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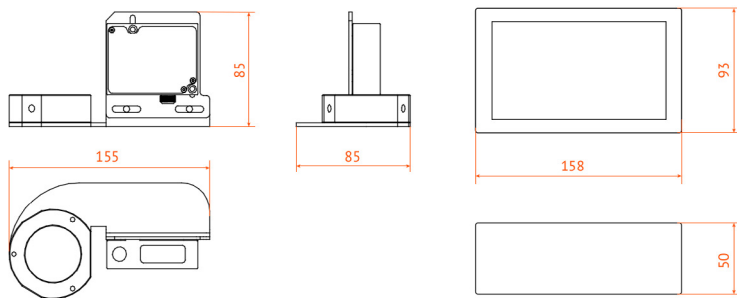
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1 Intended use

1.1 Electronic statoscope ES-15 (hereinafter ES) is designed to accurately determine the position (height) of the piston(s) when working with deadweight gauges, when calibrating deadweight gauges, as well as measurement of piston lowering speed (for reference). Depending from the performed task it can be equipped with one or two laser sensors RF603.

2 Technical specifications

Piston movement measurement range	0...15 mm
Limit of permissible basic measurement error	±0.04 mm
Sensor resolution	0.01 mm
Power supply	220V/50 Hz
Weight of information display device (with power supply), not more than	400 (600) g
Weight of laser sensor (with bracket), not more than	120 (600) g
Overall dimensions: laser sensor with bracket and information display device:	



3 Delivery package

1	Information display device	1
2	Power supply 12 V	1
3	Laser sensor RF603	1 (2) ¹
4	Laser sensor mount bracket	1 (2) ¹
5	Operating Manual	1
6	Passport for laser sensor	1
7	Laser sensor Calibration Certificate	1 (2) ¹

¹ Depending on the configuration.

4 Design and function

4.1 Outside view of the device is shown at Fig. 1.

4.2 The electronic statoscope shall be mounted on the base of the pressure generating device (USD): each of the two laser sensors is placed under the weight hanger. The information display device can be installed directly on the basis of the USD or next to the USD (on the table, shelf, etc.).



Figure 1.

The information display device has a switch on the housing, a power connector 5 mm (12V), two connectors for laser sensors RF603 and 5 inch-touch display.

5 Safety precautions

Attention. This section is aimed at ensuring the safe operation of personnel, safe-keeping and integrity of ES and accesories used with this device.

5.1 *It is prohibited* to use the device for work not specified in this manual.

5.2 Before installing the measuring instruments on test, make sure they are clean and serviceable.

5.3 It is prohibited to use ES with a power supply other than 12 V.

Attention. Laser sensors pose a danger to vision, avoid laser beam contact when working. (laser safety class 3R according to IEC 60825-1:2007).

6 Preparation for work

6.1 Unpack the device.

6.2 If the ES has been stored or transported at a temperature below 0°C, it shall be kept in laboratory conditions for at least one hour.

6.3 Install the laser sensors on the supports of the deadweight device by means of brackets. Recommended mounting height at a distance from the top edge of the sensor to the lower position of the weight hanger is 15-20mm (Fig. 2).

6.4 Connect the laser sensors to the appropriate connectors of the information display device by means of cables.

6.5 Connect the power cable to the 12V connector of the information display device and the power supply to the 220V network.

6.6 Turn on the power toggle switch.



Figure 2.

7 Operating procedure

7.1 Screen 1 (Fig. 3) appears on the display when the power is switched on.

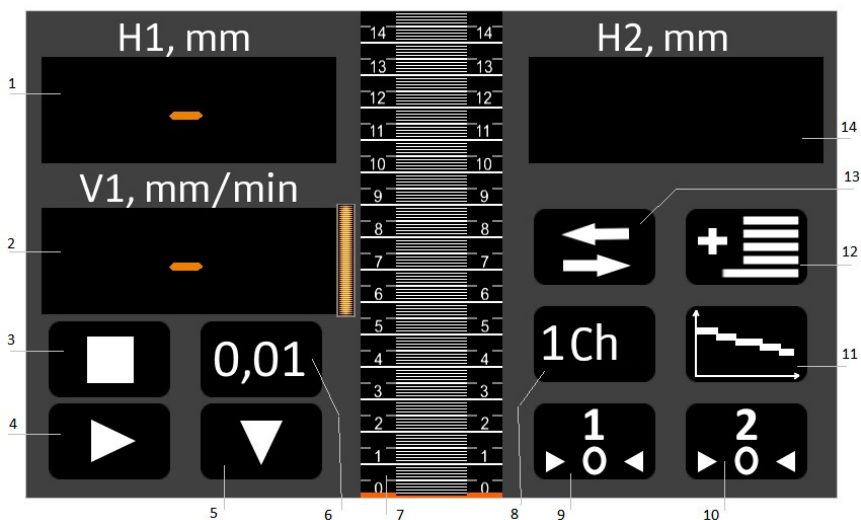


Figure 3. Screen 1 shows:

- 1— Height output window from the first sensor; 2 — Drop rate output window from the first sensor; 3 — Stop button; 4 — Height measurement start button;
- 5 — Down rate calculation start button; 6 — Precision mode selection button 0.01-0.1mm; 7 — Height display scales of 1 and 2 sensors; 8 — 2 channel measurement switch on button; 9 - First channel zero setting button;
- 10 — Second channel zero setting button; 11 — 1 channel drop chart output mode (go to screen 2) turn on; 12 — Scale view change button: with a range of 0...15mm or -7...+7mm; 13 — Screen mirror reflection button (left to right);
- 14 — Height output window from the second sensor (accuracy 0.01 mm).

7.2 To start the height measurement press the button 4 — the numeric value will appear in window 1. If you want to measure two heights — press button 8 (turn on channel 2), then press button 4 — the numeric values will appear in windows 1 and 14. Press button 3 to stop the measurement.

7.3 Press button 5 to start the measurement of the lowering rate of the first piston (where sensor 1 is installed). The measurement of the lowering rate lasts 15 seconds (the measurement process is displayed on the analog scale next to window 2). The speed value is displayed in window 2 in mm/min (that is, the speed measured in 15 seconds is multiplied by 4). During

the speed measurement, the buttons are not questioned. Press button 3 to stop the measurement.

7.4 To select the accuracy of information display, press button 6.

7.5 To set zero of the first (or second) sensor press button 9 (or 10 respectively) – ES will record the current height value, display it above window 1 (or window 14 respectively) and further calculation of the height will produce from the recorded value. When you press button 9 (10) again, the recorded value of setting zero will be reset and ES will output the absolute value of height measured by the sensor.

7.6 If you want to work in two directions from the middle position of the piston, install the piston to the middle position, perform zero setting, press button 12 – scale 7 will change the display range from 0...15mm to -7...7mm.

7.7 For ease of use, the screen can be mirrored from left to right by pressing button 13.

7.8 Pressing the 11 button moves to Screen 2 (Fig. 4).

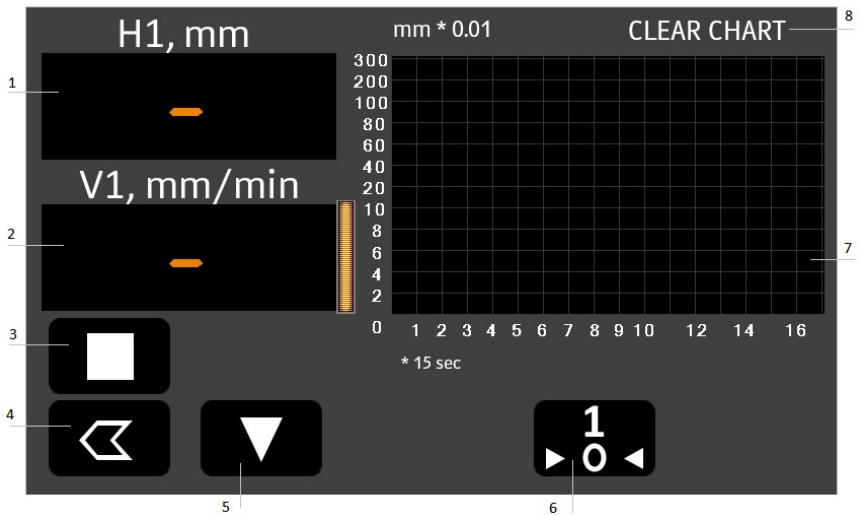


Figure 4. Screen 2 shows:

- 1 – Height output window from the first sensor;
- 2 – Drop rate output window from the first sensor;
- 3 – Stop button;
- 4 – Switch to 1 screen;
- 5 – Down rate calculation start button;
- 6 – Zero setting button;
- 7 – Drop rate chart plotting window;
- 8 – Chart clearing button;

7.9 When pressing button 5, the lowering speed of the 1st sensor is measured, similar to the first screen, in addition to this speed values are displayed on the chart in window 7 (every 15 seconds). On the chart the value is displayed in $\text{mm} \cdot 10^{-2}$. Vertical axis is nonlinear – has three ranges: from 0 to 10, from 10 to 100 and from 100 to $300 \text{mm} \cdot 10^{-2}$, the chart on these ranges is scaled.

7.10 To clear the chart, press button 8.

7.11 Press button 4 to return to Screen 1.

Note. Operating range of laser sensor: 0... 15mm, with the beginning of measurement at a distance of 15mm from the edge of the sensor. When you exit this range, ES displays zero on the screen.

8 Maintenance and calibration

8.1 ES does not require any special maintenance.

8.2 The information display device is not subject to calibration.

8.3 Laser sensors RF603 shall be verified by the manufacturer. The calibration period is 1 year.

9 Storage and transportation

9.1 When storing the ES in laboratory conditions, it is necessary to wipe it with a clean rag and cover with a polyethylene cover. Or store in a manufacturer package.

9.2 Store ES in a dry room at air temperature $-20...+70$ °C and relative humidity not exceeding 80%.

9.3 Transportation at an air temperature of $-20...+70$ °C and relative humidity not higher than 80%.

10 Possible malfunctions and solutions

Malfunction	Cause of malfunction	Solution
The piston height value is not displayed	The laser sensor cable is not connected to the information display device or connected to another connector	Connect the laser sensor cable to the desired connector on the information display device
	Laser sensor “does not see” target	Clear the optical elements of the laser sensor. Install the laser sensor so that the distance to the bottom surface of the weight hanger is 15... 20 mm.
	The laser sensor or its cable is faulty	Replace sensor with cable or repair by manufacturer

11 Warranty

11.1 The manufacturer guarantees operation of the ES under conditions of operation, storage, transportation.

11.2 The warranty period of operation is 18 months from the date of commissioning of the ES.

11.3 Warranty period for warehouse storage is 6 months.

11.4 Average service life of the ES is not less than 8 years.

11.5 The warranty does not cover defects caused by the consumer’s fault or damage to the packaging during transportation.

12 Complaint details

In case of a malfunction, draw up a certificate of repair necessity and send it to: LLC “Alfapascal”, 2nd Paveletskaya Str., 36, Chelyabinsk, 454047, tel.: +7 (351) 725-74-50, e-mail: q@alfapascal.ru

13 Acceptance Certificate

Electronic Statoscope ES-15 factory number _____ corresponds to KD 070.00.000 and is recognized as fit for operation.

Date of manufacture _____

Person in charge _____

Signature

Surname

LS

14 Packaging Certificate

Electronic Statoscope ES-15 factory number _____ was packed by LLC "Alfapascal" in accordance with KD 070.00.000.

Packing date

Person in charge _____
Signature Surname

LS

15 Note

The manufacturer reserves the right to make changes to the design of the ES that do not affect its basic characteristics without further notice.