Common Rail Fuel Pump Performance Measurement Unit

“CPFM-Tester”

OS.25-02

V1.04

Passport.
Technical description.
User manual.
Warranty card.

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Introduction

This passport is a document certifying the main parameters and technical characteristics of the CPFM-Tester OS.25-02 guaranteed by the manufacturer

This passport allows you to get acquainted with the device, the procedure and rules for its operation, compliance with which will ensure the correct operation of the device.

1. Purpose

The CPFM-Tester device is designed to test and verify the performance of diesel injection pumps (high pressure fuel pumps) of the Common Rail system.

The device has two channels for measuring the strait. In each meter (sensor) of the strait is a temperature sensor that measures the temperature of the liquid (flow).

2. Basic technical data and specifications

- Range of the measured stream: 0,05 - 20 l / min;
- Range of the measured stream: 3–1200 l / hour;
- Accuracy of flow measurement, in the range of 10-150l / hour, not more than: +/- 2l / hour;
- Accuracy of flow measurement, in the range up to 10 and more than 150 l / h: not more than 1%;
- Permissible temperature range of the measured flow: -20 - +90 ° C;
- Error of measurement of temperature of a stream, no more: +/- 2 ° C;
- Supply voltage: ~ 220 V ± 15%;
- Mass of the device: 6 kg;
- Dimensions (length x width x height): 320x285x80;
- Power consumption, no more: 24 W.

3. The design of the device.

Figure 1. Front view

The CPFM-Tester device is structurally designed as a prefix,

3.1. Front Panel.

Front Panel

On the front panel of the device are: LCD indicator, control buttons.

• "IN" - Inputs of the measured flow, “1” and “2” - the first and second channel, respectively.

• Red button - Start measurement and enter / exit the menu.

The remaining buttons are described in table 1.

3.2. Back panel

Figure 2. Back panel

On the back of the device are the connectors:

• "USB" - for connecting to a personal computer;

• "RPM" - for connecting the shaft speed sensor;

"OUT" - output, respectively, of the measured flow;

"220" - for connecting the main power ~ 220 V.

The "NET" connector is structurally made in one housing with a fuse.

In the updated version of the device, near the pipe outlets, there are two connectors (2 contact) for controlling the valves. The control voltage of the valves is + 24V and is applied at the start of the measurement (blinking of the button).

Version 1.06 (software) adds support for valve control.

4. Flow sensor.

To measure the flow, the device uses a flow sensor.

Thanks to friction-free fluid measurement technology, the sensor provides superior linearity over the entire measurement range. Sensor specifications are listed below:

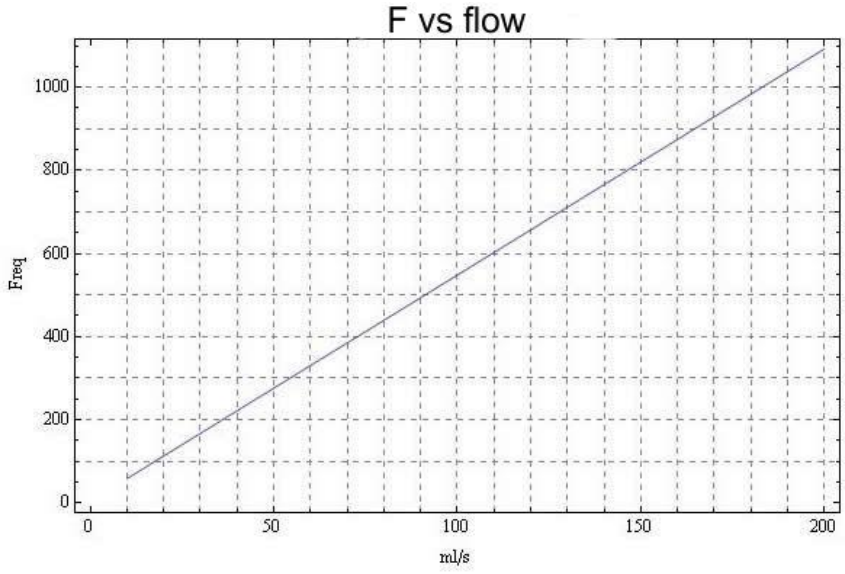


Figure 3. Characteristics of the flow measurement sensor.

5. Instructions for use

Environmental Requirements:

Operating temperature: +5 ºC to +40 ºC

Transportation temperature: -20 ºC to +60 ºC

Relative humidity (non-condensing):

Working: 8% - 80%,

Storage: 5% - 95%.

Dustiness of air: no more than 75 mcg / m3.

Since particulate matter and / or contaminated media can damage the sensor or affect measurements, we recommend using a filter (20-50 microns) in front of the flow sensor!

The applied flow sensor withstands the temperature of the measured liquid up to 90C. Do not allow the temperature to rise above this value! If there is a need for continuous operation, then a cooling radiator must be installed in front of the flowmeter!

If the device was transferred from a cold to a warm room, you need to give time for 1-1.5 hours to the device to warm up to ambient temperature.

After switching on, let the device run for 2-5 minutes, then proceed to work.

6. Limitations of liability

The manufacturer is not liable to the buyer of this product or a third party for damage or loss suffered by customers 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.

Under no circumstances will the manufacturer be liable for lost profits, lost savings, losses caused by an accident, or other subsequent economic losses, even if the company was notified of the possibility of such losses. The manufacturer is not liable for losses incurred by you on the basis of claims of a third party, or caused by failure to fulfill your obligations.

The manufacturer is not responsible for any malfunctions and losses resulting from the use of additional devices not recommended for use with this device, as well as its modification, repair or modification to its design, not provided for by the operating instructions.

7. Preparation for work

Before using the CPFM-Tester, carefully read the operating instructions.

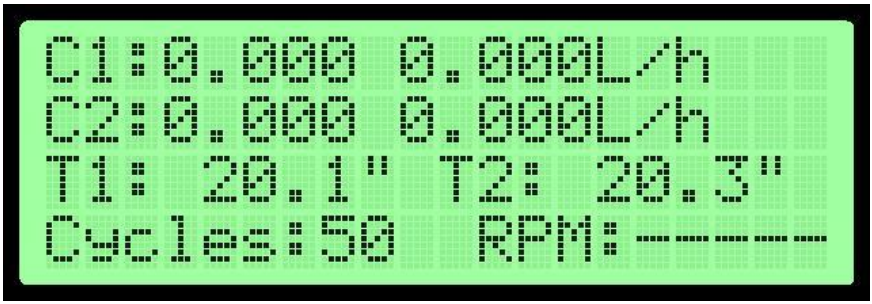
The flowmeter is connected using 3/8 ”pipe transitions to the hose.

When preparing the device for operation, it is necessary to carry out the following actions: conduct an external inspection of the device, check the reliability of pipe connections.

8. Operating of the device

8.1. Display.

In the initial state, the following information is displayed (see left to right, top to bottom):



- “C1” - Sensor 1 flow: current, average, units;
- “C2” - Sensor 2 flow: current, average, units;
- “T1”, “T2” - Temperatures 1 and 2. If there is no connection with the temperature sensor, “----” will be displayed;
- “Cycles” - The number of cycles to measure and revolutions. The number of cycles is used only for measurement in mL / c. If there is no speed, “----” will be displayed.
- “RPM” - frequency (revolutions / min) from the rotation sensor.
- To display the stream “C1” and “C2”, you can select the following dimensions:
- • L / h - l / hour;
- • L / m - l / min;
- • mL / c - ml / in cycles.

8.1. Description of control

Table 1. Description of the buttons.

Button	*Push*	*Description*
«Enter»	*Long*	*Enter to menu*
«Enter»	*Short*	*Start/stop measurement*
«C1»	*Short*	*Entering the flow sensor 1 setup menu*
«R1»	*Long*	*Reset Medium Flow 1*
«C2»	*Short*	*Entering the flow sensor 2 setup menu*
«R2»	*Long*	*Reset Medium Flow 2*
«Up»	*Short*	*Toggle Sensor 1*
«Down»	*Short*	*Toggle Sensor 2*
Menu mode		
«Up»	*Short*	*Scroll up*
«Down»	*Short*	*Scroll down*
«Enter»	*Short*	*The choice*
«Enter»	*Long*	*Exit of the menu*
Edit mode		
«Up»	*Short*	*+ (short step)*
«Down»	*Short*	*- (short step)*
«Up»	*Long*	*+ (long step)*
«Down»	*Long*	*- (long step)*
«Enter»	*Short*	*The confirmation*
«Enter»	*Long*	*Cancel*
Calibration mode		
«Enter»	*Short*	*Start/stop measurement*
«Enter»	*Long*	*Exit*
«Up»	*Short*	*Scroll up*

Menu items:

The name	*Values*	*Description*
Sensor Setup		
«Dimension»	*L/h, L/m, mL/c*	*Units*
«Property»	*1..9999 p/L*	*Property: number of pulses per liter*
«Filter»	*0.00..500.00 L*	*The volume of fluid passed through the filter.*
Main menu		
«Cycles»	*50, 100, 150, 200, 400, 500, 1000*	*The number of cycles to measure*

8.2. Description of work

Connect the flow sensors, and configure them by going to the menu with the buttons “C1” and “C2”.

Press the “Start” (“Enter”) button and the measurement will begin. At the same time, the button will blink.

To reset the average flow, press the “R1” or “R2” button. To turn off the measurement, press the "Start" button again. If the message is displayed when starting the measurement:

this means that 500 liters of fluid have passed through the filter and need to be cleaned. The current volume can be viewed in the “Filter” item. To reset it, hold down the "Start" button. The message can be ignored by pressing the "Start" button again, but it will appear each time the measurement is started.

9. Description of the soft «CPFlowMeter»

The program is designed to work with the device “CP-FM tester” - measuring the flow of pumps of the CP type.

The program allows you to:

Manage the CP-FM tester device from a computer, configure sensors, start measurement;

Display the parameters measured by the device, namely the current flow, average flow, temperature for each channel;

Draw a flow chart in real time;

Record the resulting flow chart, save the record to a file;

View recorded signal with wide navigation and measurement capabilities;

The appearance of the program is shown in Fig:

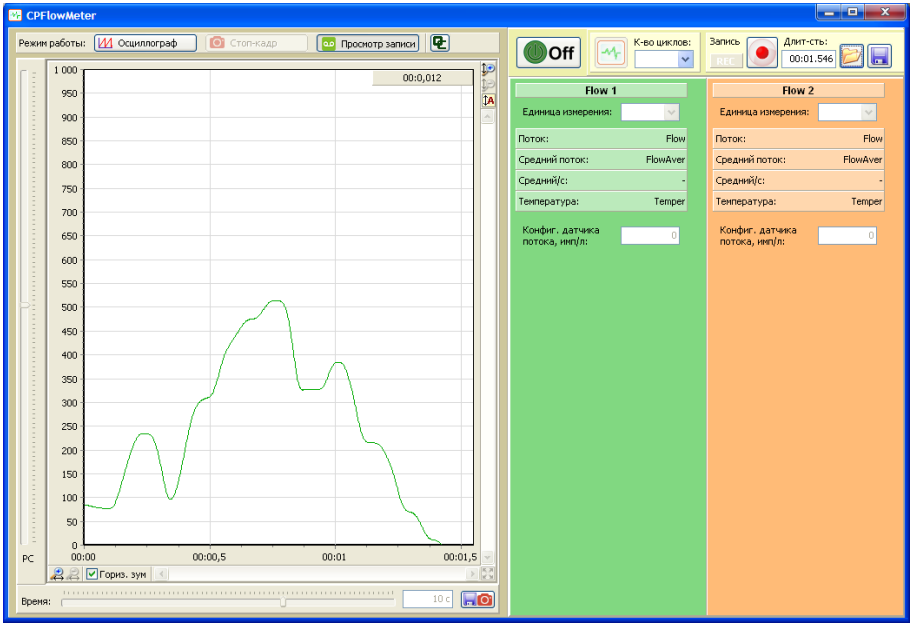


Figure 3. The main window

9.1. The main features of the soft

To start working with the program, copy it to a personal computer.

Turn on / off the device by pressing the button 

.

In this case, the button displays the connection status:

– turned ON;

– turned OFF;

– loss of communication with the device (the button takes this form if, for example, the USB cable has been disconnected).

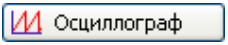
Immediately after connecting to the device, the current values of temperature, flow and average flow for each channel will begin to be transmitted.

For each channel, select the unit of measurement from the drop-down list (l / h, l / min, ml / cycle), and configure the sensor (set the value in imp / l).

To start flow measurement, press the button. In this case, a graph of the flow change starts to be drawn, the average flow value is reset to zero and begins to be re-calculated.

9.2. Work with the graphic

There are 3 modes of work with graphic:

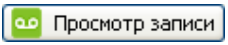
1. 

– viewing the waveform of the stream in real time.

The sweep setting, that is, the amount of time displayed on the chart, is controlled by the “Time” slider (the action is similar to switching Time / div. On hardware oscilloscopes).

2. 

– freeze the current screen (frame). You can only go into this mode from the Oscilloscope mode, while the current frame is drawn and further signal rendering stops. To save the displayed frame to a file (as a picture) - use the button 
.

3. 

– viewing the record in the buffer. The mode button is active only if a record is loaded into the buffer. Recording management is described in detail in Section 5 “Recording”.

If you enable recording of a signal, then when switching from mode to mode, it does not stop (in the “Freeze frame” or “View recording” modes, recording continues in the background).

In all modes of the program, there is the ability to navigate on a schedule.

9.3. Navigation

Navigation includes the ability to scale and scroll the image on the chart.

- **Scaling.**

Scaling a chart can be done in three ways:

1. Left mouse button. To do this, hold down the left mouse button, select the desired rectangular area in the direction from top to bottom and from left to right, and release. The graph will be enlarged to the selected rectangle. If the selection is made in the direction from bottom to top and from right to left, the scaling will be canceled - the analogue of the button  .
2. Since in the “Oscilloscope” mode horizontal scaling can be done by adjusting the sweep time, horizontal scaling with the mouse is disabled in this mode. To enable it, you can use the “Horiz. zoom ”to the left of the horizontal scrollbar.

2.1 using buttons  – horizontally, and  – vertically. In order to cancel the scaling and again show the entire graph, you must click  "Show all";

2.2 mouse scroll wheel. The rotation of the wheel with the CTRL key held down results in scaling vertically, with the ALT key - horizontally.

3. Scrolling image.

Scrolling is performed in two ways:

The right mouse button. To do this, hold down the right mouse button and drag the graph in the desired direction.

Using the scroll bars located below and to the right of the graph;

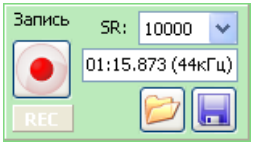
9.4. Cursor measurement

When a rectangle is selected with the left mouse button, the cursor measurements will simultaneously be displayed in the upper right corner of the graph. To view cursor measurements, but not to increase the graph to the selected rectangle, you must press the ESC key without releasing the left mouse button. You

can also return the mouse to the place where the selection was started, and release the left mouse button.

9.5. Record

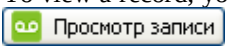
The recording panel is shown in Figure 2:



Recording panel

To start recording, press the button  «Start recording». At the same time, the “REC” indicator will blink, the recording duration will be displayed.

To stop recording, press the button  «Stop recordig».

To view a record, you must switch the program to the "View Record" mode - button 

(at the top of the main window).

After stopping the recording, it becomes possible to save it to a file - button  «Save record».

Accordingly, the saved record can also be loaded back into the program - button  «Open record».

10. The security

In case of breakage, unscrewing of threaded connections or other malfunctions of the fuel supply channels of high pressure, immediately turn off the stand, observing all safety precautions.

Remember:

The escaped fuel stream under pressure of 700 kgf / cm2 or more acts like a needle, penetrating deep into the skin, which can lead to rupture of the upper layers of the skin, resulting in blood poisoning.

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

When working with the device, observe the precautions necessary when working with the bench for testing and adjusting the high pressure fuel pump.

11. The set of delivery

Pasport OS.25-02. (Technical description, instruction of use) .....1 pc.

Controller OS.25-02 .....1 pc.

Power cable 220V.....1 pc.

Safety fuse 3A (located inside the holder) .....1 pc.

External filter (50mkm) ..... 2 pcs.

Clamps (15)..... 8 pcs.

Valve wire (2м)..... 2 pcs.

Software “CPFlowMeter” (CD).

Note. *The delivery set may differ (for example, by the presence of filters), depending on the availability in the warehouse, with subsequent retrofitting.*

12. Warranty

The manufacturer is a developer and manufactures CPFM-Tester.

The manufacturer guarantees the stable operation of the CPFM-Tester device, subject to the owner observing the storage and operation rules set forth in this passport.

The warranty period is established by the manufacturer - 18 months from the date of receipt of the product, unless otherwise specified by the manufacturer and the buyer by an additional contract.

The manufacturer notes in the warranty card the year, month, day of sale, legal address, telephone number of the company performing the warranty repair (the warranty card is in the appendix to the passport for CPFM-Tester devices).

During the warranty period, the owner is entitled to free repair upon presentation of this passport and warranty card. After repairs are carried out, a list of troubleshooting steps is entered in the warranty card.

Not a ground for complaint: violation of the integrity of the connecting wires (adapter cables).

The manufacturer does not bear guarantees for CPFM-Tester devices in the following cases: opening the CPFM-Tester device case, signs of damage on the case and CPFM-Tester board, if the storage and operation rules of the device are not observed.

Without presenting a warranty card and in case of violation of the safety of seals on the product, claims to the quality of work and warranty repairs are not made.

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

The manufacturer provides further repair of the CPFM-Tester device after the end of the warranty period under a separate contract.

Notes