Software description.
Diesel Workbench software

1. General information.

The "CR-JET" diagnostic suite consists of devices and software which enables the automated operation of the diagnostic test bench, as well as the diagnosis and repair of diesel equipment.
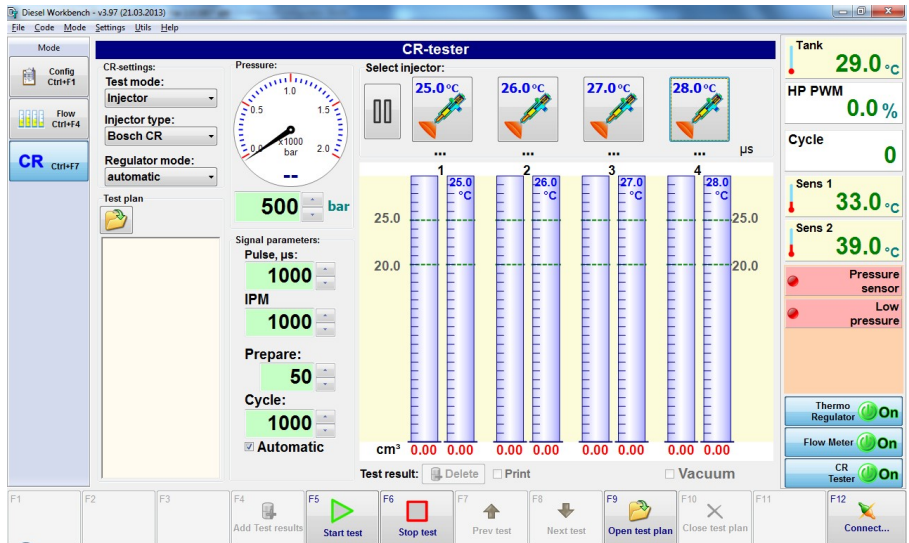

Figure 1 Software "Diesel Tester"

To program Diesel Stend are connected this devices from Diesel-Tester series:

«Flow Meter» - automatic dip-free test liquid flow measurement system.

«CR-Tester» - Common Rail pump diagnosis, test plans

«Digital Thermo Regulator» adjusting the temperature of the test liquid in the tank.

1.1. System requirements

- Diesel Stend runs on Windows XP and later versions.
- The minimum configuration of a PC is as follows:
- - 1600 MHz or older processor;
- - Screen mode 1024x768 (32 bit), 1280x1024 recommended
- - Approx. 20 MB of disk space for installing the software

1.2. Connecting the devices and installing the drivers

Devices of the "Diesel-Tester" series is connected to the PC via the USB port (in some cases the COM port can be used).

Before the first connection, the USB drivers must be installed. Depending on the device type, the driver installation software must be started :

- «FTDI_CDMxxxxx.exe» or «CDMxxxxx.exe» - USB-controller produced by FTDI (When installing the driver for the first time, the device must be connected to USB)

For older series of devices：

- «CP210x_VCP_xxxxxxx.exe» – of production «Silicon Labs»

- «PL2303_Prolific_xxxxxxx.exe» – «Prolific»

When the unit is plugged into a USB port, a virtual COM port appears in the system and is used to communicate with the software. The port number can be changed on a Windows XP system using the Device Manager.

2. Setting up the programme

The programme settings are called up from the "Settings | Device Settings" menu. The Connection Settings dialog box opens (Figure 2,3,4).
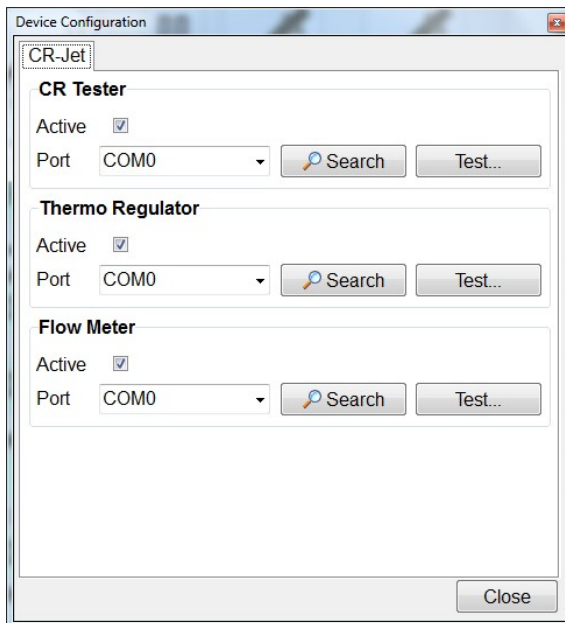

Figure 2 Window of connection setup "Device configuration"

✓ *Line «Settings | Device Settings» means the menu «Settings», submenu «Device Settings». This menu command designation will be used later in the text.*

Before making any adjustments, connect all instruments to the PC USB ports and power up the test bench.

For each appliance, you must set the parameters in the relevant field:

Active. Set if the appliance is used in a system.

Port. Select a port number. A drop-down list shows all the ports that are present in the system.

Search. Automatically search for the port to which the appliance is connected. When the search is complete - a result message will be displayed. If the device is detected - all port parameters are automatically adjusted.

Test. Communication test. Output device information - name, version, serial number (depends on device type).

3. Working with software

When the "Diesel Stend" software is started, the main programme window opens (see figure 3).

The top part of the window shows analogue (left) and digital sensor readings (right).

On the left-hand side is the "Mode" bar. It allows you to select different operating modes. The selection can be made with the mouse or the key combinations Ctrl+F1...Ctrl+F7. Depending on the set of devices connected, the set of modes can change.

On the right-hand side are indicators for temperatures and some stall settings, as well as connection buttons for devices.

At the bottom are the control buttons. Their function varies depending on the mode selected. They can be pressed with the mouse or the F1...F12 keys.

The central section displays information depending on the mode selected.

3.1. Connecting to devices

To connect to the instruments, press the relevant indicator buttons on the right-hand side of the main window. The states of the indicator buttons (see figure 3):

Bright green "glow", green "On", button pressed - communication with the appliance is established (Sensors button in illustration).

Dull "Off" sign, button depressed - no connection

Bright red "glow", red "Err", button released - communication has not been established (wrong port, device switched off) or communication failure has

occurred in the process. When an error occurs, a hint window pops up with additional information about the error.

The Connect-F12 and Disconnect-Alt+F12 commands are used to quickly connect and disconnect activated devices.

If communication with the device cannot be established - check connection port number, cable status, device must be switched on.

3.2. Mode «CR-tester»

The "Diesel Stend" software allows full control of the CR-tester and the no-nozzle measurement system. Test plans for the diagnosis of CRI injectors are included.
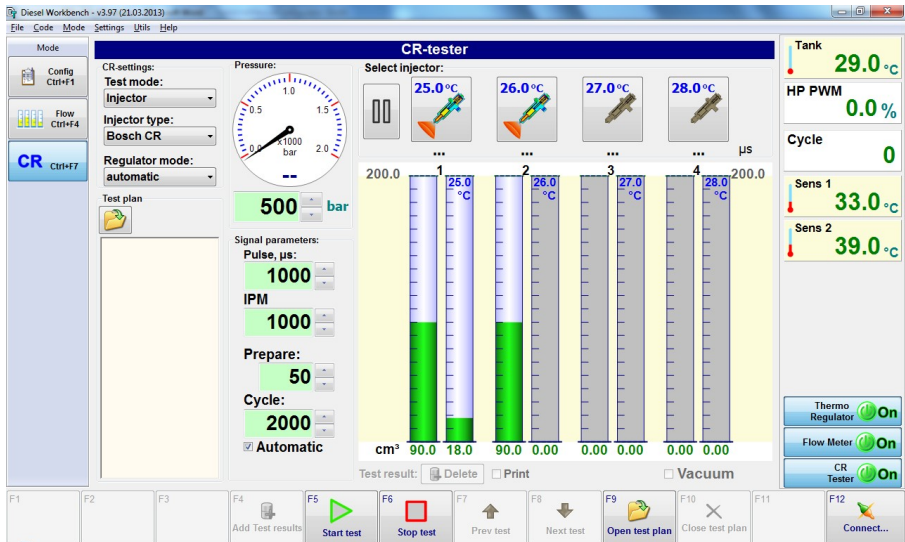

Figure 3 Mode CR-Tester

The software shows full information on the current "CR-tester" status and controls all signal and pressure parameters. It allows you to select the "Test Mode", the "Injector type" and the "Regulator mode" pressure control. The operation errors are displayed on the pop-up panel on the right side of the software window.

The connected channels are selected by the buttons on the "Select Injector" panel with the corresponding buttons that change their state when they are switched on/off. During the test a number - measured valve lift time in µs - is displayed below these buttons.

When a test plan is connected - it shows parameters of the selected injector and test plan points, the parameters are set automatically in accordance with the test plan.

To open test plans run the command "Open test plan-F9". For a description of how to operate the test plans, see "Test plan management".
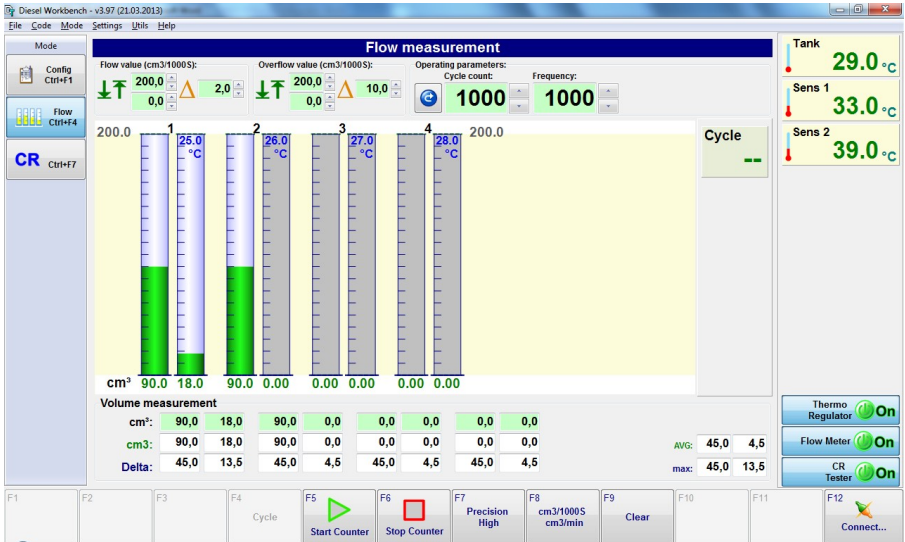

Figure 4 Mode CR-Tester + flow measuremen

A list of test points is displayed on the left-hand side of the window. If a test plan is selected, you can proceed with the test plan (Start-F5).

In normal operation mode, i.e. measurement on a "mensural" bench, the software allows both automation of signal control and adjustment on the "CR-Tester" device, and simplification of report generation. To generate a report, press the "F4 Add test result" button after completing the test. The Add test result window opens (see figure 6), in which you enter the reading from the beakers and the number of measurement tests. The result is displayed on the main programme window (in cm3/1000 cycles according to the test plan).
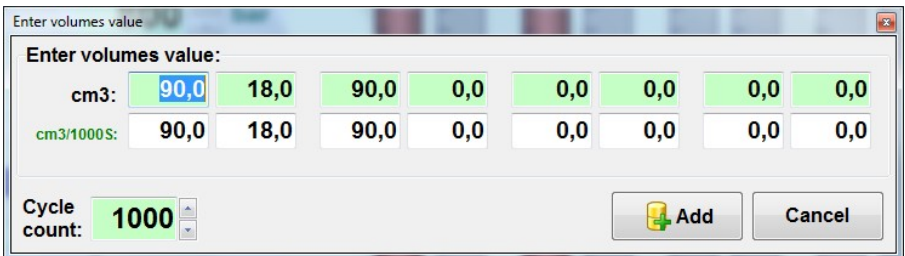

Figure 5 Adding measurement results in manual mode

If a 'no-change' measurement system is connected - the tests are carried out sequentially from the current one to the last one in automatic mode. The results are displayed in cm3/1000 cycles. To end the current test early, press "F8 Next Test". Or press "F6 Stop Test", select the desired test point and restart the test.

3.3. Management of test plans

The standard test plans will only be loaded if the "CR-tester" device is connected.
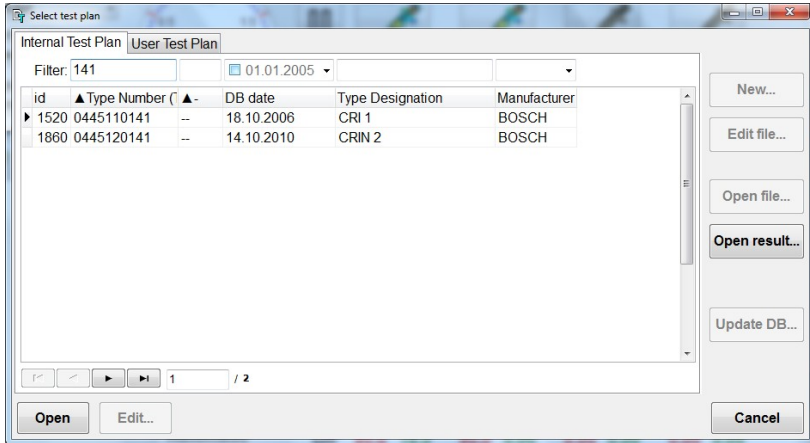

Figure 6 Selection of standard test plans

As shown in the illustration, you can use the "Filter" input fields to easily search for a test plan. For example, to search by number, enter the full number in the appropriate water field, or a partial number, in which case enter the symbol "*" or "?" instead of the missing characters. In the picture entered number filter "*020", the result will be that only the numbers ending with "020" will be displayed.

The user can also enter test plans himself. To do this switch to the "User Test Plan" tab (see figure 7).
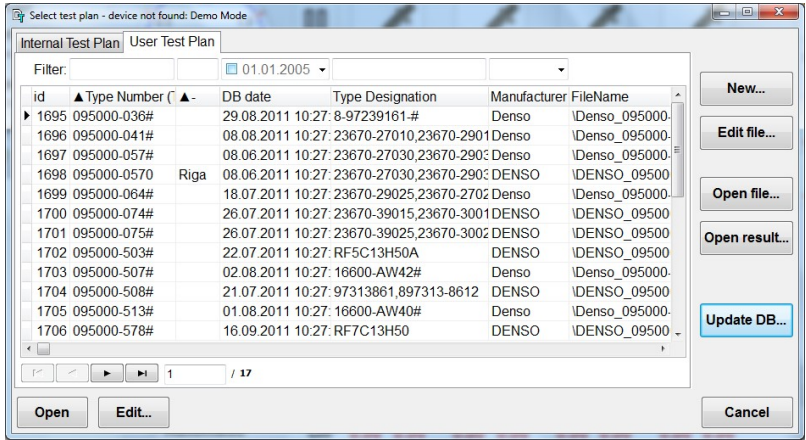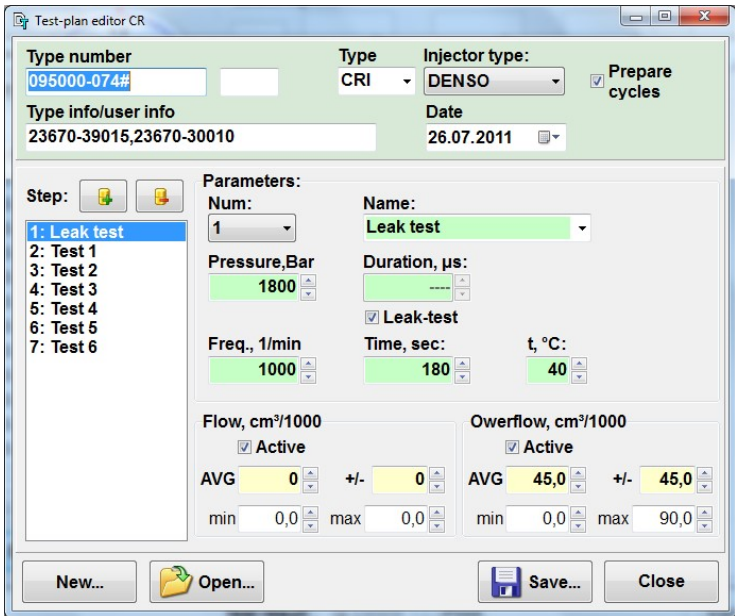
Figure 7 Custom test plans

Figure 8 Test plan editor

In this mode, the commands for editing, creating new test plans are accessible. By default, new test plans are saved in the subdirectory "UserTP_CR", which is located in the root directory of the Diesel Workbench, in which case they

will be displayed in the table. The "Update DB" button updates the list If the file is in another directory, it can be opened by pressing the "Open file" button.

The test plan editor specifies the basic nozzle parameters: nozzle number, type, manufacturer and test points. For each test point, basic signal parameters are entered: pressure, pulse duration, pulse frequency, as well as point name test time, test fluid temperature. The permissible spillage range of "Flow" and "return" - "Owerflow" is specified. The average value and the spread, or minimum and maximum limits are indicated.

3.4. Testing results

The resulting test results are stored for each test point. At the end of the test they can be viewed, saved to a file or printed out.
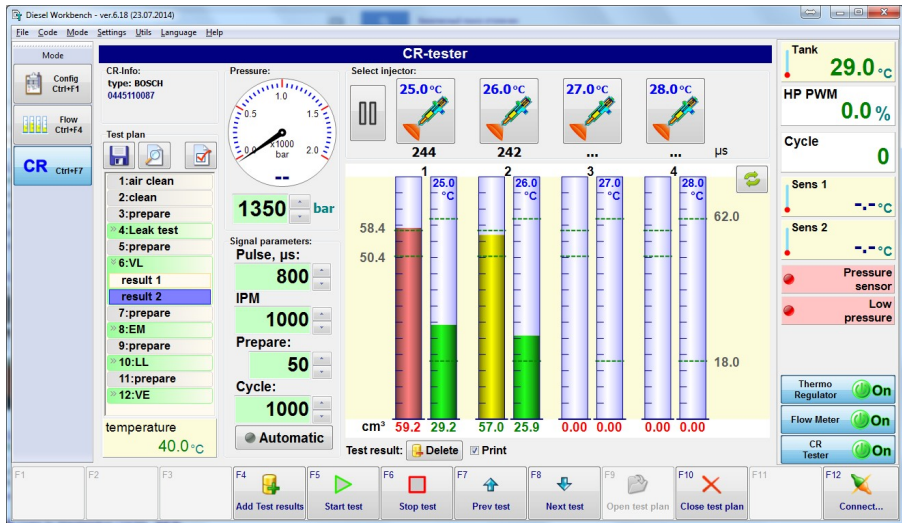

Figure 9 Viewing test results

To configure the report display parameters and enter additional information to the test result - click on the "Report Parameters" button. The "Report Parameters" window will open, where you can enter reference information (nozzle serial numbers, customer name), and specify the test plan parameters to be displayed in the report.

Button "Logo" - opens window for additional report parameters, in which company name and logo can be specified.
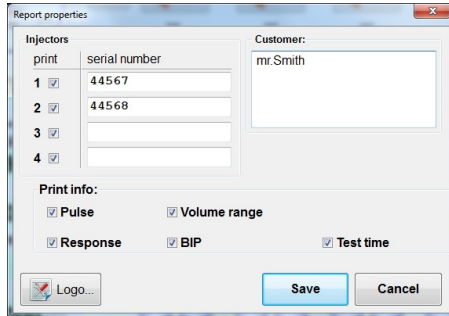
Figure 10 The "report parameters" window

Pressing the 'Print Result' button will open a report preview window which can be viewed and printed. The report shows information about the company carrying out the work, nozzle information, customer information, test plan parameters and measurement results.
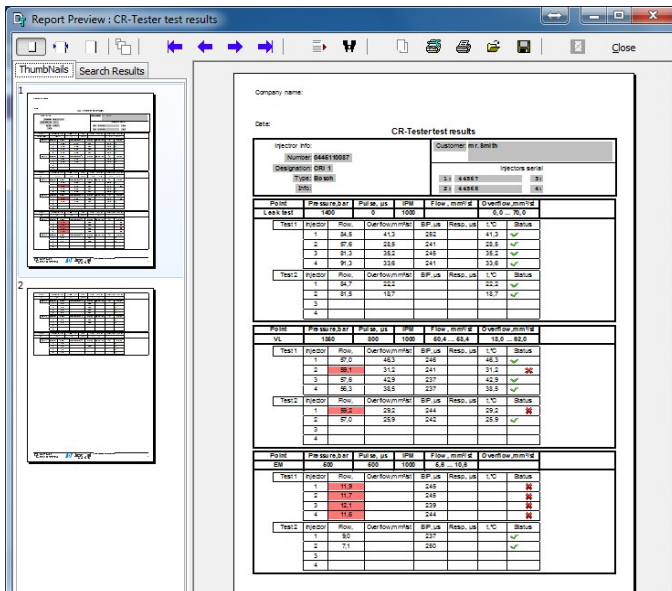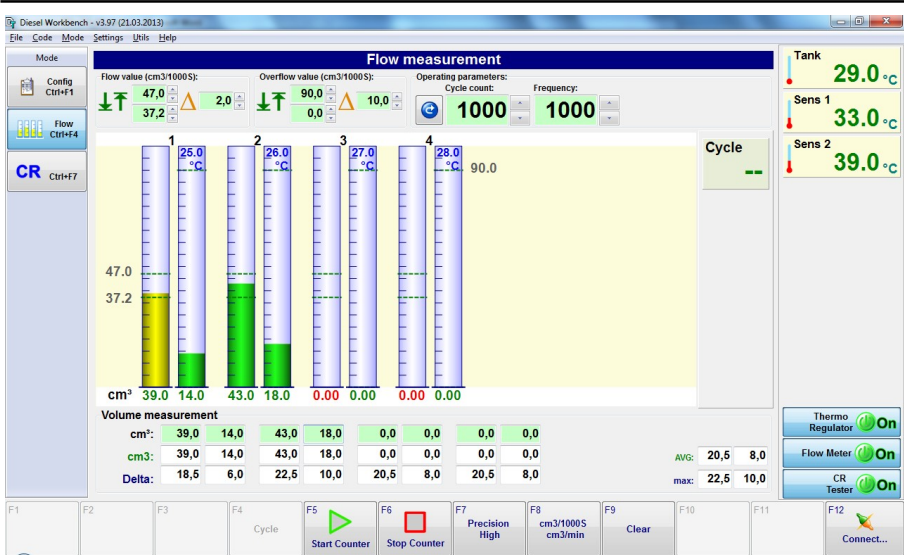

Figure 11 Viewing test results

3.5. Mode «Flow measure»

The 'Flow measure' operating mode is used to operate the universal stand. The bench is controlled by the TachoCounter.

This mode measures the flow of the test liquid. The measurement is made manually or automatically (if the dipstick-free Flow Meter is connected).

To perform the test, enter the number of cycles "Cycle count" and press "StartCounter-F6". To stop the test "StopCounter-F7". The test stops automatically after the set number of cycles. The chart shows the measured amount of test liquid (in manual mode - values are entered manually by the operator). The "Precision-F7" button switches the measurement accuracy:

"Precision Fast" - fast measurement. Displays the current measured values. Short measurement cycle, can be used to trace changes in spill when operating parameters (pressure, frequency, injection duration, etc.) are changed.

Precision Normal - Average measurement speed. Displays the current measured values.

Precision High - High measurement accuracy. The measurement speed is the same as for "Precision Normal", but the values displayed are not the current measured values, but the averaged values over the entire measurement cycle.

3.6. Setting up devices - thermal controllers

The "Diesel Workbench" software supports several devices that allow you to measure and display temperature, pressure and make temperature adjustments.

The setting commands are accessed from the "Settings" menu. The device must be connected and activated in the "Diesel Workbench" software in order to call up the settings.

Measured values of temperature, pressure, status of binary inputs, status of output control relays are displayed in the upper part of the main program window. The values are shown as indicators, which can be displayed in different graphical or

digital form with different captions, names and units. Indicator appearance settings are stored in a separate configuration file and may be adjusted to suit the specific bench configuration.

The set of indicators depends on the activated devices connected to the "ARM Diesel" software

Device «Digital Thermo Regulator».

Used in the CR-Jet bench to adjust the temperature of the test liquid in the tank.

Measures 5 channels of temperature measurement, input from liquid level sensor. Channel 5 is used to adjust the temperature.
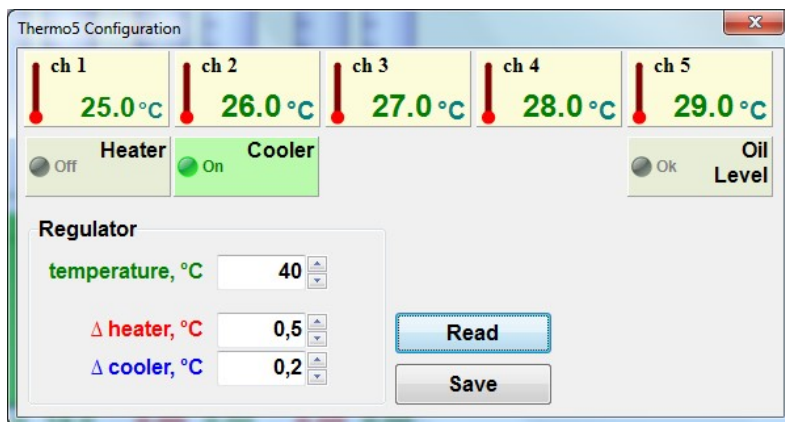

Figure 12 5-channel temperature controller

The settings window shows all measured temperatures, the status of the liquid level sensor and the status of the heater and cooler control outputs.

The desired temperature and hysteresis of the heater and cooler are indicated for the controller.

The "Read" and "Save" buttons, respectively, read and write the current controller parameters.

Device «FlowMetter»

The "FlowMetter" bezel-less filling measurement device can be used for temperature measurement.

It has 12 input channels for temperature measurement. Channels 6 and 12 and two regulators are used to control the temperature of the measuring unit, the remaining channels can be used to control the 'supply' and 'return' temperature.

The "Read" and "Save" buttons read and write, respectively, the current controller parameters.

4. Delphi C2I coding

The CR-JET-4M is equipped with the Delphi C2I injector coding system.

The procedure for coding is the same as a normal injector test. The following steps are required to perform the coding:

- - Set the Delphi C2I injector to measurement channel 1
- - Make sure that the return flow from the injector is connected through the negative pressure system.
- - Open a test plan corresponding to the nozzle code (such test plan is marked C2I).
- - Start the test

When the test is complete, select the "Code | Make C2I" menu command. A window will open with the result of the encoding:
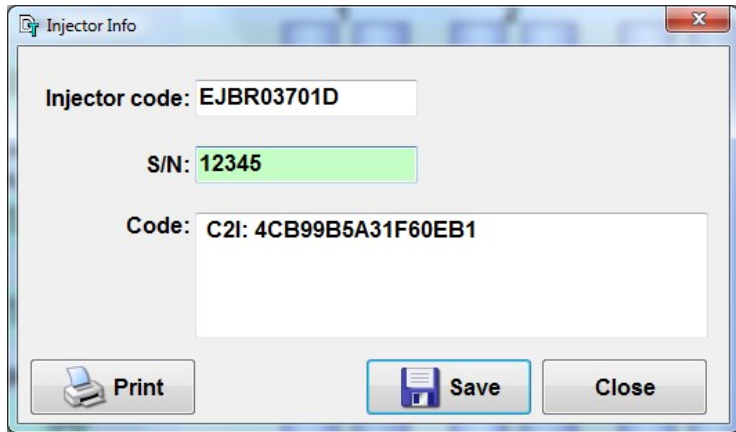
In the "S/N" entry field, you can enter the nozzle serial number or other information.

The "Code" field shows the code received, or a brief description of the error that made it impossible to obtain the code (e.g. one of the parameters is out of the operating range).

The data received can be saved in a test result file. To view previously retrieved codes select Code | Show C2I".

To retrieve the code it is necessary to close the test plan and repeat the coding procedure all over again.