

**STEERING COLUMN MADE BY
Scientific-Production Enterprise “REZONANS” LLC**

**AMENDMENT
to the Operation Manual of KIROVETS Tractors
K-744R1, K-744R2, K-744R3, K-744R4
(744P-0000010ИЭ)**

ATTENTION! Steering column KR101 made by SPE “Rezonans” LLC is installed on your tractor.

LAYOUT OF BUTTONS AND INDICATION ELEMENTS

External view of the instrument panel is given on the Fig. 1. Purpose of push buttons and elements of the instrument panel is given in the Table 1.



Fig. 1 — External view of the instrument panel

Table 1 — Purpose of push buttons and elements of the instrument panel

Pos.	Description
1	"Menu" button allows to: <ul style="list-style-type: none">– proceed to reading the parameters recorder;– proceed to system adjustment;– exit from menu.
2	"Return" button allows to: <ul style="list-style-type: none">– go to the main screen;– go to the previous menu level;– in the menu, move the cursor to the left when editing a parameter and exit from the parameter editing mode.
3	"Enter" button allows to: <ul style="list-style-type: none">– select a menu item;– enter the changed parameter value in the menu or perform a specified action; move the cursor to the right when editing a parameter.
4	Main display of the instrument panel
5	"Up" button allows to: <ul style="list-style-type: none">– move the cursor to the top menu bar; increase the value of the variable parameter.
6	"Down" button allows to: <ul style="list-style-type: none">– move the cursor to the bottom menu line;– reduce the value of a changed parameter.

DESCRIPTION OF GRAPHIC INTERFACE

The main screen of the instrument panel (hereinafter simply referred to as display or IP) consists of two parts (see Fig. 2):

- status line located at the bottom of the display;
- main display area containing indicators, digital parameter values and information icons.



The purpose of the interface elements is given in the Table 2.



Fig. 2 – External view of the main screen of instrument panel display.















Table 2 – Elements of graphic interface




















Pos.	Description
1	Information and warning icons (see description below)
2	Pointer indicator "Temperature of cooling fluid"
3	Pointer indicator "IC engine rotation speed"
4	Pointer indicator "Oil pressure in GB"
5	Indicator of warning messages and their number
6	Operating time in engine hours
7	Indicator "Pressure in pneumatic system"

Pos.	Description
8	Message line
9	Digital value "Machine motion speed"
10	Pointer indicator "Fuel level"
11	Indicator "Oil pressure in engine"
12	Value of machine total haul
13	Tray with icons  - USB storage is connected  - adjustment mode

Description of information and warning icons is given in the Table 3.

Table 3 – Description of icons

Icon	Name of icon	Icon	Name of icon
	Neutral of GB modes		Maintenance
	Parking brake		"Engine fault" lamp
	Critical temperature of cooling fluid		Thermostat on lamp
	Air filter clogging		"Heater" lamp
	Critical temperature in hydraulic system		Marker lights
	GB filter is clogged		Low-beam headlamp
	Emergency pressure of engine oil		High-beam headlamp

	Critical temperature of engine oil		Actuation of brakes
	Engine oil filter is clogged		Emergency pressure of GB oil
	Steering system filter is clogged		Rear axle engagement
	Pressure filter is clogged		Battery charging
	Attached implements filter is clogged		Emergency air pressure in II circuit of braking system
	Drain filter clogging		Emergency air pressure in I circuit of braking system
	Abnormal oil level in hydraulic tank		Left turn indicator
	Right turn indicator		Blocking of hydraulic converter
	Cooling fluid low level		Water in fuel
	Cold starting		

The indicator bars 7 and 11 change their color from normal green to red when the value goes beyond the allowed range. The zones of permissible values are depicted in gray lines along the bars, and the zones of non-permissible values are shown in red lines.

INDICATION BLOCK MENU

Main menu of display is shown on the Fig. 3.



Fig. 3. Main menu of display.

Main menu of display contains the following items:

- Condition of the machine;
- Display adjustment;
- System adjustment;
- About the system.

Machine status

The screen with information on the current values of the system sensors, information on the operating hours of the machine and voltage on battery is called up from the menu item "Machine status". Table 4 contains an example of the data displayed on the screen.

Table 4. Example of the data displayed on the screen "Machine status"

Engine RPM speed	1234 rpm
Temperature of cooling fluid	85°C
Engine oil pressure	4.6 kgf/cm ²
Battery voltage	25.9 V
GB oil pressure	12.6 kgf/cm ²
Oil temperature after hydraulic converter	70°C
Air pressure in PS	8.3 kgf/cm ²
Fuel level	34%
Operating time	453.0 h
Total haul	200 km

Display adjustment

“Display adjustment” menu section consists of the following items:

- Display backlighting;
- Volume;
- Language.

System adjustment

The menu section allows to adjust the system, update software and read the data of parameter recorder.

The section consists of the following items:

- Software update;
- Password entry.

Default password for service mode — 8888. After entering the correct password, the “System adjustment” will take the following view:

- Software update;
- Perform maintenance;
- Export of parameter recorder;
- Machine model
- Date of manufacture;
- Type of propulsion device;
- Type of engine;
- Generator;
- GB pressure sensor;
- Fuel sensor
- Terminator CAN;
- System of measures;
- Date and time.

Software update

To update the software, you need to connect a USB storage with software to the USB connector of the display. Enter in the item “Software Update” and use buttons 1 and 2 to select the required software and press button 3. The program file format *.prc is used for the display. At the end of the software update, the display will reboot and after a short time it will load with updated program.

Attention! In order to avoid display failure, it is prohibited to turn off power of the display during software update (before rebooting).

Perform maintenance

The menu item allows to reset the state of the “Maintenance” indicator.

Export of parameter recorder

In the item “Export RP”, the data of the built-in parameter recorder is saved to the connected USB-storage. Format of saved file is *.lgk. To read the parameter log file, the LogSystem program is used.

Machine model

The menu item allows to set the name of machine model. When entering, Latin and Cyrillic alphabets are available, as well as numbers and symbols “/”, “-”, “(”, “)”, “.”, “:”.

Date of manufacture

The menu item allows to set the date of production of the machine.

Type of propulsion device

The menu item allows to select the type of tractor propulsion: wheeled or caterpillar. When changing the type of propulsion, the number of impulses of the speed sensor per 1 km changes, which depends on the selected type of engine. For details, see Table 5 line "Conversion factor for speed sensor".

Type of engine

The menu item allows to select the engine type: 1-YMZ, 2-TMZ, 3-Merc (CAN), 4-YMZ Tier-3a+ZF, 5-Altay. When choosing a particular type of engine there is a change in the logic of IP operation, as well as other parameters may change. Below is Table 5 with the features of IP operation when choosing different types of engines.

Table 5. Features of IP operation when choosing different types of engines

Type of engine/parameter	YMZ	TMZ	Merc (CAN)	YMZ Tier-3a+ZF	Altay
Engine RPM speed	Frequency input	Frequency input	CAN	CAN	Frequency input
Engine oil pressure	Resistive sensor	Resistive sensor	CAN	CAN	Resistive sensor
Temperature of cooling fluid	Resistive sensor	Resistive sensor	CAN	CAN	Resistive sensor
Oil temperature after hydraulic converter	-	-	-	CAN	-
Engine loading	-	-	CAN	CAN	-
Icon "Critical temperature of cooling fluid"	Discrete input	Discrete input	CAN	CF temp > 103 C	Discrete input
Icon "Emergency pressure of engine oil"	Discrete input	Discrete input	CAN	P > 8.0 Bar; P < 1.0 Bar	Discrete input
Icon "Low cooling fluid level"	-	-	-	CAN	-
Icon "Steering system filter clogged"	Discrete input	Discrete input	Discrete input		Discrete input
Icon "Pressure filter clogged"	-	-	-	Discrete input	-
Icon "Drain filter clogged"	-	-	-	Discrete input	-
Icon "Filter of mounted implements clogged"	Discrete input	Discrete input	Discrete input		Discrete input
Icon "GB filter clogged"	Discrete input	Discrete input	Discrete input	CAN	Discrete input
Icon "Engine fault"	Discrete input	Discrete input	Discrete input	CAN	Discrete input
Icon "Water in fuel"	-	-	-	CAN	-
Icon "Cold starting"	-	-	-	CAN	-

Icon "Blocking of hydraulic converter"	-	-	-	CAN	-
Transmission ratio between generator pulley and engine pulley	3.67	2.57			2.33
Terminator CAN	-	-	On	Off	-
Scale of pointer instrument "GB pressure"	16 Bar	16 Bar	16 Bar	24 Bar	16 Bar
Type of GB pressure sensor	No change	No change	No change	Absolute, range 25 bar	No change
Conversion factor for speed sensor*	90/124 thousand	90/124 thousand	90/124 thousand	200/124 thousand	90/124 thousand

* depends on the selected tractor propulsion type: wheeled/caterpillar

Generator

The item allows to set the transmission ratio between generator pulley and engine pulley. The parameter affects the value of the displayed internal combustion engine rpm speed in case the selected engine type does not use CAN. See details in the Table 5, line "Transmission ratio between generator pulley and engine pulley"

GB pressure sensor

The menu item allows to select the type of current GB pressure sensor used: relative for 16, 25, 40, 60 kgf/cm² (bar) or absolute for 16 or 25 kgf/cm² (bar). When changing the type of engine, the type of GB pressure sensor can also be switched, which is reflected in the Table 5.

Fuel sensor

The menu item allows to select the used fuel level sensor: sensor 0.5–4.5 V, sensor 513–10 Ohm, sensor 391–10 Ohm. Resistive sensors are connected to the input X1-19 of the instrument panel, the sensor voltage is connected to the IP input X1-3.

Terminator CAN

The menu item allows to connect or disconnect the terminator to the CAN line. When changing the type of engine, the connection of the terminator also changes, which is reflected in the Table 5.

System of measures

The menu item allows to select the units of measurement displayed on the display corresponding to the English or international system of measures. When selecting the English system of measures, the interface language automatically switches to English. When switching to the international system of measures, the interface language does not change.

Date and time

The item sets the current date and time. The parameter recorder is attached to these time parameters when a record is saved in memory.

About the system

The menu item opens the page with system information. Example of information on the page is in the Table 6.

Table 6. Example of information on the page "About system".

Steering column model	KR101-005
Machine model	744P-YMZ
Factory number of machine	12684529
Date of manufacture	25.07.2015
Software version	1.851 (12.09.2017)
Version of format of black box	ID 24; VER 2
Current date	Mon, 12 Sept 2016

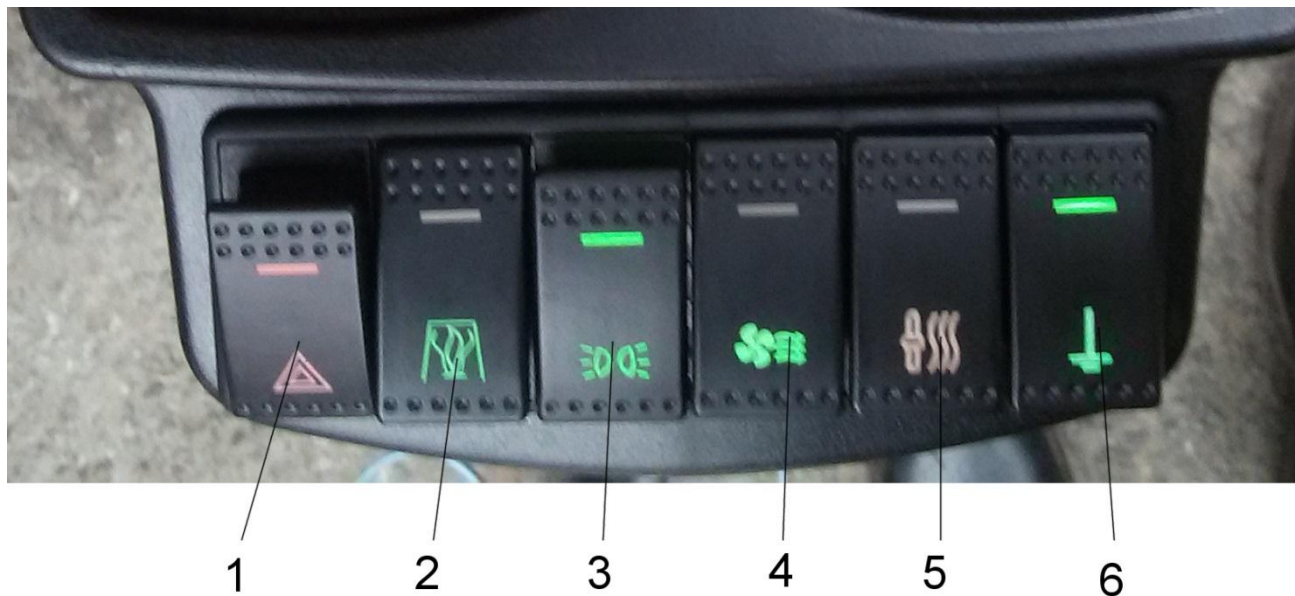


Fig. 4 Steering column control panel

- 1 – alarm activation key; 2 – "Pramotronik" heater activation key for tractors with YMZ-238ND5 engines;
3 – switch key for marker lights and headlamps;
4 – cab heater switch key; 5 – switch key of the electric torch (ET) for tractors with TMZ 8481 engines; 6 – tractor master switch key