
- 526011 LPG Reserve indicator sensor
- 526020 LPG level indicator sensor (toroidal tanks)
- 526013 Methane Reserve sensor
- 526014 Methane indicator sensor

If the LPG or Methane sensors are connected, the indication is obtained as follows: with gas in the tank, all the four LEDs are green; when the reserve is reached, the first LED turns to Red and the others go off.

Note: if a LOVATO sensor is not installed, you can connect the Green wire to a +12V voltage to stop the indicator LEDs going on. If you are using non-LOVATO level sensors, various adapters are available.

## SETTING

To simplify installation, the 198I switch is supplied by LOVATO set up for self-learning the r.p.m. threshold for switching over from petrol to gas.

## **SETTING THE SWITCHING THRESHOLD THE FIRST TIME**

Having completed the electrical system and connected the switch as in the plan, start the engine and reach the r.p.m. desired for switching (we recommend about 2,500 r.p.m.).

- A.1) Check that the status LED is orange; if the NTC is connected wait until the status LED turns orange.
- A.2) Take the engine to the rev speed desired for switching over and wait for at least 5 seconds.
- A.3) After 5 seconds, increase the engine rev speed and check if the LED is orange and blinking. Then decelerate to check the switchover.

If the orange LED does not blink, repeat the procedure from A.2. The switch has already been programmed and is operative.

**ATTENTION: IF YOU START THE CAR, THE SWITCH WILL AUTOMATICALLY LEARN THE REVS AFTER 5 SECONDS OF CONSTANT REV SPEED. SO DO NOT START THE CAR AFTER CONNECTING THE SWITCH FOR THE FIRST TIME WITHOUT SETTING THE REVS.**

## **MANUAL SETTING OF THE SWITCHOVER THRESHOLD**

Every time you want to change or set the engine revs, proceed as follows:

- M.1) Turn the key without starting the car and wait at least 5 seconds
- M.2) Turn off the key
- M.3) Turn the key and start the car while keeping the button pressed (status LED red and blinking)
- M.4) Release the button and take the rev speed to the number of revs you want to set the switchover threshold at (we recommend about 2500 r.p.m.).
- M.5) Press the button to memorise the desired switchover threshold (you can press the button repeatedly to change the switchover threshold).
- M.6) Release the button to check the set threshold by varying the engine rotation speed:
  - status LED orange, switchover not permitted
  - status LED orange and blinking, switchover permitted

## **RESETTING THE PARAMETERS**

If for any reason, you want to re-initialise the control unit parameters, returning it to the LOVATO default values, proceed as follows to reset:

- R.1) turn the key without starting the car
- R.2) wait at least 5 seconds



- R.3) turn off the key
- R.4) turn the key without starting the car
- R.5) wait at least 5 seconds
- R.6) turn off the key
- R.7) turn the key (without starting the car) while keeping the button pressed
- R.8) the green status LED will come on blinking
- R.9) after 5 seconds, the status LED will come on passing from green to red in sequence; release the button.
- R.10) turn off the key

At this point, the switch control unit returns to the original parameters.

**ATTENTION:** If the NTC sensor, code 421517, is not used, connect the Grey wire to Earth.

The Black wire (engine/r.p.m. signal) can be connected:

1. To the negative of the ignition coil
2. To the square wave signals found between the control unit, the diagnostics sockets and the rev-counter.

We recommend connecting the Red wire to position 15 of the ignition block (prevent positive timed signals) and the Brown wire to the battery earth.

**ATTENTION:** TRAVELLING ON GAS WITH THE PETROL TANK EMPTY IS NOT RECOMMENDED. You must prevent the Petrol pump from running dry. It is therefore recommended that you keep the petrol tank at least one quarter full.

