

ANNUNCIATOR OK-150

Operation Manual
PLA150.215.015.000 RE



This Manual provides information for service personnel how to perform installation, commissioning and maintenance of the Annunciator OK-150 (hereinafter referred to as the OK-150).

The OK-150 exploitation is allowed to be used by personnel who has studied this manual, set of exploitation documentation and passed safety training.

The OK-150 is intended to actuate audible and visual alarms by the signals from external equipment. This device is made as part of the DEL-150 Drilling and Well Workover Monitoring System (hereinafter referred to as the DEL-150).

Scope of application is explosive zones of premises and outdoor facilities according to Ex-marking. The OK-150 is manufactured in accordance with the requirements of ISO 9001:2015.

In order to exclude the possibility of mechanical damage, violation of electroplating and paint coatings, the rules of storage and transportation of the device should be observed. When studying the rules of operation, it is also necessary to be guided by the technical description and operating instructions of the DEL-150 System.

The OK-150 is made in a rectangular aluminum enclosure (See Fig. 1) with a degree of IP65 protection. There are printed circuit boards with an electronic control circuit inside. A cable gland or fitting depending on the required configuration for external connections is installed on the enclosure. The boards are mounted on the bottom of the enclosure and secured with screws. The upper part of the enclosure is covered with a lid. A sound emitter and light indicators are fixed on the lid. The lid is attached to the enclosure by 4 screws, there is a sealing gasket between the enclosure and the lid.

1. Technical Characteristics

Name of parameter	Value
Sound level, dB	105*
Nominal modulation frequency range, kHz	3...3.4
Number of LEDs	2
Maximum input voltage, VDC	30
Maximum input current, A	0.5
Power supply, VDC	12
Current consumption (at 12 VDC), A	0.15
Ex marking, EAC	1ExibIIAT5GbX
Ingress protection	IP65
Ambient temperature range, °C	-40...+65
Dimensions, mm	116 x 66 x 64
Weight, kg	0.6
Service life, min., years	10

* at the nominal modulation frequency



1. Enclosure;
2. Cable gland or fitting;
3. First threshold LED;
4. Second threshold LED;
5. Sound emitter

Figure 1. The OK-150 components

2. Explosion Safety During Operation

Explosion protection is provided by an intrinsically safe electrical circuit ("i" type of explosion protection).

3. Requirements for Keeping Equipment Specifications that Cause its Explosion Safety

During operation, it is forbidden to break the seals and open the OK-150 enclosure.

When the MU-150 / MU-150E / MK-140 unit of the DEL-150

System or MK-140(GAZ) Commutation Module is switched on, it is forbidden to connect and disconnect cables, power cable and grounding conductors. In case of malfunctions, it is necessary to turn off the MU-150 / MU-150E / MK-140 / MK-140(GAZ) unit and disconnect the power cable from the power source. Then replace the faulty OK-140 with a serviceable one by connecting it according to the documentation.

During operation, check the condition of communication cables periodically. If a violation of the protective layer on the cable lines is detected, replace the damaged cable immediately.

Do not allow sealing violations. If a damage is detected, replace the faulty equipment.

Ensuring explosion safety during operation is according to the safety regulations, applicable to the equipment with which (or as part of which) the equipment is used.



ATTENTION!!! During operation, it is necessary to monitor the equipment status and its cables. In case of any mechanical damage of the equipment or any of the cables connected, further operation is strictly prohibited!

4. Installation



NOTIFICATION. Installation and further commissioning of the equipment should be carried out only by qualified specialists.

Before installing the OK-150, it is necessary to make sure that:

- Basic dimensions at the processing facilities correspond to the dimensions of the OK-150 (see Fig. 2);
- Fixing bolts and screws are present;
- There is no damage of the connector insulation;
- There is no external damage of the components;
- There is no damage of the insulation of the signal cable.

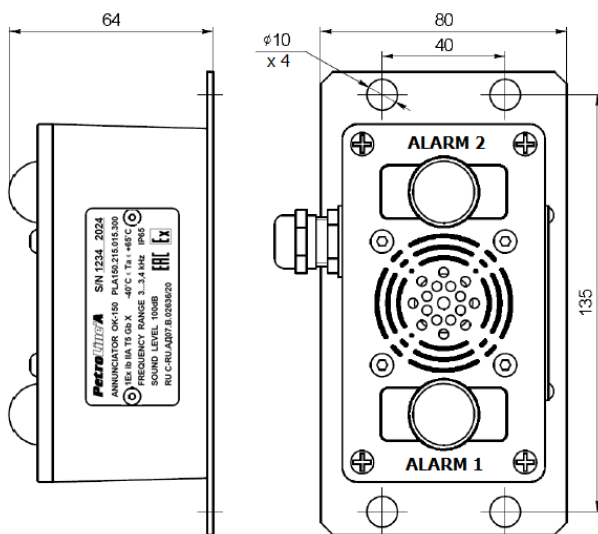


Figure 2. Overall dimensions of the OK-150 with mounting plate

Disregard of this instruction may lead to a serious failure of the OK-150.

Installation is carried out in the following order:

1. Place the OK-150 annunciator so that the LEDs are visible and the sound emitter is not closed;
2. Run and connect the commutation cable to the MU-150 / MU-150E / MK-140 unit of the DEL-150 System or to the MK-140(GAZ) Commutation Module through cable channels or places not exposed to mechanical action.

5. External Electrical Connections Installation

The commutation cables for connecting of the OK-150 to the MU-150 / MU-150E Control Modules, to the MK-140 and to the MK-140(GAZ) Commutation Modules are different. It is required to check cable's part number before connection. At the same time the 5-pin connector of the OK-150 is universal, and connection is possible only to the corresponding 5-pin connector on the MU-150 / MU-150E / MK-140 / MK-140(GAZ) unit (See Fig. 3, 4, 5).

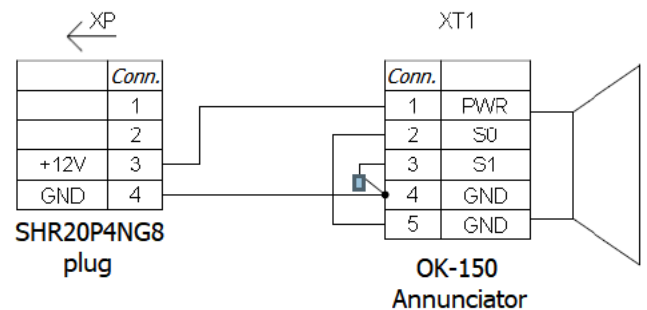


Figure 3. Drawing of the OK-150 and 4-pin plug for connection to the MU-150 / MU-150E / MK-140 unit

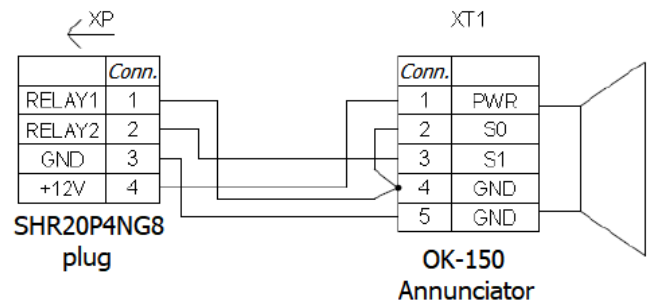


Figure 4. Drawing of the OK-150 and 4-pin plug for connection to the MK-140(GAZ) Commutation Module

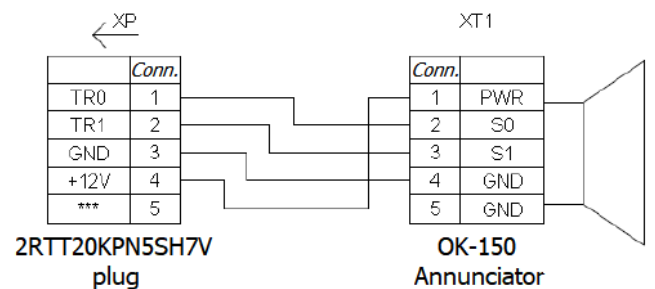


Figure 5. Drawing of the OK-150 and 5-pin plug for connection to the MU-150 / MU-150E / MK-140 / MK-140(GAZ) unit

The cable from the OK-150 is connected to the “Horn” connector of the MU-150 / MU-150E / MK-140 / MK-140(GAZ) unit (see Fig. 6).

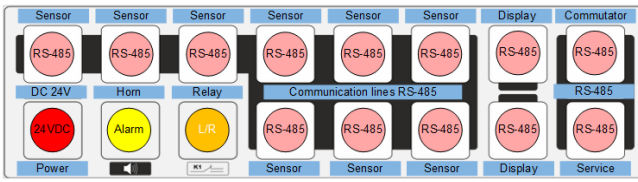


Figure 6. The MU-150 / MU-150E / MK-140 / MK-140(GAZ) unit’s connector “Horn” for the OK-150 connection

6. The OK-150 Functional Test

For functional test of the OK-150 it is necessary to connect the annunciator to the MU-150 / MU-150E / MK-140 unit, to turn power on and proceed according to the instruction below.



ATTENTION!!! The OK-150 test should be carried out only during the work provided according to periodic equipment check-up and maintenance. Exclude unauthorized disconnection or activation of technological equipment!

Enter the setting mode using the MU-150’s keyboard (see Fig. 7).

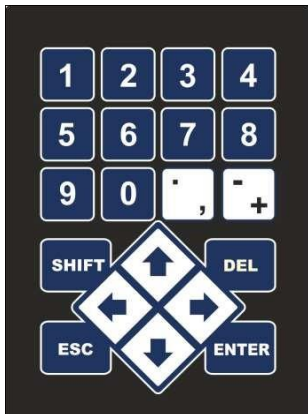


Figure 7. The MU-150 Control Module keyboard

Proceed in the following order to reach out required blocker:

1. Unblock the keyboard by pressing **SHIFT** + **ENTER** simultaneously;
2. Use **↓**, **↑** and **ENTER** to enter **CONNECTED SENSORS**. To return to the previous menu, use **ESC**.

ENTER	SENSORS INDICATORS BLOCKERS
ENTER	BLOCKERS STATUS BLOCK-D [080] -- BLOCK-R [081] SB BLOCK-P [082] --
SHIFT + ENTER	BLOCKER CHECK POLL STOPED . . . BLOCKER ON Sensors scanning is stopped, the blocker check mode is turned on, in which the OK-150 is activated and the relay also changes its state. The detailed information is referred in the DEL-150 System Operation Manual
	BLOCKER CHECK POLL STOPED . . . BLOCKER ON CHECK COMPLETED

7. Functionality Issues

If the audible and visual alarms are absent in case of exceeding of the threshold that are set for controlled parameter (See Fig. 8), it is necessary to carry out actions in the following order:

HOOK LOAD	*	95.4
FULL HOOK LOAD	*	105.4
BLOCK HEIGHT		0.4
TRIP VELOCITY		0.0

Figure 8. Examples of exceeding parameters

1. Checking of the integrity of the commutation cable;
2. Checking of the integrity of the OK-150 plug;
3. Checking of the voltage presence on the OK-150 plug’s connectors in the blocker check mode;
4. Checking of the OK-150 settings;
5. Replacement of the OK-150;
6. Replacement of the MU-150 / MU-150E / MK-140 / MK-140(GAZ) unit.

8. Setting of the OK-150 Audible and Visual Alarms

The frequency of the light indication and sound modulation of the piezoelectric element is adjusted by switches on the

printed circuit board of the OK-150 annunciator.

To access the switches (see Fig. 9), it is necessary to unscrew 4 screws and open the top cover with LEDs and a sound emitter.

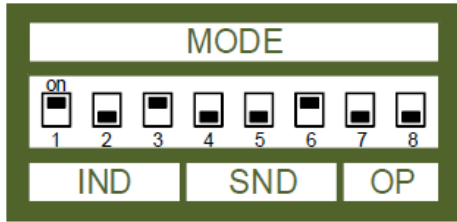


Figure 9. The OK-150's switches

Light indication modes:

C // @lights constantly
 T1 // @flash F=1 Hz
 T2 // @flash F=2 Hz

Sound emitter modes:

SND1 // @ramp: mod = 800...1000 Hz F=1 Hz
 SND2 // @ramp: mod = 3000...3400 Hz F=7 Hz
 SND3 // @ramp: mod = 3000...3400 Hz F=1 Hz
 SND4 // @square: mod = 3000/3400 Hz F=2 Hz
 SND5 // @square: mod = 1000/0 Hz F=1 Hz
 SND6 // @square: mod = 800/1000 Hz F=1 Hz
 SND7 // @square: mod = 800/1000 Hz F=2 Hz
 SND8 // @ramp: mod = 800...1000 Hz F=8 Hz
 SND9 // @square: mod = 800/1000 Hz F=2 Hz
 SND10 // @square: mod = 3400/3400 Hz F=1 Hz

Control inputs description:

[S1:S0:GND]
 [+] – input connected to GND
 [-] – input disconnected from GND
 [*] – any state
 [x] – off

DIP Description – mode switch:

[L2:L1:L0] - [B2:B1:B0] - [M1:M0]

lower switch position
 1
 upper switch position
 1

Selection of operating modes:

[M1:M0]

Mode 1 "KEY1"
 7 8
 Mode 2 "KEY2"
 7 8
 Mode 3 "SOFT"
 7 8
 Mode 4 "TEST"
 7 8

Mode 1 "KEY1" – compatibility with the MU-150 / MU-150E unit with 4-pin "Horn" connector

The mode in which the control signal "S0" is closed programmatically by default, and control occurs by the control signal "S1", which is closed to "GND" (see Fig. 10).

In case of connection according to drawing on Fig. 3 (connection to the MU-150 / MU-150E / MK-140 unit), the control signals are closed directly in the OK-150 annunciator,

sound and LED control does not occur. When power is supplied, the LEDs and the sound alarm will work simultaneously, in accordance with the modulation and frequency set by the switches.

In case of connection according to drawing on Fig. 4 (connection to the MK-140(GAZ) Commutation Module), the control signal "S0" is closed directly in the OK-150 annunciator, and sound control occurs by closing the control signal "S1" to the contact "GND" via the relay of the MK-140(GAZ) Commutation Module, and LED control is not happening.

VISUAL ALARM			CONTROL SIGNALS	
MODE			=S0=	=S1=
[L2:L1:L0]			[LED0:LED1]	[LED0:LED1]
			[C:C]	[C:C]
		0		
		1	[T1:T1]	[T1:T1]
		2	[T2:T2]	[T2:T2]
		3	[T1:T2]	[T1:T2]
		4	[T2:T1]	[T2:T1]
		5	[T1:C]	[T1:C]
		6	[T1:T1]	[T2:T2]
		7	[X:X]	[X:X]

AUDIBLE ALARM			CONTROL SIGNALS	
MODE			=S0=	=S1=
[B2:B1:B0]				
			[X]	[SND1]
		0	[X]	[SND1]
		1	[X]	[SND2]
		2	[X]	[SND3]
		3	[X]	[SND4]
		4	[X]	[SND5]
		5	[X]	[SND6]
		6	[X]	[SND7]
		7	[X]	[SND8]

Figure 10. The OK-150's switches in the "KEY1" mode

Examples of switches settings:

- When power is supplied to the OK-150, the first threshold LED lights with a frequency of T1 (1 Hz), the second threshold LED lights with a frequency of T2 (2 Hz), the sound is played two-tone (800/1000 Hz) with rectangular modulation and with a frequency of 1 Hz (SND6//@square: mod = 800/1000 Hz F=1 Hz):



- When power is supplied to the OK-150, the first threshold LED lights with a frequency of T1 (1Hz), the second threshold LED lights constantly, the sound is played monotone (1000 Hz) with rectangular modulation and with a frequency of 1 Hz (SND5//@square: mod = 1000/0Hz F=1 Hz):



Mode 2 "KEY2" – compatibility with the MU-150 / MU-150E unit with 5-pin "Horn" connector

The mode in which control occurs by the both "S0" and "S1" control signals closing them to "GND" (see Fig. 11).

VISUAL ALARM MODE		CONTROL SIGNALS	
[L2:L1:L0]		=S0=	=S1=
Without Priority			
0		[C: *]	[* :C]
1		[T1: *]	[* :T1]
2		[T2: *]	[* :T2]
"S1" control signal Priority ("S0" is off)			
3		[C: x]	[C : C]
4		[T1: x]	[T1:T1]
5		[T2: x]	[T2:T2]
6		[T1: x]	[T1:T2]
7		[T1: x]	[T1:C]
AUDIBLE ALARM MODE		CONTROL SIGNALS	
[B2:B1:B0]		=S0=	=S1=
"S1" control signal Priority ("S0" is off)			
0		[SND1]	[SND2]
1		[SND2]	[SND3]
2		[SND3]	[SND4]
3		[SND4]	[SND5]
4		[SND5]	[SND6]
5		[SND6]	[SND7]
6		[SND7]	[SND8]
7		[SND8]	[SND9]

Figure 11. The OK-150's switches in the "KEY2" mode

In case of connection according to drawing on Fig. 5, (connection to the MU-150 / MU-150E / MK-140 / MK-140(GAZ) unit), it becomes possible to control the LEDs separately, according to the first and second thresholds, as well as to reproduce a different sound for each threshold. When power is supplied, the LEDs and the sound alarm will briefly work, subsequently, with an interval of 1 time per minute, both LEDs light up briefly, signaling normal operation. When the control signal "S0" is closed to "GND", the first threshold LED and the sound signal corresponding to the first control signal will work, and when the control signal "S1" is

closed to "GND", the second threshold LED and the corresponded sound signal will be engaged in accordance with the modulation and frequency set by the switches.

Additionally, in the "KEY2" mode there are priorities by input signals. For example, the operation of LEDs by priority means that when the control signal "S1" is switched, the previously activated LED light mode by the control signal "S0" will turn off and the light mode will be turned on according to the control signal "S1".

Examples of switches settings:

- When power is supplied to the OK-150 and the control signal "S0" is working, the first threshold LED lights constantly, the sound is played two-tone (800/1000 Hz) with rectangular modulation and with a frequency of 2 Hz (SND7//@square: mod = 800/1000 Hz F=2 Hz). When the control signal "S1" appears, the first threshold LED lights constantly, the second threshold LED lights constantly, the sound is played two-tone (800...1000 Hz), with attenuating-increasing modulation, with frequency 8 Hz (SND8//@ramp: mod = 800...1000 Hz F=8 Hz):



- When power is supplied to the OK-150 and the control signal "S0" is working, the first threshold LED lights with a frequency of T1 (1 Hz), the sound is played two-tone (3000...3400 Hz), with attenuating-increasing modulation, with a frequency of 1 Hz (SND3//@ramp: mod = 3000...3400 Hz F=1 Hz). When the control signal "S1" appears, the first threshold LED lights with a frequency of T1 (1 Hz), the second threshold LED lights with a frequency of T2 (2 Hz), the sound is played two-tone (3000/3400 Hz), with rectangular modulation, with a frequency of 2 Hz (SND4//@square: mod = 3000/3400 Hz F=2 Hz):



Mode 3 "SOFT"

This mode is configured via serial communication using the program "Platone" or "ThunderFlash" and is needed to select a specific mode of operation. The program and operating instructions are available on request.

Mode 4 "TEST"

Cyclic check of light and sound alarm.

9. Setting of the OK-150 for Operation as a Part of the GSV-1 Post

To operate the OK-150 annunciator connected to the GSV-1 gas sensor directly and display each threshold with the corresponding visual and audible alarm, it is necessary to switch the annunciator over to the Mode 2 "KEY2" and to connect it to the GSV-1's connector according to the drawings on Fig. 12 or 13, depending on the gas sensor's connector.

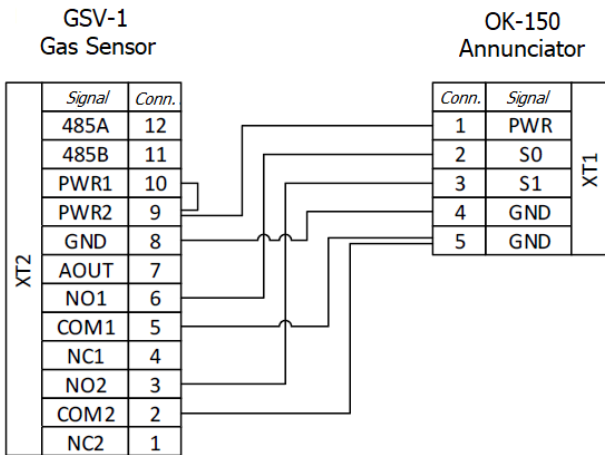


Figure 12. Connection of the OK-150 to the GSV-1 with common terminal

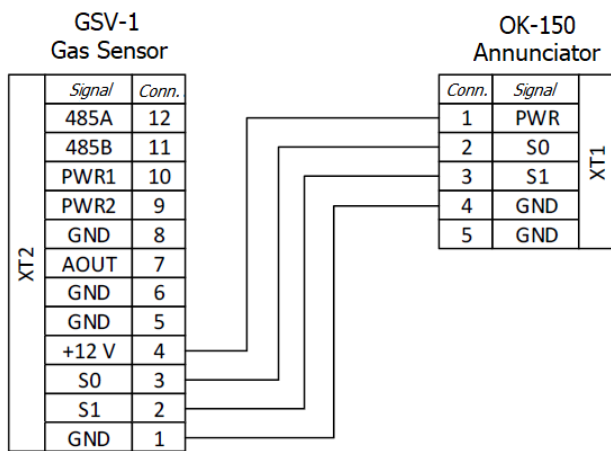


Figure 13. Connection of the OK-150 to the GSV-1 with special terminal

10. List of Critical Failures and Possible Issues in Maintenance Leading to Equipment Failures and Actions to Prevent these Failures (troubleshooting)

Incorrect set maximum values for parameters can lead to incorrect operation of the external controlled equipment if the maximum level for the controlled parameter is exceeded.

A short circuit or a break circuit in the power cable of the annunciator, may cause loss of communication. The failure can be recognized by audible and visual indication absence in case of exceeding of the threshold that are set for controlled parameter. Also, absence of periodic blinking of LEDs in the Mode 2 "KEY2" is the feature of failure.

In case of failure of the OK-150 or Control Module, it is necessary to check the equipment technical condition according to the Clause #7 of this Operation Manual. If troubleshooting did not lead to proper operation, it is necessary to stop operation and replace with obviously serviceable equipment. Defective equipment should be sent for repair to the manufacturer or to the specialized authorized service center.

In case of failures that can lead to emergency situations, it is necessary to replace the equipment that has failed. If necessary, disable additional external devices.

11. Maintenance Procedure

Maintenance is carried out in the following order:

1. Cleaning the annunciator's enclosure from contamination;
2. Checking the safety of seals (if available);
3. Checking the presence and strength of the mounting components;
4. Cleaning of connectors and terminals from contamination;
5. Checking for the absence of visible mechanical damages;
6. Replacement and (or) repair of damaged cable products;
7. Replacement of damaged connectors.

The contacts of the connector should be washed with an alcohol-gasoline mixture (need 3 ml.) using a soft brush. Connectors after cleaning and drying should be treated with Vaseline or similar lubricant. It is recommended to treat the threads on the connectors with graphite grease.



NOTIFICATION. Absence of maintenance records in the passport (section "Maintenance Records") ENTAILS VIOLATION OF THE OPERATION RULES, and the manufacturer has the right to withdraw from warranty obligations

12. Limit Conditions Parameters

In case of severe mechanical damage, leakproofness violations, seals violations, heating of parts to unacceptable temperatures, supply of unacceptable currents and voltages, change of calibration data, further use is unacceptable or impractical, or restoration of its serviceable or operable condition is impossible or impractical.

13. Marking and Packaging

The OK-150's nameplate includes the following components (see Fig.14):

1. Trademark or name of manufacturer;
2. Part number;
3. Name and model;
4. Serial number;
5. Manufacturing year;
6. Explosion protection marking together with certificate number;
7. Technical characteristics.

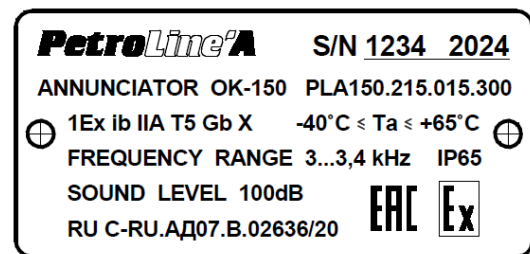


Figure 14. Example of the OK-150 marking

Other data required by regulatory and technical documentation may also be reflected on the nameplate.

Boxes made of plywood with metal handles for carrying are used to transport the OK-150 as part of the DEL-150 System.

14. List of Components

Full completeness is indicated in the passport for equipment released by manufacturer.

15. Repair

Repair of the OK-150 is carried out at the manufacturer or at a specialized authorized service center.



NOTIFICATION. Absence of repair records in the passport (section "Repair Records") ENTAILS VIOLATION OF THE OPERATION RULES, and the manufacturer has the right to withdraw from warranty obligations

16. Storage

The equipment requires careful handling, storage in dry, clean rooms with a constant temperature from +10°C to +35°C as an optimum range and a relative humidity of no more than 80%. Daily temperature fluctuations should not exceed 5°C.

The long-term storage requires conservation, according to the requirements of the equipment conservation instructions. The equipment arriving at the warehouses in the manufacturer's containers are not unpacked, packed on flat pallets and stacked or in the cells of the racks.

Factory-sealed devices are not allowed to be opened in warehouses.

Small devices and devices arriving in individual packaging are stored in box pallets with installation in a stack.

Devices and components without individual packaging should be stored in shelving cells no more than 3 rows in height with the use of cushioning materials between them.

Small devices and products arriving without packaging can be stored in small-cell racks and cabinets, while devices or products of the same type should be stored in one cell.



NOTIFICATION. Absence of storage records in the passport (section "Storage Records") ENTAILS VIOLATION OF THE OPERATION RULES, and the manufacturer has the right to withdraw from warranty obligations

17. Transportation

Transportation of the equipment is allowed by all types of closed transport. The OK-150 in a package for transportation allows the impact of transport shaking with an acceleration of 30 m/s² with a frequency of 100 beats per minute or 1500 beats with that acceleration.

18. Disposal

The OK-150 is disposed of in accordance with the requirements and norms applicable in the oil and gas industry.

19. Warranty Obligations

The warranty period is 12 months from the date of sale.

A full description of the warranty obligations is described in the equipment passport.

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