Unit Injector and Pump Section Controller
UIS tester

OS.21-07

Data sheet. Technical description. user manual. Warranty card.

Contents

Introduction

This passport is a document certifying the basic parameters and technical characteristics of the device "UIS Tester for testing and checking the performance of pump-injectors and pump sections (hereinafter UI/UP) guaranteed by the manufacturer. This passport allows you to get acquainted with the device, the order and rules of its operation, compliance with which will ensure proper operation of the device.

1. Destination

Device "UISmulti" is designed to provide control signals of electric valve of pump injectors and pump sections of various systems and manufacturers to check their performance (shape and intensity of spray, volumetric capacity).

2. Main technical data and characteristics

- Power supply voltage: ~220 V ±15%;
- The value of the signal delay angle is 0 - 359 ^{0};
- The number of injections per minute is 100-1500;
- Measurement of the response time of an electric valve;
- Automatic control of the measuring unit drive;
- The built-in software can be independently updated various CAMBOX options available for adaptation

- Unit weight: 10 kg;
- Dimensions (length x width x height) mm - 365x320x110;
- The power consumption is up to 750 W.

3. Device design

On the front panel of the device there are: ON Tumbler, mains voltage indicator, connector "X1" - for connection of adapter cables connecting the device with UI/UP, connector "X2" for connection to the injection sensor (Fig. 1).
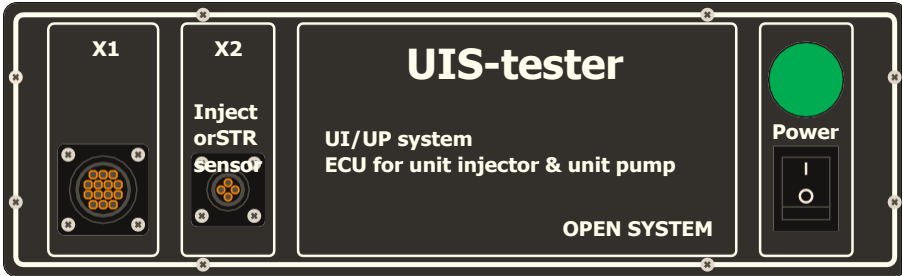
Figure   1.FrontPanel

Figure   2.Rear Panel

The rear panel of the device contains the connectors:

- USB-1-USB-3 - for connection to a personal computer;
- X8 - for connection of temperature sensors;
- X9 - for connection to a frequency converter;
- X10 - for connection to actuator sensors;
- X3-1 - for connecting an angle encoder (encoder);
- X4-1 - for connection of the speed sensor;
- X5 - for connection to the shutter relay;
- X7 - for connection to the heating/cooling control system;
- "NETWORK" for connection of mains supply ~220 V.

The"NETWORK"connectoris designed with a fuse and a power-off button (Fig. 3).

4. Operating instructions

Requirements for environmental conditions:

- operating temperature: +5 ºC to +40 ºC;
- Transport temperature: -20 ºC to +60 ºC;

- Relative humidity (non-condensing): working 8% - 80%, storage 5% - 95%;
- air dust content: not more than 75 µg/m ^{3};
- The air must be free of corrosive gases.

Before switching on the device it is necessary to check visually or by means of devices, serviceability of connectors-adapters, 220 volt power cable.

If the appliance is moved from a cold room to a warm room **Do not** switch on for 1-1.5 hours.

After switching on, allow the unit to run for 2-4 minutes and then start working.

Categorically forbidden:

- **switch on the device if the power supply cables are defective;**
- **Connect and disconnect the adapter plugs from the UI/UP solenoid valve while the unit is switched on.**

5. Limitation of liability

The manufacturer shall not be liable to the purchaser of this product or a third party for damages or losses incurred by purchasers or a third party due to improper use of the product, including inexpert or faulty operation of personnel, or for losses caused by acts or omissions of this device.

Under no circumstances will the manufacturer be liable for any lost profits, lost savings, losses due to accidents or other consequential economic losses, even if the company has been advised of the possibility of such losses. The manufacturer shall not be held liable for damages claimed by you based on third-party claims or caused by the failure to perform your obligations.

The manufacturer shall not be liable 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 conversion beyond the scope of the operating instructions, including the use of a self-made adapter plug.

6. Preparing for work

Read the operating instructions carefully before you start working with the "UISmulti" device.

When preparing the unit for operation, carry out the following steps:

Perform an external inspection of the device and connecting cables. External inspection of the device and connecting cables is carried out with power supply disconnected and consists in detection of mechanical damage of the device and connecting cables.

7. Working with the device

All control of the unit is performed by a personal computer using "ARM-Diesel" software package. Software description and sequence of operations are described below in this section.
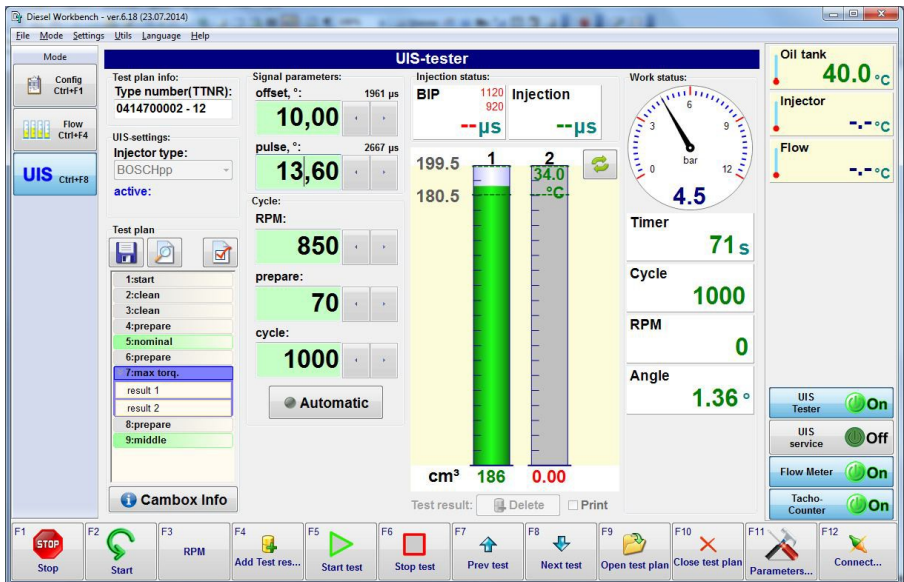

Figure 3. "ARMD diesel tester" program

The devices of the Diesel-Tester series are connected to the ARMD software:

"Flow Meter" is an automatic nonsensorless test fluid flow measurement system.

"UI/UP-Tester" - diagnostics of pump injectors and single pumps of "UI", "UP" system by built-in or created test plans.

"Tacho-Counter" - stand control, drive control, speed setting.

7.1. System Requirements

The ARMD program runs on Windows XP and newer versions.

Minimum PC configuration:

- **1600 MHz or higher processor;**
- **Screen mode 1024x768 (32 bit), 1280x1024 recommended**
- **About 40 MB of disk space to install the program**

7.2. Connecting devices and installing drivers

The devices of the "Diesel-Tester" series are connected to a PC via a USB port (in some cases the COM port can be used).

Before the first connection, you need to install the USB drivers. Depending on the instrument type, you need to run the installer program to install the driver :

- **`"FTDI_CDMxxxxxxx.exe"` or `"CDMxxxxxxx.exe"` - USB controller manufactured by FTDI (you must connect the device to USB when you first install the driver)**

When the instrument is connected to a USB port, a virtual COM port appears in the system and is used to communicate with the software. You can change the port number in Windows XP system using "Device Manager".

8. Program settings

The program settings are called from the "Settings | Device Settings" menu. The Connection settings dialog box opens (Figure 2,3,4).
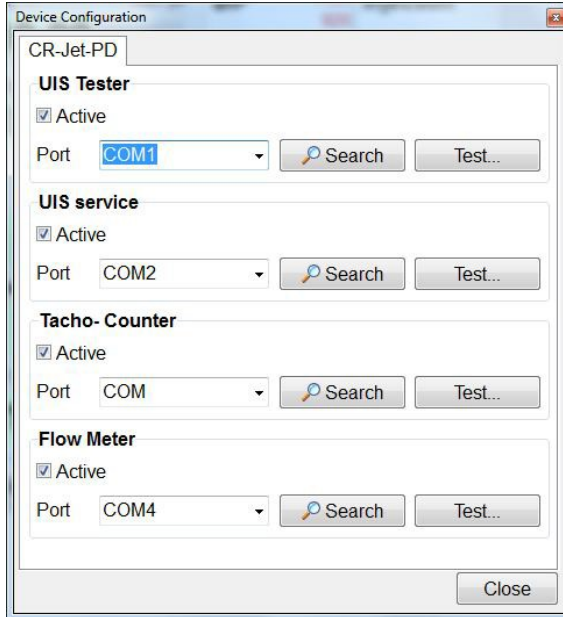
Figure 4: Device configuration window

✓ *The "Settings | Device Settings" line denotes the menu "Settings", submenu "Device Settings". Such designation of menu commands will be used further in the text.*

Before performing the setup, connect all instruments to the PC USB ports and power up the test bench.

For each device, you must set the parameters in the corresponding field:

Active. Set if the device is used in the system.

Port. Selects the port number. The drop-down list shows all the ports that are present in the system.

Search. Automatically searches for the port the unit is connected to. When the search is completed - the result will be displayed. If the device is detected - all parameters of the port are automatically configured.

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

9. Working with software

At start of software "ARMD" the main program window opens (see Figure 1).

On the left side is the "Mode" panel. It allows selecting different modes of operation. The selection is made with the mouse or the key combinations Ctrl+F1...Ctrl+F7. Depending on the set of connected devices the set of modes can change.

On the right side there are indicators of temperatures and some parameters of the bench operation, as well as buttons-indicators of connection to the devices.

At the bottom there are control buttons. Their function changes depending on the selected mode. Press the "mouse" or keys F1...F12.

The central part displays information depending on the selected mode.

9.1. Connecting to devices

To connect to the devices, click on the corresponding indicator buttons on the right side of the main window. The states of the indicator buttons (see Figure 3):

Bright green "glow", green **"On"** inscription, the button is pressed - communication with the device is established (the "Sensors" button in the figure).

Dull **"Off"** inscription, button depressed - no connection

Bright red "glow", red **"Err"** inscription, button pressed - 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 with additional information about the error pops up.

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, the device must be switched on.

9.2. UI/UP-tester" mode

The ARMD software allows full control of the instrument "UI/UP" and nondischargeable measurement system. Test-plans for diagnostics of pump-injectors and single pumps (PLD sections) are supplied in the package.

Figure 5. UI/UP-Tester mode for 4-pin NFs

The program shows full information about the current status "UI/UP-tester" and controls all signal parameters. It allows selecting the operation mode "Test Mode", injector type "Injector type". Operation errors are displayed on the pop-up panel on the right side of the program window.

Figure 3 shows the operation mode with 4-pin nozzles. In this mode additional signal parameters are added: "NCV offset", "NCV pulce".

During the test the BIP value - measured valve lift time in µs is displayed.

If a test plan is connected - it displays parameters of the selected nozzle 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 description of work with test plans, see *"Test plan management"* subsection.
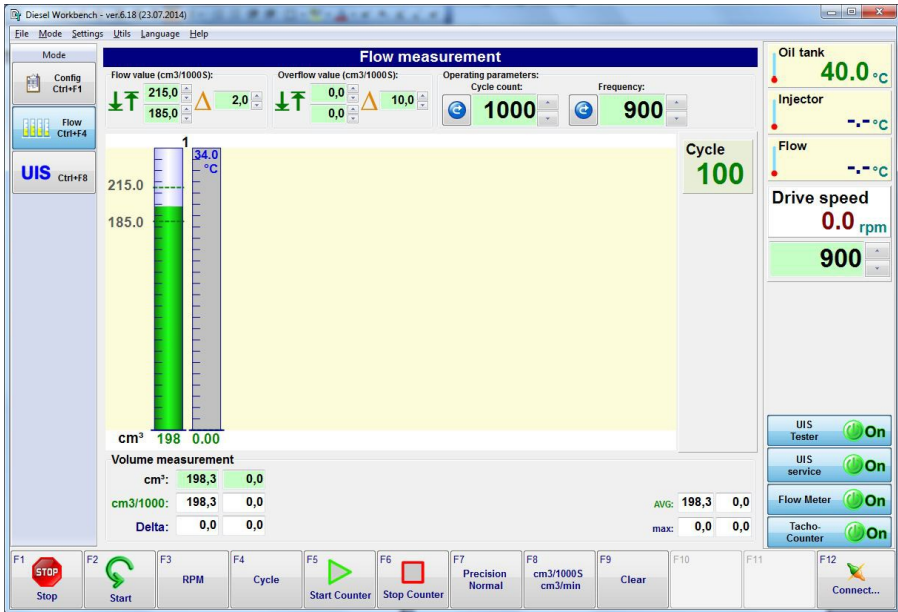
Figure 6. UI/UP-Tester mode - direct "no-arms" control

The left part of the window displays a list of test points. If the test plan is selected, you can start its execution (Start-F5).

The program can be operated in the measuring mode for filling the measuring cylinder. For this purpose, "Flow Meter" must be disabled. In this mode, the program allows you to automate both control and setting the signal on the device "UI/UP-Tester", and simplify the formation of reports. To generate the report - after completing the test press the button

"F4 Add test result". The Add test result window will be opened (see Figure 5), where you enter the reading from the beakers and the number of measurement tests. The result is displayed on the main program window (in cm ^{3}/1000 cycles according to the test plan).
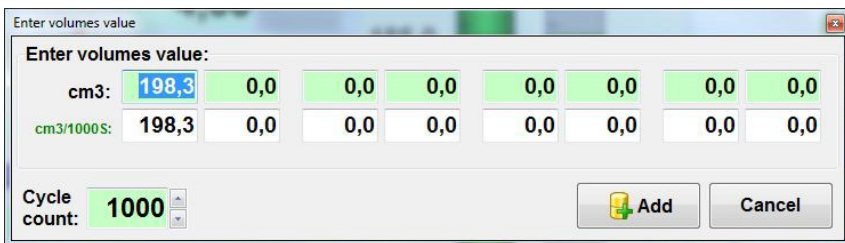

Figure 7. Adding measurement results in manual mode

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If a "no-change" measurement system is connected - the tests are performed sequentially from the current one to the last one in automatic mode. The results are displayed in cm ^{3}/1000 cycles. To end the current test ahead of time - press the "F8 Next Test" button. Or press
"F6 Stop Test", select the desired test point and restart the test.

9.3. Management of test plans

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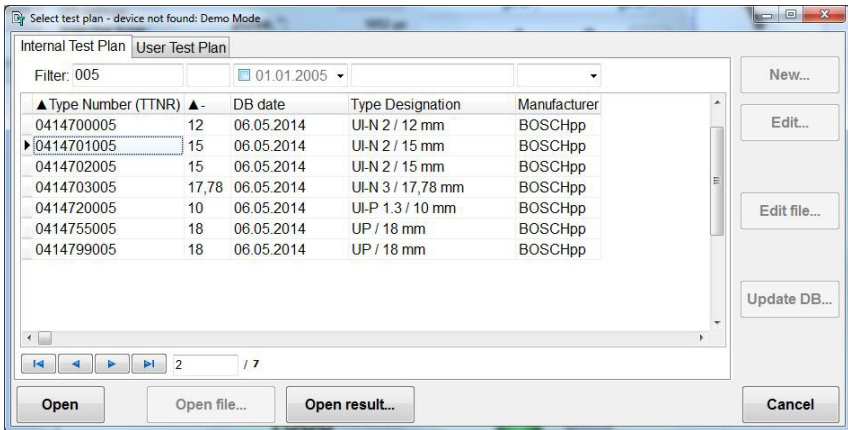

Figure 8. Selection of standard test plans

As shown in the figure, 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 field, or partially, in this case instead of missing characters enter the symbol "*" or "?". In the picture you have entered the Filter for "005", the result will be that only the numbers, ending with "020", will be displayed.

The user also has the ability to enter test plans on their own. To do this, switch to the tab "User Test Plan" (see Figure 7).
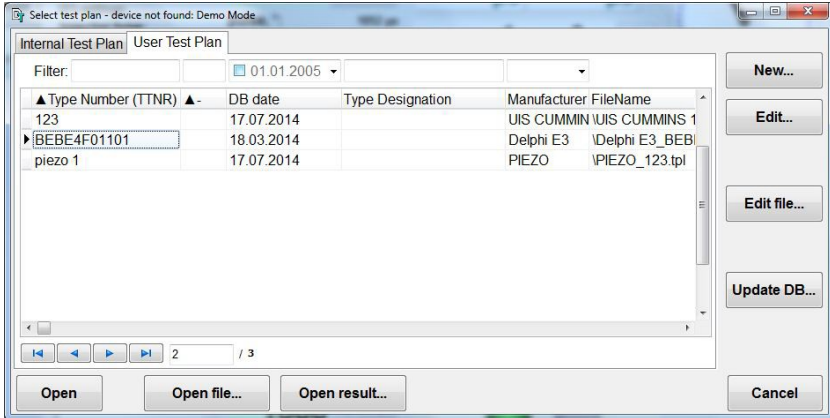
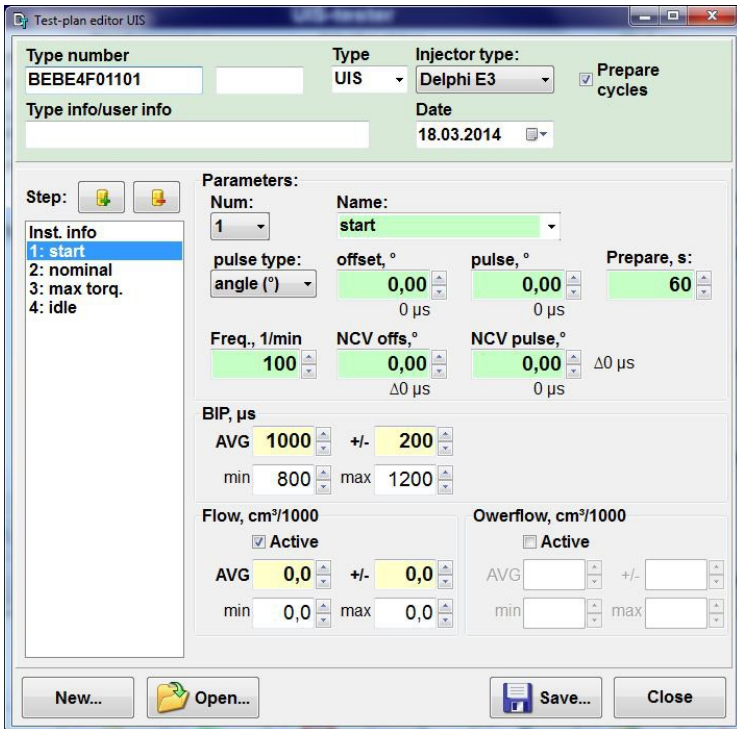Figure 9. Custom test plans

Figure 10. Test-plan editor (4-pin nozzle)

In this mode the commands for editing, creation of new test plans are available. By default, new test plans are stored in the subdirectory

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"UserTP_UIS", which is located in the root directory of the "Diesel Workbench", they will then be displayed in the table. Button
"Update DB" performs a list update If the file is located in another directory, it can be opened by pressing the "Open file" button.

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

9.4. Flow measure mode

The "Flow measure" operating mode is used for manual operation of the bezzer as well as for operation on a universal stand.
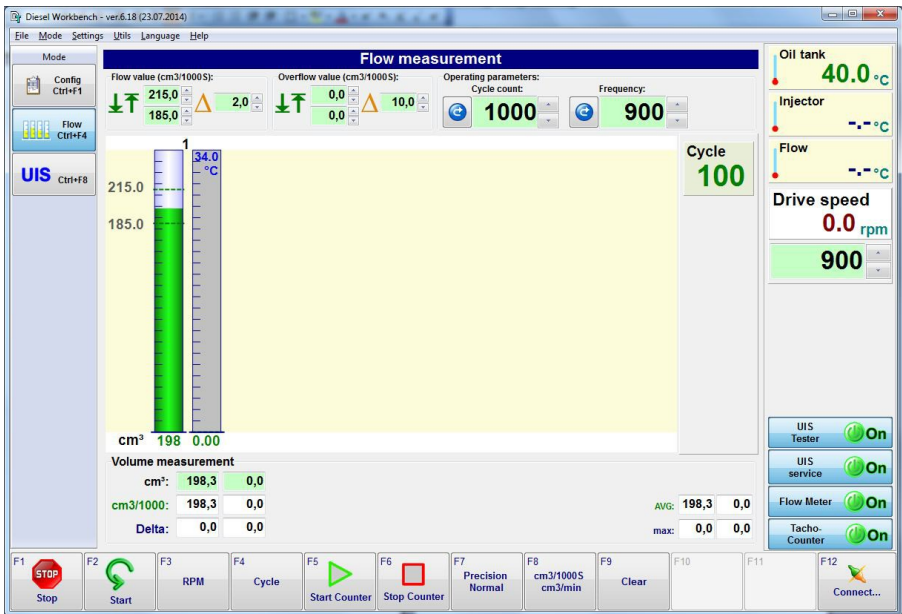

Figure 11.

This mode is used to measure the test fluid flow. The measurement is performed manually or automatically (provided the Flow Meter mandrel-free measuring system is connected).

To run 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. At

The diagram shows the measured quantity of test liquid (in manual mode - the 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.) change.

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

Precision High is for 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 for the entire measurement cycle.

9.5. Additional instrument setup

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

The setting commands are called from the "Settings" menu. To call the settings - the instrument must be connected and activated in the program "Diesel Workbench."

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

FlowMeter

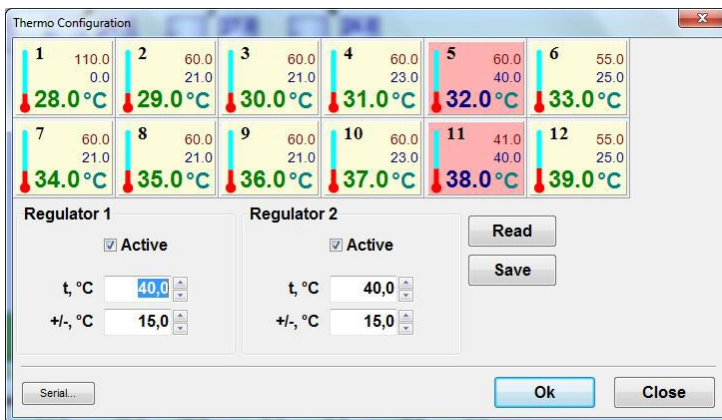The "FlowMetter" bezel-less filling measurement device can be used for temperature measurement.

Figure 12.

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.

Buttons "Read" and "Save" - respectively read and write the current parameters of controllers.
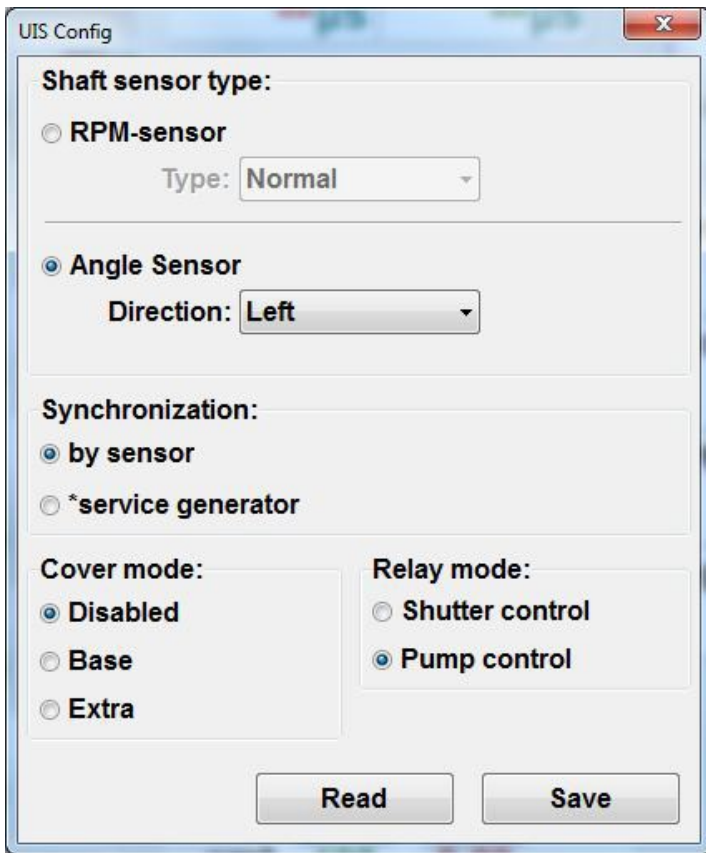
UI/UP-Tester

Figure 13.

Operation mode from RPM Sensor or Angle Sensor, synchronization mode (used for bench and instrument testing), safety guard sensor mode, control relay operation mode (curtain or booster pump control) can be selected for operation on other test benches.

Buttons "Read" and "Save" - respectively read and write the current parameters.
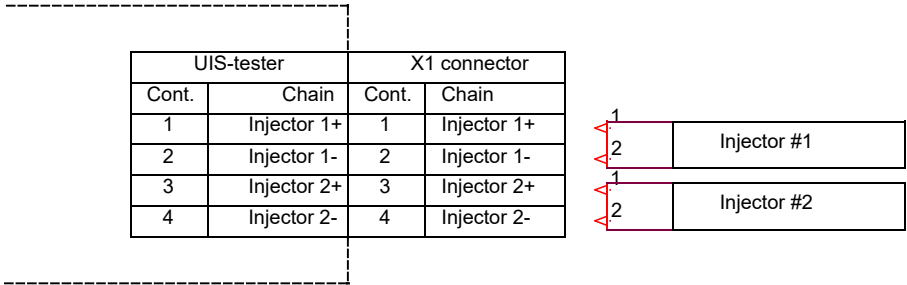
Appendix 1 X1 connector pinout

UIS-tester		X1 connector	
Cont.	Chain	Cont.	Chain
1	Injector 1+	1	Injector 1+
2	Injector 1-	2	Injector 1-
3	Injector 2+	3	Injector 2+
4	Injector 2-	4	Injector 2-

Figure 14. Nozzle connection connector

Appendix No. 2 X2 connector pinout

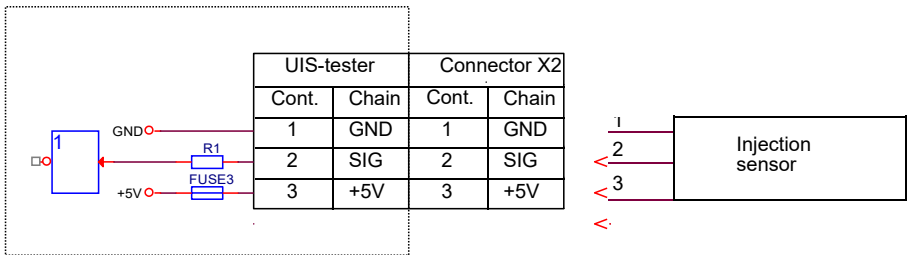| UIS-tester		Connector X2	
Cont.	Chain	Cont.	Chain
1	GND	1	GND
2	SIG	2	SIG
3	+5V	3	+5V

Figure 15. Injection sensor connection connector

Appendix No. 3 Connector pinout X3-1

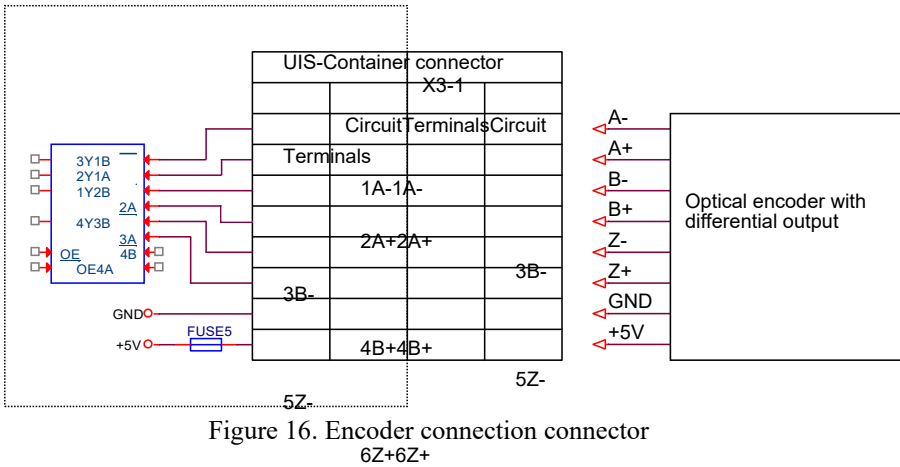Figure 16. Encoder connection connector
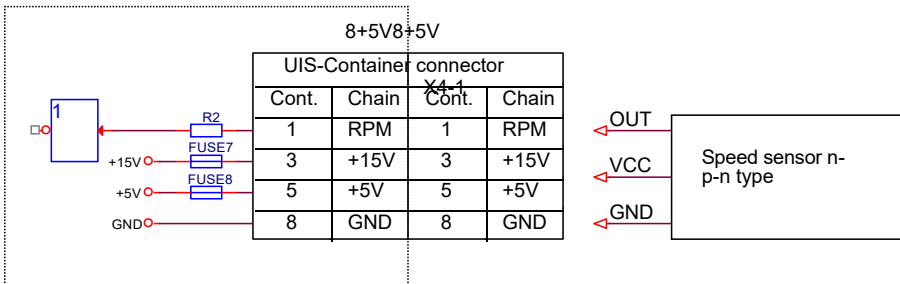
Appendix No. 4 Connector pinout X4-1

Figure 17. Speed sensor connection connector

Appendix No. 5 X5 connector pinout

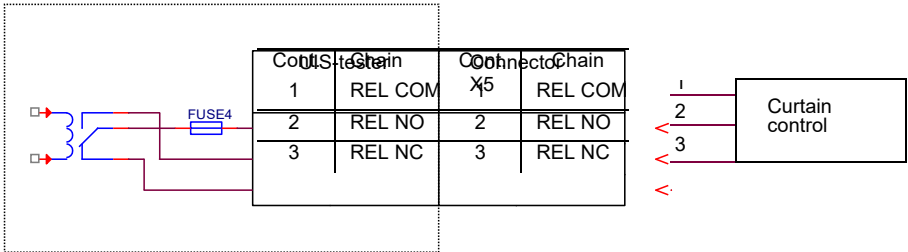| UIS-tester		Connector X5			
Cont.	Chain	Cont.	Chain		
1	REL COM	1	REL COM		
2	REL NO	2	REL NO		
3	REL NC	3	REL NC		

Figure 18. Connector to the curtain control relay

In series with the common contact of the relay, a 5A fuse is installed in the device. If the current consumption is higher, an intermediate relay must be installed.

Appendix No. 6 X7 connector pinout

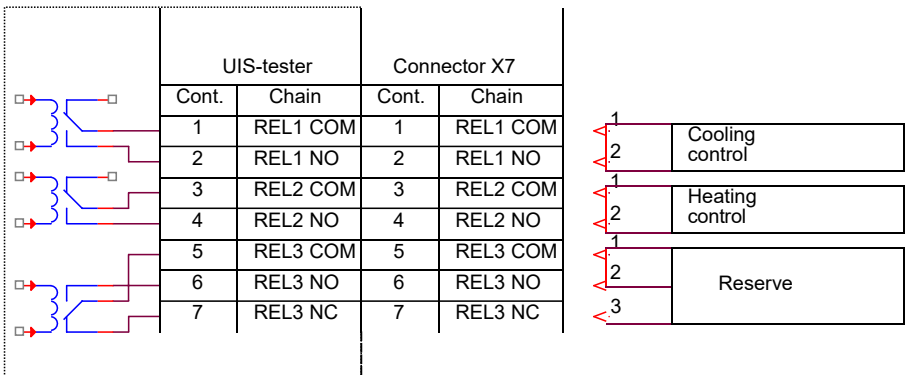| UIS-tester		Connector X7	
Cont.	Chain	Cont.	Chain
1	REL1 COM	1	REL1 COM
2	REL1 NO	2	REL1 NO
3	REL2 COM	3	REL2 COM
4	REL2 NO	4	REL2 NO
5	REL3 COM	5	REL3 COM
6	REL3 NO	6	REL3 NO
7	REL3 NC	7	REL3 NC

Figure 19. Burner control/cooling connection connector
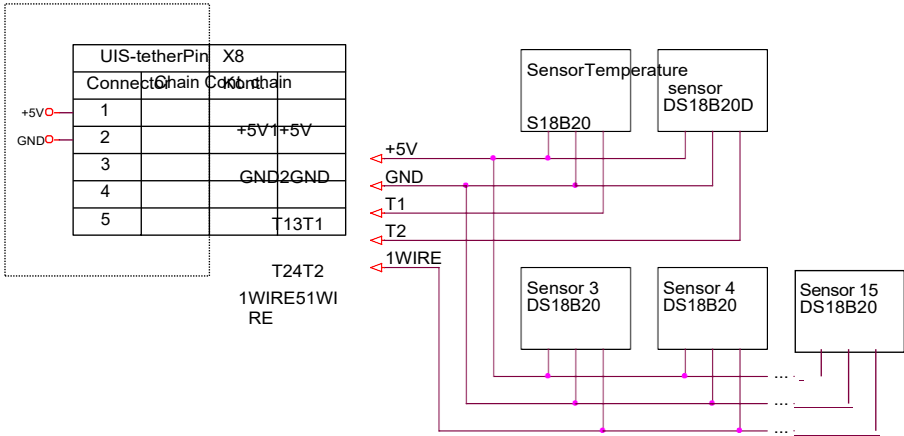
Appendix No. 7 Connector pinout X8

Figure 20. Temperature sensor connector

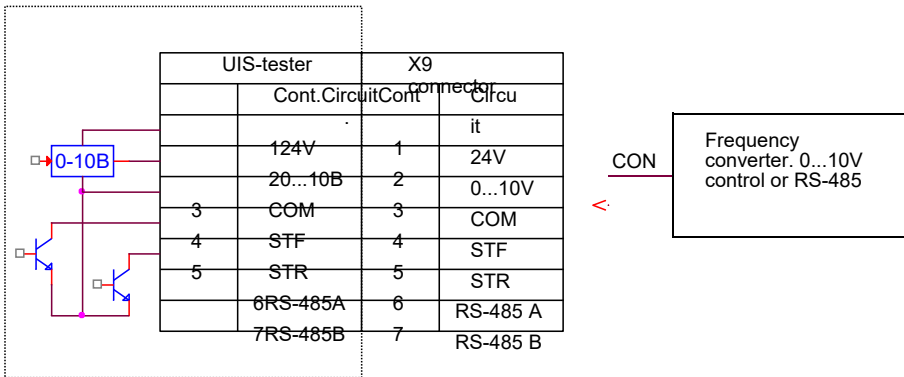## Appendix No. 8 Connector pinout X9

Figure 21. Frequency converter connection socket

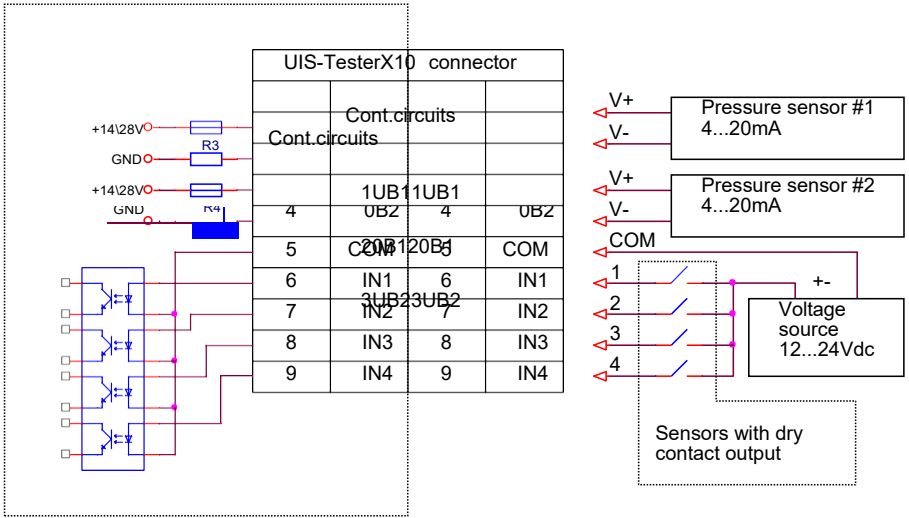22

Appendix No. 9 X10 connector pinout

Figure 22. Connector for connecting actuator sensors

10. Scope of delivery

Passport OS.21-07. (Technical description, operating instructions) 1 pc.

Controller OS.21-07 1 pc.

Adapter cable to connect to UI/UP 4 pcs.
X5 cable for connection to the curtain control unit 1 pc.

X7 cable for connection to the heating/cooling unit 1 pc.

X9 cable for connection to frequency converter, analog control 1 pc.
X10 cable for connection to sensors actuators 1 pc.

Temperature sensor DS18B20 1 pcs.
Speed sensor (or encoder) 1 pc.
Power supply cable 220V 1 pc.

Fuse 5A 1 pcs.
PC communication cable 3 pcs.

11. Warranty obligations

The manufacturer guarantees the stable operation of the device "UIS Tester" when the owner observes the rules of storage and operation set out in this passport.

The warranty period is set by the manufacturer - 24 months from the date of receipt of the product, with the exception of cases specifically agreed by the manufacturer and the buyer in the additional contract.

The manufacturer marks in the warranty card the year, month, day of sale, legal address, telephone of the company providing the warranty repair (the warranty card is enclosed to the passport of the device "UISTester").

During the warranty period the owner is entitled to a free repair on presentation of this passport and the warranty card. After repair, the list of troubleshooting works shall be recorded in the warranty card.

The following is not a reason for complaint: breach of integrity of connecting wires (cables-adapters).

The manufacturer does not guarantee the device "UIS Tester" in the following cases: opening of the device "UIS Tester" housing, traces of damage on the housing and the "UIS Tester" board, in case of non-compliance with the rules of storage and operation of the device.

Without the warranty card and in case of violation of the seals on the product, no claims to the quality of work and warranty repair will be made.

During the warranty period set for the product, repairs will be made at the owner's expense if the product is not operated in accordance with these operating instructions.

The manufacturer provides further repairs to the device "UISmulti", after the end of the warranty period under a separate contract.

Appendix No. 4 Warranty card

Warranty card No.

Device "UIS Tester" OS.21-07 for testing and checking the performance of pump injectors and pump sections.

Warranty repair and maintence of the UIS Tester controller

is performed by the company

_____.

Address _____

tel. _____

fax. _____

Date of sale "_____

For the records.

Appendix No. 5 Tear-off coupons
Tear-off coupon #1

The address of the organization that performed the repair:_____

_____

Date of repair execution:_____

Fault detected:

_____

Signed by the master:_____
The seal of the repair organization:_____

_____

Tear-off coupon No. 2

The address of the organization that performed the repair:_____

_____

Date of repair execution:_____

Fault detected:

_____

Signed by the master:_____
The seal of the repair organization:_____

_____

Tear-off coupon #3

The address of the organization that performed the repair:_____

_____

Date of repair execution:_____

Fault detected:

_____

Signed by the master:_____
The seal of the repair organization:_____

_____

Device Name: _____

Device code: _____

Serial number: _____

Declared malfunction: _____

_____

_____

_____

Device Name: _____

Device code: _____

Serial number: _____

Declared malfunction: _____

_____

_____

_____

Device Name: _____

Device code: _____

Serial number: _____

Declared malfunction: _____

_____

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