

---

---

**Common Rail Fuel System Controller**  
**“CR Tester.PR V 5”**

**OS.016.001**

*Passport.*  
*Technical description.*  
*User's manual.*  
*Warranty card.*

2019

## Content

Content .....	3
Introduction .....	4
1. General information .....	4
2. Purpose .....	4
3. The main technical data and specification .....	4
4. The design of device .....	5
5. Instructions of use .....	6
6. Disclaimer.....	7
7. Preparation for work.....	7
8. Operating the device.....	7
9. Set for delivery.....	17
10. Warranty .....	18
Appendix №1.....	19
Appendix №2.....	20
Appendix №3.....	21
Appendix №4.....	22
For notes .....	23
Appendix №5.....	26



## Introduction

This passport is a document certifying the main parameters and technical characteristics of the CR Tester.PR device OS.016.002 guaranteed by the manufacturer for testing and checking the performance of diesel Common Rail injectors. This passport allows you to familiarize yourself with the device, the procedure and rules of its operation, compliance with which will ensure the correct operation of the device.

### 1. General information

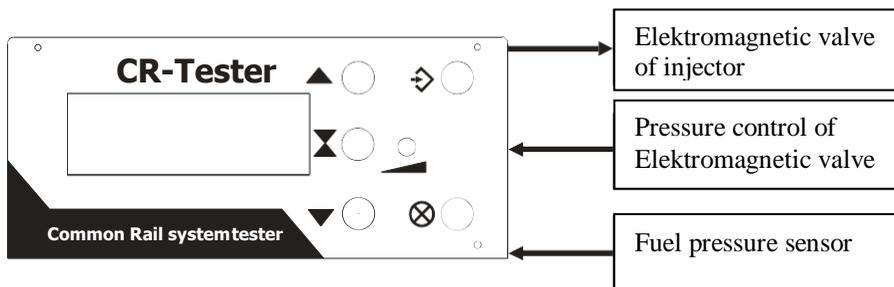


Figure 1. The block diagram of the system

### 2. Purpose

The device "CR Tester.PR" is intended to supply Common Rail system fuel injection injectors control signals programmed by the user to check their performance (shape and intensity of spraying, volumetric productivity).

### 3. The main technical data and specifications

- Power supply:  $\sim 220\text{ V} \pm 15\%$ ;
- Switching load at the output: up to 250 W;
- \* Pressure adjustment range - 100-max kgf / cm<sup>2</sup>;
- \* Pressure setting step - 10 kgf / cm<sup>2</sup>
- Mass of the device: 8 kg;
- Dimensions (length x width x height) - 300x230x150;
- Power consumption - up to 300 watts.



#### 4. The design of device

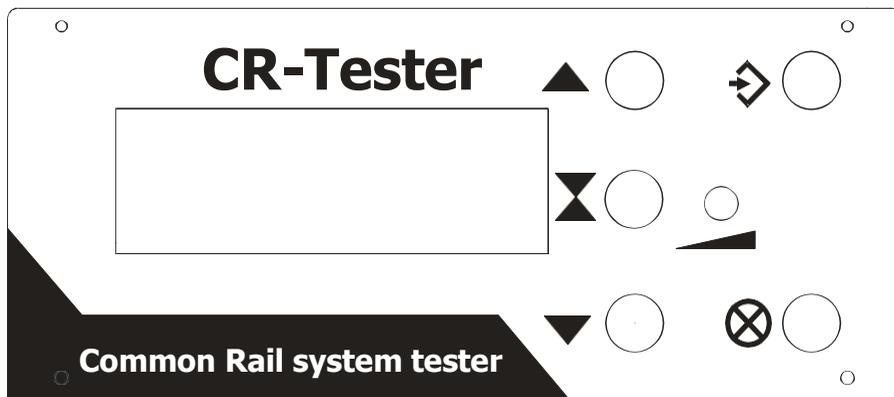


Figure 2. Front Panel

The device "CR Tester.PR" is structurally made in the form of an attachment that is connected to the injectors, the sensor and the rail pressure regulator with the help of special adapter cables.

The front panel of the device contains: a liquid crystal indicator, control buttons, a multi-turn switch (Figure 2).

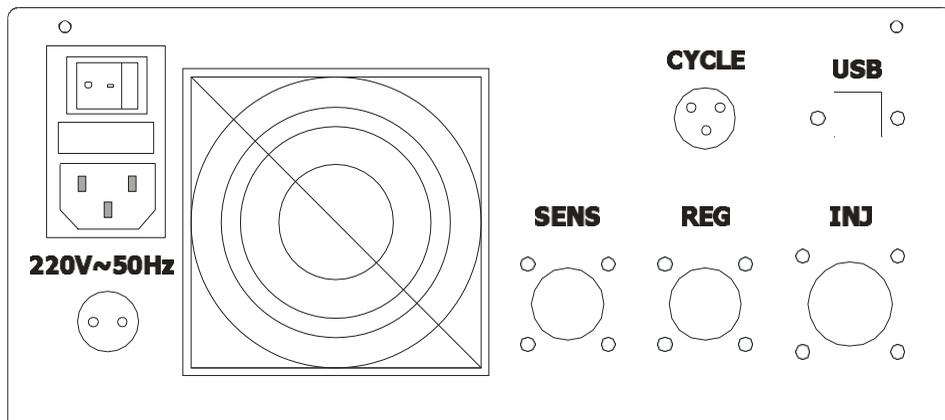


Figure 3. Back Panel

On the back of the device are the connectors:

- "USB" for connection to a personal computer;
- "SENS" for connecting a pressure sensor;
- "REG" for connecting pressure regulators;
- "CYCLE" for connection to the relay;
- "PROT" for connection of safety limit switches;
- "INJ", for connecting an adapter cable connecting the device to the

## *CR Tester.PR - Passport. Technical description.*

injectors;

- "NETWORK" to connect the power supply ~ 220 V. Connector "NETWORK" structurally designed in one case with a fuse and a power button (Fig 3).

### **5. Instructions of use**

Environmental requirements:

- Working temperature: +5 °C to +40 °C
- Temperature during transportation: -20 °C to +60 °C
- Relative humidity (non-condensing): working 8% - 80%, storage 5% - 95%.
- Air dustiness: no more than 75 µg / m<sup>3</sup>

Before switching on the device, it is necessary to check visually or with the help of instruments, the condition of the adapter connectors, and the power cable 220 volts.

If the device is moved from a cold to a warm room, it is strictly prohibited to turn it on within 1-1.5 hours.

After switching on, allow the device to work for 2-4 minutes, then proceed to work.

**It is strictly forbidden:**

- **turn on the device with defective power cables;**
- **connect and disconnect the adapter connectors from the injectors, sensor or pressure regulator when the device is turned on.**
- **connect the device in a network that does not have a ground loop;**
- **connect the device to the network with a cable that does not have a grounding contact;**
- **use the CR-Tester.PR device together with electrical equipment not connected to the grounding circuit.**

**Failure to comply with the last three points may result in electric shock.**

**In addition to health hazards, the lack of grounding, in most cases, leads to failure of the pressure sensor, since the device uses a pulsed power source, according to the circuit design features of which, on the device case, without grounding, there will be a voltage equal to half the device's supply voltage and becomes 110V.**

### **6. Disclaimer**

The manufacturer is not liable to the buyer of this product or a third party for damage and loss suffered by buyers or a third party as a result of improper use of the product, including inept or erroneous actions of personnel, as well as for losses caused by the action or inaction of this device.

In no event will the Manufacturer be liable for lost profits, lost savings, losses caused by an accident, or other subsequent economic losses, even if the manufacturer has been notified of the possibility of such damages. The manufacturer is not liable for losses claimed by you on the basis of claims from a third party, or caused by failure to fulfill your obligations.

### ***CR Tester.PR - Passport. Technical description.***

The manufacturer is not responsible for any malfunctions and damages resulting from the use of additional devices recommended for use with this device, as well as its modification, repair or modification in its design, not provided for by the operating manual, incl. when using a self-made adapter connector.

## **7. Preparation for work**

Before using the CR Tester.PR device, carefully read the instruction manual.

By preparation of the device for work it is necessary to carry out the following actions:

Perform an external inspection of the device and connecting cables. External inspection of the device and connecting cables is carried out with the power off and is to identify mechanical damage to the device and connecting cables.

## **8. Operating the device**

The "CR Tester.PR" device allows to test the diesel electrically-controlled injectors of the Common Rail system, giving the user-specified necessary injector control signals and fuel pressure by controlling the control valve.

**When working with injectors, pressure control is carried out only by a regular high-pressure regulator installed on the rail or on the CP1 pump.**

**When using a CP3 pump, it is necessary to install a rail with a high pressure regulator from the CP1 system.**

**The CR Tester.PR device in automatic mode does not control the low pressure regulator of the CP3 pump.**

All control of the device is carried out using the control buttons and multi-turn switch (Figure 2).

To change the parameters, select the menu item where the required parameter is located. Selected is the menu item on which the cursor is. Move the cursor using the buttons "Down" / "Up". After selecting a menu item, click the Start button, the control program will navigate through the menu, or it will allow you to make changes to the value of the required device parameter. Change the value by turning the knob for multi-turn switch for clockwise or counterclockwise. Changing the value occurs with a certain step, which is displayed in the lower left corner of the device indicator. Changing the step is done with the buttons "Down" / "Up".

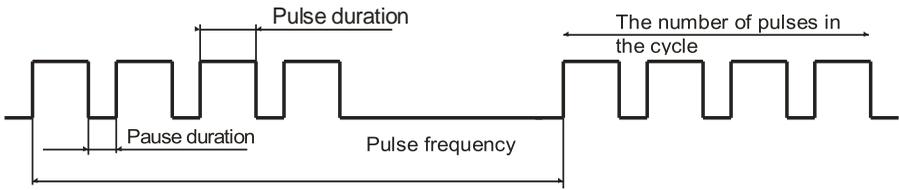
In the menu item "Injector selection" is carried out:

- choice of signal type (Bosch CR, Test CR, Denso CR, Delphi CR or Piezo);

Each injection system uses different injector control signals. The signals Bosch and Denso are structurally the same (externally similar), but since injectors have different electrical characteristics, the control program takes this difference into account when generating a signal.

The device has the ability to supply a test signal for opening the injector, which consists of pulses. The user sets the number of pulses in the parcel, the pulse duration, the duration of the pause between pulses in the parcel.

## CR Tester.PR - Passport. Technical description.



Waveform during test mode

This test signal allows you to open any electromagnetic CR injector, regardless of the injection system.

- selection of injector for which control signals will be supplied;
- hydro density test.

The test of hydro density consists of measuring the time of pressure change from one threshold to another. Two pressure thresholds are set: the upper threshold TH and the lower TL. The time for which the pressure drops from the upper to the lower threshold will be displayed on the display.

TH 350bar	390bar
TL 150bar	
00:17:376	
00:13:298	

The display shows (left to right, top to bottom):

- upper pressure threshold TH (0-max bar);
- current pressure value (0-max bar);
- lower pressure threshold TL (0-max bar);
- time of the last test;
- time of the previous test.

The test is carried out for one injector. As a pressure sensor, a standard high-pressure sensor of the Common Rail system is used. An adapter “triple” should be made (it is possible to use ready-made ones) into which a pressure sensor is screwed, an injector is connected, fuel is supplied (test liquid). As a pressure source, the use of a device for adjusting injectors is recommended (“hand pump”). At the beginning of the hydraulic density test, the pressure should be created above the upper threshold by 30-50bar. The device starts counting as soon as the pressure drops to the upper threshold, and stops when it drops to the lower.

In the menu item "Signal Parameters", the control signal parameters are set:

- frequency of pulses of opening the injector (60 - 1500 min-1);

### ***CR Tester.PR - Passport. Technical description.***

- duration of pulse opening of the injector (100 - 3000mks);

If the Delphi signal is selected, then the duration is set for each injector separately;

- initial pressure in the system (depending on the selected sensor);
- the number of injector opening cycles (1 - 5000);
- number of preparation cycles (1-5000).

If the signal type is Test CR, then the following parameters are additionally set:

- pause duration (100 - 3000 $\mu$ s);
- number of pulses per cycle (1 - 10 imp).

In the menu item "Pressure control" is carried out:

- pressure control;
- selection of pressure sensor;
- rate of change of pressure.

The device has two channels of pressure control ("HP" and "LP"). When testing pumps (see "Check pump" below), these channels have the following meanings:

- "HP" for connecting a high pressure regulator;
- "LP" for connecting a low pressure regulator.

In all other modes, these channels are paralleled, the same signal is sent to both channels to control the high pressure regulator (s) at the same time.

The simultaneous use of two high pressure regulators (for this it is necessary to use a rail for two regulators) reduces the mechanical load on the regulator, which it experiences when using a pump with increased performance, thereby increasing its service life.

Pressure control - selection of the control mode of the high pressure regulator (manual or automatic).

In automatic control mode, the user sets the desired pressure value, and the device maintains the set value by changing the control signal on the pressure regulator.

In the manual control mode, the user himself sets the duty cycle of the control signal (PWM signal) as a percentage.

**Attention: be careful, because in manual mode the device does not support pressure, an increase in the rotational speed of the pump shaft will lead to an increase in pressure in the system and vice versa. Before changing the speed, for safety reasons, you should first reduce the duty cycle of the pressure regulator control signal (the pressure regulator should stand on the high side of CPI).**

## *CR Tester.PR - Passport. Technical description.*

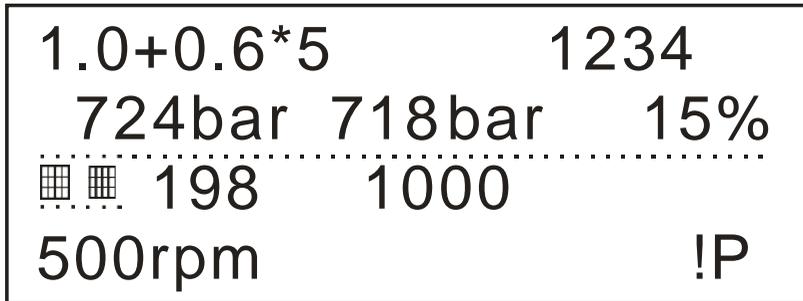
**Sensor** - selects the measuring range of the sensor. There are four preset sensor characteristics, with different maximum pressure: at 1500, 1800, 2200, 2500 bar. Depending on the sensor used, the user selects the appropriate one. Sensor selection is carried out with the button "start". It is possible to adjust for another sensor (see below "Hidden menu").

**The rate of change of pressure** - this parameter is used for automatic control mode. In order to ensure the safety of operating personnel, a smooth increase and decrease in pressure should be used (at high pump speeds, complete overlapping of the pressure regulator will lead to an instantaneous pressure jump, which in turn can lead to rupture of the fuel supply lines, and vice versa, at high pressure, a sharp opening the regulator will lead to the discharge of a large amount of fuel in the return circuit, and this process is often accompanied by a breakdown of the fuel hoses of the return circuit).

Normal is the change in pressure at 100-150 bar per second. But this parameter is not critical and the user himself determines its value.

The launch of the process of supplying the specified control signals to the selected injectors is performed by the "Start" item.

During submission to the injectors of control pulses on the screen is displayed (from left to right, from top to bottom):



- pulse duration (if the test signal, then + pause duration \* number of pulses in the cycle);
- \*\* nozzle response time for Bosch and Denso. Up /"Down" sequentially displays the response time of the tested injectors;
- numbers of injectors to which the activation signal will be given;
- current pressure value (in the absence of a sensor, horizontal dashes are displayed);
- required pressure value (only with automatic pressure control mode);
- signal ratio;
- progress indicator and fed part of the pulses;
- specified number of pulses;
- pulse frequency;

\*\* For Bosch and Denso injectors, the function measuring the response time of

## *CR Tester.PR - Passport. Technical description.*

the injector solenoid valve is implemented. The response time, we call the period of time that passes from the moment of the signal, until the landing of the armature valve. After landing of an anchor injection begins. This value is relative, it may be different at different injectors, but on those injectors that will be installed on one car, the spread must lie within  $\pm 15\%$ . Measured in microseconds.

The response time is displayed in the pulse frequency range of 300-1500. Since this time is of the order of 200-400  $\mu\text{s}$ , the signal duration must be correspondingly longer.

Changes in system pressure are made by turning the multi-turn switch knob clockwise or counterclockwise.

**Attention: if there is no signal from the pressure sensor, there will be no signal to control the pressure regulator.**

**If the initial pressure is set, the injector control signal will not be applied until the current value reaches the set value (“!P” will be displayed).**

The “Pump Check” menu item is used to check pumps and controllers of the CP1 and CP3 systems.

When testing the volumetric capacity of the CP1 pump, the amount of fuel going into the return from the rail is measured through a high-pressure regulator at various operating modes (pump speed and pressure).

To test the CP1 systems, the pressure regulator is connected to the “HP” output. The pressure required for testing is set the same as when working with injectors, and is maintained in automatic mode.

The method of testing CP3 systems is as follows: as a load, a rail is used with a high-pressure regulator installed on it and a pressure sensor. Fuel feeders for the injectors are mechanically plugged to prevent leakage through the injectors. As is known, in these systems, with low pressure control, the pump will have maximum performance with no voltage on the regulator, but as the high pressure regulator is installed on the rail, all fuel will go into return. Further, in the automatic mode, we set the load pressure with a high-pressure regulator (“HP”) and shutting off the low-pressure regulator (“LP”) with a current of different frequency measures the pump performance.

For convenience of work, in the device, it is possible to create preliminary settings of the

12/194	T 1000m s
# 1/4	P 1500bar
0445100002	F 1500m in
Bosch CR	N 2000

operation parameters (test plans). The test plan consists of verification steps. The number of steps determines the modes at which the injector will be tested (pre-injection, idling,

## *CR Tester.PR - Passport. Technical description.*

maximum load, etc.). To do this, press the middle button of the device, indicated by the icon “Hourglass”, the screen displays the following parameters:

- 12/194 - record count. A total of 194 entries can be created, in this case 12 were created;

- # 1/4 - number / amount of presets;
- 0445100002 - injector code for Bosch-marking;
- BoschCR - signal type;
- T is the pulse duration;
- P - pressure;
- F is the pulse feed frequency;
- N is the number of cycles.

Switching tests carried out using a multi-turn switch. To change the settings, use the buttons.

“Up / Down” move the cursor to the required parameter, activate the “Start” button, set the required value and confirm by pressing the “Start” button again.

To create (delete) a test plan or a verification step, move the cursor over the injector number, activate it with the "Start" button and "Up / Down" select the desired action:

- create a test plan step;
- remove the test plan step;
- create a test plan.

When creating a test plan, the injector code is entered. Input is carried out by a multi-turn switch. The line with the code displays the order of the digit that will change, the order is changed with the Up / Down buttons.

For example: 0445100000 ± 100 - this means that by turning the multi-turn switch, the third digit on the right will change 0445100000.

Code 04451xxxxx is the Bosch-marking injectors. If another type of signal is chosen, the code will consist of five digits, from 00001 to 65535 and is entered similarly.

To remove a test plan, you must delete all of its steps.

The maximum number of test plans depends on the number of steps in it.

For example: it will turn out to make 11 test plans, if you make 10 in 19 steps and 1 in 4 (a total of 194 entries).

When the device is started, the backlight indicator lights up in the Stop button.

If the backlight indicator flickers periodically, depending on the conditions, the indicator operation modes mean the following:

- the device is running - the pressure has not reached the specified value;
- the device is stopped - a signal is still given to the pressure regulator, the delivery time depends on the setting in the menu of the rate of pressure change;
- an audible signal is heard - the overcurrent protection through the injector solenoid or the regulator has been activated, the protective barrier has opened;

During the operation, the control buttons have the following meanings:

- “Start” - a temporary pause for counting cycles, the pulse is not sent to the

## ***CR Tester.PR - Passport. Technical description.***

injectors. Pressing the button again will reset the device to its original state;

- middle hourglass button - cessation of the supply of pulses to the injectors, counting cycles continues. Pressing the button again will reset the device to its original state;

- “Up / Down” - switching the valve response times between the channels (only for Bosch and Denso injectors);

- “Stop” - stop the device operation.

### **Hidden menu.**

The hidden menu contains data, which is changed very rarely:

- interface language (Russian, Ukrainian, English);
- calibration of pressure sensors (adjustment of accuracy and pressure measurement range);
- calibration recovery (return to factory settings of sensors).

To enter the hidden menu, it is necessary when the device is turned off, hold down any of the control buttons and turn on the 220V power supply.

The choice of the necessary menu item is carried out with the “up / down” buttons, the input / change - with the “start” button.

Sensor calibration consists of two points:

- calibration 1 (zero setting);
- Calibration 2 (maximum setting).

The device is designed to work with a common rail pressure sensor. The sensors of this system have a linear characteristic (the dependence of the output voltage on the applied pressure, see figure 4). At output voltage 0.5V, pressure is 0bar, at voltage 4.5V maximum. Sensors have a different measuring range. The sensors from cars, as a rule, have a maximum measured pressure of 1500 bar, that is, at an output voltage of 4.5V, the actual pressure is 1500 bar. The sensors of minibuses, trucks, measurement range is higher, depending on the generation of injection systems. There are sensors with a maximum pressure of 1800, 2200, 2500 bar.

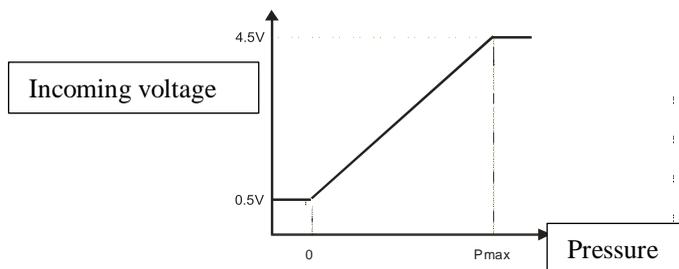


Figure 4. Characteristics of the pressure sensor

Under such (standard) sensors, factory characteristics are registered in the device.

## ***CR Tester.PR - Passport. Technical description.***

But if the user wants to use other sensors, or correct the original, then you can calibrate (configure) under your sensor.

Go to the menu item "calibration 1", with the button down:

- regulator output;
- pressure;
- save calibration.

"Regulator output" is the duty cycle of the output signal that controls the regulator. If it is necessary to create pressure using the pump and regulator of the Common Rail system (standard for the device), this is done in the same way as in the process of working in manual mode: turn on the test bench, set turns and set the duty cycle of the output signal. The pressure is controlled with an external pressure gauge.

"Pressure" enter the current pressure value. For "calibration 1", this must be 0.

Go to the menu item "Calibration 2", repeat the actions similar to "Calibration 1", only now the sensor maximum is entered.

***For example:*** there is a sensor with a maximum pressure of 600 bar (with an output voltage of 4.5 V, the actual pressure, for accuracy controlled by an external pressure gauge, is 600 bar). This sensor is not a standard one, and it is necessary to register a characteristic for it.

*We connect the sensor to the device, go "calibration 1", enter the current pressure 0 bar (the pressure in the system should be 0, controlled by an external gauge), save the calibration.*

*Go to "calibration 2", controlling the pressure gauge, bring the pressure up to  $600 \pm 15$  bar, enter this value into the device, save the calibration.*

Once in the hidden menu, all the settings are done, turn off the device, and then you need to wait 30-40 seconds until the device is completely de-energized and turn on the device. Now it will work with the new settings (for example, a menu in another language).

### **Safety**

In order to ensure the safety of working personnel, we strongly recommend using passive protection in the system (various protective covers covering rotating parts, as well as closing high-pressure lines and injectors. A convenient technical solution is to manufacture a cabinet that closes the rail and injectors made of transparent plastic, setting on opening elements limit switches).

The device has an additional input "PROT" (from the English. - Protection). On this input, the device determines whether the safety barriers are closed. The device wiring diagram is very simple and does not require special skills for its installation (see Appendix No. 2).

### **Counting the number of cycles**

In most cases, the device works in conjunction with the test bench for checking and adjusting the injection pump. In these benches a measuring unit is installed, in which

## ***CR Tester.PR - Passport. Technical description.***

dimensional containers for measuring the volume of the cycle feed are placed. The supply of test fluid to the measuring unit is blocked by an electrically controlled valve. There are various ways to implement valve control.

The device has a built-in relay, which can be connected to control the valve actuator. The relay switches and is held in this state after the passage of preparation cycles, as well as upon completion of a specified number of cycles.

The installation of the circuit should be carried out by a qualified technician, since the gate control schemes mainly operate on high supply voltage.

The pinout of the connector and the characteristics of the relay are given in the Appendix (see Appendix No. 3)

***Attention:*** *a known pressure sensor should be used in the system. If here is none, it is necessary to use an additional means of pressure control (mechanical pressure gauge with a measurement range above the sensor of at least 100 bar) and check serviceability of the pressure sensor. It is also recommended to use a mechanical pressure limiting valve with a response pressure corresponding to a maximum of 1500 or 2500 bar for safety reasons.*

*In case of breakage, unscrewing of threaded connections or other malfunctions of high-pressure fuel supply channels, you should immediately turn off the test bench, observing all precautions.*

### ***Remember:***

*An escaping jet of fuel under a pressure of 700 kg / cm<sup>2</sup> or more acts as a needle, penetrating deep into the skin, which can lead to ruptures of the upper layers of the skin, resulting in infection of the blood.*

*In addition, with this pressure, the liquid is heated to a temperature of 110-135 ° C, which in turn is dangerous for the human body.*

*During the work with the device observe the precautionary measures necessary during the work with the test bench for testing and adjusting the injection pump.*

## **9. Package**

Passport OS.016.001. (Technical specification, instruction on operation).....	1 pc.
Kontroler OS.016.002 .....	1 pc.
Cable-adapter for injectors OS.016.003 .....	1 pc.
Cable-adapter for regulators OS.016.004 .....	1 pc.
Cable-adapter for pressure sensor OS.016.005 .....	1 pc.
Power cable 220V .....	1 pc.
Safety catch 3A.....	1 pc.
Relay connector .....	1 pc.
Connector for security input .....	1 pc.



## ***CR Tester.PR - Passport. Technical description.***

### **10. Warranty**

The company "Open System" is the developer and carries out the production of "CR-Tester.PR" in Ukraine.

The manufacturer guarantees stable operation of the CR-Tester.PR provided that the owner complies with the storage and operation rules set forth in this passport.

The warranty period is set by the manufacturer - 18 months from the date of receipt of the product, except as specified by the manufacturer and the buyer by an additional contract.

The manufacturer in the warranty card marks the year, month, day of sale, legal address, telephone number of the company carrying out warranty repairs (the warranty card is attached to the passport of the CR Tester.PR device).

During the warranty period, the owner has the right to free repair upon presentation of this passport and warranty card. After the repair, a list of troubleshooting activities is entered into the warranty card.

The following is not a ground for complaint: violation of the integrity of the connecting wires (adapter cables).

The manufacturer does not guarantee the "CR Tester.PR" devices in cases of opening the "CR Tester.PR" device case, there are signs of damage on the case and the "CR Tester.PR" board, if the storage and operation rules are not followed.

Without presenting a warranty card and in violation of the safety of seals on the product claims to the quality of work and warranty repair is not performed.

During the warranty period of operation installed on the product, repairs are made at the expense of the owner if he uses it not in accordance with these operating instructions.

The manufacturer provides further repair of the device "CR Tester.PR", after the expiration of the warranty period under a separate contract.

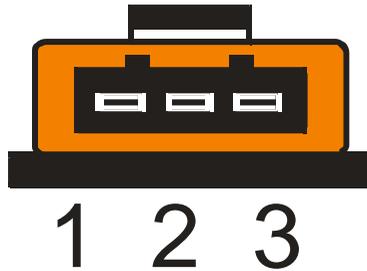


Figure 5. Pressure Sensor Connector

- 1 - Common wire;
- 2 - Pressure sensor signal output;
- 3 - Sensor power supply, +5 V.

To connect the pressure sensor to the device CR Tester.PR, an OS.16.005 adapter cable is used.

Recommended pressure sensors:

- Bosch 0 281 002 405 - 1500bar range;
- Bosch 0 281 002 534 - 1800bar range.

It is possible to use other, similar to original pressure sensors for the required range, but it is necessary to check the sensor's pinout.

Data on the pinout should be taken in the technical documentation for the sensor, or in the electrical circuits of the vehicle where it is installed.

## PROT

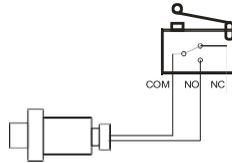


Figure 6. Wiring diagram for protective limit switches

The operation of the circuit is designed to break the chain. Depending on the method of installation and execution, such limit switch contacts should be taken so that when opening the safety guard, the circuit connecting the two contacts of the “PROT” connector will be disconnected.

At the end contacts have the following notation:

- NC - normally closed contact;
- NO - normally open contact;
- COM is a common contact (it is connected to NC with either NO, depending on whether the button is pressed or not).

For example: take the limit switch, the same as on the diagram (Fig. 6).

We install a protective cabinet on the door, so that when the doors are closed, the button is closed, when opened it opens.

From the first contact of the plug “PROT” we connect the wire with the contact of the COM switch, from the second contact we connect with NO.

If there is a need to install two or more limit switches (for several mechanisms), then we connect them in series: from the “PROT” plug to the COM contact of the first limit switch, from its NO contact, to the COM contact of the second limit switch, from its NO contact to the next limit switch, the same pattern. Start from the last end to the second contact of the “PROT” plug (see fig. 7).

**The limit switches must be isolated from the frame of the test bench (do not connect the common contact with the body) !!!**

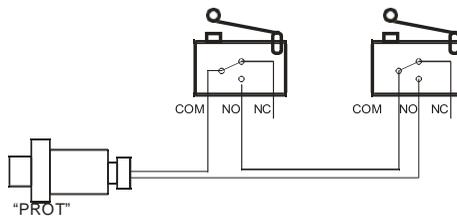


Figure 7. Connection diagram with multiple limit switches

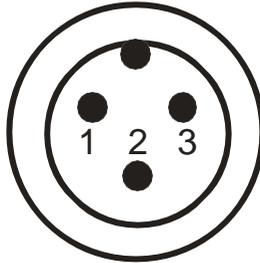


Figure 8. Connector for connecting to a CYCLE relay

Connector pinout:

- 1st contact - COM, common;
- 2nd contact - NO, normally open;
- 3rd contact - NC, normally closed.

Relay RT114012 TYCO, 12A / 250VAC. In series with the common contact of the relay, the device has a 5A fuse installed. Therefore, if the current consumption of the actuator (in this case, the electric actuator of the valve) is higher, an intermediate relay should be installed.

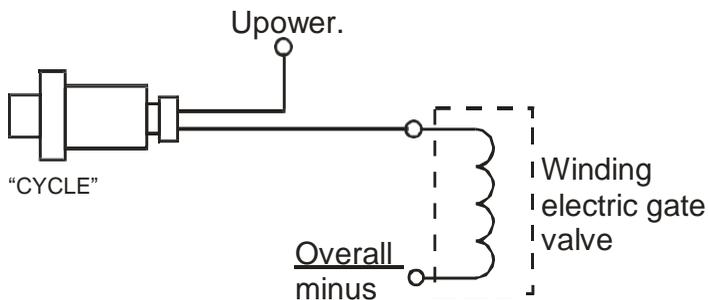


Figure 9. Simplified wiring diagram

In the diagram given (see Fig. 9), the drive supply voltage is applied to the 1st contact (general contact of the relay), the output from the 2nd (normally open). Thus, in the initial position, the winding of the electric drive is de-energized, when the relay is switched, the drive is activated and the fuel begins to flow into the measuring unit.

**Warranty card №** \_\_\_\_\_

The device "CR Tester.PR" OS.016.002 for testing and checking the performance of diesel injectors of the Common Rail system.

The warranty repair and maintenance of the controller "CR Tester.PR" is carried out by the company \_\_\_\_\_.

Address \_\_\_\_\_

Ph. \_\_\_\_\_

Fax. \_\_\_\_\_

Data of sale " \_\_\_\_\_ " \_\_\_\_\_



**Tear-off coupon №1**

Address of the organization performing the repair: \_\_\_\_\_

Date of repair: \_\_\_\_\_

Malfunction detected: \_\_\_\_\_

Master Signature: \_\_\_\_\_

Stamp of Repair Organization: \_\_\_\_\_

\_\_\_\_\_

---

**Tear-off coupon №2**

Address of the organization performing the repair: \_\_\_\_\_

Date of repair: \_\_\_\_\_

Malfunction detected: \_\_\_\_\_

Master Signature: \_\_\_\_\_

Stamp of Repair Organization:

---

**Tear-off coupon №3**

Address of the organization performing the repair: \_\_\_\_\_

Date of repair: \_\_\_\_\_

Malfunction detected: \_\_\_\_\_

Master Signature: \_\_\_\_\_

Stamp of Repair Organization



***CR Tester.PR - Passport. Technical description.***

Device Name: \_\_\_\_\_

Code of device: \_\_\_\_\_

Serial number: \_\_\_\_\_

Claimed Malfunction: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

-----  
Device Name: \_\_\_\_\_

Code of device: \_\_\_\_\_

Serial number: \_\_\_\_\_

Claimed Malfunction: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

-----  
Device Name: \_\_\_\_\_

Code of device: \_\_\_\_\_

Serial number: \_\_\_\_\_

Claimed Malfunction: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_