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MONITORING AND DIAGNOSIS OF TECHNICAL INSULATION CABLE LINES

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The question of applying the method frequecy discharges to detect locations aging or damage to isolation of cables of crosslinked polyethylene. Proposed application of modern instrumentation companies DATOS LTD, DIMRUS and Vibro Center.

Isolation, control, testing, monitoring, diagnosis, prognosis, frequency discharges, frequency pulses.

Greenhouse Complex supply systems are characterized by extensive use of cable networks 10 and 0.4 kV. 10 kV cable lines are made mainly oil-filled cables AAB, CRS, ASBzh, AAShv sections 70 to 240 mm2. In the past decade have been widely used XLPE cables for voltage 6 - 35 kV brand PvPh, PvPuh, APvPh, APvPuh.

Control and diagnostics of insulation oil-filled and XLPE now significantly different. By - variously interpreted some concepts and set IHE standards and amount of maintenance and testing.

On most greenhouse complexes cable network using oil-filled cables almost worked for 30 - 40 years. There is some accumulated experience. Up to 30% of all cable lines and rehabilitation and replacement.

Harder cable lines using XLPE cables. A number of companies (LLC "DATOS LTD", LLC "DIMRUS" NPF "Vibro-Center") is recommended for cable lines 10, 35, 110, 220, 330 kV ensure the monitoring of the technical state of isolation "under a working voltage" on the basis of Registered pulse frequency discharges [1].

The purpose of research - the applying the method to detect frequecy discharges seats aging or damage isolation of cables of crosslinked polyethylene.

Materials and methods research. Frequency is the discharge, concentrated source that distributes audio (electromagnetic) fluctuations in a homogeneous

medium insulation design.

As devices that generate and capture these variations can be used as follows: OVM - 3 CDM - 30 and so on.

Sensors fixing bits placed at the beginning and at the end of CR - 10 kV using end fittings. This line is monitored continuously in standby mode "signal level".

Having a real circuit line and its geo-information model, fixed level while the definition of the "pilot" with its reference to the real circuit.

This system used the software "AS - Diagnosis - ECS" firm of "DATOS LTD" [1].

Studies. The term "working voltage" cable refers to the level of the maximum working voltage.

Proposed to apply the method of frequency discharges for diagnosis of insulation cables, previously used only for solid insulating structures (insulators, bushing insulators, cables with crosslinked insulation). This method reduces the number of cables, high voltage test and extend their lifetime. Additionally, we can predict the next period of testing and maintenance of high voltage for the actual state of isolation.

By joining frequency discharges using devices OVM - 3 CDM - 30 (Fig. 1) with a level of 10 PCL can vyznachaty place of occurrence frequency discharges, their intensity and power.

Under conditions of entry into the program "AU - Diagnosis - ECS 'physical coordinates of cable networks and" binding "coordinates coupling can explore the technical condition of cable boxes.

This sensor frequency discharge device CDM - 30 and leakage currents are set at the terminals - Ground cable (Fig. 2).

Figure. 1. A general view of the instrument

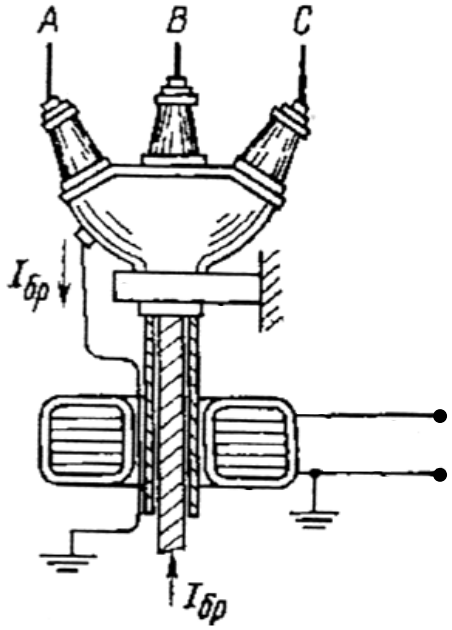

Figure. 2. The ultimate Mufta with the placement TNP

Coupler for different types of cable insulation made from GRS signals or fiber channel (which is a greenhouse complex more efficiently). According to the authors of [2] on the surface of the cable routing observed the presence of a magnetic field above the ground at the site of passage of cable line [2].

Place of occurrence frequency discharges in cable lines (number of cable incoming and outgoing lines can be up to 30!) And thus the defects in the developing world, are determined with an accuracy of 5 - 10 m

All devices together in a LAN. Managing devices by application software "AS - Diagnosis - ECS" installed on the workstation, based on industrial computer and the operating system Windows ® company Microsoft.

Stationary monitoring system is built in three levels: upper - level workstation, the average - a level of intelligent controllers based on these devices CDM - 30, lower - level - sensors.

On ARM Chief Engineer on 19 «LCD - monitor" in the "User" displays cable line, where "semaphores" indicates condition of the line where the green is induced state of "standard without deviation" yellow - "the state of pre" red - "accident" (Fig. 3).

Monitoring of registered pulses frequency discharges can build value their power and intensity. These values determined when service personnel need to use preemptive actions to prevent accidents on the line.

Functional graphical user (see Fig. 3) or "User Interface" is created for a specific item to be monitored and diagnosed.

Typically, this window displays the start and end of diagnosing lines created "semaphores", reflecting the state of an object, such as a cable line. Color "semaphore" is selected as follows: Green - technical condition of the object in the "normal" yellow - deteriorated condition of the object and recorded as a "warning" red - the technical condition of the object is recorded as "emergency" and require repair line . In functional window system for monitoring and displaying operating parameters and status of LAN remote workstations, posting and adjustment settings, view measured values, evaluating events staff.

The basis of operation of application software that performs the functions of monitoring, diagnosis, prediction of residual life of permanent monitoring systems have a database of measured values. In our case, the value of frequency discharges - parameter "Q" is expressed in coulombs, intensity frequency discharges - the "RDI" pronounced meaning "imp / sec", the power frequency discharges - the "R" marked value "MW". The measurement results are bound to the corresponding phase voltage (for example, "A").

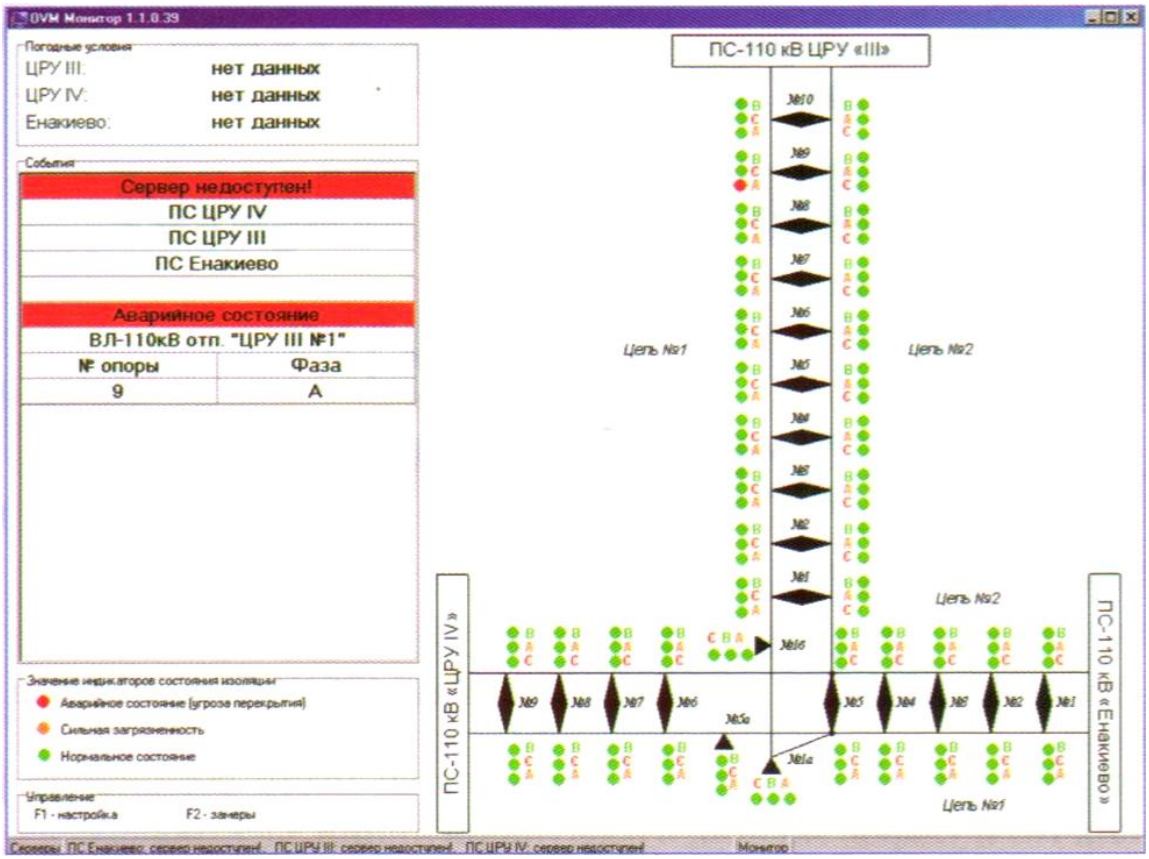

Fig.3. Monitor user

This algorithm diagnostics of cable insulation can be expressed in a logical form:

 automatically determines whether pulse frequecy discharges in line (a kind of pulse is shown in Fig. 4);

 if the registered impulse - a frequency discharge and diagnostic processor known length of the line or lines that automatically determines where you came of frequency pulse discharge cable line or external;

 If the frequency of the pulse controlled lines, the intensity value based PDI of frequency or power level R.

When the pre-entered setpoint operator reported defect levels formed as a "semaphore".

The results of the diagnostic processor stationary systems "AS - Diagnosis - SVO 'tested in the laboratory using a portable device registration (see Fig. 4).

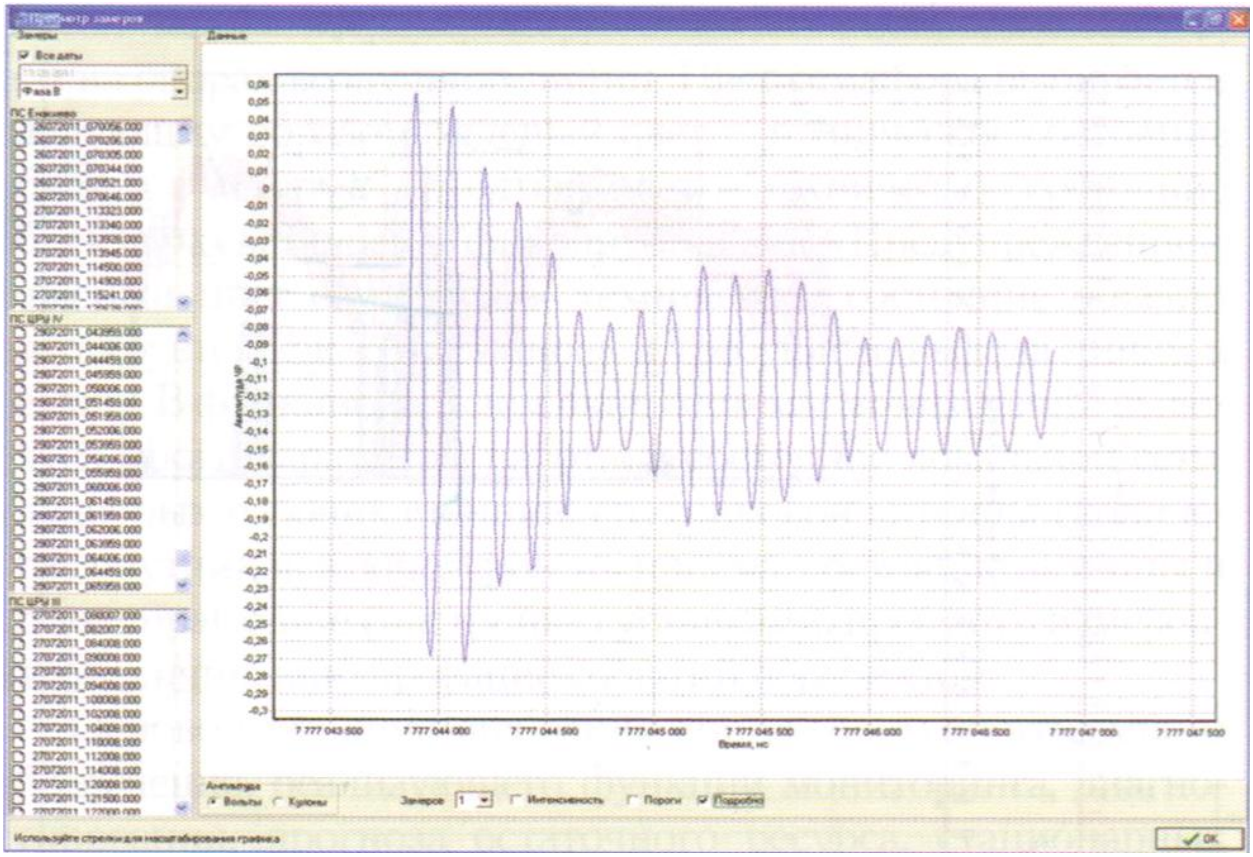

Figure. 4. Impuls of frequency discharge in phase "B" to the duration specifying of frequency pulse discharge 3 mcs

Conclusions

Based on the development of "DATOS LTD" and OOO "DYMRUS" attempt to create a trial version of the operating system condition monitoring of cables 10 kV.

Determined empirically of frequency discharge characteristics in polymeric insulation: the intensity and power.

For further improvement of algorithms needed summer and autumn registration frequecy discharges in high humidity, temperature and different modes of business.

References

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