Limited Liability Company

"EXOTRON TECHNOLOGY"

	APPROVED
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	OOO «EXOTRON TECHNOLOGY»
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	«____» _____ 2019 г.

Operations manual

Fuel pump station

EST-03 PROFESSIONAL

EST-03.002.OM

2019

Content

Attachment 1 Basic diagram17

Introduction

The purpose of the operations manual is to introduce service personnel with the station, its operating principles, technical and maintenance operations of fuel pumping station EST-03 PROFESSIONAL (hereinafter referred to as "FPS"). Before operating FPS, the given operations requires close attention. In case of non-compliance with technical conditions of station's use, measures should be taken to provide proper conditions for operating according to existing standards.

The company, which exploits the pumps is obliged to execute the requirements of this OM, relevant technical standards documentations, as well as the following requirements to pump operation:

 - GOST 12.1.003-2014 Noise. General safety requirements

 - GOST 12.1.004-91 Occupational safety standards system. Fire safety. General requirements

 - GOST 12.1.012-2004 Occupational safety standards system. Vibration safety. General requirements

 - GOST Occupational safety standards system. Electric safety. Protective conductive earth, neutralling

 - GOST 12.2.003-91 Occupational safety standards system. Industrial equipment. General safety requirements

 - GOST 12.2.007.0-75 Occupation safety standards system. Electrical equipment. General safety requirements

1. General information and requirements

Use

Fuel pump station (FPS) EST-03 is a system operating under the control of a logic controller EFR - 01. FPS allows a complete automation of a tanks calibration and moving the fuel from various storage tanks and containers. FPS is deviced with a highly reliable fuel dispensing mechanism. A matrix keypad is used to enter a value of fuel volume.

FPS has an electronic display device based on a seven-segment display for displaying parameters and emergency alert, as well as a light-emitting diode indication of system operation. Information on fuel supply is provided by flow rate meters with a pulse output.

SPT controls solenoid valves and the electric motor of the pump. Enabling external sensor fuel gauge unit is available. Dispensed fuel volume is determined with the protocol Omnicomm (RS485). Information sending and telemetry can be sent to satellite monitoring server (optional).

Technical specification

Main parameters and technical specifications are listed below

Name	Parameter
critical dimensions: height/width/depth mm	360×320×710
Supply	220/24/12
Weight	40 кг
Fuel dispensing indicators	Seven-segment indicator, mechanical counter (optional)
Relative calculating inaccuracy and dispensed fuel volume indication	± 0,1 %
Flow speed of fuel	From 40 to 70 liters per minute
Pipe joint diameter	25 mm
Operating temperature range	-40°C +50°C degrees
Accuracy of dose dispensing	30
Maximum air humidity	85%
Type of disel fuel	Дизельное
Connection to a satellite monitoring system (optional)	GPS/GLONASS/GPRS
Type of climate performance	Climatic category 2 (GOST 15150)
Maximum power consumption	1000 watt
Type of fuel indicator	LLS with Omnicomm protocol

1.3. Completeness

Complete set of delivery includes:

- fuel pump station EST-03 PROFESSIONAL;

- programmer VSBIRS485

- Passport

- User manual

1.4. Safety precautions

Protective measures against electric shock hazard conform with class I GOST 12.2.007.0-75.

Electrical work, connection to a power supply network and grounding (earthing) must be performed by a qualified specialist in a strict compliance with Rules of the Technical Operation of Electrical User, User Safety Rules for Operating Electrical Equipment, Rules For Arrangement Of Electrical Installations, as well as the requirements of this document.

While operating fuel pump station personnel must follow the safety precautions in compliance with GOST12.3.019-80.

Personnel operating a fuel pump station must be familiar with this document and authorized for operating electrical devices with voltage to 1000 V.

Fuel pump station must be operated only after being disconnected from an electrical supply network and measures being taken to prevent inadvertent activation.

After commissioning and service works are finished, all protective devices must be switched to working position.

The place of connection of a fuel pump station to the electricity supply network must be protected from water intrusion and isolated from direct access. The place of connection and use of a fuel pump station to the electricity supply network must be kept away from moisture, dirt and sparks.

STRICTLY FORBIDDEN:

- connect a fuel pump station to a power supply network without grounding (earthing)

- replace original power cable oneself

- pump chemical liquids;

- pump fuel oil and oil;

- pump highly polluted liquids and foodstuff

2. Controls and Indication
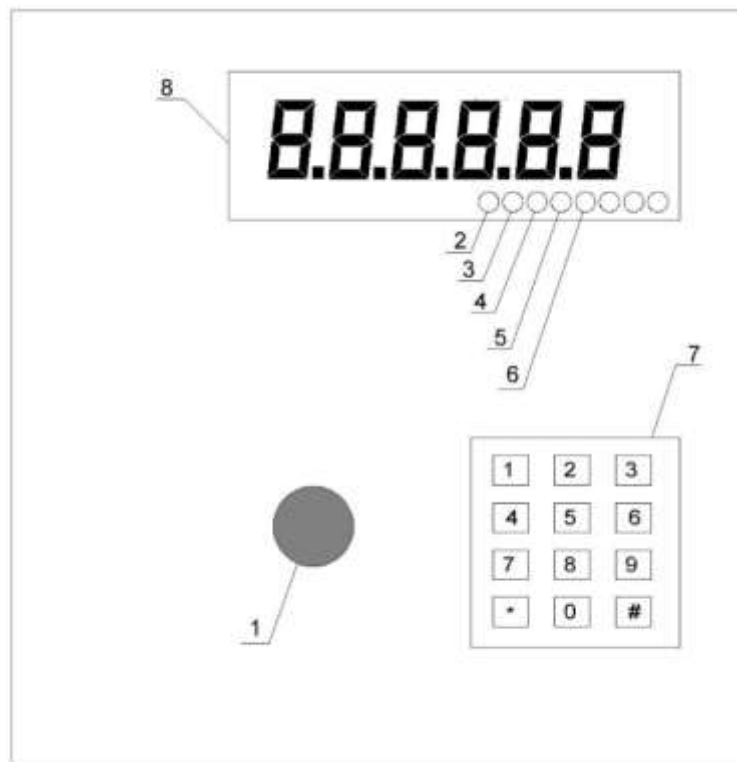
1 - emergency rest button and power-off button

2-6 - extra LED-lighting

7 - keyboard

8 - main indicator

2.1 Description of additional light-emitting diodes (LED) modes

LED number	Colour	Explanation
1	green	Fuel dispensing is allowed
Статус	yellow	Dispensing is paused

разрешения выдачи топлива Permission status of fuel dispensing	red	Enty error KRAN No permission from a column
	blue	Entry error TR_EN No permission from a tracker
	purple (blue+red)	Entry errors KRAN and TR_EN. No permission from a column and tracker
	dark blue (dark blue+green)	Fuel distribution is allowed, but a tracker does not give the permission. Entry error TR_EN
	white (red+green+dark blue)	<mark>Pause due to the empty containers for a fuel intake</mark>
RFID и мастер режим	green	Card is in the terminal base
	dark blue	Card is not in the terminal base
	red	Master mode (card or jumper)
	purple (red+dark blue)	Card is not in the terminal base in master mode
	yellow (red+green)	Card is in the terminal base in master mode
	off	No card, master mode is off
3	green	High flow valve - on Low flow valve - on
	yellow	High flow valve - off Low flow valve - on
	red	High flow valve - off Low flow valve - off
4 **Counter A phase**	green/off	Status of counter A entry is in a direct position
	red	Counter reversal
	dark blue	Counter is ignored
5 **Counter B phase**	green/off	Status of counter B entry is in direct position
	red	Counter reversal
	dark blue	Counter is ignored

Main menu
Once a terminal is on, it is inserted into the main menu automatically.

On pressing number buttons the following parameters will be displayed:
1 - total counter
2 - the last successful distribution
3- minor value of RFID card
4 - senior value of RFID card
5 - real value of distribution (used in calibration and settings)
To start the fuel dose input or to enter setting menu - press "*"

4. Input menu of dose intake

To enter a dose value use number buttons 0-9, press "#" to start fuel distribution.
To start "full tank" mode press "#" immediately after entering input meny of dose intake. Maximum number of liters in this mode is set by "A5" parameter.
After pressing "#" terminal switches to fuel distribution mode.
To restart previously paused fuel distribution, press "0" when entering input menu of dose intake. Once pause value will be restored from the memory, fuel distribution menu will be entered. Pause will be activated. To continue fuel distribution press "#" button.
To enter controls menu while in intake dose menu, press 1 and 3 keys simultaneously.
Fuel distribution is available in case there is a permission indicated by green or blue LED 1.

5. Fuel distribution menu

Data is displayed as follows XXXX.XX, where a point separates integers and hundredths of a liter.
While fuel is distributed, press "#" to stop fuel distribution and switch to pause mode. The last dot in the figure, which is a pause indicator, will start bleaming. If "#" button is pressed again, fuel distribution will be stopped.
In case of a pump nozzle error or a pump tracker error, terminal will automatically switch to pause mode.
To continue fuel distribution press "#" button.
To cancel fuel distribution or to enter main menu, press "*".
If the power is off during the fuel distribution, then a terminal will remember the status and will switch to pause mode before turning off. After a power supply reconnection fuel distribution can be continued (see Input menu of dose intake)

6. Settings menu

While in settings menu, press keys 1 and 3 simultaneously to enter settings menu. A message "PAR 1" will be displayed for a short time, which will indicate switching to "A" group parameters.
To change the parameters activate master mode (LED 2 must be red).
Keys:

1 - group A (values 0-65000)
2 - group B (values 0-255)
3 - group C (values 0-1)
4 - parameter number -
6 - parameret number +
7 - parameter value -
9 - parameter value -
0 - default parameter value
* - to access main menu

When switching between parameter group, "PAR X" message will be displayed, where X is a group type.

Параметры группы A Parameters of group "A"

Parameter	Descriprion	Default
A 1	Number of pulses per 40 litres	4000
A 2	Overfilling compensation. Distribution is stopped when it exceeds a specified number of dozens of mililitres, thus compensating an overfilling. 1 unit = 10 ml	0
A 3	Underfilling compensation. Dosage is increased in a specified number of dozens of mililitres. 1 unit = 10 mililitres	0
A 4	1 unit = 10 ml Shifting of main flow shutoff and switching to small flow is specified	50
A 5	Number of litres available for distribution in "full tank" mode. It is also a maximum number for fuel supply 1 unit = 1l	10000
A 6	Maximum value of fuel level unit while calibrating. Calibrating is stopped when obtaining this value.	4095
A 7	Capacity value of fuel intake 1 unit = 1l	190
A 8		
A 9	Firmware version display. Eg., 110 stands for 1.10 version	
A 10	Password	

Parameters of group "B"

Parameter	Description	Default
B 1	Type of calculating sensor 0-USS 1-GERKON 2-DO10	0

	3-EX	
B 2	Pulse time-out, sec	5
B 3	Single output pulse value 0- 1L 1-0.1L 2-0.01L	1
B 4	Output value duration *0.2ms	20
B 5	Adress LLS RFID	1
B 6	Adress LLS total counter	2
B 7	Value of succesful distribution	3
B 8	LLS fuel level unit "A" adress Used while calibrating	0
B 9	LLS fuel level unit "B" adress Used while calibrating	1
B 10	LLS fuel level unit "C" adress Used while calibrating	2
B 11	LLS fuel level unit "D" adress. Used while calibrating	3
B 12	Time between two spills while calibrating, sec	50
B 13	Dosage value while calibrating 1 unit = 1l	10
B 14	Number of fuel level unit, which tank's end is controlled by. 0 - without fuel level unit (FLU) data control 1 - FLU "A" 2 - FLU "B" 3 - FLU "C" 4 - FLU "D" 5 - all FLU Calibrating is stopped in case at least one FLU exceeds a specified value	0
B 15	Time-off of the last counter pulses, sec This parameter is required in case there should be false counter pulses, when fuel distribution is already over. Value 0 - counter is always active.	0
B 16	Distributor type of fuel distribution value 0-XXXX.XX 1-XXXXX.X 2-XXXXXX. 1 and 2 are rounded	0
B 17	Fuel distribution start-up timer. Valves reaction delay after fuel distribution start-up. Zero value - without delay. Unit measure - seconds.	0
B18	Operating via ETR 0 - forbidden, 1 - allowed	0
B19	Fuel dispensing unit (FDU) adress while ETR operating	0
B20	Operation speed of ETR line 0-2400, 1-4800, 2-9600, 3-19200, 4-38400, 5-	3

	57600,	6-115200	

Parameters of group "C"

Parameter	Description
C 1	1 - Card adding mode
C 2	1 - Master card installation mode
C 3	1 - Card deleting mode
C 4	1 - Deleting of all cards. Parameter A10 - password "6755" must be installed to prevent accidental pressing
C 5	1 - FLU "A" calibrating text is sent via ETR RS485 channel
C 6	1 - FLU "B" calibrating text is sent via ETR RS485 channel
C 7	1 - FLU "C" calibrating text is sent via ETR RS485 channel
C 8	1 - FLU "D" calibrating text is sent via ETR RS485 channel
C 9	
C 10	
C 11	
C 12	
C 13	
C 14	
C 15	
C 16	Initiation of terminal software update. Parameter A10 password "8934" must be installed to prevent accidental pressing
C 17	1 - calibrating mode 0 - standard mode
C 18	1- Distribution mode if a card is in the bases. Autonomous mode - fuel distribution is allowed if it is permitted by a tracker or a card, which is in the basis. 0 - a card does not influence fuel distribution decision.
C 19	

Parameters C 1-16 are not saved. They are used to start the process. 0 - default, inactive mode. While initiating activity can be set for certain time in mode 1, which is active mode.
Parameters C 17-32 are saved. When a card is added, LED 2 will change its color to yellow (red+green), when a card is deleted LED will change its color to purple (red+blue).

7. Calibrating

To active this mode, paratemer C17 must be switched to the position 1.
In this mode fuel is distributed portionwise and at certain time intervals. There are

time gaps between the portions for the fuel to calm. FLU data is fixed at the end of each pause between the portions. A number of FLU available is 1-4. Available FLU are indicated with letters A, B, C and D respectively.

Calibrating provides a possibility to change dosage volume and calming time "on the go".

7.1 Calibrating start-up menu

To switch a terminal to calibrating mode, set parameter "C17" to "1".

To start calibrating, press "*" while in the main menu. A terminal will switch to the first start-up calibrating mode.

Data is displayed as follows: TTT.XXX, where TTT - calming time between the portions (sec), XXX - dosage volume. Initial values of these parametres of calibrating are taken from the parametres B12 and B13 respectively. These values can be changed before the start.

Key functions:
4 - dicrease of calming time TTT.XXX
6 - increase of calming time TTT.XXX
7 - dicrease of fuel portion volume TTT.XXX
9 - increase of fuel portion volume TTT.XXX
3 - display of calibrating parametres TTT.XXX (calming time and dosage volume)
0 - restart of calibrating (similar to a standard mode)
2 - current values of FLU "A" AXXXXX
5 - current values of FLU "B" BXXXXX
1 - current values of FLU "C" CXXXXX
1 - current values of FLU "D" DXXXXX
"*" - return to a main menu
"#" - start calibrating
1+3 - switch to a main parametres modificatiom menu (similar to standard mode)

7.2. Calibrating menu

Key functions:
1 - display of distributed fuel volume XXXXX.XX
3 - display of rest in a fuel intake container EXXXXX
2 - current FLU "A" value AXXXXX
5 - current FLU "B" value BXXXXX
8 - current FLU "C" value CXXXXX
0 - current FLU "D" value DXXXXX
4 - fuel calming time reduction TTT.XXX
6 - fuel calming time increase TTT.XXX
7 - dicrease of fuel portion value TTT.XXX
9 - increase of fuel portion value TTT.XXX
* - return to a main menu
# - pause on/off

If fuel intake container is empty, there will be a pause and LED 1 (permission status) will be white. Press 3 to check the remain in the container. This value is set in parametre A7.

If at least one FLU has a value more than parameter A6, then calibrating will be stopped after fuel calming pause ends.

Press # to stop fuel distribution and put on a pause. Last point of a figure (which is an indicator) will start bleaming. Press # again to stop fuel distribution.

In case of a pump nozzle error or a pump tracker error, terminal will switch to a pause mode automatically.

To continue fuel distribution press #.

To cancel fuel distribution and go to main menu press *.

If the power is off during the fuel distribution, then a terminal will remember the status and will switch to pause mode before turning off. After a power supply reconnection fuel distribution can be continued (see Initiation of calibrating menu).

Displayed fuel counter does not null at every portion, but is added to the previous portions. Valve shut-off control is performed according to the counter data. Thus, absolute accuracy of portion overfilling/underfilling will not be accumulated during the calibrating. This allows to mitigate absolute accuracy value while calibrating.

While calibrating the mechanic response to a pause is similar to a standard fuel distribution.

To spill vast amount of fuel, use portion value of 200 litres and calming time 10 sec.

7.3. Calibrating data acquisition

Connect convector USB-RS485 to ETR RS485 to acquire calibrating data. Start terminal COM port software on your computer. Set the number of emulated COM portal and connect it. Data transmission speed is 19200 8bit. Execute the parameters C5 for FLU "A", C6 for FLU "B", C7 for FLU "C" and C8 for FLU "D". After setup a value will automatically switch to "0".

After the end of transmission data must be saved in ASCII formar.

Data has the following format: XXX:VVV; XXX:VVV; XXX:VVV;

where XXX – FLU value, and VVV – number of litres.

8. Accurate data calibrating

Different combinations of a set equipment can effect fuel portion accuracy. There are 3 main parametres in the terminal, which effect accuracy: A1, A2, A3. For full settings there must be an accurate measuring container (measuring tank), preferably with a foam separator. Example of an accurate calibrating process of 10-liter measing trank is described below.

8.Overfilling/underfilling preconfiguration

First, coursely set up A1 - a number of impulses for 40 litres. The aim is for a fuel level to gradually rich zero according to measuring tank data.

Fuel spilling must be executed in a single 10-liter dosage. If the level is too low, increase parameter A. If the level is too high, dicrease parameter A1.

When measuring tank data approaches "zero", start setting overfilling/underfilling, while remembering the exact level of fuel.

8.2. Overfilling/underfilling setting

A series of five 2-liter dosages are executed. The total volume is 10 liters, however, with a slight inaccuracy. If measuring tank data coincides with the point 8.1. data, then proceed to the point 8.3.

Divide by 4 odds between received value and the one, which was acquired in point 8.1. in order to get aproximate adjustment value. This value must be entered in parameters A2 and A3.

Repeat a series of five 2-liter dosages, adjusting this parameter till it equils the point 8.1.

Proceed to the next point (accurate setting of proportion ratio).

8.3. Accurate setting of proportion ratio.

When overfilling/underfilling are complete, set up a clean parameter A1 to "zero" on a measuring tank.

9. Record of changes

Record of changes									
Page number					Total number of pages in the document	document №	Incoming № of an accompaying document and date	Signature	Date
Changed	Changed	Replaced	New	Invalidated					

1. **Appendix 1. Basic diagram**

Wiring diagram — labels:

- large
- small
- signal pickup device
- optional
- if the tracker is not installed
- optional

Terminal / component labels:

L, PE, N

ECK KIT/20-20 — A2, 2/T1, 4/T2, A1, 1/L1, 3/L2

228 AC — + OUT, - 24V

+12V_OUT-1, B COUNT-4, A COUNT-3, GND-2

GAI,LED — VCC, GND, A RS485, B RS485, IN4, TB, OUT/0

+12V_OUT, GND, +12V_OUT, GND, +POWER_IN, GND
KEY_LED, TOTAL-, TOTAL+, BUZ-, BUZ+, IMP+, IMP-
+12V_OUT, A COUNT, B COUNT, GND, TR_EN, KRAN, GND
GND, A RS485 LLS, B RS485 LLS, +12V_OUT, GND, A RS485 ETR, B RS485 ETR, +12V_OUT
KEYB, GND, 1WIRE, GND, ANT, ANT, GND

KLAPAN2, KLAPAN1

ETR — +12V_OUT-1, B RS485 ETR-4, A RS485 ETR-3, GND-2
LLS — +12V_OUT-1, A RS485 LLS-3, B RS485 LLS-4, GND-2

KARABINER, KEYB, GND, BUZER
RFID, RED TRIGGER, TRIGER, COD

M