

Common Rail Injector Tester CRIT100

Operating manual





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Introduction

The Common Rail Injector Tester CRIT100 provides the right driving signals and parameters needed for proper assessment of the following injector parameters: delivery, back leak, injection quality, spray pattern, chattering, pre-injection and etc. Respectively if a proper operating injector is used, condition of the high pressure pump and the high pressure sensor can be assessed.

It's used in specialized diesel automotive repair shops for testing the injectors work and assessing their reliability. It provides the proper driving signals to the injectors according to the injector test plans.

Common Rail Injector Tester CRIT100 is used in combination with the Common Rail Pump Driver CRPD200.



The Common Rail Injector Tester CRIT100 has a high voltage driver for solenoid injectors – about 70V, and up to 160V for Piezo injectors. Attention is needed when operating solenoid injectors and especially with the Piezo injectors!

Technical specifications

Number of simultaneously connected injectors	1
High voltage drive for initial opening of Bosch and Denso solenoid injectors	70V
Low voltage drive for Delphi solenoid injectors	12V
High voltage drive for Bosch and Siemens piezo injectors	Up to 160V
Pulse width	160µS ÷ 2000µS with 50µS steps
Test duration (number of pulses, stroke)	200 ÷ 4800 and infinite
Injector drive frequency	3.33Hz ÷ 40Hz (default is 16.6Hz)
Power supply	220 ÷ 240V 50/60Hz from mains
Maximum solenoid injectors drive current	30A
Maximum piezo injectors drive current	15A
Resistance measurement	0.05ohms ÷ 10ohms
Inductance measurement	10µH ÷ 10mH
Indication	LEDs indicate the entered mode
Display	Large 20x4 LCD display
Dimensions	230mm x 205mm x 80mm
Weight	2.5 kg



Typical applications

- **It drives all Bosch, Denso, Delphi solenoid injectors, as well as the piezoelectric types (Bosch and Siemens).**
 - Initial high voltage drive for Bosch and Denso solenoid injectors.
 - Low voltage drive for Delphi solenoid injectors.
 - High voltage drive for Bosch and Siemens piezo injectors.
- **It has the needed settings for injector opening according to the injector test plans.**

Allows setting of the following injector driving parameters:

 - Pulse width
 - Drive frequency
 - Test duration (number of pulses, stroke and rpm)
- **Can generate a single pulse with a pre-defined pulse width.**
- **Can measure the active resistance of all solenoid Common Rail injectors and valves.**

Measuring range is 0.05ohms÷10ohms.
- **Can measure the inductance of all solenoid Common Rail injectors and valves.**

Measuring range is 10µH÷10mH.

Common Rail Injector Tester CRIT100

Device appearance and controls



Operation of the Common Rail Injector Tester CRIT100

Common Rail Injector Tester CRIT100 has 6 push buttons, 7 LEDs and 3 connectors on the front panel.

LEDs

- **Power** LED indicates that device is powered on and ready for operation.
- **Failure** LED indicates that a failures has occurred due to overcurrent, output short circuit, wrong or damaged injector connected and etc.
- **Bosch/Denso** LED indicates that **Bosch/Denso coil** mode has been entered.
- **Delphi** LED indicates that **Delphi coil** mode has been entered.
- **Piezo** LED indicates that **Bosch/Siemens piezo** mode has been entered.



- **Start/Stop** LED flashes with the injector frequency when a test has been started.
- **Measure** LED indicates that **CR injector R meter** or **CR injector L meter** modes are entered.

Buttons

Changing the operating mode and starting a measurement, as well as the change in the parameters of generated signal, is made by means of 6 push buttons – **Up**, **Down**, **Esc**, **Enter**, **Start/Stop** and **Measure**.

- Use **Up** and **Down** buttons to select operating mode and to change the value of the parameter already chosen.
- Use the **Enter** button to enter a submenu or to confirm the choice.
- Use the **Esc** button to go back into the pervious menu. If after the choice of the parameter the **Enter** button is not pushed, but only **Esc** button, the new value will be also kept.
- Use the **Start/Stop** button to start injector test when an operation mode is previously selected.
- **Measure** button is used to start a measurement of resistance or inductance and it's active only when **CR injector R meter** or **CR injector L meter** modes are selected.

Connectors

There are 3 connectors on the front panel:

- 2 pin connector for Bosch, Denso and Delphi solenoid injectors
- 2 pin connector for Bosch and Siemens piezo injectors
- 3 pin connector for measuring resistance and inductance of solenoid injectors and valves.

As soon as the power supply of the Common Rail Injector Tester CRIT100 is switched off, all the settings, previously done are lost. There is no possibility to remember the settings. At the next turn on of the device, the default settings are loaded.

Working modes

```
>Bosch/Denso coil  
Delphi coil  
Bosch/Siemens piezo  
Special function
```

Fig.1 Main menu

1. Bosch/Denso coil

Pulse width	160uS ~ 2000uS (with 50uS steps)
Cycle (strok)	1 ~ 4800 and infinite
RPM (IPM)	100 ~ 2400 (3.33Hz ~ 40Hz)

```
BOSCH/DENSO COIL  
>Pulse width=800uS  
Cycle(strok)=1000  
RPM(IPM)=1000
```

Fig.2 Mode Bosch/Denso coil – Pulse width adjustment

```
BOSCH/DENSO COIL  
Pulse width=800uS  
>Cycle(strok)=1000  
RPM(IPM)=1000
```

Fig.3 Mode Bosch/Denso coil – Cycle (strok) adjustment

```
BOSCH/DENSO COIL  
Pulse width=800uS  
Cycle(strok)=1000  
>RPM(IPM)=1000
```

Fig.4 Mode Bosch/Denso coil – RPM (IPM) adjustment

2. Delphi coil

Pulse width	160uS ~ 2000uS (with 50uS steps)
Cycle (strok)	1 ~ 4800 and infinite
RPM (IPM)	100 ~ 2400 (3.33Hz ~ 40Hz)



Fig.5 Mode Bosch/Denso coil – Pulse width adjustment



Fig.6 Mode Bosch/Denso coil – Cycle (strok) adjustment



Fig.7 Mode Bosch/Denso coil – RPM (IPM) adjustment

3. Bosch/Siemens piezo

Pulse width	160uS ~ 2000uS (with 50uS steps)
Cycle (strok)	1 ~ 4800 and infinite
RPM (IPM)	100 ~ 2400 (3.33Hz ~ 40Hz)

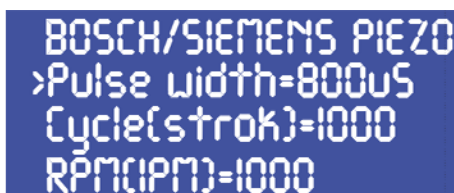




Fig.8 Mode Bosch/Denso coil – Pulse width adjustment

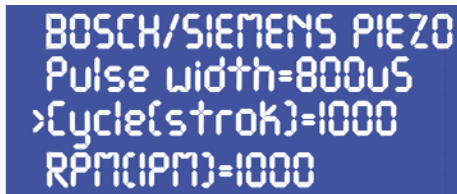


Fig.9 Mode Bosch/Denso coil – Cycle (strok) adjustment

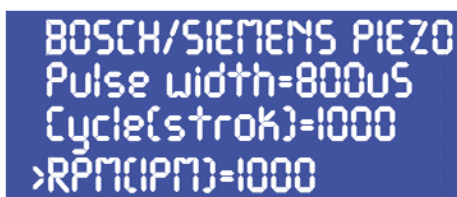


Fig.10 Mode Bosch/Denso coil – RPM (IPM) adjustment

4. Special function



Fig.11 Mode Special function – main screen

- **CR injector R meter**

Measuring range

0.05 ohms ~ 10 ohms

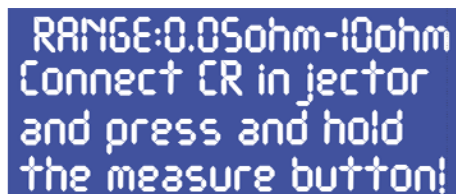


Fig.12 Mode CR injector R meter – main screen

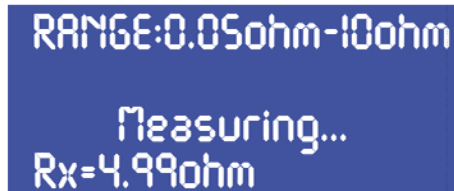


Fig.13 Mode CR injector R meter – measurement in progress



Fig.14 Mode CR injector R meter – Rx exceeds the measurement range

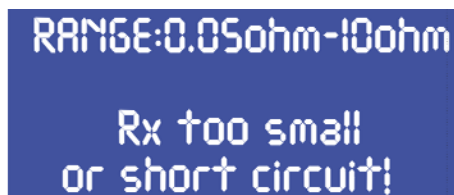


Fig.15 Mode CR injector R meter – Rx less than the measurement range

- **CR injector L meter**

Measuring range

10uH ~ 10mH

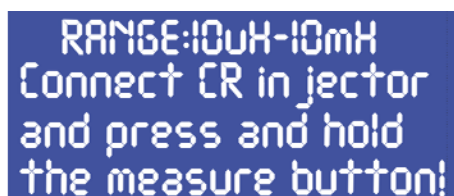


Fig.16 Mode CR injector L meter – main screen

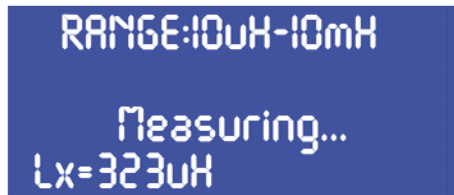


Fig.17 Mode CR injector L meter – measurement in progress

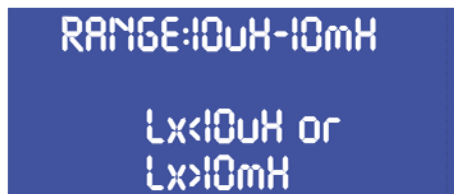


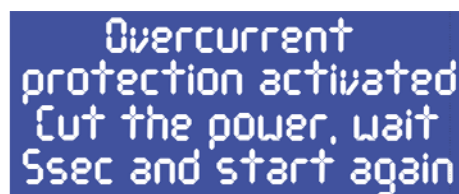
Fig.18 Mode CR injector L meter – Lx out of measurement range

Device protection

Device has an internal protection against the following events:

- Injector outputs short circuit protection.
- Overcurrent protection for solenoid injectors: over 35A
- Overcurrent protection for piezo injectors: over 15A
- Connection of piezo injector to the solenoid injector output.
- Connection of solenoid injector to the piezo injector output.

If any of the above events occur, **Failure** LED will light and the following message will appear on the LCD screen. In order to continue operation, device must be restarted by switching off for at least 5 seconds.

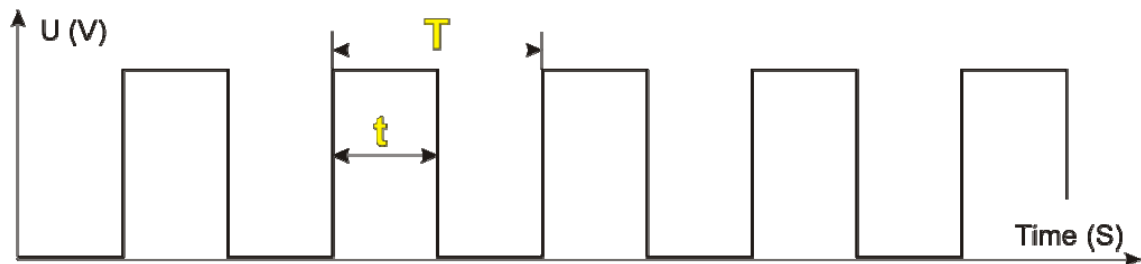


NOTE: If after switching on, **Failure** LED lights and the LCD message appears again, any of the above mentioned events still persist!

Definition of terms

Pulse width

Pulse width specifies the duration of the injector output pulse. This duration is marked with **t** on the picture below.

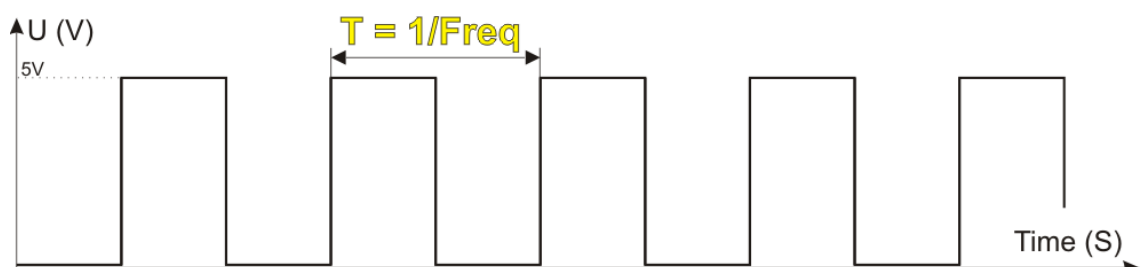


Cycle (strok)

This parameter defines the number of pulses of the injector or in other words – duration of the injector test. It depends on the injector frequency, explained below. So if Cycle (strok) = 1000 and RPM (IPM) = 1000, duration of the injector test will be: $\text{Duration} = \text{Cycle (strok)} / f = 1000 / 16,66 = 60$ seconds.

RPM (IPM) (injector frequency)

Frequency is a measurement of the numbers of repetition of electrical signal period for 1 sec. Usually the frequency is marked with **F** as the measurement unit is Hertz (Hz). Frequency of 1 Hz means, that the event occurs once per second.





Interval of time in which some event repeats is called period. In the SI system the period is marked with T and it is measured in seconds [s]. The period T is inversely proportional to the frequency and the formula for calculation is $T = 1 / f$.

In the particular case as an injector tester, this parameter is called RPM (revolutions per minute) or IPM (impulses per minute). So if on the screen RPM (IPM) = 1000, it means $f = \text{RPM (IPM)} / 60 = 1000 / 60 = 16,66\text{Hz}$. Number 60 means 1 minute which has 60 seconds.

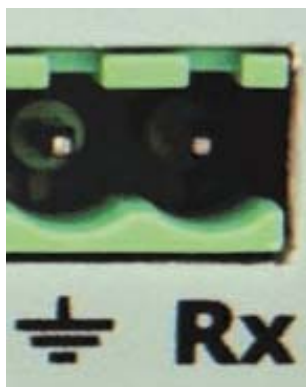
How to start an injector test?

- Identify the type (solenoid or piezo) and brand of the injector (Bosch, Denso, Delphi or Siemens).
- Connect the injector to the correct test connector of the device.
- Switch on the Common Rail Injector Tester CRIT100.
- Choose the injector type from the menu.
- Select the desired* **Pulse width** by pressing the **Enter** button and change value with **Up** and **Down** buttons. Confirm choice with **Enter** or **Esc** button.
- Select the desired* **Cycle (strok)** parameter value by pressing the **Enter** button and change value with **Up** and **Down** buttons. Confirm choice with **Enter** or **Esc** button.
- Select the desired* **RPM (IPM)** parameter value by pressing the **Enter** button and change value with **Up** and **Down** buttons. Confirm choice with **Enter** or **Esc** button.
- Press the **Start/Stop** button to start the injector test. Test will stop after a timeout which depends on the **Cycle (strok)** and **RPM (IPM)** values.

*Parameter value is chosen according to the current injector test data plan. Injector test data plan (injector test plan or injector calibration data) are list of test parameters unique for each injector.

How to measure injector resistance?

- Identify the type (solenoid or piezo) and brand of the injector (Bosch, Denso, Delphi or Siemens). Do not connect piezo injectors to the 3 pin measurement connector!!!
- Connect the injector between the right pin and the centre pin of the 3 pin measurement connector of the device. See the picture below:



- Switch on the Common Rail Injector Tester CRIT100.
- Choose the **Special function** menu and then the **CR injector R meter** menu.
- Press the **Measure** button and hold it to see the measured resistance value.



Do not connect piezo injectors to the 3 pin measurement connector!!! If the piezo injector is charged, it can damage the internal circuitry!!!

How to measure injector inductance?

- Identify the type (solenoid or piezo) and brand of the injector (Bosch, Denso, Delphi or Siemens). Do not connect piezo injectors to the 3 pin measurement connector!!!
- Connect the injector between the left pin and the centre pin of the 3 pin measurement connector of the device. See the picture below:



- Switch on the Common Rail Injector Tester CRIT100.
- Choose the **Special function** menu and then the **CR injector L meter** menu.
- Press the **Measure** button and hold it to see the measured inductance value.



Do not connect piezo injectors to the 3 pin measurement connector!!! If the piezo injector is charged, it can damage the internal circuitry!!!



Standard package list:

- Common Rail Injector Tester CRIT100 – main unit;
- 2 female 2 PIN injector connectors;
- 1 female 3 PIN connector for resistance and inductance measurement;
- Various injector test plans;
- Power supply cable.